DISCUSSION PAPERS

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CAPITAL MARKET ISSUES

ENJEUX DES MARCHÉS FINANCIERS

January 31 – February 1, 1996
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TABLE OF CONTENTS

The User Cost of Capital and Investment Spending: Implications For Canadian Firms

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and

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PRELIMINARY -- PLEASE DO NOT CITE WITHOUT PERMISSION

* Emory University and the Federal Reserve Bank of Kansas City, and the Federal Reserve Bank of St. Louis, respectively. The views expressed here do not necessarily reflect those of the Federal Reserve Banks of Kansas City nor St. Louis nor the Federal Reserve System. This paper represents part of a larger ongoing project with Steven Fazzari, and the authors are particularly grateful for his advice and insights throughout that project. All errors, omissions, and conclusions remain the sole responsibility of the authors.

Outline

Abstract

I. Introduction

II. A Review of Investment Models
  A. Implicit Models
    1. Benchmark Model
    2. Neoclassical Model
    3. Other Implicit Models

  B. Explicit Models
    1. The Lucas Critique of Econometric Models
    2. Benchmark Model
    3. Three Solutions to the Unobservable Expectations Problem

III. A Framework For Estimation
  A. Which Model?

  B. Specification, Estimation, and Empirical Issues
    -- Separate Price and Output Effects
    -- Internal Finance
    -- Heterogeneous Responses
    -- Measurement Error
    -- Simultaneity

  C. The Dataset and Canadian/U.S. Sectors

IV. Empirical Results

V. Summary and Conclusions

Appendix A: Sector Definitions and SIC Matches

Appendix B: Detailed Regression Results

References (not enclosed)

Table 1: Summary Statistics

Table 2: Summary Regression Results

Table 3: User Cost Elasticities

The User Cost of Capital and Investment Spending:

Implications For Canadian Firms

(Abstract)

Public policies aimed at enhancing economic performance through increases in business capital depend upon two separate and quantitatively important channels -- the response of investment incentives to changes in policy and the subsequent impact of these incentives on investment spending. Quantifying the latter channel is the task of this paper.

Unfortunately, Canadian time series data at the firm level are not available currently. The user cost elasticity is estimated with panel dataset containing 21,000+ independent observations for 3,500+ manufacturing and non-manufacturing U.S. firms for the period 1972-1991. The U.S. data are grouped into sectors comparable to those in Canada, thus enhancing the usefulness of the estimated user cost elasticities for assessing issues facing Canadian policymakers. Panel data permit us to control for several factors that may distort estimates of the user cost elasticity.

The strengths and weaknesses of several different investment models are reviewed, and a modified Jorgensonian "Neoclassical" model is favored. The estimated user cost elasticities vary widely across the eleven sectors studied here. Our preferred estimates reveal sizeable elasticities in several sectors. However, in most instances, the elasticities are not precisely estimated, a problem due to an insufficient amount of variation in the sectoral data.

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The User Cost of Capital and Investment Spending: Implications For Canadian Firms

I. Introduction

Public policies aimed at enhancing economic performance through increases in business capital depend upon two separate and quantitatively important channels. The first channel has been examined in the majority of the papers presented at this conference. These studies have focused on how government policies can correct market failures and enhance economic performance by altering economic incentives for acquiring capital. These incentives have usually been stated in terms of the user cost of capital facing firms in making investment decisions.

Substantial variations in the user cost is necessary but not sufficient for effective policy. The second critical channel translates a given change in the user cost into a change in factors of production. Quantifying the sensitivity of investment spending to the user cost of capital is the task of this paper.

The structure of the Canadian economy makes this task quite difficult. The user cost of capital depends on relative prices and the rates of interest, depreciation, and taxation and is a relatively parsimonious concept with which to capture the enormous complexity of the tax code's impacts on business investment decisions. In even the simplest tax systems, the user cost can only approximate the effects of the tax code. In the case of Canada, however, the approximation is particularly poor

because of the very liberal carryback and carryforward provisions that make the timing of tax payments largely discretionary. Moreover, the depreciation rates, asset mixes, and income tax rates are quite complicated and vary substantially across firms. Much care must be taken in incorporating these factors into the user cost in a reasonable manner. Unfortunately, time series data at the firm level that would reduce the approximation error to a tolerable level do not appear to be available currently.

This problem is circumvented by examining an economy with a simpler tax structure but nonetheless with market conditions and available technologies resembling those in Canada. These criteria are met by firms in the United States. However, useful comparisons between Canadian and U.S. firms are compromised by substantial differences in the composition of industrial and commercial activities in the two economies. The U.S. data become useful for issues facing Canadian policymakers when they are grouped into sectors comparable to those in Canada. For example, the Canadian Health Care Sector comprises firms with Canadian SIC codes 3740, 3770, and 8600, and comparable U.S. firms (as defined by a match of SIC codes) form the Health Care Sector used in this study. (Details of the SIC matches are provided in Section III.D and Appendix A.) With these groupings, we are able to generate estimates of the user cost elasticities from the U.S. data that are relevant for understanding the responsiveness of Canadian firms to variations in the user cost of capital.

The paper begins in Section II with a review of the investment literature with a particular focus on estimating the

effects of tax policy on investment spending. Extant models are divided into two broad categories depending on whether dynamics are treated implicitly or explicitly. Models are included in the latter category if dynamic elements appear explicitly in the optimization problem and if the estimated coefficients are linked explicitly to the underlying technology and expectation parameters. The Implicit category contains those investment models that do not meet these criteria. For each category, a Benchmark model is developed, and related to specific models appearing in the literature.

Section III develops the framework for estimating the responsiveness of investment. We highlight the strengths and weaknesses of the Implicit and Explicit models, and conclude that neither category dominates. The reasons for using the Implicit Jorgensonian "Neoclassical" model to estimate user cost elasticities are discussed. This section identifies several factors that may distort elasticity estimates but that are avoided with the panel data used in this study. The dataset contains $20,000^{+}$ independent observations for $3,500^{+}$ manufacturing and non-manufacturing firms for the period 1972-1991. Section III discusses these data, the mapping between Canadian sectors and U.S. firms, and the econometric equation that is the basis for all of the estimates reported in this study.

The empirical results are presented in Section IV. Panel data permit several different estimation techniques to be employed, and four are used here: pooled, mean-difference, first-

difference, and first-difference with instrumental variables. Additionally, as emphasized in much recent work, the availability of internal finance may loom large in investment equations, and estimates with and without cash flow are presented for all four estimators. Hence, eight estimates of the user cost elasticity are computed for each sector.

Section V summarizes the results for the user cost elasticities and presents our preferred estimates. Directions and data needed for future research are discussed.

II. A Review Of Investment Models[1]

This section presents an overview of the investment literature with an emphasis on issues involved in estimating the effects of taxes and other price variables on business investment spending. To place some structure on this vast literature, we divide extant models into two broad categories depending on whether dynamics are treated implicitly or explicitly. Models are included in the latter category if dynamic elements appear explicitly in the optimization problem and if the estimated coefficients are linked explicitly to the underlying technology and expectation parameters. The Implicit category contains those investment models that do not meet these criteria. The Implicit and Explicit models are examined in Sections A and B, respectively.

A. Implicit Models

This section begins by sketching a Benchmark Model that serves as a basis for interpreting Implicit models. We then offer an extensive discussion of the Neoclassical Model and criticisms thereof that have played a very important role in estimating the response of investment spending to policy variables. Theory and key assumptions are reviewed. Other Implicit models developed in the 1980s are discussed briefly.

1. The Benchmark Model

The Benchmark Model is based on a demand for capital and, with the addition of dynamics, a demand for investment. The

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[1] This section draws on Chirinko (1993, Sections II and III), which contains detailed references to the literature and a discussion of empirical results.

demand for capital is derived from elementary economic principles, and is determined by the equality between the expected marginal benefits and costs from an additional unit of capital. This equality can be transformed so that the desired (or optimal) capital stock (K^*_t) depends on price variables, quantity variables, and autonomous shocks,

$$K^*_t = f[\text{prices, quantities, shocks}]. \quad (1)$$

Equation (1) follows from well known static theory and, absent any dynamic considerations, the firm would achieve K^*_t instantaneously. Dynamics are introduced into the Benchmark Model when specifying the demand for the flow of investment, and are imposed implicitly, that is, without reference to an explicit theory. The Benchmark Model depends on two types of dynamics. First, the translation from a stock demand to a flow demand is based on a series of maintained assumptions about 1) delivery lags (as well as expenditure and gestation lags), 2) adjustment costs, 3) vintage effects (i.e., the putty and clay qualities of capital), and 4) replacement investment. These dynamic elements may compel the firm to look deep into the future. The firm's expectations, however, are usually unobservable to the applied researcher. A second set of dynamics is introduced when these unobservable expectations are linked to observable variables through regressive or extrapolative schemes represented by distributed lags. Various combinations of assumptions concerning the desired capital stock (1), expectations, and the other dynamic elements listed above define the different Implicit models appearing in the literature.

2. Neoclassical Models -- Theory

By far the most frequently used specification for the analysis of investment spending has been the Neoclassical Model pioneered by Dale Jorgenson and his numerous collaborators (Jorgenson, 1963, 1971). In this model, the firm maximizes the discounted flow of profits over an infinite horizon, delivery lags, adjustment costs, and vintage effects are absent, and capital depreciates at a geometric rate. As a consequence of these assumptions, the firm can achieve any K^*_t instantaneously. Thus, the firm does not need to take a deep look into the future, and the multiperiod optimization problem becomes essentially static.[2] Maintaining that the production function has a constant elasticity of substitution (σ) between capital and variable inputs, we obtain the following well known relation between the desired stock of capital, the level of output (Y_t), and the user cost (or rental price) of capital (U_t),

$$K^*_t = \xi\, Y_t\, U_t^{-\sigma} \qquad (2a)$$

$$U_t = (p^I_t / p^Y_t)\,(r_t + \delta)\,(1 - m_t - z_t) / (1 - t_t), \qquad (2b)$$

where ξ is the CES distribution parameter, p^I_t is purchase price of new capital, p^Y_t is the price of output, r_t is the real financial cost of capital, δ is the geometric rate of capital depreciation, m_t is the rate of the investment tax credit, z_t is the discounted value of tax depreciation allowances, and t_t is the rate of business income taxation at both the provincial/state and federal levels. The r_t variable is defined as a weighted-

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[2] The only dynamic element remaining is the expected one-period capital gain on new investment goods affecting r_t in (2b).

average of the cost of equity (a dividend-price ratio cum capital gains or an earnings-price ratio) and the cost of debt (average yield on new issues of high-grade corporate bonds). The cost of debt is lowered by its tax deductibility and the expected inflation. The weights can vary from zero to one, but generally equity receives a larger weight of approximately two-thirds, reflecting the share of retentions and new equity issues in financing investment.

To form an investment relation, we divide total investment into net and replacement components. Capital is assumed to depreciate geometrically at a constant mechanistic rate (δ). Hence, replacement investment (I^r_t) is proportional to the capital stock available at the beginning of the period and, in contrast to net investment, adjusts instantaneously,

$$I^r_t = \delta K_{t-1}. \tag{3}$$

Net investment (I^n_t) is the change in the capital stock between periods t-1 and t, and is scaled by the existing capital stock. This ratio (plus 1.0) equals K_t / K_{t-1}, which adjusts according to the weighted geometric mean of relative changes in the desired capital stock,

$$\begin{aligned} I^n_t / K_{t-1} + 1.0 = K_t / K_{t-1} &= \prod_{h=0}^{H} [K^*_{t-h} / K^*_{t-h-1}]^{\mu_h} \\ &= \prod_{h=0}^{H} [\Delta K^*_{t-h} / K^*_{t-h-1} + 1.0]^{\mu_h} \end{aligned} \tag{4}$$

where the μ's represent the delivery lag distribution extending

for H+1 periods.[3] Taking logs of (4), using the approximation $\ln(1+x) \approx x$, differentiating the logarithm of (2a) and substituting for $(\Delta K^*/K^*)$, using (3) for replacement investment, and appending a stochastic error (ϵ_t), we obtain the following distributed lag investment equation,

$$I_t / K_{t-1} = I^r_t / K_{t-1} = I^n_t / K_{t-1}$$

$$= \delta - \sigma \sum_{h=0}^{H} \mu_h (\Delta U_{t-h}/U_{t-h-1}) \qquad (5)$$

$$+ \sum_{h=0}^{H} \mu_h (\Delta Y_{t-h}/Y_{t-h-1}) + \epsilon_t .$$

While the dynamics associated with replacement investment follow from explicit assumptions, theory has been relatively silent on the dynamics for net investment as represented by the distributed lag coefficients.

2. Neoclassical Models -- Key Assumptions and Caveats

Estimated equations based on variants of (5) have appeared frequently and, as with any pioneering effort, have been subject to a number of criticisms. Three are reviewed here, and are related to the following recurring issues that have been encountered repeatedly by researchers:

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[3] The geometric adjustment process is employed in (4) because, since I_t and ΔS_t have pronounced trends, it is preferable to specify the investment equation so that all variables enter as ratios or rates.

1) consistency of the theoretical model,

2) characteristics of the technology,

3) quantification of expectations.

The initial set of criticisms pertains to the consistency of the theoretical model, and there have been three specific problems. First, the profit-maximizing firm chooses the capital stock, other factors of production, and output simultaneously. Equations (2) or (5) do not usually recognize these interactions nor the dependence of the optimal level of output on the user cost. Regarding the latter point, even if the endogeneity of output does not distort the estimated coefficients (discussed below), simulations based only on (5) may underestimate the effects of policies intended to stimulate capital formation.

Second, the development of (5) was based on an inharmonious treatment of delivery lags. The optimal capital stock (2) was derived under the assumption that delivery of capital goods was immediate, but the net investment equation (4) was based on a delivery lag distribution. In this formulation, the investment path generated by the Neoclassical Model may not be optimal. However, under static expectations (as assumed by Jorgenson), the model is consistent because the benefits and costs of acquiring capital are expected to be the same at any point in time, hence independent of any delivery lag.

Third, the definition of K^*_t provided by (2) has been questioned. No problem arises if the production technology exhibits decreasing returns to scale but, when returns are

constant (as assumed by Jorgenson), K^*_t is not well-defined. In this case, Jorgenson (1972) has argued that "desired capital should be interpreted as a moving target rather than the long-run equilibrium value of capital. ... This policy is identical to that appropriate for a description of technology with production and installation subject to constant returns to scale" (p. 246). As with the analysis of delivery lags, such an interpretation depends crucially on static expectations. Relaxing this assumption and specifying the theoretical model explicitly were items that remained on the investment research agenda.

The second set of criticisms concerns the characteristics of the technology, and three aspects have been discussed. First, vintage effects may influence the relation between past investments and the capital stock entering the production function. Under one specification, vintage effects are absent if capital is putty-putty -- both before and after installation, it can be combined with other inputs in any desired proportions. This assumption is used in most investment studies, and implies that the period in which capital is purchased is of no particular importance. At the opposite extreme, vintages matter if capital is putty-clay -- before installation, it can be combined with inputs in any desired proportion (which depends on the path of input prices expected at the time of acquisition); however, after installation, the proportion is fixed until the capital good is retired. Consequently, output changes lead to more rapid investment than comparable (with respect to K^*_t) user cost changes, and (5) must contain separate distributed lags for the

output and user cost terms.

Second, the Neoclassical Model assumes that capital depreciates at a constant geometric rate, thus justifying the treatment of replacement investment as a fixed proportion of the existing capital stock. The validity of constant geometric depreciation has been the subject of numerous empirical investigations providing mixed support for this assumption. Introspection suggests that, for many capital goods, depreciation rates can be altered by firms through variations in usage or maintenance. These choices represent additional margins through which economic factors -- such as tax, interest, and inflation rates -- can affect the firm.

Third, an additional aspect of the technology that has generated significant controversy is the value of σ. This parameter is both the elasticity of substitution between labor and capital and the elasticity of K^*_t with respect to U_t, which contains all of the price terms. Thus, in the original version of the Neoclassical Model (5), the potency of tax policies and interest rates, ceteris paribus, is closely linked to the value of σ. Direct estimates of σ are mixed, with cross-section studies finding values near unity (as assumed by Jorgenson) and time-series analyzes generating much lower estimates.

The third set of criticisms concerns expectations. For example, the abovenoted role for σ depends heavily on static expectations. However, in the presence of non-static expectations and delivery lags, the terms in (2a) would be

distributed over current and future periods and interpreted as expected values.[4] Approximating K^*_t linearly and assuming that expectations of the output and user cost terms are based on extrapolations of their past values, we obtain the following modified Neoclassical Model,

$$I_t / K_{t-1} = \delta + \sum_{h=0}^{H_U} \alpha_h (\Delta U_{t-h}/U_{t-h-1}) + \sum_{h=0}^{H_Y} \beta_h (\Delta Y_{t-h}/Y_{t-h-1}) + \epsilon_t. \quad (6)$$

As shown by (6), knowledge of σ alone does not determine the response of investment to the user cost. Rather, the estimated distributed lag coefficients represent an amalgam of technology, delivery lag, and expectation parameters.[5]

In the above discussion and elsewhere, expectations play a crucial role in investment decisions. Static or extrapolative expectations are assumed in versions of the Neoclassical Model,

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[4] Since this alternative derivation depends on non-static expectations, it is plagued by an inconsistent treatment of delivery lags in the optimization problem.

[5] A similar criticism applies to the importance of putty-putty versus putty-clay capital. Even if putty-clay considerations contribute to relatively low price effects, the underlying expectation parameters can lead to an elimination or reversal of the estimated roles of output and user cost in econometric equations. (Abel (1981a) offers an alternative reason why the estimated response of investment to changes in relative prices and output may not provide any evidence on putty-putty versus putty-clay capital.) Since the length of the distributed lags need not be equal, the assumption of extrapolative expectations in this derivation provides a justification for the differing lag lengths (H_c, H_y) for output and user cost frequently found in empirical work.

and unknown expectations are replaced by distributed lags of past observations. While easy to implement empirically, these expectation schemes are totally at odds with the fundamental forward-looking nature of capital accumulation. Four related concerns have arisen. First, such extrapolations treat all changes, perhaps brought about by tax policy, as though they were permanent. For example, the change in the investment tax credit in 1966 that was announced to be temporary would have the same impact on the expected user cost as permanent changes.

Second, preannounced changes in tax parameters would have no immediate effect in the Neoclassical Model, yet firms would be expected to alter their plans so as to benefit from the anticipated future policy. Such a scenario was presented by the phase-in provisions for depreciation allowances in the 1981 tax act's 10-5-3 program, where firms had an incentive to delay current investment in anticipation of more generous tax writeoffs in later years (which were eventually rescinded). Similar incentives existed in the latter part of 1992 concerning an anticipated reinstatement of the investment tax credit under the Clinton Administration.

Third, firms form their expectations based on whatever information is available, and the assumption that firms use a single lag with invariant parameters may be restrictive. These parameters reflect basic characteristics of the economy that may themselves be subject to change. For example, the forecasting rules for interest rates pre-1979, when they were targeted by the Federal Reserve, may have changed radically after the October

1979 policy switch to monetary aggregates and the reversal in October 1982.

A fourth and related point is that, by utilizing a univariate autoregression for the expected user cost, we are constraining all of the variables embedded in U_t to have the same set of expectation parameters. Yet it is doubtful that expected rates of interest and taxation possess similar time series properties. The ramification of unstable expectations from whatever source is that the estimated coefficients in the investment function will be unstable over time and unreliable in assessing alternative policies.

These four concerns about the modeling of expectations are usually referred to as the "Lucas Critique."

3. Other Implicit Models

Our review of the Neoclassical model has highlighted three important criticisms -- consistency of the theoretical model, characteristics of the technology, and quantification of expectations. These unresolved issues have generated two contrasting responses: the introduction of more structure, following the pattern initiated in the Neoclassical research program, or of less structure. While each strategy has its strengths and weaknesses, most research has pursued structural model-building, and subsequent work has been based on explicit modeling of the firm's optimization problem with careful attention to dynamics and technology. This line of research will be examined in terms of the Explicit models in Section II.B.

This subsection describes briefly three models -- Vector Autoregressive, Effective-Tax-Rate, and Return-Over-Cost -- introduced in the 1980s that use less structure. Autonomous shocks may play an important role in assessing the determinants of investment. Reported empirical results could be affected seriously by a simultaneity problem induced by autonomous shocks contained in ϵ_t. For example, shocks could be correlated positively with both ΔY_t and ΔC_t in (5) or (6) because of technology shocks interacting with the joint endogeneity of firm decisions or because of links between aggregate saving and investment. The resulting distortion could account for the finding of significant output effects and insignificant user cost effects, even though the latter has a substantial negative impact on investment. Instrumental variables is the appropriate econometric technique for addressing this problem, but obtaining valid instruments is a difficult task, especially at the aggregate level.

In response to these potential problems, Sims (1980) argues for a relatively non-structural approach. Believing that the restrictions needed to identify the econometric structure are "incredible," Sims treats each variable in the system as endogenous, and regresses current values on their own lags and those of all other variables in the system. In this Vector Autoregression, the dynamics are implicit. Only a few authors have applied this approach to investment spending: Gordon and Veitch (1986) and McMillin (1985) with U.S. data and Funke (1989) with West German data.

In his Fischer-Schultz Lecture, Martin Feldstein introduced two new investment models focused on quantifying the role of taxes.[6] His Effective-Tax-Rate Model relates net investment directly to a quantity and a price variable, and is of particular interest because it provides an alternative way of examining the effects of taxes on investment. The price variable, RN_t, is the net real return to capital, and is defined as the average yield to bondholders and equityholders net of depreciation and effective taxes. The latter is a comprehensive measure of taxes affecting the ultimate providers of funds, and incorporates taxes on corporate income, property, dividends, capital gains, and interest income received by creditors. The quantity variable captures fluctuations in demand, and is measured by an index of capacity utilization, $UCAP_t$. Dynamics enter by lagging both the price and quantity variables one period to reflect delays in decision making, production, and deliveries and to avoid simultaneity bias. (Since his investment equation is estimated with a GLS correction for autocorrelated residuals, the effective lag exceeds one period.) These considerations, coupled with a stochastic error term, lead to the following specification of the Effective-Tax-Rate Model,

$$I^n_t/Y_t = \gamma_0 + \gamma_1 RN_{t-1} + \gamma_2 UCAP_{t-1} + \epsilon_t, \qquad (7)$$

where the dependent variable is scaled by output presumably to account for the trend component in the investment series and to

[6] The models analyzed by Feldstein are examined critically by Chirinko (1987b). See Feldstein (1987) for a response to Chirinko's study, and Feldstein and Jun (1987), Junge and Zarinnejadan (1986), and Sumner (1988) for further results.

place all variables in the same units.

An important difference between the Neoclassical and Effective-Tax-Rate Models is that the price variable in the Neoclassical Model (U_t) is defined as a marginal concept, while RN_{t-1} is based on averages.[7] Neither would appear to be dominant in the analysis of capital formation incentives. Average returns are a deficient measure because they are not directly related to the marginal decisions at the core of economic theory. However, quantifying the marginal benefits and costs of capital can be achieved only by considering selected features of the tax code and by relying on a number of maintained assumptions -- competitive markets, uniformly positive taxable profits, and the maximization of a particular objective function constrained by a particular technology. Studies using average returns are best viewed as complementary to work with marginal concepts where, in the former, potentially restrictive assumptions are relaxed at the expense of a direct link to a well-specified model of capital accumulation.

The second new model presented by Feldstein quantifies marginal investment incentives by contrasting the maximum potential net return, $MPNR_t$, that firms can afford on a standard investment project with the cost of funds, COF_t. In this Return-Over-Cost Model, the following decision rule equates benefits and costs and determines the desired capital stock (cf. (1) or (2)),

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[7] Fullerton (1984) provides an excellent discussion of various definitions of and differences in average and marginal returns and tax rates.

$$MPNR_t = COF_t. \quad (8)$$

$MPNR_t$ depends positively on a hypothetical marginal return inclusive of taxes. Dynamics enter in terms of a partial adjustment mechanism; whenever the benefits ($MPNR_t$) exceed the costs (COF_t), firms begin to acquire capital in order to reestablish (8). Assuming that net investment is positively affected by fluctuations in demand conditions, lagging the independent variables per the above discussion, and appending a stochastic error term, we obtain the Return-Over-Cost Model,

$$I^n_t/Y_t = \gamma_0 + \gamma_1 (MPNR_{t-1} - COF_{t-1}) + \gamma_2 UCAP_{t-1} + \epsilon_t. \quad (9)$$

B. Explicit Models

In response to the successes of and difficulties with the Neoclassical Model, most subsequent work has been based on explicit modeling of the firm's optimization problem with careful attention to dynamics and technology. This section presents models in which these dynamic elements appear explicitly in the optimization problem and the estimated coefficients are linked explicitly to the underlying technology and expectation parameters. The Benchmark model is presented, and three solutions to the unobservable expectations problem are discussed. These solutions are related to the Brainard-Tobin Q, Euler Equation, and Direct Forecasting models. Before developing the Benchmark model, we review Lucas' critique of econometric models and practice.

1. The Lucas Critique of Econometric Models

A watershed in the modeling of investment behavior occurred in the mid 1970s when Robert Lucas published his often-cited critique of the prevailing practice for quantifying the effects of alternative policies. He argues that, in formulating plans, economic agents necessarily look into the future, and thus the decision rules guiding their actions depend on parameters describing the expectations of future variables, as well as parameters of taste and technology. Lucas views economic policy as the selection of rules that generate paths of policy variables, rather than the selection of arbitrary paths. Thus, "any change in policy will systematically alter the structure of econometric models" (Lucas, 1976, p. 126), and the estimated coefficients in (the then current) consumption, wage/price, or investment models could not be considered structural, that is, invariant to alternative policy regimes. The important and damning implication for policy analysis is that these econometric relations will prove unstable in precisely those situations in which they are called upon to analyze proposed policies.

In light of this Lucas Critique, quantitative policy analysis can proceed only if the econometric specification permits the expectation parameters, which will vary with alternative policies, to be identified separately from technology parameters, which are invariant to policy changes. As noted in Section II (especially in (6)), the estimated coefficients in Implicit models are generally an amalgam of expectation and technology parameters, and thus are vulnerable to the Lucas

Critique. Consequently, much subsequent work, to be reviewed in this section, has focused on the modeling and isolation of dynamics arising from expectations.

2. The Benchmark Model

In the Benchmark Model, dynamic aspects of the technology are captured by the assumption that, in varying its capital stock, the firm faces adjustment costs. These adjustment costs were introduced by Eisner and Strotz (1963), and may represent either external costs, due to an upward sloping supply curve for capital goods, or internal costs. Studies have generally focused on internal adjustment costs, which represent lost output from disruptions to the existing production process (as new capital goods are "broken-in" and workers retrained), additional labor for "bolting-down" new capital, or a wedge between the quantities of purchased and installed capital. These costs increase at an increasing rate, an assumption that plays a crucial role in explicit models. With linear or concave adjustment costs, the firm would have an all-or-nothing investment policy. Convexity forces the firm to think seriously about the future, as too rapid accumulation of capital will prove costly. Alternatively, too little accumulation results in foregone profits.

For expositional purposes, it is useful to derive the Benchmark Model from an optimization problem. We begin by assuming that the firm chooses inputs to maximize the discounted sum of expected cash flows, which is equivalent to maximizing its market value. The firm is a price-taker in both its input and

output markets, and is further constrained by production, adjustment cost, and accumulation technologies. Output (Y_t) is determined by labor (L_t), capital (K_t), and a stochastic technology shock (τ_t), and the production technology is $Y_t = F[L_t, K_t : \tau_t]$.[8] An important element in the Explicit models considered in this section is that, in contrast to variable labor input, capital is quasi-fixed -- that is, net increments to the capital stock are subject to adjustment costs. These are represented by $G[I_t, K_t : \tau_t]$, which is increasing in I_t, usually decreasing in K_t, and valued by the price of foregone output. The stock of existing capital is accumulated as a weighted sum of past investments. If the weights follow a declining geometric pattern, we obtain the familiar transition equation for capital, $K_t = I_t + (1-\delta)K_{t-1}$. The price of output is the numeraire, and the relative prices of labor and investment are represented by w_t and $p^{I'}_t$,[9] respectively, adjusted for taxes.[10] To emphasize the fundamentally forward-looking nature of the firm's decision problem, we introduce an expectations operator, $E_t\{.\}$, where the subscript indicates that expectations are based on information

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[8] With no loss in analytic insights but much saving in notation, we assume that production is affected by the end-of-period capital stock and, below, that the discount rate is constant.

[9] Note that $p^{I'}_t$ is a relative price and p^I_t, used in the Implicit models elsewhere in the paper, is an absolute price.

[10] An inconsistency (which is unlikely to be empirically important) enters many analyses because tax depreciation (z_t in (2b)), which accrues over time, is usually computed under the assumption of static expectations, but expectations of other variables are computed under non-static assumptions.

available to the firm at the beginning of period t. These considerations lead to the following equation for the firm's cash flow (CF_t) in period t,

$$E_t\{CF_t\} = E_t\{F[L_t,K_t:\tau_t] - G[I_t,K_t:\tau_t] - w_tL_t - p^{I'}{}_tI_t\}. \quad (10)$$

With the restriction implied by the capital accumulation constraint, the firm has two margins along which to maximize the sum of expected cash flows discounted to the beginning of the planning period (t) at rate r, and faces the following optimization problem,

$$\underset{\{L_s,K_s\}}{\text{MAX}} \; E_t\Big\{ \sum_{s=t}^{\infty} \{(1+r)^{-(s-t)}\{F[L_s,K_s:\tau_s] - G[I_s,K_s:\tau_s] - w_sL_s - p^{I'}{}_sI_s\}\}\Big\} \quad (11a)$$

subject to

$$I_s \equiv K_s - (1-\delta)K_{s-1}. \quad (11b)$$

Using variational methods and differentiating (11) with respect to labor and capital, we obtain the following conditions characterizing an optimum,

$$E_t\{F_L[L_t,K_t:\tau_t] - w_t\} = 0, \quad (12a)$$

$$E_t\{\lambda_t - \Delta^{\rho}\{G_I[I_t,K_t:\tau_t]\} - \Delta^{\rho}\{p^{I'}{}_t\}\} = 0, \quad (12b)$$

$$\lambda_t \equiv F_K[L_t,K_t:\tau_t] - G_K[I_t,K_t:\tau_t],$$

$$\Delta^{\rho}\{X_t\} \equiv X_t - \rho\, X_{t+1}, \quad X_t=\{G_I[t],p^{I'}{}_t\}$$

$$\rho \equiv (1-\delta)/(1+r) < 1,$$

$$\lim_{s\to\infty} E_t\{(1+r)^{-(s-t)}\{\lambda_{t+s} - p^{I}{}_{t+s} - G_I[t+s]\}K_{t+s}\} = 0. \quad (12c)$$

These conditions have the following economic interpretations. Equation (12a) is the familiar marginal productivity condition for a variable input. Equation (12b) indicates that, along the optimal capital accumulation path, the firm will be indifferent to an increase in capital by 1 unit in period t and a decrease of $(1-\delta)$ units in t+1, thus leaving the capital stock unaffected from period t+1 onward. The benefit of this perturbation is represented by λ_t -- the marginal revenue product of capital net of the decrease in adjustment costs due to a higher level of capital. Perturbing the capital stock is costly, and the Euler Equation (12b) sets λ_t equal to the marginal adjustment and purchase costs incurred in t and saved in t+1. These perturbations are represented by the $\Delta^{\rho}\{.\}$ operator in (12b), and the t+1 savings are adjusted for discounting and depreciation as represented by ρ.

The transversality condition is provided by (12c), and restricts the value of the firm and the value of the capital stock from exploding. Its importance in applied work arises as a boundary condition used in obtaining the following solution to the difference equation (12b) for capital,

$$E_t\{\Lambda_t - p^{I'}{}_t - G_I[I_t,K_t:\tau_t]\} = 0, \qquad (12d)$$

$$\Lambda_t \equiv \sum_{s=0}^{\infty} \rho^s \lambda_{t+s}. \qquad (12e)$$

Equation (12d) is the dynamic equivalent of the simple decision rule for the optimal capital stock (1) in Section II.A.1, and

equates the expected marginal benefits and costs of investing in period t. The marginal benefit is measured by the shadow price of capital, Λ_t. Owing to capital's durability, Λ_t is the discounted sum of the "spot" marginal revenue products (λ_{t+s}'s) over the life of the capital good as evaluated with information available in period t. The marginal costs are the sum of purchase costs and the sunk adjustment costs associated with investing. Since the sunk costs can not be recovered, they force the firm to look ahead when investing. Thus, the optimal investment policy can be characterized by two alternative formulations -- a comparison of the net benefits of investing today versus tomorrow (12b) or a comparison of the benefits over the life of the capital good to its costs (12d).

To obtain an investment equation to serve as a benchmark for the models found in the literature, we assume that adjustment costs are quadratic in gross investment, homogeneous of degree one in I_t and K_t, and affected by the technology shock, τ_t,

$$G[I_t,K_t:\tau_t] = (\alpha/2)\ [I_t/K_t - \tau_t]^2 * K_t, \qquad (13)$$

and obtain the following Benchmark Model,

$$I_t/K_t = (1/\alpha)\ (E_t\{\Lambda_t\} - p^{I'}{}_t) + u_t, \qquad (14)$$

where the error term (u_t) is identical with the technology shock. Whenever there is a discrepancy between $E_t\{\Lambda_t\}$ and $p^{I'}{}_t$, the firm has an incentive to change its capital stock, but its actions are tempered by the convex adjustment cost technology. The steeper is the adjustment cost function, the larger is α, and

the more slowly investment responds.

In contrast to the Implicit models, the path of investment does not depend on the optimal capital stock, and lag variables do not appear in (14). The latter is somewhat surprising given the dynamic adjustment costs faced by the firm. It must be realized, however, that (14) is not a closed-form decision rule for investment (since I_t affects the λ_{t+s}'s in Λ_t), but rather a consistency condition reflecting only part of the information from the optimization problem. If the other restrictions implied by optimal behavior were considered simultaneously, then the paths of I_t and K_t would be "sluggish," and would depend on lagged variables.[11]

The Benchmark Model (14) is the basis for all of the models discussed in this section,[12] and successfully addresses a number of the unresolved issues highlighted in the Neoclassical research program. Since (14) is derived directly from an optimization problem, it is theoretically consistent, recognizes explicitly the dynamics due to expectations and technology, and isolates their separate influences. Furthermore, the error term follows explicitly from the theory. For empirical researchers, the

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[11] Under static expectations and an approximation about the steady-state capital stock, this adjustment cost model would also generate lags in an econometric equation. With these assumptions, we obtain the partial (or stock) adjustment model with I_t proportional to the spread between the actual and desired capital stocks.

[12] Additionally, the user cost of capital (2) can be derived from (12b) or (12d) when adjustment costs are absent, expectations are static, and the optimization problem is stated in continuous time (cf. Jorgenson, 1967, pp. 218-219).

critical problem with developing an estimable equation from (14) is relating the unobservable Λ_t to observable variables.

3. Three Solutions to the Unobservable Expectations Problem

There are three solutions to the unobservable expectations problem that exists with (14), and each solution is reviewed briefly.[13]

The Q theory of investment uses information in financial markets to relate $E_t\{\Lambda_t\}$ to observables. In this theory, investment expenditures are positively related to Average Q, defined as the ratio of the financial value of the firm (V_t) to the replacement cost of its existing capital stock,

$$Q^A_t = V_t / p^{I'}{}_t K_t. \qquad (15)$$

The intuition underlying Q theory has been articulated vividly by Keynes (1936),

> daily revaluations of the Stock Exchange,..., inevitably exert a decisive influence on the rate of current investment. For there is no sense in building up a new enterprise at a cost greater than that at which a similar existing enterprise can be purchased; whilst there is an inducement to spend on a new project what may seem an extravagant sum, if it can be floated off on the Stock Exchange at an immediate profit (p. 151).

This intuitive notion has been derived from formal models in which the adjustment cost technology and optimizing behavior lead to a relation between investment and Marginal Q, the ratio of the discounted future revenues from an additional unit of capital to

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[13] Key assumptions and empirical results are discussed in detail in Chirinko (1993, Section III).

its purchase price (i.e., $E_t\{\Lambda_t\}/pI'_t$). Since Marginal Q is unobservable, empirical researchers have utilized observable Average Q. The formal conditions under which this substitution is appropriate have been established by Hayashi (1982): 1) product and factor markets are competitive, 2) production and adjustment cost technologies are linear homogeneous, 3) capital is homogeneous, and 4) investment decisions are largely separate from other real and financial decisions. Under these conditions, optimizing behavior implies the following relation for the (constant dollar) value of the firm as evaluated on financial markets (V_t),

$$V_t = E_t\{\Lambda_t\}\ K_t, \tag{16}$$

In (16), the assumptions on market structure and technology ensure that the firm does not expect to earn any profits from actions taken in and beyond period t. Hence, the value of the firm equals the quasi-rents from the existing capital stock, which are the product of the expected shadow price of capital and K_t.[14]

The Q investment model follows from (14)-(16), which relates the investment/capital ratio to observable Q.

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[14] Tax depreciation allowances accruing after period t on capital purchased prior to period t (i.e., the depreciation bond) will enter as an additional positive term on the right-side of (16). See Hayashi (1982, equations (5) and (14)). Interest and principal payments on debt existing prior to but paid after period t enter in a similar manner, though on the left-side of (16). In applied work, net current financial assets, inventory stocks, and other capital assets are added to the right-side of (16). Goodwill and firm-specific human capital should also be included, but are difficult to quantify.

$$I_t/K_t = (1/\alpha)\, Q_t + u_t, \qquad (17)$$

$$Q_t \equiv (Q^A{}_t - 1)\, p^{I'}{}_t,$$

where the latter term in Q_t depends on the valuation of adjustment costs.[15] Equation (17) solves the problem of unobservable expectations by equating a forward-looking variable to one that is readily observed. A particularly attractive aspect of (17) is that, unlike the Neoclassical or other Implicit models (cf. (6), (7), and (9)), the Q investment equation will not be affected by instability in expectations parameters because expectations enter (17) directly through $Q^A{}_t$. By relying on financial market data, which in principle incorporates expectations of future variables relevant to the investment decision (and are readily available), Q models provide a direct role for expectations in the econometric specification.

Euler equations provide a second solution to the problem of unobservable expectations, that is, the unobservables contained in $E_t\{\Lambda_t\}$. In (17), the bulk of the variables in $E_t\{\Lambda_t\}$ can be eliminated by a Koyck-lead transformation. An alternative and more direct approach combines the Euler equation (12b) and the adjustment cost technology (13). In either case, we obtain the following equation,

$$I_t/K_t = \rho\, E_t\{I_{t+1}/K_{t+1}\} - (1/\alpha)(p^{I'}{}_t - \rho\, E_t\{p^{I'}{}_{t+1}\}) \qquad (19)$$

$$+ (1/\alpha) E_t\{\lambda_t\} + \tau_t.$$

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[15] If adjustment costs are valued in terms of labor or new capital, then the term $p^{I'}{}_t/p^Y{}_t$ in (17) is replaced by $p^{I'}{}_t/w_t$ or 1.0, respectively.

The importance of (19) is that the infinite number of unknown λ_{t+s}'s $(s=0,\infty)$ has been reduced dramatically to just λ_t.

Estimation proceeds by parameterizing λ_t in terms of the technology (cf. (12b)) and substituting actual for expected values in (19). Under rational expectations, the actual values represent the appropriate expectation up to an additive and orthogonal expectation error (McCallum, 1979), and thus (19) yields the following Euler Equation Model,

$$I_t/K_t = \rho\,(I_{t+1}/K_{t+1}) - (1/\alpha)(p^{I\prime}{}_t - \rho\, p^{I\prime}{}_{t+1}) + (1/\alpha)\,\lambda_t + u_t. \tag{20}$$

$$u_t = \tau_t + e_t - \rho\, e_{t+1},$$

where the error term is a combination of technology shocks and expectation errors (e's).[16]

A third solution to the unobservable expectations problem is to forecast directly the unknown λ_{t+s} terms in Λ_t. A key element in Direct Forecasting models is the assumed stochastic processes governing λ_t, which, for expositional convenience, can be specified as a first-order univariate autoregression,

$$\lambda_t = \mu\,\lambda_{t-1} + e_t, \tag{21}$$

where μ is an expectation parameter and e_t is an expectation error. Under rational expectations, e_t is orthogonal to all variables known to the firm in period t. Combining this

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[16] Since u_t is correlated with the regressors, instrumental variables are needed to ensure consistency. The projection of an endogenous variable dated t+1 on the instruments can be interpreted as a one-period ahead forecasting equation assumed stable over the sample period.

assumption with (21), we compute the expected value of λ_{t+s} with information available at the beginning of period t with the following simple recursive relation,

$$E_t\{\lambda_{t+s}\} = \mu^{s+1} \lambda_{t-1}. \quad (22)$$

The Direct Forecasting approach has been implemented by estimating the equations describing forecasts and optimization either simultaneously or sequentially. In the former case, (22) is substituted repeatedly into the Benchmark Model (14), thus replacing the unobserved $E_t\{\Lambda_t\}$ as follows,

$$E_t\{\Lambda_t\} = \sum_{s=0}^{\infty} \rho^s E_t\{\lambda_{t+s}\} = \lambda_{t-1} \sum_{s=0}^{\infty} \rho^s \mu^{s+1} = \lambda_{t-1}(\mu/(1-\rho\mu)), \quad (23)$$

and generating the following Closed-Form Model,

$$I_t/K_t = (\mu/\alpha(1-\rho\mu)) \lambda_{t-1} - (1/\alpha) p^{I'}_t + u_t, \quad (24)$$

where u_t contains only τ_t and is orthogonal to λ_{t-1}. As with a number of the Implicit models, the estimated coefficients in (24) are an amalgam of the underlying expectation (μ) and technology (α, ρ) parameters. These are identified by estimating the stochastic forcing process (21) and the investment decision rule (24) simultaneously.

Alternatively, the Two-Step Model separates the forecasting of expected values from the estimation of technology parameters. In the first step, $E_t\{\Lambda_t\}$ is quantified in terms of parameters and variables known at time t by estimating the expectation parameter in (21) and then computing the $E_t\{\lambda_{t+s}\}$'s with (22)

and $E_t\{\Lambda_t\}$ with (12e) and a preset ρ. In the second step, the constructed $E_t\{\Lambda_t\}$ is inserted as a regressor in the Benchmark Model, and the investment equation (14) is estimated.

III. A Framework For Estimation[17]

1. Which Model?

From a theoretical perspective, Explicit models clearly dominate Implicit models, as the latter suffer from problems of model consistency and expectations. However, the above review did not mention the empirical performance of these models, a consideration that reverses the ranking.[18]

Implicit models perform well empirically. These models explain a reasonable amount of the variation in the aggregate data and, apart from the user cost, usually obtain coefficients that have the theoretically correct sign and are statistically and economically significant. Moreover, despite the availability of many alternative specifications, Implicit models containing output, user cost, and liquidity variables continue to be the model of choice among forecasters.

This favorable empirical performance is not enjoyed by the Explicit models. While Explicit models provide attractive frameworks for ultimately understanding investment behavior, their overall empirical performance has not been satisfactory, thus raising questions about the ability of the current generation of models to deliver empirical estimates useful in the analysis of public policies.

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[17] This section draws on Chirinko, Fazzari, and Meyer (1995).

[18] See Chirinko (1993, Section II and III) for a discussion of the empirical results and Oliner, Rudebusch, and Sichel (1995) for a comparison of the forecasting performance of Implicit and Explicit models.

The applied econometrician is thus faced with the dilemma of choosing between Implicit models that are dependable empirically but deficient conceptually or Explicit models that have a solid theoretical foundation but a shaky empirical superstructure. Both approaches have strengths and weaknesses, and thus provide useful and complementary information. While some empirical successes have been achieved, Explicit models are insufficiently "sturdy" to estimate price elasticities with panel data and draw inferences for tax policy. Furthermore, the Neoclassical Implicit model provides a direct estimate of the user cost elasticity of primary concern in this paper. Thus, we proceed with estimating a Neoclassical model, though we must keep in mind that our policy assessments must be tempered by the raised in Section II.

2. Specification, Estimation, and Empirical Issues

The model to be used in this study follows from (6) with several modification discussed in this subsection,

$$I_{i,t} / K_{i,t-1} = \phi_i + \sum_{h=0}^{6} \alpha_h (\Delta U_{i,t-h} / U_{i,t-h-1}) + \sum_{h=0}^{4} \beta_h (\Delta Y_{i,t-h} / Y_{i,t-h-1}) + \sum_{h=0}^{4} \gamma_h (CF_{i,t-h} / K_{i,t-h-1}) + \epsilon_{i,t}, \quad (25a)$$

$$U_t = (p^I_t / p^Y_t) (r_t + \delta) (1 - m_t - z_t) / (1 - t_t), \quad (25b)$$

where the "i" subscript indexes firms, CF represents cash flow, and the ϕ's are constants that reflect δ_i as well as other firm-specific factors. An examination of alternative lag lengths indicated that lags of 0 to 6 for $(\Delta U_{i,t}/U_{i,t-1})$ and lags of 0 to 4 for $(\Delta Y_{i,t}/Y_{i,t-1})$ and $(CF_{i,t}/K_{i,t-1})$ are adequate. The user cost formula is copied from (2a) for expositional convenience. The response of the long-run capital stock to changes in the user cost is captured by the sum of the α's (SUM(α)).[19]

There are five important empirical issues that may seriously affect the estimated α's, and hence the implications for tax policy. First, critical to the empirical results is the manner in which ΔY_t and ΔU_t enter the regression. The version of the Neoclassical Model estimated by Jorgenson and his collaborators contains the composite term $\Delta(Y_t/U_t)$ entered as a distributed lag. Such a specification is justified under the assumption that expectations are static and $\sigma = 1$ (cf. (5)) or, under the alternative derivation based on non-static expectations (6), that $\sigma = 1$ and the expectation parameters for both output and user cost are identical. In general, the estimated coefficients on the composite term will reflect a mixture of output and user cost effects, and can generate misleading implications for policy

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[19] To see that the sum of the α's represent the elasticity of the long-run capital stock with respect to the user cost, consider the following abbreviated version of (25a):
$I/K = I^n/K + \delta = \Delta K/K + \delta = \delta + SUM(\alpha)*(\Delta U / U) + ...$
Canceling δ's and rearranging yields an expression for the elasticity: $(\Delta K/K)/(\Delta U/U) = SUM(\alpha)$. This formula depends on the user cost elasticity being identical across firms.

evaluations.[20] Consider a situation where the relationship between investment and output is stronger than that between investment and user cost. Estimated coefficients from a regression using $\Delta(Y_t/U_t)$ will exceed coefficients on the user cost from a regression where ΔY_t and ΔU_t have been entered separately. Thus, the version of the Neoclassical Model with a composite term, often used in policy analysis, may overstate the effects of changes in fiscal and monetary policies, operating through U_t, on investment spending. This bias has been confirmed empirically in a number of studies,[21] and will be avoided in the estimates reported in this paper by estimating separate distributed lags for output (or sales) and user cost variables.

Second, a firm's financial structure may matter for investment, and this issue has been investigated extensively. For example, with aggregate data, Sinai and Eckstein (1983) find that an interest coverage variable is an important determinant of investment. However, in reviewing the results from a number of models, Jorgenson (1971) concludes that "Variables associated with internal finance do not appear as significant determinants of desired capital in any model that also includes output as a

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[20] Putty-clay considerations discussed in Section II.A.2 also imply that the distributed lags on sales and user cost may differ.

[21] See Eisner and Nadiri (1968, 1970), Eisner (1969b, 1970), and Chirinko and Eisner (1982, 1983). Hall and Jorgenson (1969) comment on the first and third studies; Sinai and Eckstein (1983) on the fifth and sixth studies. When subjected to a statistical test, the equality constraint for the ΔY_t and ΔU_t distributed lag coefficients is rejected in the version of the Neoclassical Model used by Sinai and Eckstein (Chirinko and Eisner, 1982, p. 58).

significant determinant" (p. 1133).

Recent work with panel data has found a more robust role for financial variables, especially for those firms who may face information problems in capital markets.[22] If a firm has access to internal sources of funds for investment, it need not resort to debt or new equity that may involve higher costs due to capital market frictions. The financial variable used most often in this context is internal cash flow, and the estimated α's will be affected if 1) cash flow is significant and 2) cash flow and the user cost variables are correlated. To examine the impact of financial structure, we include cash flow, scaled by the beginning-of-period capital stock, in some of the regressions.

Third, an advantage of panel data is that we can allow for different responses by firms. Ideally, we would like to permit both intercept and slope coefficients to vary by firm. This more general model can not be estimated because of too few degrees of freedom, and this restriction is evident in (25) by the absence of "i" subscripts on the α, β, and γ coefficients. It is feasible, however, to allow each firm to have its own intercept, an important generalization because firm-specific depreciation rates entering the model (25) generate an a priori reason to expect firm-specific fixed effects.[23] If the variation in ϕ's

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[22] See Chirinko (1993) and Hubbard (1995) for recent surveys, Fazzari, Hubbard, and Petersen (1988) for an important early contribution, and Chirinko and Schaller (1995) for a recent examination of Canadian firms.

[23] Rather than being treated as fixed constants, the ϕ_i's are sometimes modeled as a random variable. The resulting random-effects estimator is more efficient than the mean-difference and

across firms is not recognized, estimates of the α, β, and γ coefficients can be severely distorted.

Equation (25) is estimated in three ways. We maintain that $\phi_i = \phi$ for all firms, and estimate a pooled model. This specification has the advantage that it utilizes all of the variation in the data, but operates under the restriction that the ϕ's are equal. Fixed effects can be allowed for with either mean-difference or first-difference estimators. The mean-difference estimator subtracts the firm-specific means from all variables entering (25), and is equivalent to adding constants for each firm.[24] The pooled model is nested within the mean-difference model, and an F-test can be performed to evaluate the restriction that $\phi_i = \phi$ for all i.

An alternative method for allowing for fixed effects is to difference the data (by firms), and eliminate the ϕ's directly. This first-difference estimator generates coefficients that are asymptotically equivalent to those from the mean-difference estimator under the assumption that the model is correctly specified. If the regressors are measured with error, however, coefficients estimated by first-differencing will be lower (asymptotically) than those estimated by mean-differencing.

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first-difference estimators used in this study. However, the consistency of the random effects estimator depends on the effects being uncorrelated with the regressors, a condition that is usually rejected in panel data. See Chirinko, Fazzari, and Meyer (1995) for the appropriate test.

[24] See Hsaio (1986) for further discussion about panel data estimators.

In order to understand the impact of heterogeneity and measurement error, we present pooled, mean-difference, and first-difference estimates for all sectors.

Fourth, errors in measuring the regressors can lead to coefficient estimates that are too close to zero relative to their "true" values. As noted in the Introduction, the user cost is a relatively simple concept with which to capture the complexities of the tax code.[25] Ballentine (1986) reports that only 8.1% of the dollar volume of corporate tax increases in the 1986 Tax Act (over a five year period) are reflected in the variables entering U_t. Further measurement error might enter because of margins along which firms optimize that are omitted in the Neoclassical framework.[26] We test for user cost measurement error by comparing estimates of α from mean-difference and first-difference models.

Fifth, since the regressors are predetermined but not exogenous, coefficient estimates may be affected by simultaneous equation bias due to correlations between $\epsilon_{i,t}$ and the regressors. As noted in Section II.A.3, simultaneity could account for estimated user cost elasticities that are too close to zero relative to their "true" values. Instrumental variables

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[25] See Chirinko (1993, Appendix) for details about the construction of the user cost variable.

[26] These margins might include asset churning with insufficient recapture provisions, relations between the cost of leverage and the type of asset, alternative minimum taxes, endogenous capital depreciation and utilization, an inappropriate discount rate for calculating tax depreciation, or tax loss carryforwards.

is the appropriate econometric technique for addressing this problem, and the extensive variation in our micro data may provide better instruments than can be obtained at the aggregate level.

When using instrumental variables, the choice between mean-difference and first-difference estimators is important. As with most studies, we use lagged regressors as instruments. Lags should be valid instruments because they are likely to be correlated with the included predetermined variables and, under the assumption that $\epsilon_{i,t}$ is serially uncorrelated, uncorrelated with the error term. However, if the data are mean-differenced, then the latter condition will not hold because of a correlation between the future values of the regressor used to compute its mean and the contemporaneous error term.[27] This problem does not arise when using first-differences to remove fixed effects. Thus, to account for simultaneity (as well as measurement error), we will present first-differenced models estimated with instrumental variables.

C. The Dataset and the Canadian/U.S. Sectors

To estimate (25a), we link two unique data sources that each provide information particularly well-suited to our objectives. We obtained information on the user costs (maintained by Data Resources, Inc.) for 26 different capital assets (24 types of equipment and two types of structures). We created industry-

[27] See Arellano and Bover (1995) and Urga (1992) for further discussion.

specific user costs as a weighted average of the asset user costs. The weights are the proportion of capital accounted for by each of these assets for 26 different industries.[28] This industry information was then merged with the firm-level Compustat data using each firm's S.I.C. code.[29] These data provide important micro-level variation in user costs that should prove useful in estimating the effects of tax and other policies.

Our investment, sales and cash flow data come from the extensive Compustat "full coverage" files. After selecting usable data for regressions and computing the necessary lags, we have a sample of 4,112 firms from all sectors of the economy that provide 26,171 usable annual observations for the regressions from the period 1981 to 1991.

These data were then grouped into twelve sectors for which Industry Canada has mandated responsibility for following ongoing developments. These twelve sectors were defined by the Canadian SIC categories listed in Appendix A. The sectors used in this study are constructed from the SIC codes in the corresponding U.S. industries (also listed in Appendix A). Note that this grouping is non-exclusive (as some firms are in several sectors) and non-exhaustive (as 18% of the observations are not utilized

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[28] These weights are from the Bureau of Economic Analysis capital flow tables and reflect asset usage by establishment. The Compustat data reflect ownership by company.

[29] Because the DRI user cost data are quarterly, we average them to obtain an annual user cost. The averages are computed at the firm level to account for the fact that firms have different fiscal years. The user cost information is therefore tailored to each firm's specific accounting period.

in any of the sectors). Also, there were no U.S. data for the Environmental Affairs sector (#5). The total number of non-duplicative observations used in the eleven sectors is 21,471.

Table 1 provides summary statistics for the main variables that enter our regression. The variable I_t/K_{t-1} is the investment-capital ratio (firm and industry subscripts are suppressed for simplicity). Investment is Compustat's capital expenditure variable from firms' uses of funds statement. Capital is the estimated constant dollar replacement value of plant and equipment. The t-1 subscript on the capital stock indicates that it is measured at the beginning of each accounting year. Sales is taken from the Compustat net sales figure; its growth rate is represented by $\Delta S_t/S_{t-1}$. Cash flow (CF_t), which is scaled by the beginning-of-period capital stock, is net after-tax income plus non-cash expenses. The latter is primarily depreciation expense. The $\Delta U_t/U_{t-1}$ variable is the percentage change in the user cost defined in equation (25b).

Summary statistics for the eleven sectors are presented in Table 1. The user costs of capital average somewhat greater that 20%, and they generally fall during the sample period (1981-1991). Two measures of standard deviation are reported: STD which measures all of the variation in a particular variable and WFSTD. The latter label is for "within-firm standard deviations," which are computed by subtracting firm means from each variable prior to computing the standard deviation. (That is, the data were "mean differenced" prior to computing the standard deviation.) The statistics for the model regressors

show substantial volatility of the "mean-differenced" firm data, and only a modest drop in variation between STD and WFSTD.

IV. Empirical Results

This section contains the empirical results for the eleven sectors. Eight estimates are computed for each sector. For the model without cash flow, we estimate models where the data are pooled, mean-differenced, first-differenced (all estimated by least squares), and first-differenced and estimated with instrumental variables. These four estimators are recomputed with a model that includes a distributed lag of cash flow. We focus the discussion primarily on the coefficient sums in Table 2 with a particular emphasis on the user cost elasticities (i.e., the sum of the α's). Individual coefficient estimates are reported in Appendix B.

We begin with a model without cash flow and with the data pooled, thus utilizing all of the variation in the panel data. The range of the elasticities is striking, from +.033 (#1) to -1.695 (#12). Eight of the eleven user cost elasticities are negative and statistically significant.[30] In contrast to results with aggregate data, these initial results suggest the possibility of uncovering substantial elasticities with firm-level data.

Much recent work in investment has been concerned with the role played by financial conditions as proxied by cash flow. Omitting cash flow from the regression may distort the estimates, and this potential distortion is examined by including cash flow

[30] Statistical significance is only one means for assessing "relative importance." Other measures, such as economic significance, will be examined in the next draft.

in the pooled regressions. In all regressions, the sum of cash flow coefficients are positive and statistically significant. This role for cash flow comes at the expense of the sales growth coefficients, which are uniformly lower. Cash flow appears to be an important element in the investment equation, and focus on regression with cash flow in the remainder of the study.

The pooled estimates considered so far are based on the potentially important homogeneity assumptions that the intercepts are the same across firms within a sector. The mean-difference and first-difference estimators allow for varying intercepts across firms. Estimates of the user cost elasticity based on the mean difference estimator are usually larger (in absolute value) relative to the pooled estimates. The only two exceptions are for Chemicals (#4) and Manufacturing (#9). Thus, fixed effects seem to be an important factor that needs to be controlled for in estimation.[31]

First differencing the data is an alternative way to eliminate fixed effects. If the model is specified properly, then the mean-difference and first-difference estimates will be close together. However, if measurement error is present in the user cost variable, we would expect the first-differenced elasticities to be closer to zero than the mean-differenced elasticities. For ten of the eleven sectors, the first-differenced elasticities are either roughly equal to or greater than (in absolute value) the mean-differenced elasticities. (The

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[31] It may prove convenient to examine Table 3 when comparing user cost elasticities in models with cash flow.

Transportation Sector (#11) is the exception.) The user cost elasticities range from -.454 to -2.196. Measurement error in the user cost variable does not appear to be a problem. Thus, a prime suspect in prior low estimates of the user cost elasticity is exonerated by these results.

The final empirical issue concerns simultaneity, and we employ the first difference estimator with instrumental variables.[32] The results are mixed, as the user cost elasticity rises (in absolute value) in four sectors (#2, #8, #11, #12), falls in five sectors (#1, #3, #4, #6, #7), and stays roughly constant in two sectors (#9, #10). The overall elasticities are striking, and are quite large (in absolute value) relative to most previous estimates. However, the standard errors are also large, and do not permit firm inferences to be drawn.

As shown in Appendix B, the user cost terms have their greatest effect with a lag of one to two years, but the effect on investment trails-off slowly in several sectors.

Apart from the user cost elasticities, the sums of coefficients on sales growth (i.e., the accelerator) are worth noting. These sums are usually very significant in investment equations, but are statistically insignificant in all but one of the eleven first-difference/instrumental variables regressions (Services (#10) is the exception). The comparable regression

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[32] The instruments are as follows: lags 2-6 of sales growth, the difference in sales growth, cash flow, and the difference in cash flow (the cash flow variables relative to the capital stock); lags 2-8 for the percentage change in the user cost and the difference in the percentage change in the user cost.

without cash flow indicates that this surprising result is due to the inclusion of cash flow. When cash flow is excluded, the accelerator coefficients rise sharply, and six of the sums are now significant at conventional levels. In most cases, the user cost elasticities rise when cash flow is excluded. Thus, it is important to gain a further understanding of whether cash flow's significant role is related to finance constraints or merely as a proxy for current and future demand.

V. Summary and Conclusions

This paper has presented a variety of estimates of the elasticity of investment spending to the user cost of capital. This elasticity is important for policymakers because it is one of two complementary channels through which public policies can alter economic behavior and enhance economic performance. At present, suitable data for Canadian firms does not exist, and the elasticity estimates were computed for U.S. firms grouped to correspond to sectors in the Canadian economy. Our dataset contained a substantial amount of firm-level variation relative to prior studies, and the panel structure permitted us to evaluate several factors that might distort estimates of the user cost elasticity. Summary estimates of the user cost elasticity for models with cash flow are presented in Table 3, which is ordered by the estimates appearing in column 4. There is a wide variety of results across estimators and across sectors. Our preferred estimates are given in column 4 (first-difference/instrumental variables), where the user cost elasticities range from -3.572 to -.379. Unfortunately, these large point estimates are matched in most cases with large standard errors. In eight of eleven sectors, we can not reject the hypothesis that the user cost elasticity is zero, but we also can not reject the hypothesis that it is unity. Thus, our overall conclusion is that there is too much imprecision in these estimates to reach firm conclusions about the likely response of investment spending to variations in investment incentives.

A comparison of columns 3 and 4 reveal that much of this

imprecision arises with the instrumental variables. This suggests searching for better instruments within the context of the first-difference estimator or using estimators that avoid simultaneity problems. An alternative way to improve precision is to use more data. While expanding the dataset would prove quite difficult, more data can be brought to bear for a given estimate by defining the sectors more broadly. Estimation issues aside, while the sectoral groupings used here are valid, they can nonetheless only approximate the activities of firms in the Canadian sectors. The collection of suitable Canadian firm-level data must be a high priority for future research.

Appendix A:

Sector Definitions and SIC Matches

	Can SIC	USA SIC
ADVANCED MATERIALS & PLASTICS (AMP)		
Advanced Materials		???
Plastics		
Rubber Hose & Belting Industry	1520	305
Other Rubber Products	1590	267, 301, 305, 306
Plastic Products Industries	1600	26, 30
Plastic and Synthetic Resin Industry	3731	2821, 3087
AEROSPACE & DEFENCE (AD)		
Aerospace & Defence		359, 372, 376
Aircraft and Aircraft Parts Industry	3210	3625, 3651, 3661, 3663
Other Communication and Electronic Equipment Industr	3359	3669, 3812, 7629
AUTOMOTIVE (AUTO)		
Motor Vehicle Industry	3230	371
Truck and Bus Body and Trailer Industries	3240	245, 371, 379
Motor Vehicle Engine and Engine Parts Industry	3251	3519, 3592, 3694, 3714
Motor Vehicle Wiring Assemblies Industry	3252	3647, 3694, 3714
Motor Vehicle Stampings Industry	3253	3465, 3714
Motor Vehicle Steering and Suspension Parts Industry	3254	3493, 3714
Motor Vehicle Wheel and Brake Industry	3255	3714
Plastic Parts and Accessories For Motor Vehicles Ind	3256	3089, 3714
Motor Vehicle Fabric Accessories Industry	3257	2396, 2399, 2531
Other Motor Vehicle Accessories, Parts and Assemblie	3259	3429, 3599, 2531
Motor Vehicle Parts and Accessories, Wholesale	5520	3429, 3599, 3714
Automobile Dealers	6310	369, 371, 501, 753
Gasoline Service Stations	6330	551, 552
Automotive Parts and Accessories Stores	6340	554, 754
Motor Vehicle Repair Shops	6350	501, 553
Other Motor Vehicle Services	6390	753, 754
Tire and Tube Industry	1510	301

CHEMICALS & BIO-TECHNOLOGY (CBI)

Biotechnologies		????
Chemicals		
Industrial Chemicals Industries N.E.C.	3710	281, 282, 286, 287
Agricultural Chemical Industries	3720	281, 287
Pharmaceutical and Medicine Industry	3740	283, 384
Paint and Varnish Industry	3750	285
Soap and Cleaning Compounds Industry	3760	284, 329
Toilet Preparations Industry	3770	284
Other Chemical Products Industries	3790	284, 286, 287, 289, 348

ENVIRONMENTAL AFFAIRS (EA)

Environment		
Other Utility Industries N.E.C.	4990	495, 496

FASHION, LEISURE & HOUSEHOLD PRODUCTS (FLHP)

Leather Tanneries	1711	3111
Footwear Industry	1712	3021, 3142, 3143, 3144, 3149
Lugage, Purse and Handbag Industry	1730	3161, 3171, 3172
Other Leather and Allied Products Industries	1790	3131, 3172, 3199
Man-Made Fibre and Filament Yarn Industry	1811	2281, 2282, 2296, 2823, 2824, 3229
Wool Yarn and Woven Cloth Industry	1821	2231, 2281, 2282
Other Spun Yarn and Woven Cloth Industries	1829	2211, 2221, 2261, 2262, 2269, 2281, 2282
Broad Knitted Fabric Industry	1831	2257, 2258
Natural Fibres Processing and Felt Products Industry	1911	2297, 2299
Carpet, Mat and Rug Industry	1921	2273
Canvas and Related Products Industry	1931	2394
Narrow Fabric Industry	1991	2241, 2258, 2397
Contract Textile Dyeing and Finishing Industry	1992	2231, 2253, 2254, 2257, 2258, 2261, 2262, 2269, 2295, 2396
Household Products Of Textile Materials Industry	1993	2211, 2221, 2258, 2391, 2392, 2591
Hygiene Products Of Textile Materials Industry	1994	3842
Tire Cord Fabric Industry	1995	2296

Other Textile Products Industries N.E.C.	1999	2259, 2284, 2298, 2299, 2392, 2393, 2395, 2396, 2399, 2672
Men's and Boys' Coat Industry	2431	2311, 2329, 2385, 2386
Men's and Boys' Suit and Jacket Industry	2432	2311, 2329
Men's and Boys' Pants Industry	2433	2325, 2329
Men's and Boys' Shirt and Underwear Industry	2434	2253, 2254, 2321, 2322, 2326
Men's and Boys' Clothing Contractors	2435	2311, 2321, 2322, 2323, 2325, 2326, 2329
Women's Coat and Jacket Industry	2441	2337, 2339, 2385, 2386
Women's Sportswear Industry	2442	2253, 2337, 2339
Women's Dress Industry	2443	2253, 2335
Women's Blouse and Shirt Industry	2444	2253, 2331
Women's Clothing Contractors	2445	2253, 2331, 2335, 2337, 2339, 2341, 2395
Children's Clothing Industry	2451	2253, 2254, 2341, 2361, 2369, 2385
Sweater Industry	2491	2253, 2329, 2339, 2369
Occupational Clothing Industry	2492	2311, 2326, 2337, 2339, 2389, 3842
Glove Industry	2493	2259, 2381, 3089, 3151, 384
Hosiery Industry	2494	2251, 2252
Fur Goods Industry	2495	2371
Foundation Garment Industry	2496	2342
Other Clothing and Apparel Industries n.e.c.	2499	2253, 2254, 2322, 2323, 2329, 2339, 2341, 2353, 2384, 2385, 2387, 2389, 2396
Wooden Household Furniture Industry	2611	2511, 2517, 5712
Upholstered Household Furniture Industry	2612	2512, 2515
Other Household Furniture Industries	2619	2514, 2519
Metal Office Furniture Industry	2641	2522 2531
Other Office Furniture Industries	2649	2529, 2522
Bed Spring and Mattress Industry	2691	2515
Hotel, Restaurant and Institutional Furniture and Fi	2692	2531, 2541, 2542, 2599, 3821
Other Furniture and Fixture Industries n.e.c.	2699	2426, 2499, 2591
Commercial Printing Industries	2810	273, 275, 276, 277, 278
Platemaking, Typesetting and Bindery Industry	2820	278, 279, 738
Publishing Industries	2830	271, 272, 273, 274
Combined Publishing and Printing Industries	2840	271, 272, 273, 274

Stationery Paper Products Industry	2792	2621, 2675, 2677, 2678, 2679
Small Electrical Appliance Industry	3310	363
Major Appliance Industry	3320	358, 363
Electric Lighting Industries	3330	322, 364, 399
Sporting Goods Industry	3931	3089, 3429, 3648, 3751, 3944, 3949
Floor Tile, Linoleum and Coated Fabric Industry	3993	2295, 3069, 3996

FOREST INDUSTRIES & BUILDING PRODUCTS (FLHP)

Sawmill, Planing Mill and Shingle Mill Products Indu	2510	242, 244
Veneer and Plywood Industries	2520	243
Wooden Box & Pallet Industry	2561	2441, 2448, 2449
Coffin & Casket Industry	2581	3995
Pulp and Paper Industry	2710	249, 261, 262, 263
Paper Box and Bag Industries	2730	262, 263, 265, 267
Coated and Treated Paper Industry	2791	2671, 2672, 2679, 3861
Paper Consumer Products Industry	2793	2621, 2676
Other Converted Paper Products Industries	2799	2621, 2655, 2656, 2675, 2679, 3497
Sash, Door and Other Millwork Industries	2540	242, 243, 245, 249, 254
Other Wood Industries	2590	244, 249

HEALTH CARE INDUSTRIES (HCI)

Pharmaceutical and Medicine Industry	3740	283, 384
Toilet Preparations Industry	3770	284
Health and Social Service Industries	8600	41, 80, 83, 86, 87, 89, 96

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MANUFACTURING & PROCESSING TECHNOLOGIES (MPT)

Adv. Mfg Technologies

Compressor, Pump and Industrial Fan Industry	3191	3561, 3563, 3564
Sawmill and Woodworking Machinery Industry	3193	3553
Other Machinery and Equipment Industries n.e.c.	3199	3519, 3524, 3537, 3541,

		3542, 3545, 3546, 3547, 3549, 3552, 3554, 3555, 3556, 3559, 3562, 3564, 3565, 3567, 3569, 3582, 3586, 3589, 3999
Clock and Watch Industry	3913	3579, 3873
Ophthalmic Goods Industry	3914	3851
Sign and Display Industry	3970	399
Other Manufactured Products Industries	3990	209, 229, 239, 259, 274, 305, 306, 317, 329, 365, 369, 384, 393, 395, 396, 399, 807
Other Rolled, Cast and Extruded Non-Ferrous Metal Pr	2990	334, 335, 336, 339, 346, 349
Fabricated Structural Metal Products Industries	3020	344
Heating Equipment Industry	3070	343, 356, 358, 363
Machine Shop Industry	3080	351, 359, 371
Other Metal Fabricating Industries	3090	305, 329, 339, 342, 343, 344, 346, 348, 349, 359, 364, 382, 399
Agricultural Implement Industry	3110	352
Commercial Refrigeration and Air Conditioning Equipm	3120	358
Power Boiler & Heat Exchanger Industry	3010	344
Turbine and Mechanical Power Transmission Equip	3194	3511, 3566, 3568, 3593, 3594
Electrical Industrial Equipment Industries	3370	351, 354, 361, 362, 367, 369, 769
Communications and Energy Wire and Cable Industry	3380	335
Other electrical Industries (Batteries, etc)	3390	362, 364, 366, 369
Electric Power Systems Industry	4910	491, 493
Refined Petroleum Industries	3610	291, 299
Other Petroleum and Coal Products Industries	3690	295, 299
Gas Distribution Systems Industry	4920	492, 493
Construction and Mining Machinery and Materials Hand	3192	3531, 3532, 3533, 3534, 3535, 3536, 3537

MANUFACTURING & PROCESSING TECHNOLOGIES (MPT)
Adv. Mfg Technologies

Asphalt Roofing Industry	2720	262, 295
Primary Steel Industries	2910	331, 332, 339
Steel Pipe and Tube Industry	2920	331
Iron Foundries	2940	332
Non-Ferrous Metal Smelting and Refining Industries	2950	333
Aluminum Rolling, Casting and Extruding Industry	2960	335, 336, 339, 346
Copper and Copper Alloy Rolling, Casting and Extrudi	2970	335, 336, 339
Ornamental and Architectural Metal Products Industri	3030	254, 323, 344
Stamped, Pressed and Coated Metal Products Industrie	3040	341, 344, 345, 346, 347, 349
Wire and Wire Products Industries	3050	331, 335, 339, 342, 345, 349, 354
Hardware, Tool and Cutlery Industries	3060	342, 352, 354, 399
Clay Products Industries	3510	145, 325, 326
Hydraulic Cement Industry	3520	324
Concrete Products Industries	3540	327
Ready-Mix Concrete Industry	3550	327
Glass & Glass Products Industries	3560	321, 322, 323
Abraisives Industry	3570	329
Lime Industry	3580	327
Other Non-Metalic Mineral Indsutries	3590	289, 305, 325, 327, 328 329
Jewellery and Precious Metal Industries	3920	334, 335, 347, 349, 384, 391, 396

SERVICE INDUSTRIES & CAPITAL PROJECTS (SICP)

Service Industries

Accounting and Bookkeeping Services	7730	729, 872
Advertising Services	7740	731, 733, 738, 873, 874
Architectural, Engineering and Other Scientific and	7750	078, 138, 738, 871, 873, 874, 899
Offices of Lawyers and Notaries	7760	738, 811
Consumer and Business Financing Intermediary Industr	7100	60, 61, 67
Investment Intermediary Industries	7200	60, 61, 62, 63, 67
Insurance Industries	7300	63, 94
Other Financial Intermediary Industries	7400	60, 61, 62, 67
Real Estate Operator Industries (Except Developers)	7500	65
Insurance and Real Estate Agent Industries	7600	64, 65

Postal and Courier Service Industries	4840	421, 431, 738
Petroleum Products Industries, Wholesale	5100	51, 59
Food, Beverage, Drug and Tobacco Industries, Wholesa	5200	51
Apparel and Dry Goods Industries, Wholesale	5300	51
Household Goods Industries, Wholesale	5400	50, 51
Motor Vehicles, Wholesale	5510	501, 753
Metals, Hardware, Plumbing, Heating and Building Mat	5600	50, 51, 52
Farm Machinery, Equipment and Supplies, Wholesale	5710	508, 769
Construction, Forestry and Mining Machinery, Equipme	5720	508
Industrial Machinery, Equipment and Supplies, Wholes	5730	508
Other Machinery, Equipment and Supplies, Wholesale	5790	502, 504, 506, 507, 508, 509, 762, 769
Other Products Industries, Wholesale	5900	50, 51
Shoe, Apparel, Fabric and Yarn Industries, Retail	6100	56, 59
Household Furniture, Appliances and Furnishings Indu	6200	57, 76
Recreational Vehicle Dealers	6320	555, 556, 557, 559, 769
General Retail Merchandising Industries	6400	53, 59
Other Retail Store Industries	6500	52, 53, 56, 59, 73, 76
Non-Store Retail Industries	6900	54, 59
Grain Elevator Industry	4710	422
Other Storage and Warehousing Industries	4790	422, 738
Pipeline Transport Industries	4610	461, 492
Service Industries Incidental To Crude Petroleum and	0910	138
Service Industries Incidental To Mining	0920	108, 124, 148
Building Development & Construction	4000	15, 16
Industrial and Heavy (Engineering) Const.	4100	15, 16, 17
Trade Contracting Industry	4200	07, 16, 17, 73, 76
Service Industry Incidental to construction	4400	17, 65, 73, 87

TRANSPORTATION INDUSTRIES (TRAN)

Transportation

Railroad Rolling Stock Industry	3260	346, 351, 374
Shipbuilding and Repair Industry	3270	373
Boatbuilding and Repair Industry	3281	3732
Other Transportation Equipment Industries	3290	375, 379
Other Services N.E.C.	9990	075, 609, 654, 738, 752, 769, 869, 899

Water Transport Industries	4540	441, 442, 443, 444, 448, 449
Public Passenger Transit Systems Industries	4570	411, 413, 414, 415, 417
Other Transportation Industries	4580	411, 412, 489
Air Transport Industries	4510	072, 138, 451, 452, 731, 733, 799, 829, 871
Service Industries Incidental To Air Transport	4520	458, 735
Railway Transport and Related Service Industries	4530	401, 448, 474, 478
Service Industries Incidental To Water Transport	4550	449, 473, 478
Truck Transport Industries	4560	421, 422, 423
Machinery and Equipment Rental and Leasing Services	9910	721, 735, 784, 799
Automobile and Truck Rental and Leasing Services	9920	751

INFORMATION & TELECOMMUNICATIONS INDUSTRIES (ITI)

Electronic Computing and Peripheral Equipment	3361	3571, 3572, 3575, 3577
Electronic Office, Store and Business Machine Indust	3362	3578, 3579, 3596
Other Office, Store and Business Machine Industries	3369	3578, 3579, 3581, 3596, 3861, 3999
Record Player, Radio and Television Receiver Industr	3341	3651
Telecommunication Equipment Industry	3351	3661
Electronic Parts and Components Industry	3352	3661, 3663, 3671, 3672, 3674, 3675, 3676, 3677, 3678, 3679, 3699
Telecom Equipment		
Electrical Industrial Equipment Industries	3370	351, 354, 361, 362, 364, 367, 369, 769
Communications & Energy Wire & Cable Industry	3380	335
Indicating, Recording and Controlling Instruments In	3911	3491, 3492, 3822, 3823, 3824, 3825, 3829
Other Instruments and Related Products Industry	3912	3812, 3821, 3826, 3827, 3829, 3841, 3842, 3843, 3844, 3845, 3861

Telecom Services		
Cable Television Industry	4814	4841
Telecommunications Carriers Industry	4821	4812, 4813, 4822, 4899
Computer Machinery, Equipment & Software, Whls	5744	5045, 5734
Computer and Related Service	7720	737

Appendix B

Detailed Regression Results

Sector 1: (No cash flow)
Plastics

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	0.059	0.100	-0.170	0.098	-0.204	0.107	0.012	0.230
PCUCI1	-0.003	0.103	-0.095	0.091	-0.156	0.116	-0.324	0.203
PCUCI2	-0.003	0.102	-0.173	0.089	-0.139	0.115	-0.126	0.137
PCUCI3	0.109	0.109	-0.154	0.106	-0.144	0.130	0.005	0.183
PCUCI4	-0.017	0.093	-0.047	0.079	-0.073	0.097	-0.122	0.112
PCUCI5	-0.113	0.083	-0.204	0.075	-0.190	0.097	-0.101	0.122
PCUCI6	0.001	0.094	-0.222	0.094	-0.216	0.097	-0.246	0.161
Sum	0.033	0.243	-1.065	0.344	-1.122	0.559	-0.903	0.733
SG	0.108	0.018	0.088	0.016	0.076	0.018	0.203	0.132
SG1	0.045	0.018	0.035	0.016	0.021	0.020	-0.020	0.043
SG2	0.051	0.019	0.028	0.017	0.021	0.021	0.012	0.026
SG3	0.040	0.019	0.031	0.017	0.027	0.021	0.014	0.024
SG4	0.034	0.019	-0.002	0.017	-0.011	0.019	-0.005	0.021
Sum	0.278	0.033	0.180	0.040	0.135	0.073	0.206	0.142
INT	0.143	0.005						
SSE.	29.410		19.075		34.245		36.880	
Rsq.	0.067		0.040		0.025		0.010	
Obs.	1367		1367		1367		1367	

Sector 1: (With cash flow)
Plastics

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	0.052	0.091	-0.046	0.098	-0.175	0.107	-0.013	0.228
PCUCI1	0.011	0.093	0.005	0.090	-0.123	0.115	-0.268	0.186
PCUCI2	-0.006	0.093	-0.106	0.088	-0.120	0.114	-0.109	0.134
PCUCI3	0.034	0.099	-0.068	0.105	-0.129	0.129	-0.013	0.182
PCUCI4	-0.063	0.085	-0.039	0.078	-0.058	0.096	-0.098	0.111
PCUCI5	-0.146	0.075	-0.179	0.073	-0.167	0.096	-0.115	0.117
PCUCI6	-0.094	0.086	-0.173	0.093	-0.208	0.097	-0.210	0.147
Sum	-0.212	0.222	-0.605	0.341	-0.979	0.555	-0.826	0.724
SG	0.075	0.017	0.060	0.017	0.048	0.018	0.178	0.112
SG1	0.018	0.017	0.009	0.016	-0.010	0.021	-0.022	0.037
SG2	0.027	0.018	0.011	0.017	0.006	0.022	0.009	0.028
SG3	0.013	0.018	0.008	0.017	0.015	0.022	0.018	0.026
SG4	-0.023	0.018	-0.031	0.017	-0.026	0.020	-0.015	0.023
Sum	0.111	0.032	0.057	0.043	0.032	0.077	0.167	0.147
CF_K1	0.046	0.018	0.077	0.018	0.104	0.021	-0.048	0.124
CF_K11	0.087	0.020	0.096	0.019	0.094	0.024	0.071	0.045
CF_K12	0.013	0.022	0.008	0.020	0.009	0.024	0.030	0.035
CF_K13	0.063	0.027	0.024	0.025	-0.005	0.028	-0.017	0.032
CF_K14	0.117	0.024	0.079	0.026	0.049	0.028	0.044	0.030
Sum	0.326	0.019	0.284	0.038	0.251	0.077	0.079	0.141
INT	0.076	0.006						
SSE.	24.072		18.159		33.428		36.526	
Rsq.	0.237		0.086		0.048		0.018	
Obs.	1367		1367		1367		1367	

Sector 2: (No cash flow)
Aero.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.759	0.213	-0.925	0.204	-0.504	0.262	-0.288	0.766
PCUCI1	-0.011	0.222	-0.241	0.224	-0.229	0.317	-0.076	0.613
PCUCI2	0.165	0.237	0.005	0.219	0.078	0.242	0.062	0.457
PCUCI3	-0.490	0.224	-0.531	0.206	-0.274	0.223	-0.115	0.386
PCUCI4	0.004	0.190	-0.117	0.180	-0.246	0.257	-0.070	0.501
PCUCI5	0.081	0.185	-0.222	0.196	-0.249	0.277	-0.031	0.488
PCUCI6	0.206	0.185	-0.102	0.193	-0.024	0.199	-0.060	0.280
Sum	-0.805	0.513	-2.133	0.652	-1.448	1.287	-0.578	2.501
SG	0.172	0.023	0.132	0.023	0.113	0.027	0.402	0.246
SG1	0.147	0.024	0.088	0.024	0.040	0.032	0.056	0.052
SG2	0.138	0.023	0.093	0.023	0.053	0.032	0.087	0.048
SG3	0.105	0.023	0.078	0.023	0.031	0.031	0.053	0.041
SG4	0.064	0.024	0.027	0.023	0.008	0.026	0.019	0.029
Sum	0.626	0.045	0.418	0.061	0.245	0.111	0.616	0.323
INT	0.163	0.016						
SSE.	60.718		46.851		93.667		104.979	
Rsq.	0.150		0.070		0.020		0.006	
Obs.	1347		1347		1347		1347	

Sector 2: (With cash flow)
Aero.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.603	0.205	-0.659	0.195	-0.461	0.257	-0.384	0.697
PCUCI1	-0.095	0.212	-0.133	0.212	-0.174	0.311	-0.278	0.539
PCUCI2	0.081	0.227	-0.022	0.208	0.090	0.237	-0.015	0.414
PCUCI3	-0.333	0.215	-0.390	0.195	-0.266	0.218	-0.165	0.356
PCUCI4	0.016	0.181	-0.027	0.170	-0.217	0.252	-0.186	0.456
PCUCI5	-0.030	0.177	-0.196	0.186	-0.216	0.271	-0.219	0.431
PCUCI6	0.123	0.176	-0.100	0.182	-0.024	0.195	-0.122	0.259
Sum	-0.841	0.490	-1.527	0.621	-1.267	1.261	-1.370	2.240
SG	0.117	0.024	0.071	0.023	0.053	0.027	0.184	0.221
SG1	0.084	0.024	0.004	0.024	-0.023	0.034	-0.005	0.052
SG2	0.097	0.023	0.026	0.023	0.006	0.034	0.033	0.050
SG3	0.069	0.023	0.015	0.023	-0.002	0.033	0.020	0.045
SG4	0.044	0.024	-0.013	0.024	0.000	0.028	0.010	0.030
Sum	0.411	0.047	0.104	0.063	0.034	0.119	0.242	0.316
CF_K1	0.055	0.013	0.095	0.013	0.119	0.016	0.133	0.080
CF_K11	0.064	0.014	0.098	0.014	0.083	0.017	0.068	0.030
CF_K12	0.032	0.015	0.058	0.014	0.039	0.017	0.033	0.021
CF_K13	0.015	0.015	0.028	0.014	0.009	0.016	-0.003	0.022
CF_K14	0.009	0.013	0.015	0.014	-0.003	0.015	0.003	0.021
Sum	0.176	0.016	0.294	0.026	0.246	0.053	0.234	0.109
INT	0.119	0.016						
SSE.	55.031		41.619		89.345		91.962	
Rsq.	0.230		0.174		0.065		0.016	
Obs.	1347		1347		1347		1347	

Sector 3: (No cash flow)
Auto

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.114	0.138	-0.227	0.132	-0.308	0.144	-0.052	0.326
PCUCI1	-0.139	0.138	-0.180	0.131	-0.102	0.175	0.216	0.299
PCUCI2	-0.057	0.158	-0.147	0.135	-0.043	0.153	-0.197	0.276
PCUCI3	-0.161	0.151	-0.355	0.130	-0.364	0.145	-0.330	0.192
PCUCI4	-0.199	0.137	-0.348	0.120	-0.359	0.155	-0.076	0.263
PCUCI5	-0.007	0.122	-0.171	0.123	-0.154	0.161	-0.137	0.207
PCUCI6	0.020	0.142	-0.130	0.139	-0.034	0.121	0.022	0.148
Sum	-0.655	0.346	-1.557	0.472	-1.363	0.758	-0.554	1.066
SG	0.127	0.020	0.065	0.019	0.050	0.020	-0.215	0.214
SG1	0.113	0.021	0.075	0.018	0.068	0.024	0.077	0.036
SG2	0.101	0.021	0.052	0.019	0.028	0.025	0.004	0.038
SG3	0.090	0.021	0.063	0.019	0.043	0.024	0.014	0.037
SG4	0.071	0.021	0.017	0.019	-0.008	0.020	-0.033	0.030
Sum	0.502	0.041	0.271	0.050	0.179	0.084	-0.154	0.295
INT	0.142	0.007						
SSE.	52.743		34.640		62.303		73.741	
Rsq.	0.108		0.054		0.019		0.012	
Obs.	1434		1434		1434		1434	

Sector 3: (With cash flow)
Auto

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.021	0.126	-0.041	0.126	-0.286	0.141	0.022	0.324
PCUCI1	-0.064	0.126	-0.064	0.124	-0.091	0.172	0.274	0.315
PCUCI2	-0.031	0.144	-0.040	0.128	-0.004	0.150	-0.271	0.286
PCUCI3	-0.132	0.138	-0.172	0.124	-0.298	0.142	-0.297	0.205
PCUCI4	-0.256	0.125	-0.296	0.114	-0.318	0.152	0.020	0.254
PCUCI5	-0.019	0.111	-0.070	0.117	-0.100	0.158	-0.153	0.231
PCUCI6	0.048	0.130	-0.014	0.132	0.001	0.119	0.026	0.161
Sum	-0.474	0.316	-0.697	0.453	-1.096	0.744	-0.379	1.147
SG	0.057	0.019	0.017	0.019	0.014	0.021	-0.345	0.215
SG1	0.038	0.020	0.004	0.018	0.006	0.025	0.021	0.047
SG2	0.039	0.020	0.001	0.019	-0.009	0.026	-0.055	0.044
SG3	0.040	0.020	0.007	0.019	0.012	0.025	-0.026	0.037
SG4	0.023	0.020	-0.010	0.019	-0.019	0.021	-0.055	0.032
Sum	0.196	0.042	0.018	0.052	0.003	0.089	-0.461	0.310
CF_K1	0.100	0.016	0.132	0.017	0.128	0.018	0.065	0.196
CF_K11	0.107	0.019	0.136	0.018	0.117	0.021	0.110	0.082
CF_K12	0.024	0.020	0.039	0.018	0.029	0.021	0.055	0.035
CF_K13	0.058	0.021	0.061	0.019	0.046	0.021	0.007	0.032
CF_K14	0.018	0.018	-0.003	0.018	-0.007	0.020	-0.001	0.024
Sum	0.307	0.018	0.365	0.034	0.313	0.063	0.236	0.152
INT	0.085	0.008						
SSE.	43.572		30.957		59.570		82.209	
Rsq.	0.263		0.154		0.062		0.022	
Obs.	1434		1434		1434		1434	

Sector 4: (No cash flow)
Chem.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.451	0.125	-0.269	0.103	-0.255	0.134	1.070	0.674
PCUCI1	-0.345	0.119	-0.120	0.098	-0.277	0.149	-0.574	0.240
PCUCI2	-0.135	0.118	-0.025	0.097	-0.271	0.154	-0.468	0.200
PCUCI3	-0.106	0.135	-0.030	0.113	-0.141	0.178	0.391	0.377
PCUCI4	-0.085	0.111	0.045	0.091	-0.047	0.122	-0.327	0.206
PCUCI5	-0.241	0.109	-0.171	0.090	-0.334	0.111	-0.249	0.161
PCUCI6	0.062	0.111	0.053	0.091	-0.081	0.118	0.154	0.185
Sum	-1.302	0.402	-0.515	0.355	-1.405	0.741	-0.004	1.349
SG	0.154	0.018	0.083	0.017	0.071	0.020	-0.271	0.186
SG1	0.155	0.020	0.086	0.019	0.073	0.026	0.117	0.049
SG2	0.092	0.019	0.039	0.019	0.013	0.027	-0.004	0.051
SG3	0.074	0.018	0.012	0.019	-0.100	0.027	-0.127	0.047
SG4	0.100	0.019	0.019	0.018	-0.018	0.022	-0.041	0.034
Sum	0.574	0.036	0.239	0.053	0.039	0.094	-0.327	0.314
INT	0.139	0.008						
SSE.	68.761		42.577		100.112		134.525	
Rsq.	0.137		0.029		0.038		0.032	
Obs.	1797		1797		1797		1797	

Sector 4: (With cash flow)
Chem.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.424	0.123	-0.224	0.099	-0.261	0.132	0.726	0.620
PCUCI1	-0.316	0.118	-0.087	0.094	-0.280	0.147	-0.540	0.223
PCUCI2	-0.131	0.116	-0.049	0.093	-0.303	0.151	-0.437	0.183
PCUCI3	-0.096	0.133	-0.015	0.109	-0.181	0.175	0.217	0.349
PCUCI4	-0.077	0.109	0.008	0.088	-0.080	0.120	-0.334	0.190
PCUCI5	-0.241	0.107	-0.236	0.087	-0.385	0.110	-0.314	0.151
PCUCI6	0.088	0.109	0.065	0.088	-0.087	0.116	0.080	0.171
Sum	-1.197	0.397	-0.537	0.342	-1.576	0.729	-0.602	1.245
SG	0.157	0.019	0.048	0.017	0.045	0.021	-0.109	0.164
SG1	0.131	0.020	0.031	0.019	0.023	0.026	0.069	0.046
SG2	0.083	0.019	-0.001	0.019	-0.017	0.027	-0.016	0.045
SG3	0.055	0.018	-0.042	0.019	-0.146	0.027	-0.149	0.041
SG4	0.094	0.019	0.002	0.019	-0.048	0.022	-0.062	0.032
Sum	0.520	0.037	0.039	0.054	-0.143	0.095	-0.267	0.267
CF_K1	-0.019	0.013	0.066	0.013	0.090	0.016	-0.004	0.079
CF_K11	0.058	0.016	0.098	0.014	0.103	0.016	0.144	0.052
CF_K12	0.003	0.016	0.027	0.014	0.021	0.017	0.031	0.023
CF_K13	0.036	0.016	0.063	0.015	0.081	0.017	0.069	0.022
CF_K14	-0.026	0.013	-0.010	0.013	0.033	0.016	0.046	0.018
Sum	0.052	0.008	0.243	0.024	0.329	0.051	0.286	0.080
INT	0.127	0.008						
SSE.	66.485		39.223		96.152		112.571	
Rsq.	0.165		0.106		0.076		0.051	
Obs.	1797		1797		1797		1797	

Sector 6: (No cash flow)
Fashion

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	0.003	0.088	-0.296	0.090	-0.054	0.097	0.031	0.190
PCUCI1	-0.136	0.089	-0.294	0.086	-0.178	0.112	-0.073	0.142
PCUCI2	-0.171	0.093	-0.374	0.083	-0.275	0.099	-0.189	0.133
PCUCI3	-0.081	0.097	-0.332	0.088	-0.176	0.101	-0.100	0.131
PCUCI4	-0.034	0.081	-0.112	0.073	-0.087	0.100	0.001	0.118
PCUCI5	-0.069	0.072	-0.335	0.077	-0.206	0.099	-0.073	0.119
PCUCI6	-0.041	0.076	-0.348	0.086	-0.198	0.078	-0.160	0.085
Sum	-0.529	0.196	-2.090	0.329	-1.173	0.503	-0.564	0.631
SG	0.138	0.013	0.086	0.012	0.072	0.013	0.194	0.103
SG1	0.105	0.013	0.071	0.012	0.056	0.015	0.065	0.024
SG2	0.092	0.013	0.058	0.012	0.053	0.016	0.071	0.021
SG3	0.049	0.013	0.032	0.012	0.027	0.016	0.035	0.018
SG4	0.062	0.013	0.021	0.012	0.022	0.014	0.032	0.016
Sum	0.446	0.025	0.269	0.032	0.231	0.055	0.396	0.131
INT	0.150	0.005						
SSE.	93.446		61.695		120.132		124.579	
Rsq.	0.101		0.048		0.014		0.009	
Obs.	3259		3259		3259		3259	

Sector 6: (With cash flow)
Fashion

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	0.084	0.085	-0.211	0.088	-0.065	0.096	0.071	0.191
PCUCI1	-0.077	0.085	-0.225	0.083	-0.164	0.110	0.012	0.147
PCUCI2	-0.139	0.090	-0.320	0.081	-0.249	0.097	-0.185	0.134
PCUCI3	-0.035	0.093	-0.258	0.085	-0.174	0.099	-0.091	0.133
PCUCI4	-0.022	0.078	-0.106	0.071	-0.091	0.098	0.027	0.120
PCUCI5	-0.042	0.069	-0.306	0.075	-0.198	0.097	-0.085	0.119
PCUCI6	0.014	0.073	-0.287	0.084	-0.194	0.077	-0.176	0.087
Sum	-0.216	0.189	-1.713	0.322	-1.134	0.495	-0.428	0.641
SG	0.112	0.013	0.055	0.012	0.044	0.013	-0.021	0.103
SG1	0.070	0.012	0.031	0.012	0.016	0.016	0.025	0.024
SG2	0.064	0.013	0.028	0.012	0.026	0.017	0.031	0.022
SG3	0.034	0.013	0.004	0.012	0.002	0.016	-0.006	0.020
SG4	0.042	0.013	-0.002	0.013	0.004	0.014	-0.001	0.017
Sum	0.322	0.025	0.116	0.034	0.092	0.057	0.027	0.138
CF_K1	0.016	0.009	0.050	0.009	0.081	0.010	0.220	0.069
CF_K11	0.075	0.010	0.088	0.009	0.083	0.010	0.017	0.036
CF_K12	0.005	0.010	0.020	0.009	0.016	0.011	0.008	0.014
CF_K13	0.020	0.011	0.027	0.010	0.027	0.011	0.030	0.013
CF_K14	0.010	0.009	0.014	0.009	0.015	0.011	0.010	0.012
Sum	0.127	0.008	0.199	0.017	0.222	0.034	0.286	0.061
INT	0.126	0.005						
SSE.	85.851		58.082		116.138		128.810	
Rsq.	0.174		0.104		0.047		0.019	
Obs.	3259		3259		3259		3259	

Sector 7: (No cash flow)
Forest

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.088	0.159	-0.216	0.148	-0.164	0.146	-0.223	0.245
PCUCI1	-0.225	0.145	-0.198	0.134	-0.198	0.163	-0.211	0.214
PCUCI2	-0.093	0.136	-0.194	0.124	-0.160	0.152	-0.113	0.171
PCUCI3	0.030	0.161	-0.162	0.150	-0.100	0.162	-0.100	0.186
PCUCI4	0.066	0.119	0.088	0.106	0.009	0.136	0.019	0.147
PCUCI5	-0.089	0.114	-0.160	0.105	-0.203	0.134	-0.153	0.159
PCUCI6	-0.018	0.150	-0.206	0.138	-0.120	0.118	-0.156	0.161
Sum	-0.418	0.545	-1.048	0.530	-0.936	0.728	-0.937	0.851
SG	0.192	0.023	0.163	0.023	0.123	0.026	0.180	0.123
SG1	0.087	0.024	0.062	0.023	0.042	0.031	0.050	0.044
SG2	0.091	0.023	0.065	0.022	0.040	0.032	0.050	0.040
SG3	0.120	0.024	0.089	0.024	0.062	0.030	0.070	0.035
SG4	0.090	0.024	0.021	0.024	0.012	0.025	0.018	0.030
Sum	0.580	0.044	0.400	0.062	0.280	0.108	0.369	0.202
INT	0.127	0.013						
SSE.	24.783		18.821		34.627		34.850	
Rsq.	0.155		0.068		0.040		0.018	
Obs.	1067		1067		1067		1067	

Sector 7: (With cash flow)
Forest

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	0.111	0.144	0.088	0.138	-0.121	0.140	-0.155	0.252
PCUCI1	-0.126	0.131	-0.046	0.124	-0.211	0.156	-0.182	0.217
PCUCI2	-0.070	0.121	-0.129	0.113	-0.203	0.145	-0.157	0.173
PCUCI3	0.115	0.145	-0.006	0.137	-0.133	0.155	-0.086	0.189
PCUCI4	-0.012	0.106	0.023	0.097	-0.049	0.131	0.010	0.151
PCUCI5	-0.139	0.102	-0.181	0.096	-0.246	0.128	-0.183	0.159
PCUCI6	0.035	0.135	-0.038	0.127	-0.078	0.113	-0.115	0.160
Sum	-0.085	0.489	-0.289	0.487	-1.041	0.695	-0.867	0.868
SG	0.120	0.022	0.087	0.022	0.063	0.025	0.163	0.126
SG1	0.018	0.022	-0.001	0.021	-0.024	0.031	0.019	0.049
SG2	0.015	0.022	0.001	0.022	-0.014	0.032	0.024	0.045
SG3	0.037	0.023	0.028	0.023	0.007	0.030	0.026	0.038
SG4	0.054	0.022	0.002	0.023	-0.004	0.026	0.006	0.033
Sum	0.244	0.045	0.116	0.061	0.028	0.108	0.238	0.224
CF_K1	0.106	0.016	0.161	0.017	0.185	0.019	-0.016	0.112
CF_K11	0.099	0.017	0.143	0.017	0.146	0.023	0.155	0.043
CF_K12	0.044	0.021	0.046	0.021	0.053	0.024	0.050	0.028
CF_K13	0.084	0.022	0.045	0.022	0.096	0.021	0.078	0.025
CF_K14	-0.064	0.017	0.003	0.021	0.007	0.021	-0.014	0.026
Sum	0.269	0.019	0.398	0.037	0.487	0.069	0.253	0.143
INT	0.092	0.012						
SSE.	19.758		15.541		31.297		35.963	
Rsq.	0.326		0.231		0.132		0.040	
Obs.	1067		1067		1067		1067	

Sector 8: (No cash flow)
Health

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.675	0.176	-0.606	0.161	-0.406	0.190	-0.120	0.740
PCUCI1	-0.336	0.164	-0.163	0.145	-0.341	0.212	-0.524	0.385
PCUCI2	-0.102	0.160	-0.041	0.139	-0.285	0.213	-0.706	0.352
PCUCI3	-0.266	0.181	-0.345	0.165	-0.275	0.227	-0.332	0.392
PCUCI4	-0.069	0.144	-0.028	0.129	-0.138	0.174	-0.013	0.289
PCUCI5	-0.389	0.138	-0.410	0.128	-0.522	0.164	-0.835	0.274
PCUCI6	0.153	0.154	0.075	0.136	-0.093	0.156	-0.063	0.204
Sum	-1.685	0.545	-1.518	0.551	-2.060	1.013	-2.593	1.574
SG	0.174	0.021	0.080	0.020	0.032	0.024	-0.534	0.377
SG1	0.145	0.023	0.040	0.022	0.045	0.030	0.171	0.058
SG2	0.055	0.023	-0.048	0.023	-0.043	0.030	-0.084	0.081
SG3	0.023	0.022	-0.064	0.023	-0.142	0.030	-0.187	0.072
SG4	0.090	0.023	-0.002	0.023	-0.022	0.026	-0.083	0.066
Sum	0.487	0.039	0.006	0.059	-0.130	0.105	-0.717	0.577
INT	0.156	0.012						
SSE.	114.886		78.600		181.080		269.985	
Rsq.	0.106		0.034		0.029		0.024	
Obs.	1831		1831		1831		1831	

Sector 8: (With cash flow)
Health

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.583	0.171	-0.520	0.157	-0.402	0.187	-0.444	0.631
PCUCI1	-0.286	0.160	-0.125	0.140	-0.353	0.209	-0.492	0.326
PCUCI2	-0.074	0.156	-0.055	0.135	-0.306	0.210	-0.530	0.296
PCUCI3	-0.199	0.177	-0.305	0.160	-0.305	0.224	-0.399	0.335
PCUCI4	-0.058	0.140	-0.077	0.125	-0.184	0.172	-0.118	0.261
PCUCI5	-0.342	0.135	-0.464	0.124	-0.549	0.162	-0.714	0.224
PCUCI6	0.181	0.150	0.071	0.132	-0.097	0.154	-0.095	0.178
Sum	-1.362	0.534	-1.477	0.535	-2.196	1.000	-2.792	1.354
SG	0.158	0.021	0.031	0.020	-0.001	0.025	-0.212	0.346
SG1	0.122	0.023	-0.007	0.022	-0.002	0.030	0.125	0.061
SG2	0.054	0.023	-0.076	0.024	-0.063	0.031	-0.039	0.064
SG3	0.002	0.022	-0.111	0.024	-0.183	0.032	-0.164	0.051
SG4	0.065	0.023	-0.032	0.024	-0.047	0.027	-0.056	0.054
Sum	0.401	0.039	-0.195	0.061	-0.295	0.107	-0.347	0.466
CF_K1	0.026	0.016	0.104	0.016	0.116	0.019	0.050	0.089
CF_K11	0.055	0.018	0.090	0.017	0.099	0.020	0.079	0.071
CF_K12	0.001	0.018	0.018	0.017	0.012	0.021	0.008	0.028
CF_K13	0.041	0.019	0.072	0.019	0.086	0.021	0.060	0.031
CF_K14	0.015	0.016	0.030	0.018	0.042	0.019	0.047	0.022
Sum	0.137	0.014	0.314	0.031	0.354	0.064	0.243	0.105
INT	0.127	0.012						
SSE.	108.557		73.485		175.329		195.647	
Rsq.	0.155		0.097		0.060		0.040	
Obs.	1831		1831		1831		1831	

Sector 9: (No cash flow)
Manuf.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.333	0.055	-0.386	0.055	-0.151	0.065	-0.055	0.161
PCUCI1	-0.397	0.054	-0.356	0.051	-0.266	0.071	-0.414	0.098
PCUCI2	-0.168	0.054	-0.212	0.049	-0.093	0.070	-0.187	0.090
PCUCI3	-0.258	0.060	-0.348	0.057	-0.144	0.077	-0.087	0.127
PCUCI4	-0.078	0.051	-0.055	0.047	-0.123	0.069	-0.133	0.083
PCUCI5	-0.121	0.047	-0.204	0.047	-0.233	0.066	-0.161	0.126
PCUCI6	-0.132	0.053	-0.262	0.055	-0.208	0.054	-0.163	0.069
Sum	-1.486	0.133	-1.824	0.182	-1.218	0.344	-1.200	0.542
SG	0.159	0.008	0.119	0.008	0.091	0.009	0.201	0.111
SG1	0.127	0.008	0.085	0.008	0.061	0.011	0.113	0.018
SG2	0.123	0.008	0.081	0.008	0.054	0.012	0.102	0.022
SG3	0.067	0.008	0.035	0.008	0.009	0.012	0.040	0.015
SG4	0.074	0.008	0.036	0.008	0.018	0.010	0.038	0.011
Sum	0.550	0.016	0.355	0.021	0.233	0.042	0.493	0.153
INT	0.120	0.003						
SSE.	356.081		260.769		553.164		562.601	
Rsq.	0.127		0.052		0.016		0.011	
Obs.	9428		9428		9428		9428	

Sector 9: (With cash flow)
Manuf.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.267	0.054	-0.175	0.053	-0.131	0.064	-0.097	0.158
PCUCI1	-0.360	0.053	-0.242	0.049	-0.237	0.070	-0.323	0.097
PCUCI2	-0.134	0.053	-0.128	0.047	-0.086	0.068	-0.150	0.088
PCUCI3	-0.216	0.058	-0.182	0.055	-0.158	0.076	-0.145	0.124
PCUCI4	-0.095	0.050	-0.046	0.045	-0.120	0.068	-0.127	0.081
PCUCI5	-0.133	0.046	-0.164	0.045	-0.210	0.065	-0.188	0.120
PCUCI6	-0.115	0.051	-0.165	0.052	-0.199	0.053	-0.177	0.067
Sum	-1.320	0.130	-1.103	0.176	-1.140	0.338	-1.205	0.523
SG	0.131	0.008	0.067	0.008	0.038	0.010	0.061	0.116
SG1	0.090	0.008	0.023	0.008	0.002	0.012	0.049	0.019
SG2	0.092	0.008	0.023	0.008	0.006	0.013	0.043	0.022
SG3	0.049	0.008	-0.010	0.008	-0.027	0.012	-0.001	0.016
SG4	0.063	0.008	0.011	0.008	0.006	0.010	0.022	0.012
Sum	0.426	0.017	0.114	0.022	0.024	0.044	0.173	0.159
CF_K1	0.037	0.006	0.107	0.006	0.133	0.007	0.160	0.068
CF_K11	0.061	0.007	0.102	0.006	0.089	0.008	0.068	0.024
CF_K12	0.022	0.007	0.052	0.006	0.049	0.008	0.044	0.009
CF_K13	0.004	0.007	0.027	0.006	0.024	0.008	0.023	0.008
CF_K14	0.002	0.006	0.012	0.006	0.001	0.007	0.001	0.007
Sum	0.126	0.005	0.299	0.012	0.296	0.024	0.296	0.061
INT	0.098	0.004						
SSE.	334.572		237.804		532.152		535.107	
Rsq.	0.179		0.135		0.056		0.018	
Obs.	9428		9428		9428		9428	

Sector 10: (No cash flow)
Service

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.074	0.046	-0.117	0.045	-0.090	0.049	0.059	0.168
PCUCI1	-0.221	0.046	-0.240	0.042	-0.205	0.062	-0.218	0.099
PCUCI2	-0.252	0.045	-0.270	0.039	-0.239	0.064	-0.324	0.116
PCUCI3	-0.099	0.044	-0.123	0.039	-0.094	0.066	-0.072	0.072
PCUCI4	-0.069	0.044	-0.074	0.040	-0.092	0.068	-0.067	0.076
PCUCI5	-0.107	0.044	-0.120	0.040	-0.125	0.072	-0.123	0.092
PCUCI6	0.081	0.073	0.034	0.066	0.018	0.060	-0.042	0.079
Sum	-0.741	0.118	-0.910	0.154	-0.827	0.316	-0.787	0.393
SG	0.183	0.012	0.157	0.011	0.133	0.013	0.256	0.080
SG1	0.121	0.013	0.098	0.012	0.056	0.016	0.092	0.025
SG2	0.095	0.013	0.085	0.012	0.063	0.016	0.101	0.021
SG3	0.029	0.012	0.028	0.011	0.005	0.016	0.032	0.018
SG4	0.050	0.012	0.026	0.011	0.029	0.014	0.041	0.015
Sum	0.478	0.021	0.394	0.029	0.286	0.055	0.523	0.112
INT	0.169	0.004						
SSE.	243.158		159.168		350.405		358.424	
Rsq.	0.121		0.077		0.027		0.012	
Obs.	5165		5165		5165		5165	

Sector 10: (With cash flow)
Service

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.011	0.044	-0.069	0.043	-0.065	0.048	0.019	0.163
PCUCI1	-0.179	0.044	-0.189	0.040	-0.173	0.060	-0.168	0.097
PCUCI2	-0.226	0.043	-0.209	0.038	-0.201	0.062	-0.253	0.115
PCUCI3	-0.063	0.042	-0.066	0.038	-0.065	0.065	-0.054	0.070
PCUCI4	-0.042	0.042	-0.041	0.038	-0.067	0.067	-0.049	0.074
PCUCI5	-0.090	0.042	-0.092	0.038	-0.090	0.071	-0.081	0.092
PCUCI6	0.142	0.070	0.046	0.063	0.024	0.059	-0.019	0.076
Sum	-0.469	0.113	-0.620	0.148	-0.637	0.310	-0.606	0.390
SG	0.140	0.012	0.106	0.011	0.094	0.013	0.208	0.081
SG1	0.082	0.013	0.046	0.012	0.022	0.016	0.065	0.025
SG2	0.068	0.012	0.050	0.012	0.051	0.017	0.092	0.021
SG3	0.017	0.012	0.012	0.011	0.008	0.016	0.036	0.019
SG4	0.018	0.012	0.011	0.011	0.029	0.014	0.041	0.015
Sum	0.324	0.021	0.225	0.030	0.205	0.057	0.443	0.111
CF_K1	0.056	0.008	0.119	0.008	0.133	0.009	0.106	0.073
CF_K11	0.070	0.009	0.111	0.009	0.086	0.011	0.066	0.025
CF_K12	0.002	0.010	0.028	0.009	-0.000	0.011	-0.012	0.013
CF_K13	-0.011	0.010	-0.007	0.009	-0.021	0.011	-0.025	0.012
CF_K14	0.050	0.009	0.012	0.009	0.005	0.010	0.002	0.011
Sum	0.168	0.008	0.262	0.016	0.202	0.033	0.137	0.069
INT	0.132	0.004						
SSE.	221.780		144.527		335.437		341.083	
Rsq.	0.198		0.162		0.069		0.020	
Obs.	5165		5165		5165		5165	

Sector 11: (No cash flow)
Tran.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.091	0.041	-0.151	0.041	-0.107	0.040	0.146	0.166
PCUCI1	-0.181	0.038	-0.238	0.035	-0.193	0.051	-0.215	0.094
PCUCI2	-0.185	0.040	-0.207	0.035	-0.146	0.055	-0.403	0.136
PCUCI3	-0.056	0.036	-0.086	0.033	-0.039	0.058	-0.115	0.077
PCUCI4	-0.030	0.037	-0.069	0.035	-0.049	0.059	-0.132	0.082
PCUCI5	-0.068	0.040	-0.095	0.035	-0.064	0.065	-0.219	0.115
PCUCI6	-0.018	0.075	-0.046	0.068	0.054	0.053	-0.082	0.081
Sum	-0.630	0.103	-0.893	0.132	-0.544	0.266	-1.020	0.410
SG	0.134	0.014	0.100	0.013	0.045	0.015	0.344	0.106
SG1	0.063	0.014	0.032	0.013	0.001	0.018	0.052	0.030
SG2	0.069	0.014	0.037	0.014	-0.001	0.019	0.079	0.032
SG3	0.041	0.014	0.013	0.013	-0.012	0.019	0.030	0.025
SG4	0.034	0.014	-0.001	0.013	-0.032	0.016	-0.023	0.019
Sum	0.340	0.028	0.181	0.036	0.002	0.067	0.483	0.160
INT	0.145	0.004						
SSE.	54.469		36.375		75.659		100.179	
Rsq.	0.119		0.086		0.020		0.013	
Obs.	1906		1906		1906		1906	

Sector 11: (With cash flow)
Tran.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.054	0.039	-0.127	0.040	-0.090	0.040	0.119	0.144
PCUCI1	-0.159	0.037	-0.204	0.034	-0.168	0.051	-0.198	0.083
PCUCI2	-0.169	0.039	-0.175	0.034	-0.117	0.054	-0.231	0.116
PCUCI3	-0.021	0.035	-0.055	0.032	-0.016	0.058	-0.044	0.068
PCUCI4	0.004	0.036	-0.052	0.034	-0.043	0.059	-0.082	0.072
PCUCI5	-0.050	0.038	-0.080	0.034	-0.061	0.064	-0.148	0.100
PCUCI6	0.026	0.072	-0.028	0.066	0.042	0.052	0.018	0.067
Sum	-0.423	0.100	-0.720	0.130	-0.454	0.264	-0.566	0.359
SG	0.117	0.014	0.090	0.013	0.028	0.015	0.067	0.082
SG1	0.043	0.014	0.015	0.013	-0.019	0.018	0.019	0.028
SG2	0.050	0.014	0.028	0.014	-0.012	0.020	0.028	0.029
SG3	0.022	0.014	0.004	0.013	-0.022	0.019	0.003	0.023
SG4	0.013	0.014	-0.002	0.013	-0.031	0.016	-0.020	0.018
Sum	0.246	0.028	0.136	0.035	-0.056	0.068	0.096	0.133
CF_K1	0.019	0.015	0.067	0.014	0.127	0.018	0.259	0.085
CF_K11	0.059	0.017	0.093	0.016	0.109	0.018	0.090	0.038
CF_K12	0.025	0.018	0.011	0.017	0.024	0.020	0.002	0.025
CF_K13	0.040	0.019	0.008	0.019	0.026	0.019	0.014	0.023
CF_K14	0.022	0.015	0.007	0.017	-0.029	0.020	-0.013	0.022
Sum	0.164	0.012	0.186	0.020	0.257	0.054	0.352	0.090
INT	0.115	0.005						
SSE.	49.506		34.061		72.902		78.060	
Rsq.	0.199		0.144		0.055		0.027	
Obs.	1906		1906		1906		1906	

Sector 12: (No cash flow)
Info.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.453	0.106	-0.646	0.101	-0.151	0.126	-1.334	0.437
PCUCI1	-0.478	0.108	-0.605	0.107	-0.443	0.148	-0.817	0.248
PCUCI2	-0.202	0.110	-0.248	0.100	-0.233	0.117	0.020	0.211
PCUCI3	-0.327	0.109	-0.436	0.097	-0.199	0.116	-0.776	0.240
PCUCI4	-0.050	0.095	-0.161	0.088	-0.148	0.127	-0.674	0.232
PCUCI5	-0.104	0.091	-0.274	0.097	-0.197	0.132	-0.434	0.227
PCUCI6	-0.080	0.098	-0.245	0.100	-0.185	0.096	-0.204	0.136
Sum	-1.695	0.278	-2.613	0.364	-1.556	0.643	-4.220	1.229
SG	0.214	0.012	0.184	0.012	0.145	0.014	0.316	0.150
SG1	0.158	0.013	0.137	0.012	0.081	0.016	0.122	0.026
SG2	0.142	0.013	0.114	0.012	0.065	0.017	0.123	0.030
SG3	0.069	0.013	0.049	0.012	0.003	0.017	0.040	0.020
SG4	0.078	0.013	0.027	0.012	0.005	0.014	0.018	0.015
Sum	0.662	0.022	0.510	0.031	0.298	0.058	0.619	0.189
INT	0.134	0.007						
SSE.	289.879		206.175		432.358		453.709	
Rsq.	0.157		0.090		0.024		0.010	
Obs.	5841		5841		5841		5841	

Sector 12: (With cash flow)
Info.

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
PCUCI	-0.412	0.103	-0.336	0.097	-0.163	0.123	-0.903	0.415
PCUCI1	-0.503	0.105	-0.452	0.102	-0.469	0.146	-0.717	0.238
PCUCI2	-0.188	0.107	-0.209	0.095	-0.237	0.115	-0.101	0.202
PCUCI3	-0.297	0.105	-0.244	0.092	-0.217	0.114	-0.601	0.228
PCUCI4	-0.111	0.092	-0.110	0.084	-0.185	0.125	-0.546	0.222
PCUCI5	-0.166	0.088	-0.224	0.092	-0.231	0.129	-0.459	0.218
PCUCI6	-0.086	0.095	-0.178	0.095	-0.202	0.094	-0.244	0.131
Sum	-1.763	0.270	-1.752	0.349	-1.705	0.630	-3.572	1.176
SG	0.173	0.012	0.115	0.012	0.079	0.014	0.026	0.157
SG1	0.106	0.013	0.043	0.012	0.008	0.017	0.052	0.027
SG2	0.092	0.013	0.025	0.013	0.009	0.018	0.039	0.031
SG3	0.046	0.013	-0.004	0.013	-0.027	0.018	0.003	0.021
SG4	0.056	0.013	-0.010	0.013	-0.002	0.015	0.008	0.016
Sum	0.472	0.024	0.169	0.034	0.067	0.061	0.128	0.201
CF_K1	0.037	0.007	0.107	0.007	0.124	0.008	0.182	0.086
CF_K11	0.058	0.008	0.106	0.008	0.080	0.009	0.048	0.027
CF_K12	0.028	0.008	0.061	0.008	0.049	0.009	0.046	0.012
CF_K13	0.006	0.008	0.021	0.008	0.014	0.009	0.009	0.010
CF_K14	0.006	0.007	0.015	0.007	-0.007	0.008	-0.008	0.009
Sum	0.136	0.007	0.310	0.015	0.260	0.028	0.277	0.082
INT	0.105	0.007						
SSE.	271.619		185.591		414.537		425.195	
Rsq.	0.210		0.181		0.064		0.015	
Obs.	5841		5841		5841		5841	

Table 1: Summary Statistics

1. I_K1 (I/K)

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	0.15298	0.11820	0.15193	0.12061	193	1367
2	Aero.	0.21379	0.16784	0.23036	0.19344	205	1347
3	Auto	0.16448	0.11987	0.20311	0.15982	212	1434
4	Chem.	0.18610	0.13902	0.21059	0.15627	282	1797
6	Fashion	0.17867	0.13879	0.17861	0.14103	512	3259
7	Forest	0.15280	0.11539	0.16584	0.13767	150	1067
8	Health	0.21776	0.15588	0.26503	0.21086	324	1831
9	Manuf.	0.16687	0.11831	0.20796	0.17081	1389	9428
10	Service	0.19968	0.14787	0.23139	0.18272	853	5165
11	Tran.	0.16555	0.12178	0.18017	0.14451	313	1906
12	Info.	0.20449	0.13726	0.24260	0.19701	932	5841

2. UCI (u)

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	0.21034	0.21337	0.023585	0.012291	193	1367
2	Aero.	0.21832	0.21466	0.018651	0.014028	205	1347
3	Auto	0.20508	0.19814	0.026840	0.011522	212	1434
4	Chem.	0.22308	0.22182	0.009954	0.008010	282	1797
6	Fashion	0.22434	0.22256	0.022751	0.012457	512	3259
7	Forest	0.22901	0.22551	0.013793	0.012666	150	1067
8	Health	0.24037	0.23376	0.024066	0.010818	324	1831
9	Manuf.	0.21261	0.21121	0.018218	0.011706	1389	9428
10	Service	0.26028	0.26431	0.036029	0.016444	853	5165
11	Tran.	0.22143	0.21690	0.052119	0.017337	313	1906
12	Info.	0.21580	0.21290	0.025962	0.012325	932	5841

3. PCUCI ($\Delta u/u$)

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	-0.008899	-0.013616	0.04828	0.044640	193	1367
2	Aero.	-0.029249	-0.033096	0.04105	0.038762	205	1347
3	Auto	-0.014344	-0.016077	0.04936	0.045682	212	1434
4	Chem.	-0.011502	-0.017673	0.04500	0.043576	282	1797
6	Fashion	-0.019567	-0.023186	0.04300	0.039594	512	3259
7	Forest	-0.024241	-0.029856	0.04223	0.040936	150	1067
8	Health	-0.018289	-0.022628	0.04083	0.038667	324	1831
9	Manuf.	-0.018687	-0.023186	0.04458	0.041610	1389	9428
10	Service	-0.019716	-0.031930	0.07398	0.065538	853	5165
11	Tran.	-0.004153	-0.020377	0.11170	0.099053	313	1906
12	Info.	-0.024402	-0.030185	0.03892	0.037015	932	5841

4. SALES (S)

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	1062.74	224.782	1904.38	395.66	193	1367
2	Aero.	1443.00	97.510	3355.55	903.62	205	1347
3	Auto	2923.20	106.405	12095.63	2538.90	212	1434
4	Chem.	1153.61	221.724	3101.60	558.65	282	1797
6	Fashion	624.42	136.532	1321.96	299.58	512	3259
7	Forest	1229.49	178.248	2563.08	621.43	150	1067
8	Health	808.28	115.117	1857.52	466.87	324	1831
9	Manuf.	1616.24	108.131	7441.40	1493.42	1389	9428
10	Service	1237.57	197.451	5469.00	1156.99	853	5165
11	Tran.	880.10	203.638	1708.92	489.58	313	1906
12	Info.	774.11	71.223	3390.65	718.51	932	5841

5. SG ($\Delta S/S$)

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	0.036478	0.019172	0.23912	0.21082	193	1367
2	Aero.	0.033301	0.023438	0.25324	0.22541	205	1347
3	Auto	0.023459	0.010507	0.26029	0.23214	212	1434
4	Chem.	0.054726	0.039589	0.26054	0.22459	282	1797
6	Fashion	0.032452	0.022174	0.24031	0.21267	512	3259
7	Forest	0.018984	0.005811	0.21545	0.19052	150	1067
8	Health	0.069636	0.051718	0.29513	0.25460	324	1831
9	Manuf.	0.020615	0.010739	0.25200	0.22715	1389	9428
10	Service	0.030303	0.022041	0.26016	0.22319	853	5165
11	Tran.	0.039622	0.017423	0.27933	0.25004	313	1906
12	Info.	0.029970	0.021784	0.24644	0.21444	932	5841

6. CF_K1 (CF/K)

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	0.19862	0.16934	0.28008	0.19218	193	1367
2	Aero.	0.26705	0.28759	0.54673	0.40041	205	1347
3	Auto	0.20955	0.18557	0.37527	0.25845	212	1434
4	Chem.	0.30941	0.25645	0.66099	0.29090	282	1797
6	Fashion	0.26724	0.23111	0.48552	0.28525	512	3259
7	Forest	0.18900	0.16287	0.33051	0.24355	150	1067
8	Health	0.29586	0.25173	0.54222	0.31418	324	1831
9	Manuf.	0.21724	0.18812	0.47406	0.29076	1389	9428
10	Service	0.25667	0.21079	0.49687	0.30137	853	5165
11	Tran.	0.18994	0.12783	0.39614	0.24399	313	1906
12	Info.	0.24746	0.20680	0.55753	0.35286	932	5841

7. K1 (K_{t-1})

SECTOR	SECLABEL	MEAN	MEDIAN	STD	WFSTD	NFIRMS	NOBS
1	Plastics	789.77	84.765	1547.31	276.05	193	1367
2	Aero.	395.47	24.302	950.88	266.45	205	1347
3	Auto	946.41	31.740	3983.02	539.60	212	1434
4	Chem.	623.24	63.832	1989.84	384.63	282	1797
6	Fashion	299.84	36.178	831.38	163.09	512	3259
7	Forest	853.57	56.055	1758.51	353.16	150	1067
8	Health	345.61	26.761	838.76	215.52	324	1831
9	Manuf.	971.18	34.384	4571.22	605.09	1389	9428
10	Service	227.27	34.920	589.04	151.41	853	5165
11	Tran.	1045.50	104.335	2412.38	581.21	313	1906
12	Info.	888.19	22.173	7144.18	2732.03	932	5841

Table 2: Summary Results Tables

Sector 1: Plastics

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	0.033	0.243	-1.065	0.344	-1.122	0.559	-0.903	0.733
Sum SG	0.278	0.033	0.180	0.040	0.135	0.073	0.206	0.142
SSE.	29.410		19.075		34.245		36.880	
Rsq.	0.067		0.040		0.025		0.010	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.212	0.222	-0.605	0.341	-0.979	0.555	-0.826	0.724
Sum SG	0.111	0.032	0.057	0.043	0.032	0.077	0.167	0.147
Sum CF	0.326	0.019	0.284	0.038	0.251	0.077	0.079	0.141
SSE.	24.072		18.159		33.428		36.526	
Rsq.	0.237		0.086		0.048		0.018	

Sector 2: Aero.

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.805	0.513	-2.133	0.652	-1.448	1.287	-0.578	2.501
Sum SG	0.626	0.045	0.418	0.061	0.245	0.111	0.616	0.323
SSE.	60.718		46.851		93.667		104.979	
Rsq.	0.150		0.070		0.020		0.006	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.841	0.490	-1.527	0.621	-1.267	1.261	-1.370	2.240
Sum SG	0.411	0.047	0.104	0.063	0.034	0.119	0.242	0.316
Sum CF	0.176	0.016	0.294	0.026	0.246	0.053	0.234	0.109
SSE.	55.031		41.619		89.345		91.962	
Rsq.	0.230		0.174		0.065		0.016	

Sector 3: Auto

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.655	0.346	-1.557	0.472	-1.363	0.758	-0.554	1.066
Sum SG	0.502	0.041	0.271	0.050	0.179	0.084	-0.154	0.295
SSE.	52.743		34.640		62.303		73.741	
Rsq.	0.108		0.054		0.019		0.012	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.474	0.316	-0.697	0.453	-1.096	0.744	-0.379	1.147
Sum SG	0.196	0.042	0.018	0.052	0.003	0.089	-0.461	0.310
Sum CF	0.307	0.018	0.365	0.034	0.313	0.063	0.236	0.152
SSE.	43.572		30.957		59.570		82.209	
Rsq.	0.263		0.154		0.062		0.022	

Sector 4: Chem.

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.302	0.402	-0.515	0.355	-1.405	0.741	-0.004	1.349
Sum SG	0.574	0.036	0.239	0.053	0.039	0.094	-0.327	0.314
SSE.	68.761		42.577		100.112		134.525	
Rsq.	0.137		0.029		0.038		0.032	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.197	0.397	-0.537	0.342	-1.576	0.729	-0.602	1.245
Sum SG	0.520	0.037	0.039	0.054	-0.143	0.095	-0.267	0.267
Sum CF	0.052	0.008	0.243	0.024	0.329	0.051	0.286	0.080
SSE.	66.485		39.223		96.152		112.571	
Rsq.	0.165		0.106		0.076		0.051	

Sector 6: Fashion

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.529	0.196	-2.090	0.329	-1.173	0.503	-0.564	0.631
Sum SG	0.446	0.025	0.269	0.032	0.231	0.055	0.396	0.131
SSE.	93.446		61.695		120.132		124.579	
Rsq.	0.101		0.048		0.014		0.009	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.216	0.189	-1.713	0.322	-1.134	0.495	-0.428	0.641
Sum SG	0.322	0.025	0.116	0.034	0.092	0.057	0.027	0.138
Sum CF	0.127	0.008	0.199	0.017	0.222	0.034	0.286	0.061
SSE.	85.851		58.082		116.138		128.810	
Rsq.	0.174		0.104		0.047		0.019	

Sector 7: Forest

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.418	0.545	-1.048	0.530	-0.936	0.728	-0.937	0.851
Sum SG	0.580	0.044	0.400	0.062	0.280	0.108	0.369	0.202
SSE.	24.783		18.821		34.627		34.850	
Rsq.	0.155		0.068		0.040		0.018	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.085	0.489	-0.289	0.487	-1.041	0.695	-0.867	0.868
Sum SG	0.244	0.045	0.116	0.061	0.028	0.108	0.238	0.224
Sum CF	0.269	0.019	0.398	0.037	0.487	0.069	0.253	0.143
SSE.	19.758		15.541		31.297		35.963	
Rsq.	0.326		0.231		0.132		0.040	

Sector 8: Health

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.685	0.545	-1.518	0.551	-2.060	1.013	-2.593	1.574
Sum SG	0.487	0.039	0.006	0.059	-0.130	0.105	-0.717	0.577
SSE.	114.886		78.600		181.080		269.985	
Rsq.	0.106		0.034		0.029		0.024	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.362	0.534	-1.477	0.535	-2.196	1.000	-2.792	1.354
Sum SG	0.401	0.039	-0.195	0.061	-0.295	0.107	-0.347	0.466
Sum CF	0.137	0.014	0.314	0.031	0.354	0.064	0.243	0.105
SSE.	108.557		73.485		175.329		195.647	
Rsq.	0.155		0.097		0.060		0.040	

Sector 9: Manuf.

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.486	0.133	-1.824	0.182	-1.218	0.344	-1.200	0.542
Sum SG	0.550	0.016	0.355	0.021	0.233	0.042	0.493	0.153
SSE.	356.081		260.769		553.164		562.601	
Rsq.	0.127		0.052		0.016		0.011	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.320	0.130	-1.103	0.176	-1.140	0.338	-1.205	0.523
Sum SG	0.426	0.017	0.114	0.022	0.024	0.044	0.173	0.159
Sum CF	0.126	0.005	0.299	0.012	0.296	0.024	0.296	0.061
SSE.	334.572		237.804		532.152		535.107	
Rsq.	0.179		0.135		0.056		0.018	

Sector 10: Service

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.741	0.118	-0.910	0.154	-0.827	0.316	-0.787	0.393
Sum SG	0.478	0.021	0.394	0.029	0.286	0.055	0.523	0.112
SSE.	243.158		159.168		350.405		358.424	
Rsq.	0.121		0.077		0.027		0.012	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.469	0.113	-0.620	0.148	-0.637	0.310	-0.606	0.390
Sum SG	0.324	0.021	0.225	0.030	0.205	0.057	0.443	0.111
Sum CF	0.168	0.008	0.262	0.016	0.202	0.033	0.137	0.069
SSE.	221.780		144.527		335.437		341.083	
Rsq.	0.198		0.162		0.069		0.020	

Sector 11: Tran.

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.630	0.103	-0.893	0.132	-0.544	0.266	-1.020	0.410
Sum SG	0.340	0.028	0.181	0.036	0.002	0.067	0.483	0.160
SSE.	54.469		36.375		75.659		100.179	
Rsq.	0.119		0.086		0.020		0.013	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-0.423	0.100	-0.720	0.130	-0.454	0.264	-0.566	0.359
Sum SG	0.246	0.028	0.136	0.035	-0.056	0.068	0.096	0.133
Sum CF	0.164	0.012	0.186	0.020	0.257	0.054	0.352	0.090
SSE.	49.506		34.061		72.902		78.060	
Rsq.	0.199		0.144		0.055		0.027	

Sector 12: Info.

No cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.695	0.278	-2.613	0.364	-1.556	0.643	-4.220	1.229
Sum SG	0.662	0.022	0.510	0.031	0.298	0.058	0.619	0.189
SSE.	289.879		206.175		432.358		453.709	
Rsq.	0.157		0.090		0.024		0.010	

With cash flow:

	Pooled		Mean-diff.		First-diff.		First-diff. IV	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Sum UC	-1.763	0.270	-1.752	0.349	-1.705	0.630	-3.572	1.176
Sum SG	0.472	0.024	0.169	0.034	0.067	0.061	0.128	0.201
Sum CF	0.136	0.007	0.310	0.015	0.260	0.028	0.277	0.082
SSE.	271.619		185.591		414.537		425.195	
Rsq.	0.210		0.181		0.064		0.015	

Table 3 User Cost Elasticities*

Equation (25) With Cash Flow

Sector (Observations)	Least Squares: Pooled	Least Squares: Mean Diff.	Least Squares: First Diff.	Inst. Vars. First Diff.
	(1)	(2)	(3)	(4)
Info. (#12) (5841)	-1.763 (.270)	-1.752 (.349)	-1.705 (.630)	-3.572 (1.176)
Health (#8) (1831)	-1.362 (.534)	-1.477 (.535)	-2.196 (1.000)	-2.792 (1.354)
Aero. (#2) (1347)	-.841 (.490)	-1.527 (.621)	-1.267 (1.261)	-1.370 (2.240)
Manuf. (#9) (9428)	-1.320 (.130)	-1.103 (.176)	-1.140 (.338)	-1.205 (.523)
Forest (#7) (1067)	-.085 (.489)	-.289 (.487)	-1.041 (.695)	-.867 (.868)
Plastics (#1) (1367)	-.212 (.222)	-.605 (.341)	-.979 (.555)	-.826 (.724)
Service (#10) (5165)	-.469 (.113)	-.620 (.148)	-.637 (.310)	-.606 (.390)
Chemicals (#4) (1797)	-1.197 (.397)	-.537 (.342)	-1.576 (.729)	-.602 (1.245)
Trans. (#11) (1906)	-.423 (.100)	-.720 (.130)	-.454 (.264)	-.566 (.359)
Fashion (#6) (3259)	-.216 (.189)	-1.713 (.322)	-1.134 (.495)	-.428 (.641)
Auto (#3) (1434)	-.474 (.316)	-.697 (.453)	-1.096 (.744)	-.379 (1.147)

* Elasticity estimates from Table 2. Standard errors in parentheses.

Preliminary
For discussion only

Cost of Capital for the United States, Japan, and Canada

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Summary

We begin in section 2 with the discussion of in what sense the ratio of the sum of interest payments, dividends, retained earnings with the inventory valuation adjustment and capital consumption adjustment to the total value of firm (the sum of the market value of debt less trade debt plus the market value of equity outstanding) averaged over a fairly long period of time and over a large number of firms may approximate the cost of capital for the firms covered. The cost of capital here is understood to be the gross payment (including economic depreciation and corporate profit tax) that the firm must pay for one dollar's worth of funds used in the operation of the firm.

In section 3, we discuss the availability of data for estimating the cost of capital for the U.S., Japan, and Canada. What is needed at a minimum is balance sheet information at the reproduction cost or at market value, including the market value of equity outstanding, and the total value added and its distribution between the labor share and capital share, adjusted for inflation biases. It is reported that, for the United States, we have more or less the consistent information required in the aggregate national income and product accounts as well as for large corporations listed on the New York Stock Exchange (COMPUSTAT files) for 1955 through 1994. An important feature of the U.S. data is that we know in detail exactly how the aggregate data have been constructed, so that we know what are their biases and weaknesses.

For Japan, we have somewhat similar information for large companies listed on the Tokyo Stock Exchange, First Division, from Nikkei-Needs files. Unfortunately, however, the consolidated data file from the Nikkei-Needs data begins to be usable only in 1985, while their standard data file is unconsolidated and potentially not fully compatible with the U.S. data. The earlier result of Ando and Auerbach, however, had shown that these two files yield similar result for the few years in which data overlap, and this result is confirmed by our own computations. We therefore believe that we can utilize the results of Ando and Auerbach and our new results based on the data files combined. The Japanese national income and product accounts present difficulties for several reasons. First, for the non-financial corporate sector, we are lacking an estimate of total value added though we believe we have data on interest payments, dividends, and retained earnings which we believe to be with inventory valuation adjustment (IVA) and capital consumption adjustment (CCAdj). We also have the balance sheet for this sector, but the extraordinarily large and one-sided market valuation discrepancy and the lack of information on how some critical items in the balance sheet are estimated raises some questions about the reliability of this data. The Japanese national accounts do provide complete information on the total value added and its distribution for one-digit industries including both corporate and unincorporated sectors (here again we cannot be completely sure if it is with or without IVA and CCAdj), but we do not have the balance sheet information for these sectors.

For Canada, the national account data are apparently without IVA and CCAdj so that they are not usable for our purposes. Information for large corporations listed on the Toronto Stock Exchange is based on very few firms until 1983 so that their averages are too erratic to be usable. Even for 1984 and thereafter, the sample size is quite small (160 to 248 depending on the years), and their reliability is subject to doubt.

In section 4, we summarize the results of our computations. For the United States, the market measure and the adjusted accounting measure based on individual firm data for large corporations (COMPUSTAT file) are identical for the longest available period (1955-1994). They are in turn quite close to estimates generated by

data from the national accounts. Moreover, this feature of the U.S. data is preserved for variety of subperiods, provided that these subperiods are not very short. Thus, we can conclude with some confidence that the real cost of capital in the U.S. has been between 8 to 12 percent, during the period 1955-1994.

For Japan, for the longest available period (1967-1994) for the micro data, the market measure and the adjusted accounting measure are reasonably close to each other and about 6%. This suggests that the Japanese cost of capital is some four percentage points lower than the American cost. On the other hand, the calculations based on the national accounts data give us, for the period 1970 to 1993, the cost of capital for Japan at close to 10%. While we cannot be conclusive about the relative reliability of these two calculations nor about the cause of the difference between the two because we have not been able to obtain precise information about the detailed procedures by which relevant figures in the national accounts are estimated. We are inclined to believe that the result based on the micro data is more reliable because we know how the data are generated.

For Canada, the market measure and the adjusted accounting measure are radically different from each other (8.4% for the former against 14.7 for the latter) for the period 1976-93. Unfortunately, therefore, we must conclude that we know little about the cost of capital in Canada.

This leaves us with the problem of reconciling the large difference between the cost of capital in the U.S. and the cost of capital in Japan (based on individual firm data). We offer some hypotheses that are not necessarily mutually exclusive. First, Japanese depreciation, especially after our adjustments for inflation, may be overestimated. Second, the debt-equity ratio for Japanese corporations is twice as large as that for U.S. corporations, and given the treatment, of interest payments on the one hand and of the return on equity on the other under corporate profit tax laws, this would make the total return on capital before tax greater for the U.S. than for Japan. Third, there are the complex consequences of the extraordinarily high value of land which has experienced large and continuous real capital gains for the 1955-1990 period. The role of the enormous appreciation of land value in Japan on our estimates of the cost of capital in that country is discussed in detail in section 5 of this paper.

1 Introduction

In a series of papers, Ando and Auerbach (1988a), (1988b), and (1990) have estimated the cost of capital in the U.S. and in Japan using data for firms listed on the New York and Tokyo stock exchanges. They concluded that, while in the United States, the accounting measure and the market measure of the cost of capital appeared reasonably close to each other when they are averaged over a fairly long period of time, in Japan the market measure appeared to be noticeably higher than the accounting measure. The market measure of the cost of capital appeared similar for these two countries, and therefore the accounting measure of the cost of capital in the U.S. looked noticeably higher than that in Japan. They explored a number of potential causes for this pattern, and suggested as a plausible hypothesis a role played by the extraordinarily high price of land and continual real capital gains corporations enjoyed by the ownership of land. Since such real capital gains are not included in the measurement of earnings by firms, if these gains are in fact recognized by market participants and taken into account in valuing corporate shares, it may explain the discrepancy between the accounting and the market measures of the cost of capital, and hence the difference between the cost of capital in the U.S. and in Japan in terms of its accounting measure.

Since the price of land and the value of equity have both declined sharply in Japan since 1990, the most recent data seem to offer an opportunity to test this hypothesis. There is also an impression that the cost of capital in Canada is somewhat higher than that in the U.S., and this seems surprising given the close integration of the capital markets of these two countries, at least for large companies with access to equity and bond markets.

In this paper, we will take another look at the cost of capital in the U.S., Japan, and Canada. The cost of capital is, in principle, a forward-looking concept, and it is a notoriously difficult quantity to measure. Following much of the literature and especially the work of Ando and Auerbach, we continue to approximate it by the ex-post return on capital and hope that by averaging over firms and time, we can obtain a reasonable measure of the order of magnitude of the cost of capital for these firms.

Since we will rely heavily on the accounting measure of earnings by firms, and these earnings may include the contribution of physical capital to the total value added of the firm as well as oligopoly rent, in the next section, we will first attempt to clarify the relationship between the accounting measure of earnings and the user cost of capital as usually understood in the literature on investment. We will then report our empirical investigation using both aggregate data and individual firm data and conclude the paper with a statement of remaining puzzles and their potential explanations.

2 Some Conceptual Issues

2.1 Corporate Profit Tax, Oligopoly Rent, and the Term Structure of Interest Rates

The user cost of capital is the amount of money that a firm pays in order to use one dollar's worth of capital for a period of time (one year). In the absence of taxes and under the assumption of perfect markets, this cost must be equal to the real required rate of return in the market plus the economic rate of depreciation. We are, however, embarking on an empirical measurement of the cost of capital actually incurred by firms, so that we must allow for corporate taxes, the presence of market imperfections, and other issues. In order to arrive at an operational formulation in which a measurable quantity can be interpreted as an approximation to the cost of capital, we posit the following two equations.

$$T^c = \tau^c[P_x X - WE - z(\rho+\delta)P_k K] \tag{1}$$

$$(1-\tau^c)P_x X = \mu[(1-\tau^c)WE + (1-z\tau^c)(\rho+\delta)P_k K] \tag{2}$$

where
T^c : corporate profit tax
τ^c : corporate profit tax rate
P_x : price of output (value added)
X : value added measure of output
W : gross compensation rate per man-hour, including all fringe benefits
E : employment in man-hours
ρ : the real rate of interest per year prevailing in the capital market
δ : the economic rate of depreciation per year
P_k : reproduction price of capital
K : net stock of capital used in production

z : the rate of the depreciation allowed under the corporate profit tax law on K as a fraction of the total cost of capital, i.e., $Z = z(\rho+\delta)P_k K$, where Z is depreciation allowed under the corporate profit tax

μ : the mark-up factor; that is, the pricing policy of the firm is assumed to require that the net of the tax value added is μ times the net of the tax cost of labor and the net of the tax cost of capital used.

Equation (1) is a grossly simplified description of the corporate profit tax system imbedded in the U.S. tax law. We assume that the tax rate is proportional and ignore many fine points of the law. We also assume that the corporate tax applies to profits net of other taxes such as real estate taxes and sales tax, so that in our empirical work we define the value added of the firm as net of these indirect taxes. Employment taxes are included in the rate of compensation, W.

In order for the mark-up pricing equation (2) to make sense, we must have a homogeneous production function of degree one underlying the whole process, and we assume that this is true in the range of production activities actually observed. We suppose that the mark-up factor, μ, may vary from one firm to another and over time, but that it is not a function of the corporate tax rate,τ^c, or the rate of gross return, $\rho+\delta$. It is instructive to rewrite (2.2) by dividing both sides of equation by $\mu(1-\tau^c)$:

$$\frac{P_x X}{\mu} = WE + \frac{1-\tau^c z}{1-\tau^c}(\rho+\delta)P_x X \qquad (2')$$

In (2'), the left-hand side is total value added before it is marked up. On the-right hand side, the first term is a gross wage bill, and the second term is the gross return on capital which the firm must earn in order to pay the corporate profit tax and the return required on funds obtained in the market, and to cover economic depreciation. It is perhaps helpful to note that this term can be split as follows:

$$\frac{1-\tau^c z}{1-\tau^c}(\rho+\delta)P_k K = (\rho+\delta)P_k K + \frac{\tau^c(1-z)}{1-\tau^c}(\rho+\delta)P_k K \qquad (3)$$

The first term on the right-side is, of course, the market required return and economic depreciation, and the second term is the tax payment. When z is equal to 1.0, all cost of capital may be deducted so that no tax is imposed on the use of capital. When z is zero, the tax payment is equal to $\tau^c/(1-\tau^c)$ times the total gross cost of capital, as expected.

We may also note the identity

$$P_x X = \frac{P_x X}{\mu} + \frac{\mu-1}{\mu}P_x X \qquad (4)$$

The first term on the right hand side is gross value added, and the second term is the oligopoly rent earned by the firm.

Substituting (2.2) into (2.4) and then inserting the resulting expression into (2.1) and simplifying, we obtain

$$T^c = \tau^c \frac{\mu-1}{\mu}P_x X + \frac{(1-z)\tau^c}{1-\tau^c}(\rho+\delta)P_k K \qquad (1')$$

(1) says that the total corporate profit tax payment is the sum of the oligopoly rent times the full tax rate and the gross cost of capital net of tax times the factor $(1-z)\tau^c/(1-\tau^c)$. We can now decompose total sales net of intermediate inputs and rearrange it so that the decomposed parts can be interpreted as corresponding

to familiar concepts appearing in the corporate sector of the national income and product accounts:

$$P_x X - WE - \delta P_k K = (1-\tau^c)\frac{\mu-1}{\mu}P_x X + \rho P_x K + \tau^c \frac{\mu-1}{\mu}P_x X + \frac{\tau^c(1-z)}{1-\tau^c}(\rho+\delta)P_k \tag{5}$$

The left hand side of equation (2.5) above represents, for the corporate sector, corporate profits with inventory valuation adjustment and capital consumption adjustment, before corporate profit tax, plus interest payments.[1] On the right hand side, the first term is the oligopoly rent after taxes, the second term is the market required return on capital used, and the third and fourth terms are corporate profit taxes on oligopoly rent and the cost of capital, respectively. The important point here is that on the basis of national income and product account data or on the basis of standard accounting data such as those reported in the COMPUSTAT tape or its equivalent in other countries, we can at best compute only the left-hand side of (2.5), and not its right-hand side. That is, we cannot directly measure separately the required return in the market, $\rho P_k K$, and the oligopoly rent after the corporate profit tax, $(1-\tau^c)\frac{\mu-1}{\mu}P_x X$, although we can obtain data for total profit tax paid, that is, the sum of the last two terms on the right-hand side of (5).[2]

Our discussion, so far, implies that the return on capital measured as total value added minus total labor costs minus economic depreciation on physical

[1]This is so because we have interpreted the term $\delta P_k K$ as the economic depreciation on all capital at replacement cost. This means that depreciation of capital goods is based on their replacement costs, and the cost of inventory sold is also valued at its replacement cost.

[2]This assertion is not quite true. We may observe that, under our assumption, the total corporate profit tax collected by the authority is given by

$$\tau^c \frac{\mu-1}{\mu}P_x X + \frac{\tau^c(1-z)}{1-\tau^c}(\rho+\delta)P_k K = T^c \qquad (a)$$

while the total tax base plus the depreciation allowance is given by

$$\frac{\mu-1}{\mu}P_x X + \frac{1-\tau^c z}{1-\tau^c}(\rho+\delta)P_k K = B + Dep \qquad (b)$$

where B and Dep are the taxable profits and depreciation allowance reported to the tax authority. T^c, B,and Dep are available from the tax data, and τ^c and z are computable from the tax codes. Hence, (a) and (b) above may be considered as two equations in two unknowns, $\frac{\mu-1}{\mu}P_x X$ and $(\rho+\delta)P_k K$, and may be solved for these two quantities. In practice, however, this is an extraordinary complex task because many detailed provisions of the corporate profit tax codes must be taken account of and data adjusted accordingly. I may note that, whatever it may be worth, my attempt to carry out this program in mid 1970's for the United States suggested that the value of μ is between 1.02 and 1.04. This does not mean, of course, that we can say anything about the value of μ for other countries.

investment (including inventories) at the reproduction cost is an overestimate to the extent that this measure includes oligopoly rent. Since we are in the end interested in the rate of return to capital, we now turn our attention to the question of the measurement of the denominator, namely, the value of capital. If all capital is "malleable" and the market for the putty content of the capital is perfect, then the reproduction cost and market value must be the same. Since we believe that the nature of capital, especially of capital equipment, is putty-clay, the reproduction cost of capital is not well defined. We therefore believe that the only sensible measure of the value of capital to be used as the denominator of the rate of return must be on the market value of capital.[3]

Furthermore, there is no direct estimate of the market value of physical assets, and the best we can do is to rely on the indirect estimate, namely, the total market value of the firm defined as the sum of the market value of equity outstanding and the market value of the debt of the firm. There are two basic problems with this measure. First, it is very likely that the amount of debt reported in the accounting records of the firm is the face value of debt, not the market value. When the long term rate of interest fluctuates significantly, the market value can deviate markedly from the face value of debt, and thus our estimate of the total value of the firm may be subject to serious errors. The same observation applies to the aggregate value of debts of corporations reported in the Flow of Funds accounts in the U.S. and in the National Accounts in Japan.

Second, as we have discussed above, the total capital income of a firm includes oligopoly rent, and this means that the total market value of a firm must include the capitalized value of expected future oligopoly rent. In order to clarify the implications of the presence of oligopoly rent, consider a case in which the market value of physical capital is precisely equal to its reproduction cost and debt is also reported at its market value. Since economic depreciation is subtracted from income accruing to capital, the existing capital can be perpetually replaced so that current income may be viewed as a perpetuity. Under these assumptions and defining the ratio m by

$$m = \frac{(1-\tau^c)\frac{\mu-1}{\mu}P_x X}{\rho P_k K},$$

the ratio of net of tax income from capital to the market value of the firm is given by

$$\frac{(m+1)\,\rho P_k K}{\left(m\frac{\rho}{\rho+q}+1\right)P_k K} = \rho\frac{m+1}{m\frac{\rho}{\rho+q}+1} \tag{6}$$

[3]Note, however, that the measurement of depreciation used in estimating the left-hand side of (5) above, the numerator of the rate of return on capital, must be based on the reproduction cost of physical capital, since it is not feasible to estimate the market value of physical capital separately from the total value of the firm discussed below.

where q is the risk premium demanded by the market for capitalizing oligopoly rent. It is clear from this expression that, if q is zero, then the presence of oligopoly rent will not create any distortion when we measure the cost of capital by the ratio of total income from capital to the market value of the firm.

We must now review another, rather complex question. For a firm faced with a decision of whether or not to invest in capital equipment that may last for a fairly long time, where the nature of the equipment is basically putty-clay, the relevant rate of return is the real, long term rate of return whose maturity is coincidental with the expected life of the equipment. On the other hand, for investors purchasing equities and debt of the firm, presumably the most relevant measure of the profitability of such an investment is the one-period holding rate. The relationship between the one-period holding rate and the long term real interest rate is a rather messy expression except in the limiting case of the perpetuity, whose rate of return we shall refer to as the capitalization rate. In that case, we have the relationship:

$$R_t^* = \rho_t^* - \left(\frac{\dot{\rho}_t^*}{\rho_t^*}\right)^e \tag{7}$$

where ρ_t^* is the capitalization rate for the perpetuity, $(\dot{\rho}^*/\rho^*)$ is the expected rate of change of ρ_t^*, and R_t^* is the one period holding rate associated with the security whose capitalization rate is ρ_t^*. It is the one-period holding rate which would be equilibrated in the market, and since the expected rate of change of the capitalization rate is not necessarily uniform among market participants, the capitalization rate itself is not necessarily equilibrated in the market. Since the cost of capital, ρ, is closer to the capitalization rate rather than to the one-period holding rate, this is another reason why the cost of capital may not be fully equalized among markets in several countries.

2.2 Special Problems in Comparing the Cost of Capital Across Countries

In addition to all the problems that we have raised above, the costs of capital in two or more countries have an additional reason for remaining differentiated, namely, the exchange risk. Let us recall the standard uncovered arbitrage equation involving the expected rate of change of the exchange rate and the differential of the short term interest rate between two countries, given by

$$(R_t^d - R_t^f) - \left(\frac{\dot{e}_t}{e_t}\right)^e = \eta_t \tag{8}$$

where R^d and R^f are the real one period interest rate in domestic and foreign countries and e_t is the real exchange rate, $(\dot{e}_t/e_t)^e$ is the expected rate of change

of the real exchange rate, and η_t is the risk premium plus a random residual noise.[4]

Even assuming that the variation of η is relatively small, movements of the expected rate of change of the exchange rate are bound to be quite significant. Consider, for example, a case in which the exchange rate is expected to rise by one-half of one percent in a three month period. This is equivalent to a two percent rise in the exchange rate at an annual rate, so that it will create a gap of two percentage points in the three months' interest rates in the two countries in question measured at an annual rate. This is clearly a very significant difference between the two real interest rates. In Figure 1, we exhibit the three month commercial paper rate for Japan and for the United States in the upper panel. Between 1987 and 1994, we happen to have a direct measure of the expected rate of change of the exchange rates among several currencies including the exchange rate between U.S. dollars and Yen.[5] Taking advantage of this availability, we exhibit in the lower panel what American residents should have expected to receive in dollars by holding three month commercial paper in Japan, in one case assuming that the directly observed expectation data in fact represented the expectation of the person in question, and in the second case assuming perfect foresight. It is easy to see not only that the realized rate of return on such an operation is very different from holding domestic commercial paper of similar quality, but the expectation and the realization can be very different from each other.

We have now outlined the more important reasons why the cost of capital in two countries may not equalize even when the mobility of capital between the two countries in question is nearly complete. First, there may be a significant differences between the short-term real rate of interest in two countries due to the expected rate of change of the exchange rate, and this difference may be quite volatile over time. Second, even if the short term interest rates in the two countries are the same, when this is translated into long term rates through an equation like (7), the expected rate of change of the capitalization rate must be taken into account, and there is no reason why the expected rate of change of the capitalization rate must be identical in two countries. Third, there are a number of measurement problems discussed in Section 2.1 above, and the order of magnitude of these measurement biases may not be the same between two countries.

[4]The relationship (8) is often expressed in nominal terms rather than in real terms. Provided that the expectation of the inflation rate incorporated into interest rates and the one underlying the exchange rate expectation are the same, the formulation of (8) in real terms and in nominal terms are equivalent to each other.

[5]Currency Forecasters' Digest, published monthly, P.O.Box 139, Gedney Station, White Plains, NY., 10605. Fax # 914-949-0303

These are reasons for the deviation of the cost of capital between two countries even before the more commonly cited reasons, different risk premiums and different fiscal systems, are introduced. These factors, moreover, are capable of creating quite large differences in the cost of capital among countries, and market forces would not necessarily operate to eliminate the differences so long as the underlying causes persist. It is also the case that it would be extremely difficult to attribute a specific magnitude of the difference in the cost of capital in two countries to a particular cause, unless we have a direct measurement on such quantities as the expected rate of change of the capitalization rate and the expected rate of change of the exchange rate.

Under the circumstances, in this paper, as we did in the earlier papers of Ando and Auerbach, we will concentrate on reporting the observed differences in the cost of capital in three countries, and leave our speculation as to their causes to a brief section at the end.

3 Data

Our original intention was to supplement earlier estimates by Ando and Auerbach (1988b), (1990) by adding the years 1988-94, to perform similar calculations using aggregate, national account data for the non-financial corporate sector, and then to perform a parallel analysis for Canada.

Unfortunately, the paucity of data in Canada makes the results of our analysis of that country less reliable than that for the U.S. and Japan. The individual firm data begin only in 1976, and only in 1984 does the number of firms become large enough to make the result meaningful. To our surprise, it turns out that Canadian national income and product accounts do not provide an inventory valuation adjustment and a capital consumption adjustment; hence, it is not possible to estimate real earnings accruing to equity holders in the national accounts. Thus, we have been forced to confine our analysis based on national accounts data to Japan and the United States.

Let us begin by reviewing briefly the basis of our estimate of the total value of the firm. The flow of funds accounts of the United States and the stock part of the Annual Report on National Accounts of Japan contain balance sheets for non-financial and financial corporations, and as a part of these balance sheets, total financial liabilities and the market value of equities of non-financial and financial corporations are reported. We accept these figures for our aggregated analysis with one exception. We will exclude from the total liabilities the item called 'trade debt' or 'Purchasing Liabilities'. These items are accounts payable incurred in the process of purchasing goods needed for the production or other business activities of the firm, and they usually do not involve explicit interest payment. It is therefore inappropriate to include them in the calculation of the cost of capital.

Even though we accept these figures as reported in the national accounts, there are several issues that must be remembered in their use in our calculations of the cost of capital. First, while all financial liabilities should be reported at market value in principle, in practice, most of them are reported at face value. This is not a serious problem for short term liabilities, but for long term liabilities with fixed terms, such as long term bonds, the difference between the two concepts could be very large if the long term rate of interest has moved significantly in the past, as indeed it has done between 1960 and 1995.

Second, we have the problem of measurement of the market value of equity. For a corporation that is listed on one of the public exchanges and therefore publicly traded, the market price of the share is known and recorded, and the number of shares outstanding is also known. For these corporations, therefore, there should be no difficulty in estimating the market value of equity precisely, and indeed, in our work with individual firm data, we calculate their value of equity in this way.

For those companies whose equities are not traded in any publicly recognized exchanges, and especially those firms that are privately held, the measurement of their equity is much more difficult. This appears to be an especially serious problem for Japan, and we will return to this question shortly.

The third and last observation we wish to offer on the nature of the balance sheet concerns the market valuation discrepancy, that is, the difference between the market value of the firm and the reproduction cost of the firm. We have defined the market value above, and in order to understand the nature of the reproduction cost valuation, it is useful to write down the balance sheet identity with a few items recognized:

$$ARR + ARNR + AFE + AFNE = LF + NWR$$

where

ARR : reproducible real asset, primarily equipment and structures

$ARNR$: non-reproducible real assets, primarily land

AFE : equity of other firms owned (not equities of subsidiaries since we presume that our data treat firms on consolidated basis)

$AFNE$: financial assets other than equities

LF : financial liabilities

NWR : net worth on the reproduction cost basis.

We also have:

$$DMV = NWM - NWR$$

where

NWM: value of equity outstanding at the market value

DMV: market valuation discrepancy

ARR is the only part of the balance sheet that can be valued on a reproduction cost basis, and both in Japan and in the United States, the agencies responsible for the national accounts and balance sheets make a serious effort to put it on a reproduction cost basis. Individual firm accounts, on the other hand, report ARR on an original cost basis, and our analysis makes the conversion as best we can.

By definition, we cannot define the reproduction cost of $ARNR$. We believe that figures reported in the Japanese national accounts are meant to be an approximation to the market value of land owned by corporations, while figures reported in the U.S. flow of funds accounts for recent years are apparently the residual between the market value of total real estate properties owned by corporations and the reproduction cost of structures.[6] The COMPUSTAT files do not report the value of land as an item in the balance sheet, nor do the Nikkei consolidated account files. In the case of the U.S. , this is a less serious issue for our purposes since the value of land is a relatively small item in the balance sheet of most corporations. For Japan, however, the value of land may play a critical role in interpreting our final results because it is such a large item in the balance sheet of a corporation, as we will see at the end of our analysis.

Equities of corporations are in principle reported at their current market value, both on the asset and the liability side. As we have mentioned earlier, however, estimates of the equities of those corporations that are not listed on major stock exchanges are quite difficult to obtain, and there may be substantial measurements errors. Here, we believe that our estimate from individual company data for large corporation should be accurate, since here we know the price of the share and the number of shares outstanding exactly.

We have already commented on the problems of $AFNE$ and LF, namely, that some of these items are most likely reported at their face value, rather than at their current market value, and the difference can be substantial if movements of the long term interest rate have been substantial in the past.

Thus, although we refer to NWR as net worth on a reproduction cost basis, actual figures available are sums of items, some of which are measured at market value, some are an approximation to reproduction costs, and still others are their face value or even their original costs. This may have some bearing on puzzles which we later encounter in our analysis.

If all variables are correctly defined and measured, then DMV, the market valuation discrepancy, should be of reasonable size and its mean over a fairly long period of time should be close to zero. In the U.S. flow of funds accounts

[6]Until the early 1980's, there existed an independent estimate of the market value of land owned by corporations obtained as a part of the Census of Goverment in the U.S. This information was no longer gathered in recent Census of government as a result of budget cuts imposed on the Census Bureau.

this quantity was persistently negative throughout for years since the end of the Second World War, except in a few years in the late 1960's, until 1990, Since 1991 it has become positive and quite large. It is evident that this phenomenon is at least partly related to the sharp decline of the reported value of land which starts in 1990 or 1991. In 1989, the value of land held by all non-financial corporations was reported at $940 billion, but it declines sharply in the subsequent 4 years, following the pattern of $753, $422, $110, and $90 billion. This is clearly unreasonable. If the value of land held by non-financial corporations in 1993 was the same as it was in 1989 adjusted for the general inflation of prices measured by the GDP deflator, the market value of the equity of non-financial corporations would have been smaller than their net worth estimated on a reproduction cost basis, though the discrepancy would have been fairly small by historical standards.

In the Japanese national accounts, DMV is extremely large, ranging between two and three times the total value of equity in most years except for the bubble years of 1986 through 1989. The last figures available, for the end of 1993, are Y 332 trillion for the value of equity and Y 541 trillion for the discrepancy, making the discrepancy a relatively 'modest' 1.6 times the value of equity.[7] We also observe, without drawing any conclusions, that the value of this discrepancy is strongly correlated with the value of land which non-financial corporations are reported to own. Mechanically, these patterns result from the fact that the price of land has been more volatile than the price of equity shares in Japan. The value of land is approximately the same as the value of all reproducible assets on a reproduction cost basis for these corporations, or it is more than a half of what we called NWR. Since in these balance sheets, net financial assets excluding ownership of equities of other companies ($AFNE - LF$) is relatively small and quite stable, and the value of ARR is also quite stable over time, the short-run fluctuation of NWR is dominated by the movement of $ARNR$, that is, the price of land.

We nevertheless believe that the market value of equity (NWM) plus the reported value of liability (LF) less trade debts is the best approximation to the total value of the firm. For those firms on COMPUSTAT tapes and in the Nikkei consolidated accounts files, we have the exact value of equity shares outstanding. For aggregate national accounts data, the reported value of equity is subject to substantial measurement errors, most importantly due to the difficulties of measuring the equity values for those companies not listed on major stock exchanges. Liability figures are also subject to measurement errors. But we believe the errors

[7]The Japanese word used to designate this discrepency, 'Shomi Shisan', means approximately 'true net value of assets'. Perhaps, many years ago, designers of these tables viewed stock holders as another class of creditors similar to bond holders, and this discrepancy as the part of the value of corporations belonging to the management or more vaguely to the company as such.

measuring NWM and LF are less serious than the potential errors in reported value of (ARR, $ARNR$, AFE and $AFNE$), at least for firms on COMPUSTAT files and Nikkei files.

We now turn to the question of measuring income accruing to equity owners and creditors of corporations. Ando and Auerbach (1988a), (1988b) have discussed the adjustments needed to correct biases due to inflation in conventional accounting data, and we follow their procedure in adjusting data for individual companies. For aggregate national accounts data, the inventory valuation adjustment and capital consumption adjustments take care of inflation biases in the inventory and depreciation accounting. Inflation transfers income from creditors to debtors, in this case to equity owners, but our discussion will primarily be in terms of the total returns to both creditors and equity owners combined, so that in most cases we can ignore this transfer. When we look at the return to equity owners alone, however, we recognize this transfer due to inflation.

When a corporation maintains a significant amount of financial assets, it incurs capital loss on the part of financial assets whose contracts are stated in nominal terms. Here again, we exclude from financial assets trade credits, since they are mostly given to their customers in conjunction with sales, and corporations do not earn interest explicitly on these credits.

While we are all familiar with these adjustments to income to correct biases due to inflation, any changes in relative prices of assets or liabilities can cause similar biases of measurement. One important case of this type is the real capital gains and losses incurred by Japanese corporations on their ownership of land. Between 1970 and 1990, the price of land rose by 11.7 times in terms of one index, while the GDP deflator rose by 2.8 times. That is, the average rate of increase of the price of land per year during this period was 12.3 %, while the average rate of increase of GDP inflator per year during the same period was 4.9%. The real capital gain on land by corporations during this period was approximately 7.4% per year. If we are to accept figures given in the balance sheet of non-financial corporations in the Japanese national accounts at their face value, the value of land owned by corporations on average is almost twice as large as the value of their equity outstanding. Given such a large value of land holding by Japanese corporations, real capital gains on land for these corporations have major effects on their true earnings, and since such real capital gains are not included in the reported earnings of these corporations, they can create a major gap between the true earnings of these corporations and reported earnings. We will return to this issue later in our analysis.

4 Results

We shall use the total return on capital before tax as the primary focus of our discussion. While it may be argued that it is the after tax rate of return that

should be equalized in the market, there is some ambiguity as to exactly how to define the rate of return after tax for the purpose of international comparisons especially when interest payments, dividends, and retained earnings are treated differently for tax purposes, and these treatments are in turn different among countries. We will, however, offer two alternative definitions of the return on capital after tax for discussion.

We begin our review of our results by focusing on estimates of the total rate of return on capital based on aggregate data from the national accounts and the estimate of the same quantity based on individual firm data. They are shown in Figure 2.1 for the United States and Figure 2.2 for Japan. Unfortunately, we are unable to perform this comparison for Canada because apparently in Canada national income and product accounts do not provide estimates of capital consumption adjustments and of the inventory valuation adjustment. For the U.S., the rate of return computed from the aggregate data is reasonably close to the one computed from individual firms for earlier years. Since 1971 the rate computed from the aggregate data is consistently below the one computed from the individual firm data, and the difference between the two rates has been about 2 percentage points[8] on average.

For Japan, the difference between the estimate of the rate of return based on national accounts data and the one based on individual company data is very large, especially prior to 1980. Since 1980, the average difference appears to be roughly 3 percentage points, but the absolute level of these rates of returns in Japan is quite low to begin with, making the higher of the two rates almost twice the lower rate. In Japan, unlike in the United States, it is the rate of return based on national accounts data that is higher compared with the rate based on individual company data.

We believe that we have taken care of major conceptual differences in these two measurements other than the fact that national account figures refer to all non-financial corporations while those we have computed based on the consolidated file of Nikkei data files refer to a sample of companies listed in on the Tokyo Stock Exchange, First Division. As an additional check to insure that we have not created discrepancy in the course of our data adjustment and the estimation

[8]We are reasonably confident that, in the U.S., data for large corporations recorded in COMPUSTAT files are reasonably standardized and we understand what they represent. We also believe that corporate interest payments and their profits with IVA and CCAdj reported in the national income and product accounts cannot be very far off from their actual value. Finally, in constructing the estimate of the market value of corporate equities, those responsible for flow of funds data have ready access to the values of equities outstanding for those companies listed in major stock exchanges, and these companies correspond by and large to the group listed on the COMPUSTAT file. We therefore venture a guess that the discrepancy here is probably due to the difficulty of estimating the market value of equities for companies that are not listed on major stock exchanges.

procedure, we report in Table 3 a comparison of the dividend-price ratio and the earnings-price ratio as computed from national accounts for non-financial corporations and the parallel ratios for companies listed in the First Division, Tokyo Stock Exchange, as reported in Economic Statistics Annual of the Bank of Japan without any further adjustments. Although the Bank of Japan figures are not adjusted for inflation biases, etc., they are much closer to our estimates based on individual company data than to those based on national account data. This comparison confirms the result of comparing the rate of return based on the national data and that based on our calculation using Nikkei data, namely, that the rate based on the national account data is almost twice as high as the rate for companies listed on the Tokyo Stock Exchange, First Division.

This comparison is a serious issue in the present context. If we believe that our estimates of the rate of return based on individual accounts are the more accurate reflection of reality, we are likely to conclude that the cost of capital in Japan appears to be significantly lower than that in the U.S. On the other hand, if we rely primarily on national account data for our analysis, we are likely to conclude that the cost of capital in recent years is more or less the same for the two countries or somewhat higher for Japan than for the U.S. We have not been able to obtain from the Economic Planning Agency the detailed description of the exact procedure by which they arrived at their estimates of the value of equity outstanding for non-financial corporations, and we are uncomfortable with their estimates because the market valuation discrepancy is so large and always one-sided. In what follows, we will primarily be concerned with our estimates from individual company data.

It would have been much better if we could have worked with records covering the same and a fairly long period for all three countries. For the United States, we have a consistent set of data from 1955 to 1994. Earlier data have been more carefully edited and made easier to use since the work of Ando and Auerbach was completed, so we have gone back and recomputed our estimates for the entire period 1955-1994. For Japan, Ando and Auerbach (1988b), (1990) worked with then available Nikkei-Needs data covering 1967 through 1988, but in some cases did not record the results beyond 1983. Since then, Nikkei has begun to release tapes containing the consolidated accounts of a fairly large sample of companies.

These consolidated accounts are much more compatible with the U.S. company records reported in the COMPUSTAT tapes, and are preferable for our analysis. On the other hand, they have the disadvantage that they cover only a much shorter period, 1985-84[9]. Since we have the records of similar computations by Ando and Auerbach up to 1983 even though they were based on unconsoli-

[9]Data for some companies go back a few additional years, but the number of companies for these earlier years is too small for our purposes.

dated data files[10], we have decided to rely on their results up to 1983 and then continue the same computation using consolidated data starting in 1985 through 1994. Thus, when we are looking at the average for as long a period as possible, we would be missing 1984. The year 1984, however, appears to be a very normal year in Japan, so that the absence of this year from our sample does not affect the result. The data for Japan, then, covers 1967-83 and 1985-94.

For Canada, we are unable to work with national accounts data because corporate profits are apparently not corrected for the inventory valuation adjustment and the capital consumption adjustment. Canada's individual company data begin in 1976, but only starting in 1983 does the number of companies covered become large enough to make our computation meaningful. We nevertheless use 1976-93 as the basic sample period for Canada because 1983-93 is a period too short to give us a reliable estimate of the cost of capital, given that we are using the ex-post rate of return as an estimate of the cost of capital.

The results of our computations are presented in Figure 3.1.1. through 3.3.4. The first digit in the designation of figures refer to the basic return calculation. The second digit runs from 1 to 3, and they refer to unadjusted accounting returns, adjusted accounting returns, and market returns. The adjustment in this context refers to adjustments to conventional accounting reports to correct biases due to inflation. The third digit runs from 1 to 4 , and indicates the earnings price ratio, the total return on capital before tax, the total return on capital after tax with the assumption that the interest paid on bonds is not taxed, and total return on capital after tax with the assumption that the interest paid on bonds is taxed. The tax question involved requires some explanation.

The total return before tax is a relatively unambiguous concept. In practice, it is computed as the ratio in which the denominator is the sum of the total value of equity and the total value of debt (excluding trade debt), and the numerator is the sum of dividends paid, retained earnings with IVA and CCAdj, and corporate profit tax liability. The same ratio with the corporate profit tax liability omitted from the numerator is defined as the total return before tax with untaxed bonds. The problem in this concept is that the rate of return depends on the debt-equity ratio since the interest payment on debt is allowed to be deducted for tax purposes while dividends and retained earnings are not. The debt-equity ratio may be endogenously determined, but it can also be affected by the social tradition of a country. Thus, this concept may be an appropriate one for an analysis confined to a single country, but it may be misleading when it is used for international comparisons of the rate of return.

[10]Ando and Auerbach (1990) reported their calculation up to 1988 for the adjusted accounting measure, and showed that the result of their analysis appears to be virtually the same whether they use unconsolidated data or consolidated data for those years in which both data are available.

In order to avoid this problem, we have created an artificial concept in which we impute the corporate profit tax to interest payments on debt. That is, we compute the ratio in which the denominator is the same as above but the numerator is equal to dividends plus retained earnings with IVA and CCAdj plus interest paid minus interest paid multiplied by the marginal rate of the corporate profit tax. We refer to this ratio as the total return to capital after tax with taxed bond.

In the market return, the earnings price ratio is simply the ratio of dividends plus capital gains accruing to equity divided by the initial value of equity. To compute total returns, we always use the total value of equity and the total value of debt as the denominator, and in the numerator, we add dividends, capital gains, the interest payments and taxes as discussed above.

Table 1 summarize information presented in Figure 3.1.1. to 3.3.4. We first note that, for the U.S., the adjusted accounting returns and the market returns are quite similar, especially for the total return to capital before tax. Indeed, for the average of this measure over the longest possible period for which we can make a comparison, for 1956-94, the values of the adjusted accounting return and the market return are identical at .109. This is what we would expect if the capital market is functioning well. Even for shorter periods and for other concepts, for the United States, the adjusted accounting rate of return and the corresponding market rate of return are reasonably close.

For Japan, again in terms of the total return to capital before tax, the adjusted accounting rate and the market rate of return are fairly close for the longest period for which we can make comparison, namely, 1967-94. The situation, however, is quite different from the U.S. case. For the U.S., the adjusted accounting measure and the market measure do not deviate from each other dramatically, so that relatively short period averages of two measures track each other fairly closely. For Japan, on the other hand, for the bubble years of 1985-89 and bust years of 1990-94, these two measures move in the opposite direction for a fairly long period of time, as shown in rows 4a and 4b of Table 1. It turns out, however, when the entire period of this dramatic episode, 1985-1994, is averaged, the two measures have an approximately the same level, .045 and .044. The earlier conclusion of Ando and Aurbach (1990) that the market rate of return is significantly higher than the accounting rate of return in Japan was due to the fact that they were making their calculations in 1990 and included 1985-89 in their averaging, but did not anticipate what would happen in the Japanese equity market in 1990-94. Knowing what has taken place in 1990-94, the most plausible interpretation has to be that the market measure of the rate of return and the accounting measure tend to come together given a long enough time, and that our best estimates of both measures is between .05 and .06 for the total return to capital before tax.

The cost of capital in Japan, therefore, must be viewed as some 5 to 6 per-

centage points lower than that for the United States before tax during the period 1967-94. This conclusion must be viewed with some skepticism in view of the evidence we have presented in Figure 2.1 and 2.2., indicating that, had we relied on the aggregate, national account data, we would have arrived at a very different conclusion, namely, that the cost of capital using the same definition was lower in the U.S. than in Japan by 1 or 2 percentage points.

For Canada, again focusing on the total return to capital before tax, the market measure and the adjusted accounting measure are radically different. The former is .084 while the latter is .147. Thus, by the adjusted accounting measure, the cost of capital is significantly higher than that for the U.S, during the comparable period, .124 for 1976-93, while by the market measure, it is lower for Canada than for the U.S., .126. We believe that this rather erratic result for Canada must be due to the paucity of data. The number of firms in the sample is less than 100 prior to 1983, and even after that year it is between 160 and 240. The highest values of the rate of return before tax for Canada by adjusted accounting measure occur between 1976 and 1981, and due to the smallness of the sample size, these figures are suspect, although even when we exclude these years, the adjusted accounting measure of the total rate of return to capital remains above .13. (see Figure 3.2.2.). Given the erratic pattern of results for Canada, we believe it is prudent to draw no conclusion about the cost of capital from our investigation.

5 Some Interpretations

Before we can make sense of any international comparison of the cost of capital, we must be able to feel that, for each country involved, we have a measurement of the cost of capital in which we can place some confidence. We have suggested in this paper that we may check how well alternative measures of the cost of capital agree with each other as one indication of the reliability of our measurement. In the case of the United States, we have found that the market measure and the adjusted accounting measure of the cost of capital, based on conventional individual company data reported in the COMPUSTAT files closely agree with each other, and they in turn agree with similar measures based on the aggregate national accounts data. This appears to be true both for the longest period for which we have data, 1956-1994, and for various subperiods so long as subperiods are not extremely short. We believe that this is an important, though not conclusive, indication that our estimate of the cost of capital is meaningful and probably not too far from the actual cost faced by firms.

For Canada, we must regrettably conclude that we have not been able to make sense of what the available data generates. In the first place, we have been informed that, in the Canadian national accounts, estimates of IVA and CCAdj to corporate profits do not exist, and hence we are unable to gain any information

from this aggregate data source. In the second place, the market measure and the adjusted accounting measure of the total return to capital before tax based on the same set of firms are totally different orders of magnitude, making neither of these figures believable. We suspect that the smallness of our sample for Canada, both in terms of the length of the period and the number of firms included in the sample, is the main cause of the lack of uniformity of our result. Whatever the cause may be, at this point, our honest conclusion must be that we know very little about the cost of capital in Canada.

This conclusion is reinforced by two peripheral observations. First, when our firms are grouped into broad industry groups and the total return to capital is computed for each group using the adjusted accounting measure, we obtain the result reported in Table 2. For the U.S., the resulting pattern is more or less what we would have expected: the order of magnitude is similar for all industry groups, but it is highest for manufacturing and construction and lower for transportation and public utilities by narrow margins. This pattern is true both for the long period of 1955-1994, and the shorter period of 1967-93 for the purpose of comparing with the result for Canada.

For Canada, on the other hand, the rate of return is highest for transportation and public utilities by a very large margin (0.212), and lowest for services and public administration (0.042). The rate for manufacturing and construction is in the middle, at 0.119. This pattern just does not make sense. Transportation and public utilities are regulated industries, with relatively little risk. Unless the regulation is grossly mismanaged, there is no reason why the cost of capital should be high for these industries, let alone by a very large margin. Our conclusion must again be that the smallness of the sample is generating too much sampling variation to make our estimate meaningful.

Another possible source of insight into the cost of capital in Canada is the record of those corporations which have issued shares both in Canadian dollars in the Canadian market, and in the U.S. dollars in the U.S. market. If a Canadian firm issues equity shares denominated in the U.S. dollars in the U.S. market (thereby, by implication defining dividends on these shares in U.S. dollars), from the point of view of U.S. investors, there is no exchange risk at all. Therefore, if these companies are matched against "similar" companies in the U.S., the difference between two groups is simply that the first is a group of Canadian companies and the second is a group of U.S. companies. The difference in the rate of return between two groups, therefore, must represent the country risk. Unfortunately, we have not been able to locate such a group of companies in Canada, and hence we have not been able to carry out the analysis.[11]

[11]The so-called "cross listed companies" are not the same as the group sought in the above paragraph. Cross listed companies generally issue shares denominated in Canadian dollars only, and list such shares in the New York (or other American) stock exchanges and offer to

The situation is different in Japan. For Japan, the necessary information for computing the total return on capital before tax both in terms of the adjusted accounting measure and in terms of the market measure formally exists in the national accounts, and the number of firms in our sample from whom we can compute the parallel estimates based on conventional accounting data is quite large. The period over which data exist is also considerably longer than for Canada. Thus, we cannot attribute our difficulty in interpreting the Japanese data to the smallness of the sample or the lack of data.

The problem here is that the difference in the total return to capital estimated from the national account data and the same concept estimated from individual company data is very large and hard to explain. In Table 3. we report some evidence indicating that this difference is not due to some arithmetic errors on our part. Here, we reproduce the dividend-price ratio for those companies listed in the Economic Statistics Annual published by the Bank of Japan, and match it against the same ratio computed based on the national account data for the non-financial corporate sector. The former is roughly a half of the latter throughout. We do the same with the price earnings ratio, and again, the figures reported by the Bank of Japan is twice the figure implied by the national accounts.

In terms of comparison with the corresponding figures for the United States, the rate of return figures computed from the national account data makes better sense, since they are quite close to the U.S. rate on average. We have argued earlier that there is no reason to expect that the rate of return in the two countries to be the same at all times, or even very close to each other. On the other hand, a very large difference in the rate of return in two countries that persist for a very long period of time is quite puzzling[12].

We presume that the conventional accounting data reported in the Nikkei files are a major source of information in constructing the corporate sector of the national accounts, so that the National Income Division of the Economic Planning Agency has the exact information on how this set of data is incorporated into figures shown in the national accounts tables. We very much hope that the

pay dividends in U.S. dollars. But the dividends are defined in Canadian dollars, and they are converted into U.S. dollars at the exchange rate at the time of payment. Thus, these shares are still strictly denominated in Canadian dollars, and the cross listing merely reduces the transactions cost to U.S. investors. The performance of these cross listed companies provides no information whatever on the segmentation of the market.

[12]Note that these rates are, by construction, the real rate, so that the arbitrage equation for the exchange rate applicable to them involves the expected rate of change of the real exchange rate, not the nominal exchange rate. Most of the changes in the nominal exchange rate between the dollar and the yen represent the different rates of inflation. The real exchange rate may be moving in the yen's favor quite slowly until recently, but the movement is not nearly enough to explain the 5 to 6 percentage points difference in the real rates of return between the two countries.

detailed description of the procedure for the construction of all tables in national accounts and information of sources of data will be forthcoming. Until then, the puzzle remains, and we must speculate on why the rate of return computed from individual company data is so low. We offer three hypotheses.

First, the debt-equity ratio of Japanese corporations is much higher than the corresponding ratio for U.S. corporations, and given the tax treatment of debt and equity capital in both countries, the higher debt-equity ratio induces a lower cost of capital. This is a long standing, well known proposition, but at the end of the 1980's the debt-equity ratio in Japan was declining quite rapidly and the proposition was becoming moot. We now see that the appearance then was misleading because the decline of the debt-equity ratio was simply a result of the stock market bubble. As the price of equity shares declined after the bubble busted, the debt-equity ratio rose more or less to the earlier level. as Figure 4 makes clear. Such a high level of the debt-equity ratio cannot fail to make the total cost of capital before tax somewhat smaller.

Second, as Ando and Auerbach reported earlier, the reported depreciation rate for Japanese corporations is two or three percentage points higher than that in the United States. If these depreciation rates reflect the reality of the two countries, then there is no problem. One might wonder, however, if this can be so given that the technology available in both countries must be roughly the same. If the true depreciation rate is the same while the reported rate is higher for Japan and for the U.S., then this may cause the reported rate of return in the U.S. to be higher than that in Japan.

The last potential cause of distortion in the cost of capital is the extraodinarily high price of land. In an earlier work by Ando and Auerbach (1990), they were able to utilize information on the physical size of the land carried in the standard Nikkei-Needs files, together data on price of land obtained from other sources, and to generate an approximate value of land owned by corporations at current prices. From this information, they were able to estimate capital gains enjoyed by each corporation and to adjust the earnings of corporations accordingly. When the earnings of corporations are so adjusted, then the rate of return on capital for Japanese corporations could be shown to be comparable to that for corporations in the U.S. Nikkei-Needs files for consolidated accounts do not carry the information on the physical size of land owned by corporations, and hence we are not able to estimate the real capital gains on land at the micro level.

We have, therefore, no choice but to base our speculation about the role of the price of land in the determination of corporate earnings on information provided by the national accounts. Figure 5 provides the indication of how important the capital gains on land has been for Japanese corporations. Note that the capital gains on land value are divided by the total value of firms, not the value of land, so that the ratio represented by the black boxes can be directly added to the total

return on capital. Because the land price has been quite volatile, the average ratio of the capital gain to the total value of the firm is very sensitive to the choice of period over which the ratio is averaged. It is, however, safe to say that the average value of the ratio of capital gains on land to the total value of the firm is at least 2.5% to 3%. For individual firm based data, the addition of the return of this order of magnitude to the total return on capital before tax in Japan reported in Table 1 would bring the total return close to .09, still somewhat below the U.S. level but quite close to it. The total return after tax, on the other hand, becomes roughly the same as the U.S. level. In terms of measurement based on the national account data, the Japanese rate of return was somewhat higher than the U.S. rate of return to begin with, so that the addition of the capital gains on land would make the discrepancy greater.

There is another aspect to the impact on the high price of land. To understand this second problem, it is easiest to visualize two identical firms, one in Japan and one in the U.S., starting production in 1990. Suppose that the labor cost and the cost of capital are identical in both countries, but that the price of land is ten times higher in Japan. Even if the rental rate in Japan is one-half of that in the U.S., the rent that must be paid in Japan is five times the rent payment in the U.S. If we suppose that, in Japan, the value of land needed for production is roughly the same as the value of structures and equipment as suggested by the national account data, the rent payment for land by the Japanese firm is roughtly the same as the cost of capital, net of depreciation for equipment and structure, while for the American firm it is only one-fifth of the cost of capital, net of depreciation for equipment and structure. If the firm chooses to purchase the land, then the rent on land is likely to appear in the accounting record of the firm as an additional cost of capital rather than as rent, but the fact remains that the sum of rent and the cost of capital net of depreciation is 1.8 times greater for the Japanese firm compared to that of the U.S. firm.

We have no indication that the rent payment or the cost of capital per unit of output is radically higher for Japanese firms than for U.S. firms.[13] On the other hand, in the balance sheets of non-financial corporations in the Japanese national accounts, the value of land is clearly recorded as equal to or greater than the value of equipment and structure at the reproduction cost. How can we reconcile this contradictory evidence?

We venture to offer a somewhat unorthodox hypothesis. Most Japanese firms, especially large corporations, are well established firms with long histories, and they acquired their land before the price of land in Japan had become so much

[13]Unfortunately, in the Japanese national accounts, the total value added of the non-financial corporate sector is not explicitly shown. Because of this, it is difficult to gain a reliable estimate of the share of capital in net-value added in this sector. The statement in the text is based on a number of indirect indications

higher than that in other industrialized countries. Because they did not pay for their land at current price, they do not include the full imputed rent on land used in production in their pricing policy of output. They treat the cost of land as a 'sunk' cost, and since, in fact, they did not pay for it, they can satisfy creditors even though they are not earning the proper return on it. On the other hand, the market for equity has recognized the value of land and priced the equity shares accordingly, thus making the earning-price ratio look very low. Since, until recently, the real price of land relative to the output of firms kept increasing, and this increase was reflected in the increase in the market price of equity shares, equity owners received, or expected to receive, a reasonable rate of return.

If our hypothesis is right, in Japan we had a curious phenomena in which the extraordinarily high price of land was reflected in the value of corporate shares while it was not reflected in the cost of production and output prices, and the situation was sustained by the perpetual increases in the relative price of land. It had an effect that the conventionally calculated cost of capital appeared low, while the cost of capital for new firms which had to purchase land at the current price was exceptionally high, thus preventing the formation of new firms and making the penetration of the Japanese market by foreign firms difficult.

While our hypothesis appears to be capable of reconciling some contradictory observations on the Japanese cost of capital and related phenomena, we are unable at this time to provide convincing support for it because we cannot locate a number of critical data needed for doing so. We hope that we will be able to enlist the cooperation of Japanese officials with access to the necessary data, since clarification of the questions raised here would provide important insights not only into the Japanese capital market but also to the capital markets of other countries.

Table 1.
Average Rate of Return
A.
Accounting Returns,
Unadjusted

USA

Period	E/P	R/K After Tax, Taxed Bonds	R/K Before Tax
(1) 1956~94	0.083	0.070	0.125
(2) 1967~94	0.091	0.076	0.135
(3) 1976~93	0.099	0.083	0.146

JAPAN

(2)* 1967~94	0.051	0.042	0.077
(2a) 1967~83	0.065	0.053	0.093
(2b) 1985~94	0.028	0.024	0.050
(4a) 1985~89	0.032	0.027	0.057
(4b) 1990~94	0.024	0.021	0.044

CANADA

(3) 1976~93	0.167	0.124	0.179

* 1984 is missing from averages reported in this row

Table 1.
Average Rate of Return
B.
Accounting Returns,
Adjusted

USA

Period	E/P	R/K After Tax, Taxed Bonds	R/K Before Tax
(1) 1956~94	0.085	0.054	0.109
(2) 1967~94	0.095	0.056	0.115
(3) 1976~93	0.104	0.061	0.124

JAPAN

(2)* 1967~94	0.068	0.023	0.057
(2a) 1967~83	0.092	0.025	0.064
(2b) 1985~94	0.028	0.018	0.044
(4a) 1985~89	0.032	0.022	0.052
(4b) 1990~94	0.023	0.013	0.036

CANADA

(3) 1976~93	0.163	0.093	0.147

* 1984 is missing from averages reported in this row

Table 1.
Average Rate of Return
C.
Market Return

USA

Period	E/P	R/K After Tax, Taxed Bonds	R/K Before Tax
(1) 1956~94	0.080	0.053	0.109
(2) 1967~94	0.076	0.044	0.105
(3) 1976~93	0.102	0.061	0.126

JAPAN

(2)* 1967~94	0.072	0.018	0.053
(2a) 1967~83	0.075	0.016	0.057
(2b) 1985~94	0.066	0.020	0.045
(4a) 1985~89	0.249	0.113	0.141
(4b) 1990~94	-0.116	-0.072	-0.051

CANADA

(3) 1976~93	0.065	0.025	0.084

* 1984 is missing from averages reported in this row

Table 2.

Adjusted Accounting Rate of Return to Capital

Before Tax

Industry Breakdown

	USA		CANADA
Period / **Industry**	1955~94	1967~93	1967~93
Agriculture and Primary Industries	0.102	0.101	0.118
Manufacturing and Construction	0.118	0.137	0.119
Transportation and Public Utilities	0.091	0.101	0.212
Trade	0.111	0.126	0.150
Services and Public Administration	0.108	0.122	0.042

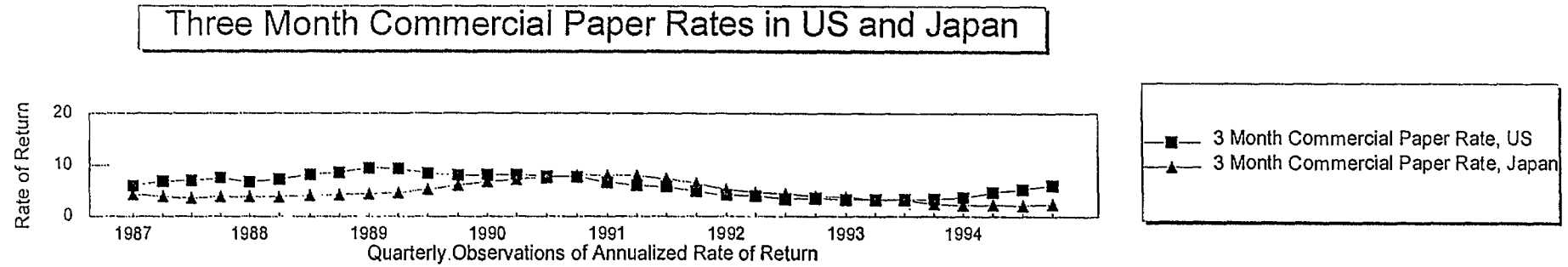
Table 3
Conventional Dividend-Price Ratio and Price-Earnings Ratio
Japan

	Dividend/Price Ratio		Price/Earnings Ratio	
Year	Tokyo Stock Exchange First Division*	Whole Non-financial Corporate Sector**	Tokyo Stock Exchange First Division*	Whole Non-financial Corporate Sector**
1975	0.029	0.045	27	673.75
1976	0.018	0.047	46.3	19.51
1977	0.02	0.034	24.2	16.55
1978	0.015	0.04	34.3	7.71
1979	0.016	0.03	23.3	10.23
1980	0.016	0.03	20.4	12.50
1981	0.016	0.032	21.1	12.64
1982	0.016	0.027	25.8	13.22
1983	0.012	0.03	34.7	11.96
1984	0.01	0.023	37.9	12.37
1985	0.01	0.022	32.2	12.34
1986	0.007	0.02	47.3	12.13
1987	0.006	0.014	58.3	16.83
1988	0.005	0.012	58.4	18.24
1989	0.004	0.012	70.6	26.00
1990	0.007	0.008	39.8	42.73
1991	0.007	0.012	37.8	37.19
1992	0.01	0.011	36.7	41.76
1993	0.009	0.017	64.9	20.93
1994	0.008		79.5	

* Bank of Japan, Economic Statistic Annual, 1994,p.246

** Economic Planning Agency, Government of Japan, Annual Report on National Accounts, 1995, pp.86-87 and pp.332-335

FIGURE 1


Three Month Commercial Paper Rates in US and Japan
Rate of Return
20
10
0
1987
1988
1989
1990
1991
1992
1993
1994
Quarterly Observations of Annualized Rate of Return
3 Month Commercial Paper Rate, US
3 Month Commercial Paper Rate, Japan

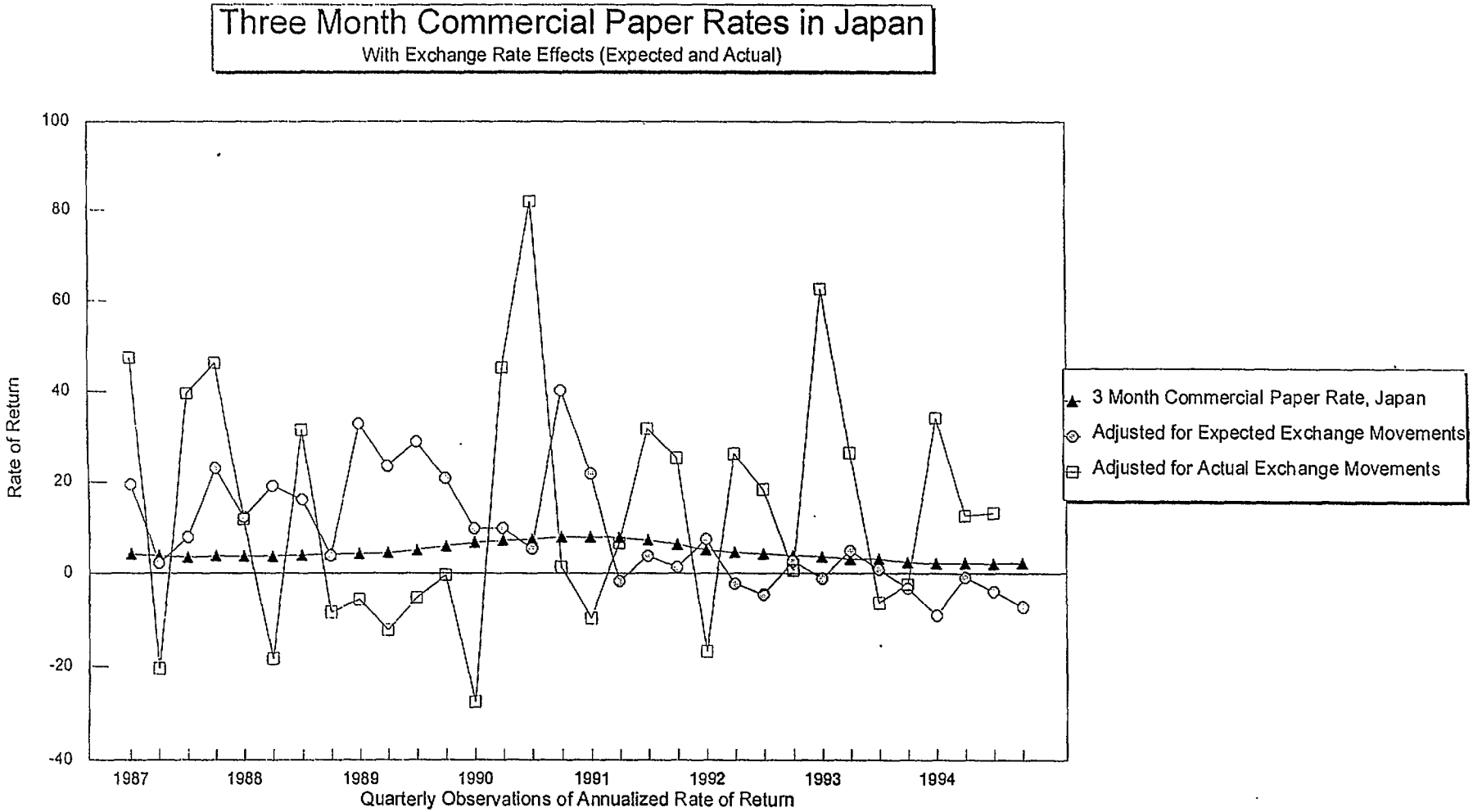

Three Month Commercial Paper Rates in Japan
With Exchange Rate Effects (Expected and Actual)
Rate of Return
100
80
60
40
20
0
-20
-40
1987
1988
1989
1990
1991
1992
1993
1994
Quarterly Observations of Annualized Rate of Return
3 Month Commercial Paper Rate, Japan
Adjusted for Expected Exchange Movements
Adjusted for Actual Exchange Movements

Figure 2.1

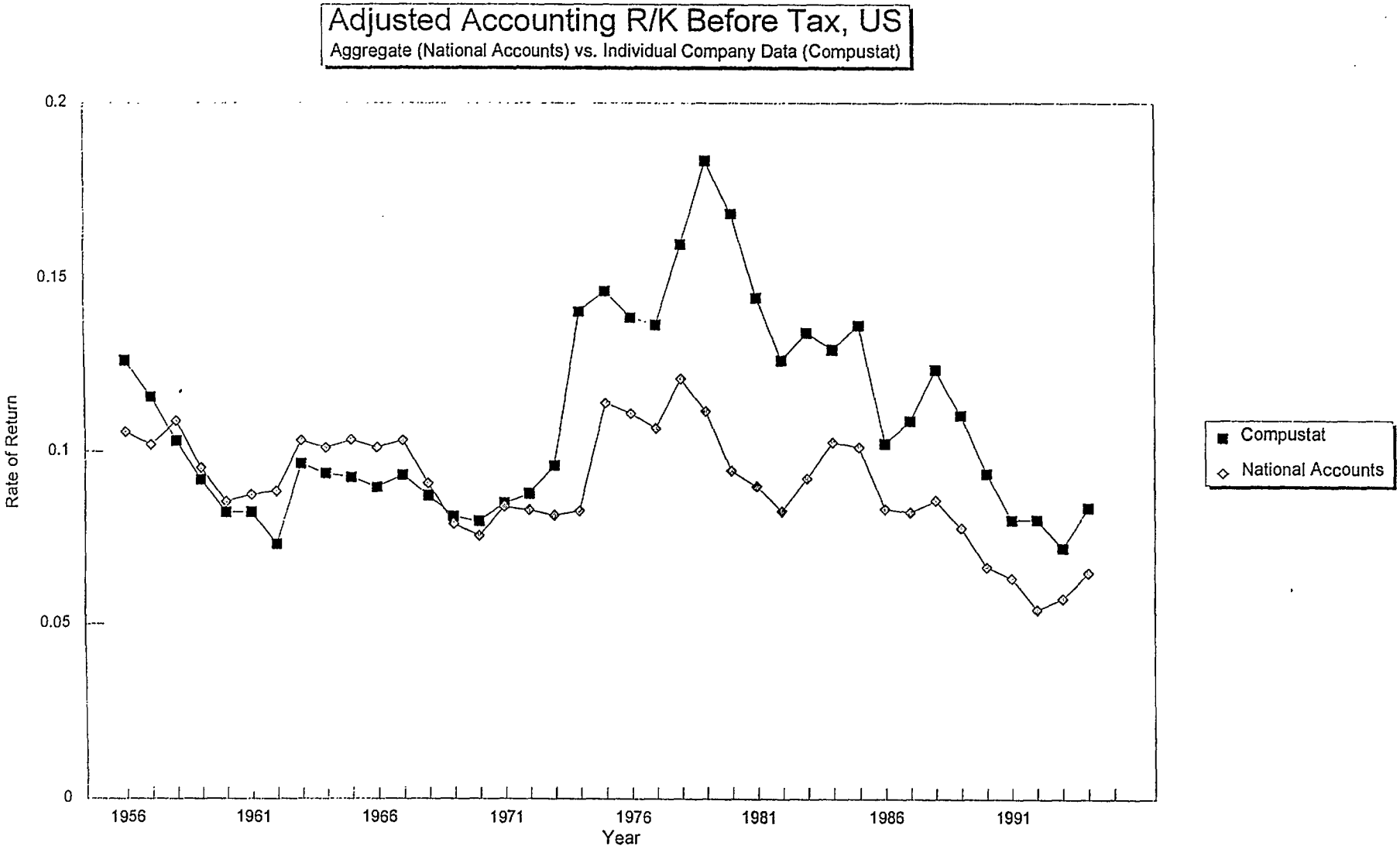

Adjusted Accounting R/K Before Tax, US
Aggregate (National Accounts) vs. Individual Company Data (Compustat)
0.2
0.15
0.1
0.05
0
Rate of Return
1956
1961
1966
1971
1976
1981
1986
1991
Year
Compustat
National Accounts

FIGURE 2.2

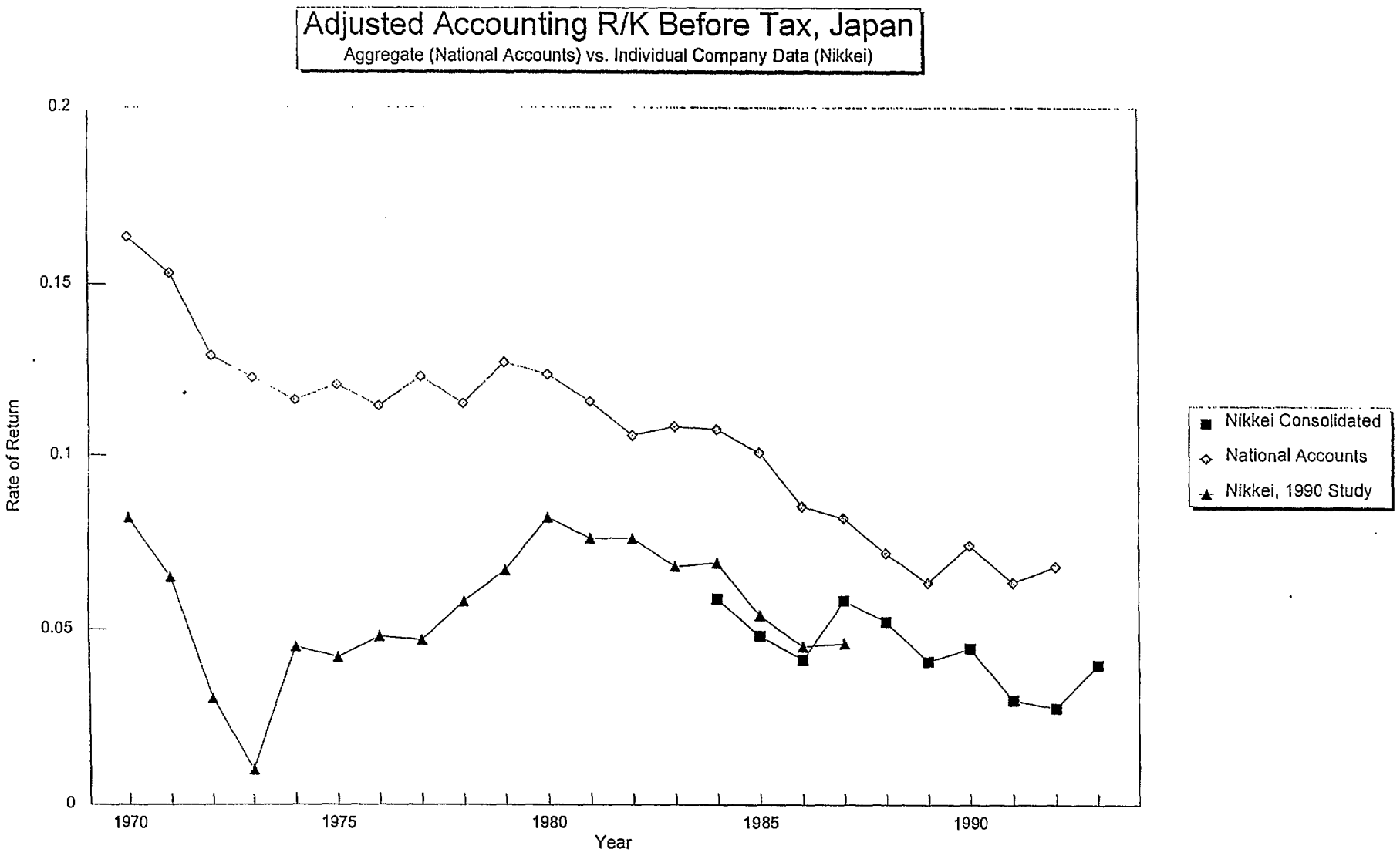

Adjusted Accounting R/K Before Tax, Japan
Aggregate (National Accounts) vs. Individual Company Data (Nikkei)
0.2
0.15
0.1
0.05
0
Rate of Return
1970
1975
1980
1985
1990
Year
Nikkei Consolidated
National Accounts
Nikkei, 1990 Study

FIGURE 3.1.1

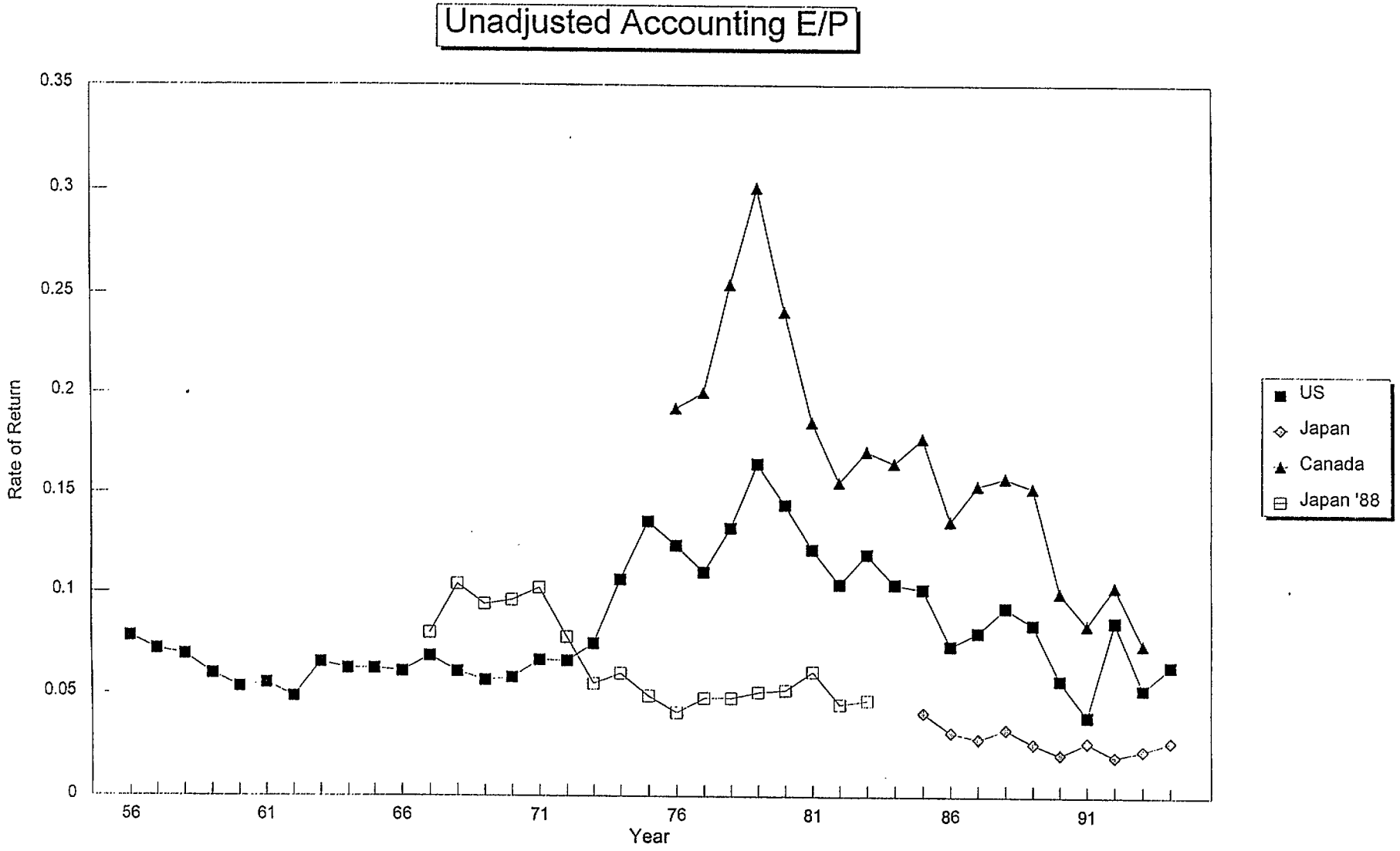

Unadjusted Accounting E/P
Rate of Return
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

FIGURE 3.1.2

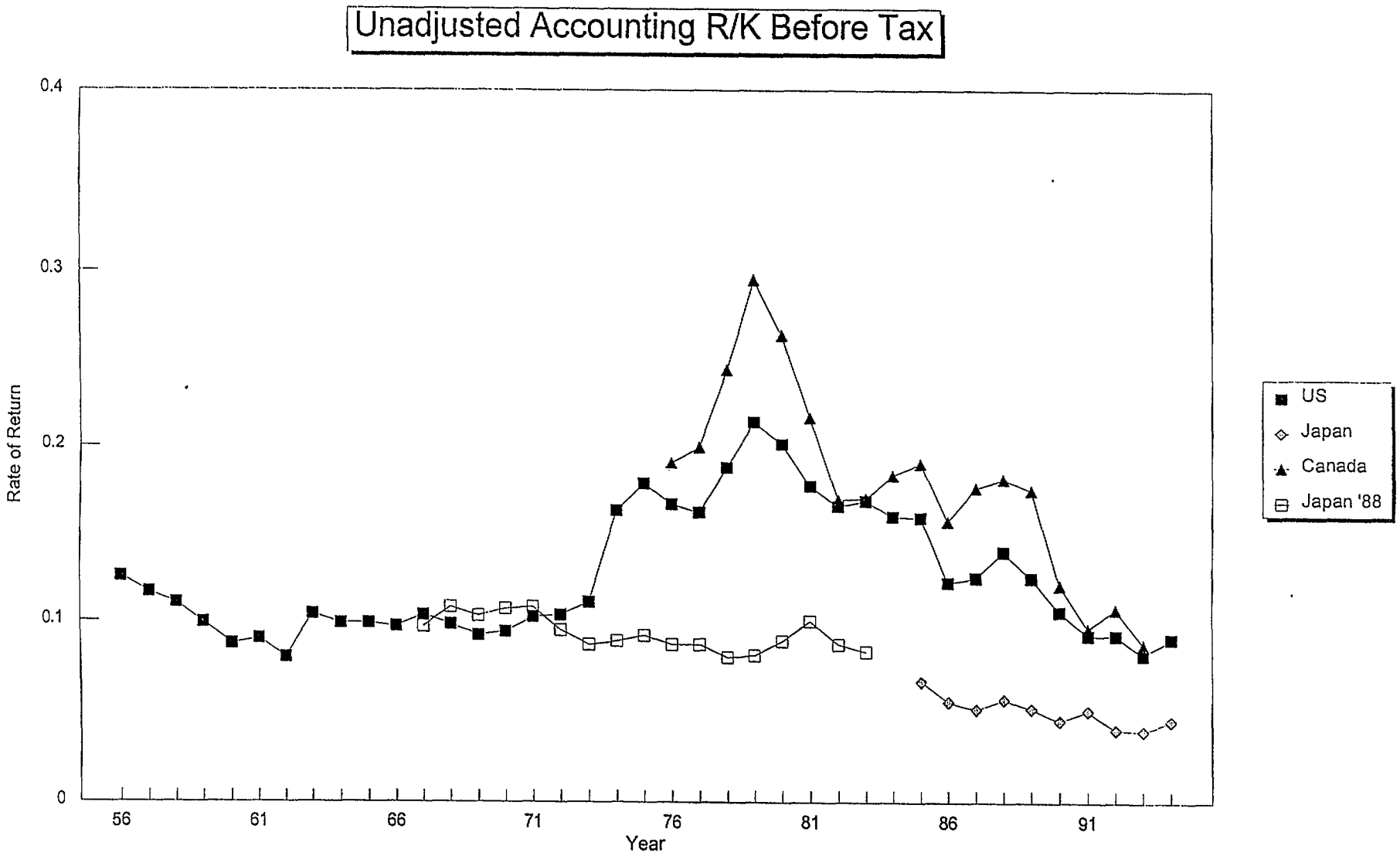

Unadjusted Accounting R/K Before Tax
0.4
0.3
0.2
0.1
0
Rate of Return
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

FIGURE 3.1.3

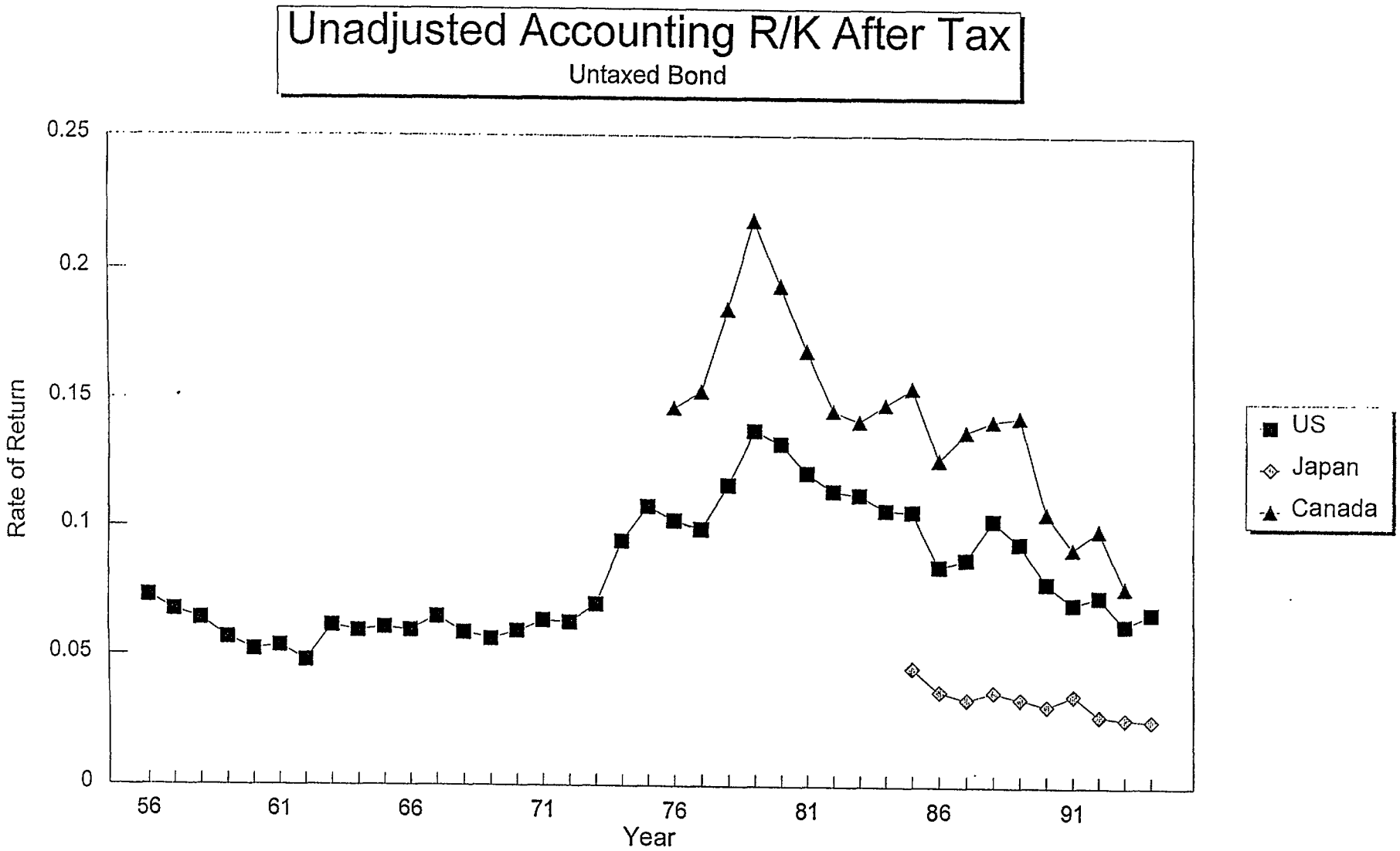

Unadjusted Accounting R/K After Tax
Untaxed Bond
Rate of Return
0.25
0.2
0.15
0.1
0.05
0
56
61
66
71
76
81
86
91
Year
US
Japan
Canada

FIGURE 3.1.4

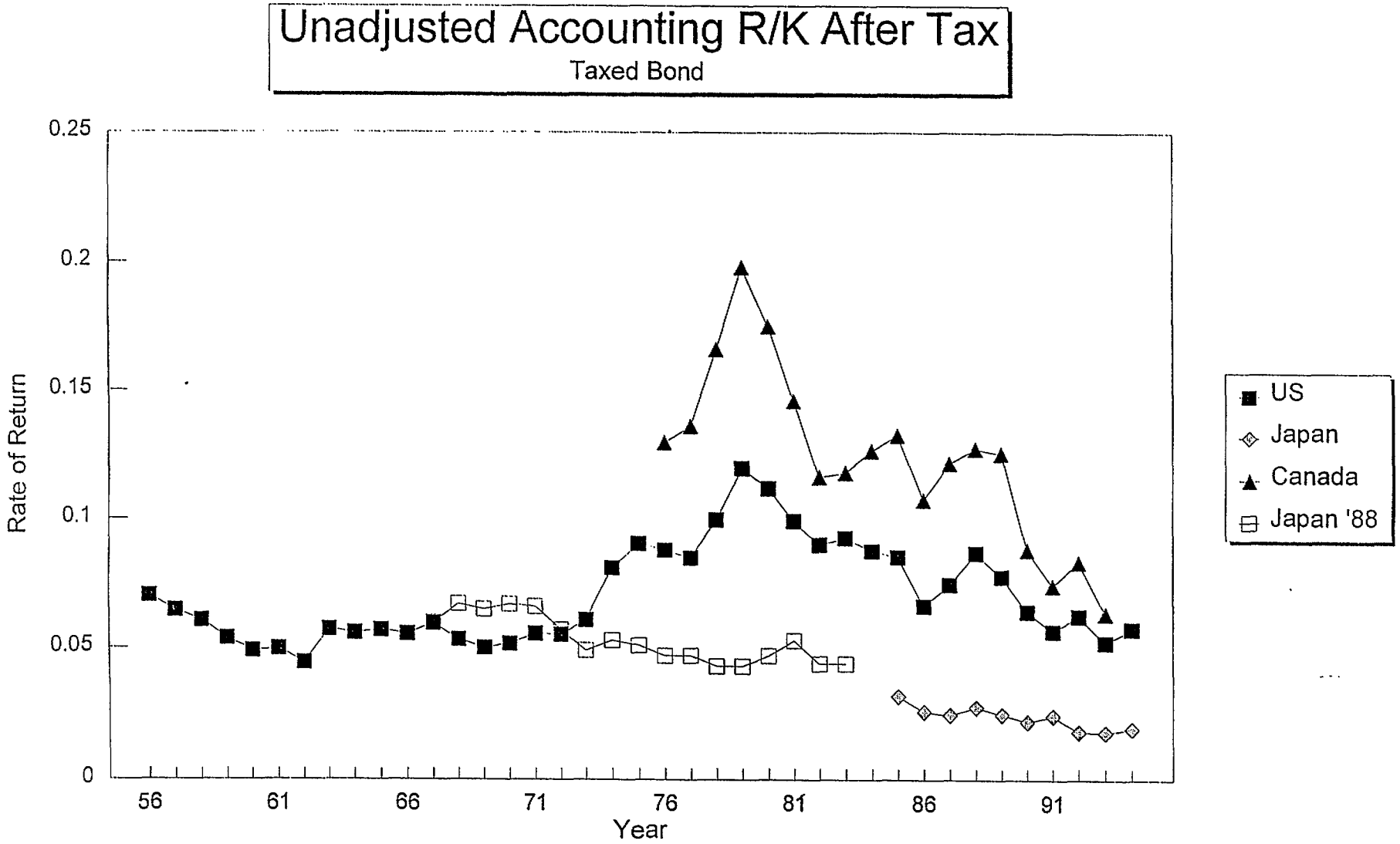

Unadjusted Accounting R/K After Tax
Taxed Bond
Rate of Return
0.25
0.2
0.15
0.1
0.05
0
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

FIGURE 3.2.1

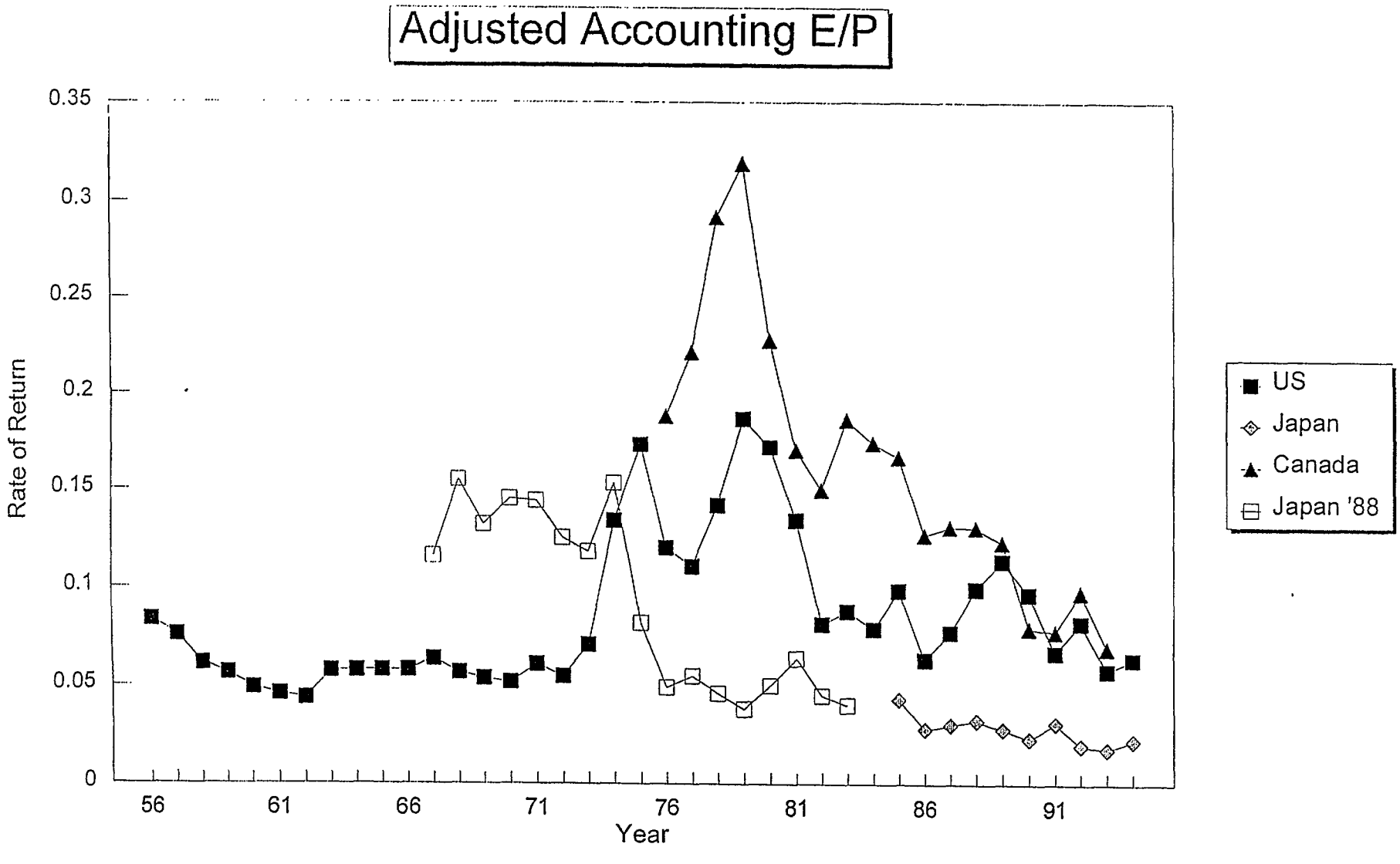

Adjusted Accounting E/P
Rate of Return
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

Figure 3.2.2

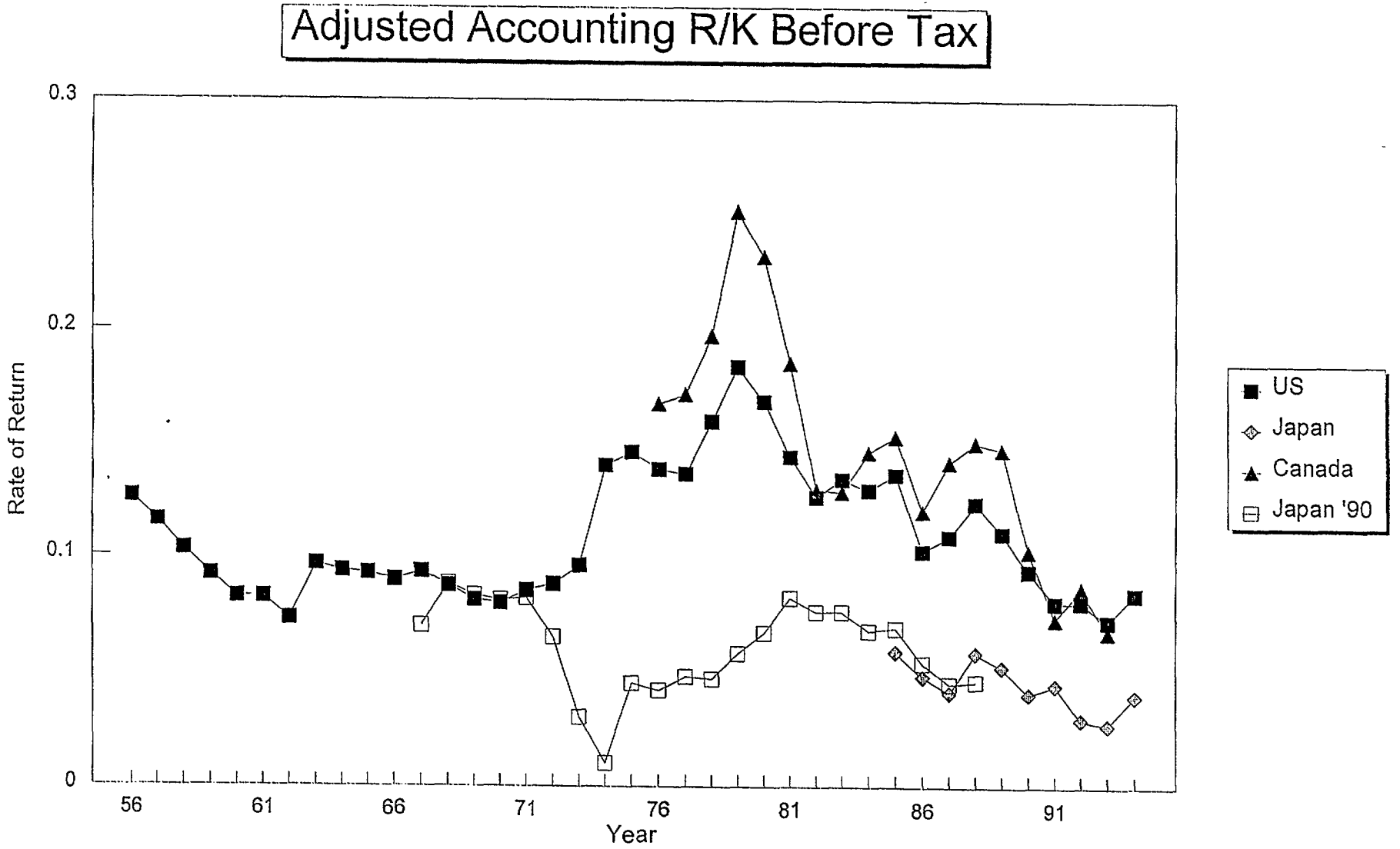

Adjusted Accounting R/K Before Tax
0.3
0.2
0.1
0
Rate of Return
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '90

FIGURE 3.2.3

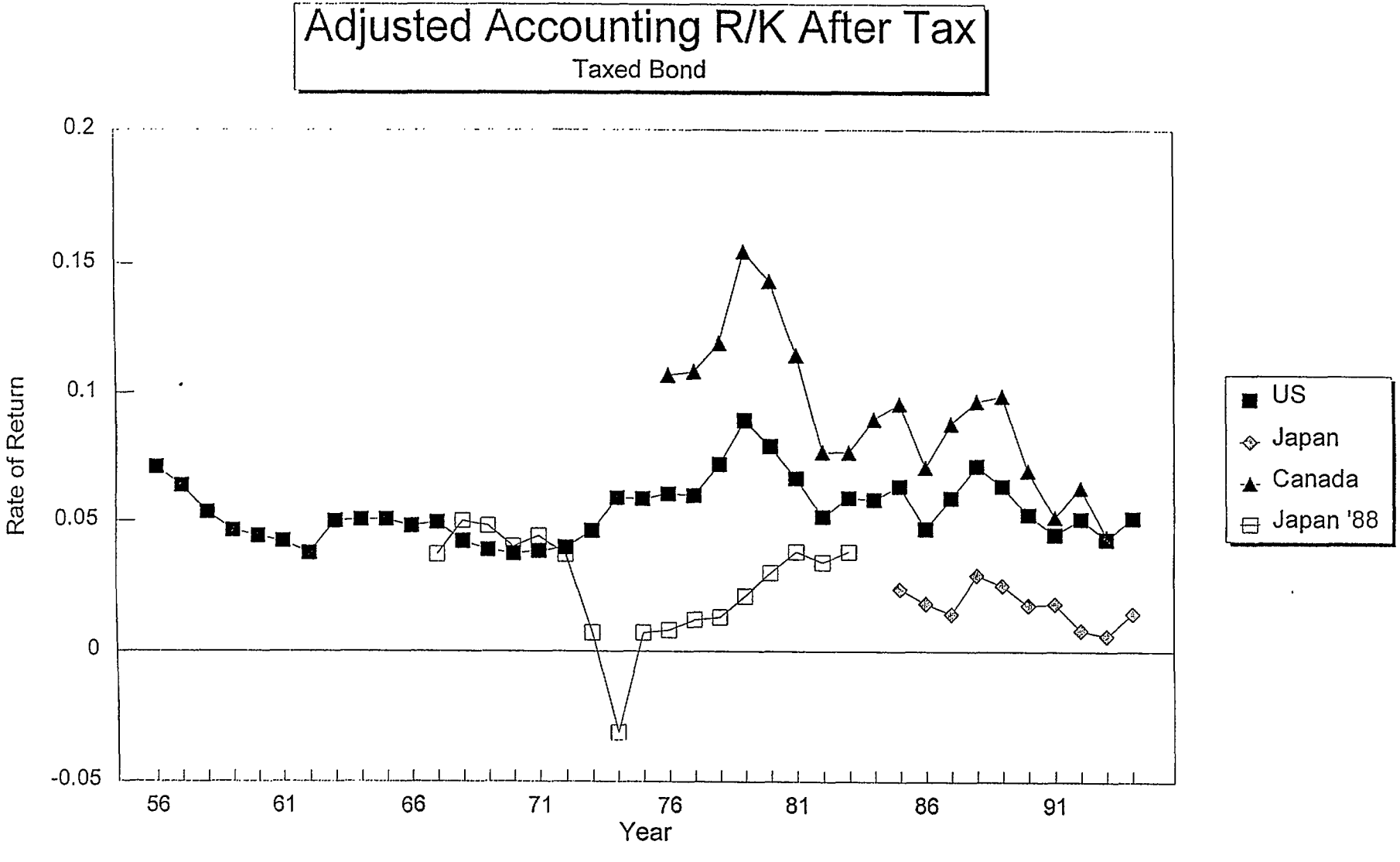

Adjusted Accounting R/K After Tax
Taxed Bond
0.2
0.15
0.1
0.05
0
-0.05
Rate of Return
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

Figure 3.2.4

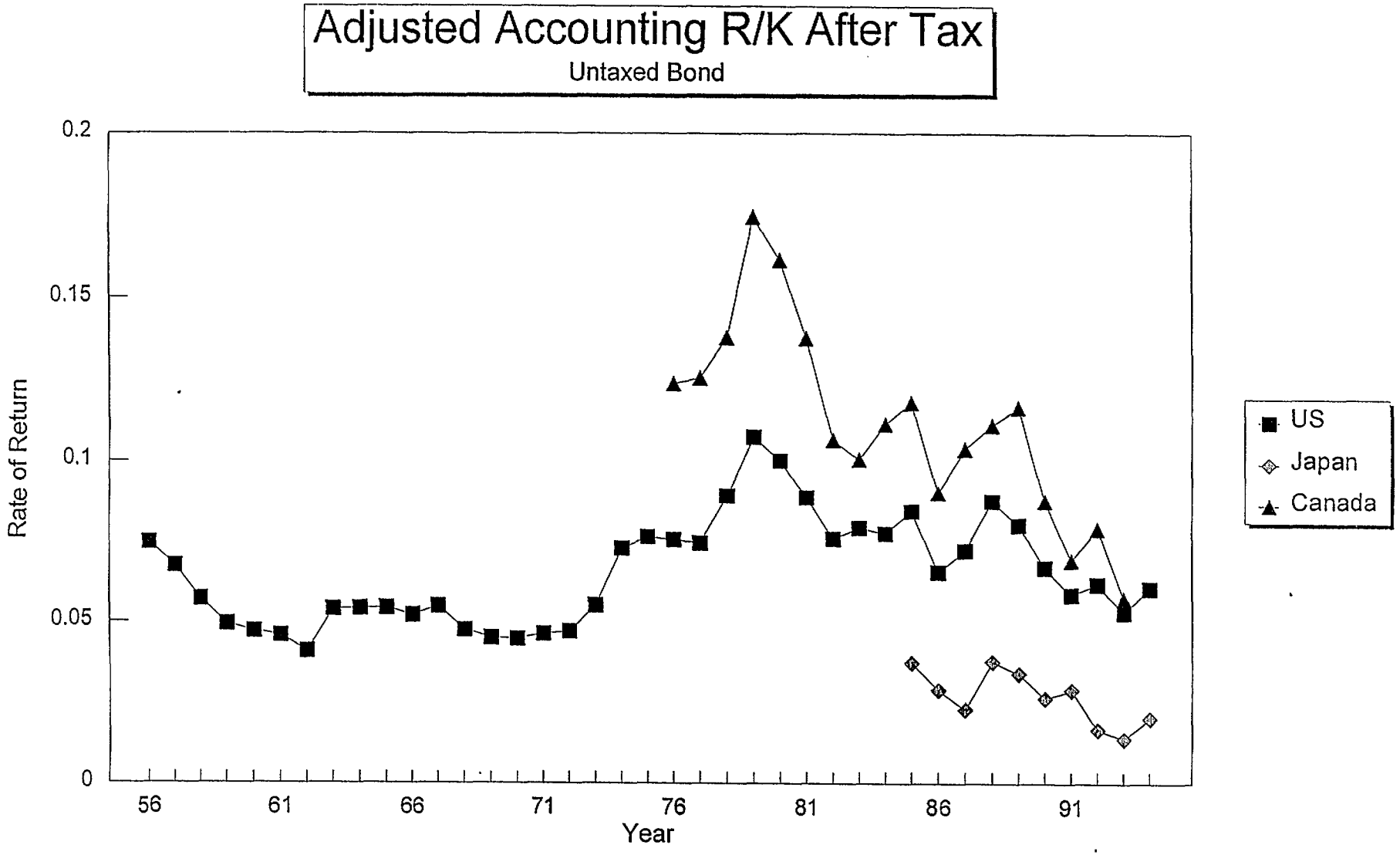

Adjusted Accounting R/K After Tax
Untaxed Bond
Rate of Return
0.2
0.15
0.1
0.05
0
56
61
66
71
76
81
86
91
Year
US
Japan
Canada

FIGURE 3.3.1

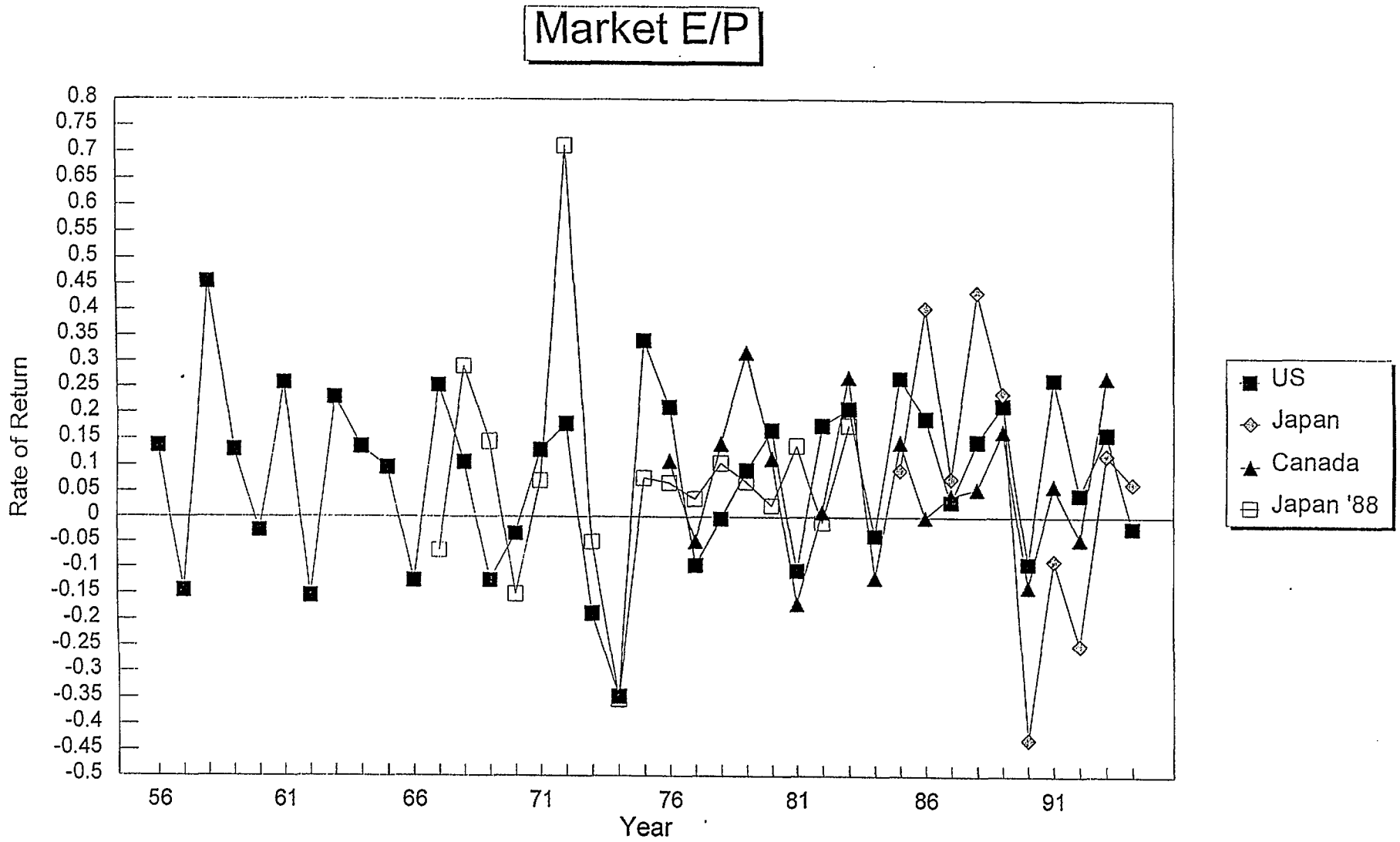

Market E/P
Rate of Return
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
-0.45
-0.5
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

Figure 3.3.2

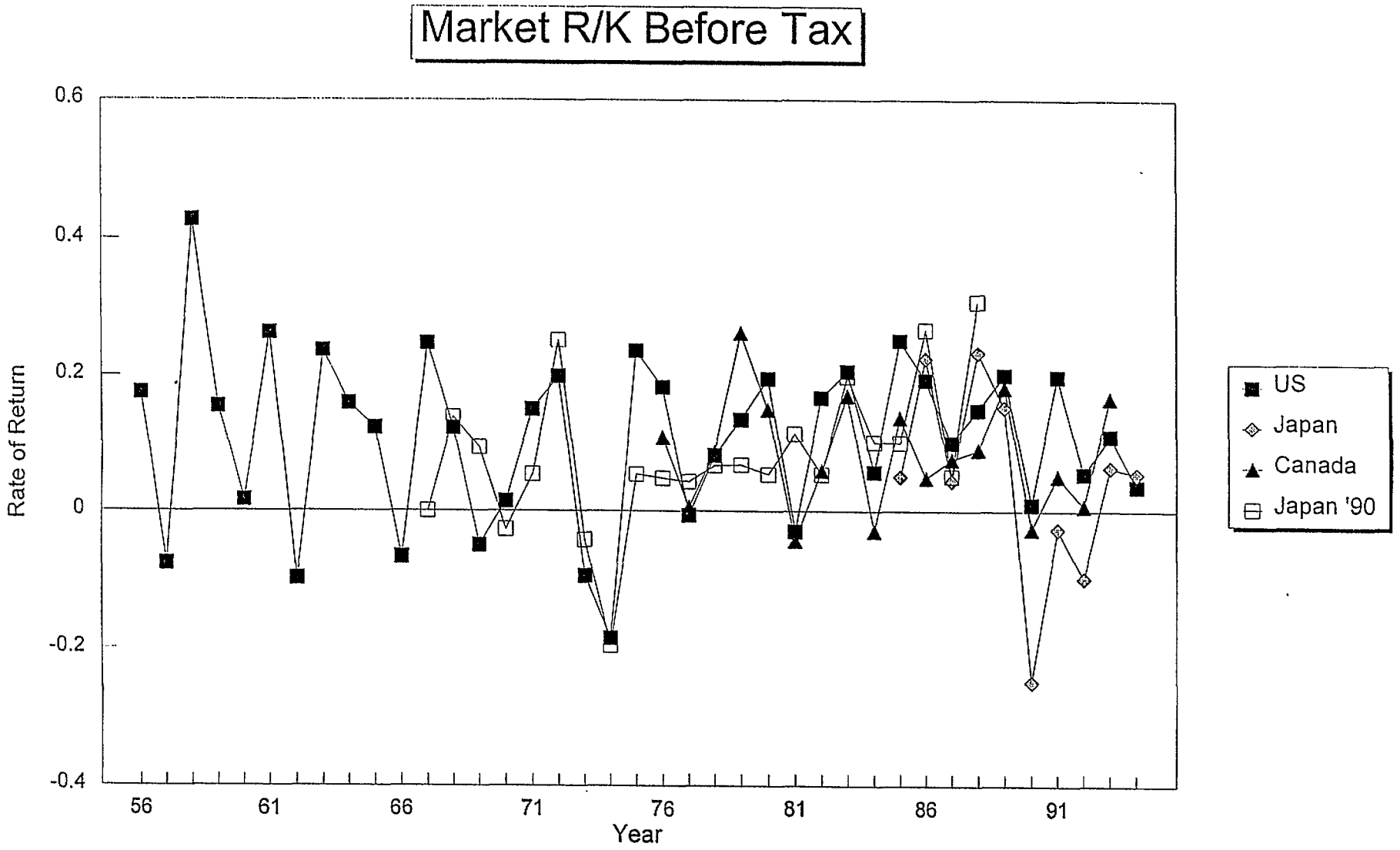

Market R/K Before Tax
0.6
0.4
0.2
0
-0.2
-0.4
Rate of Return
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '90

FIGURE 3.3.3

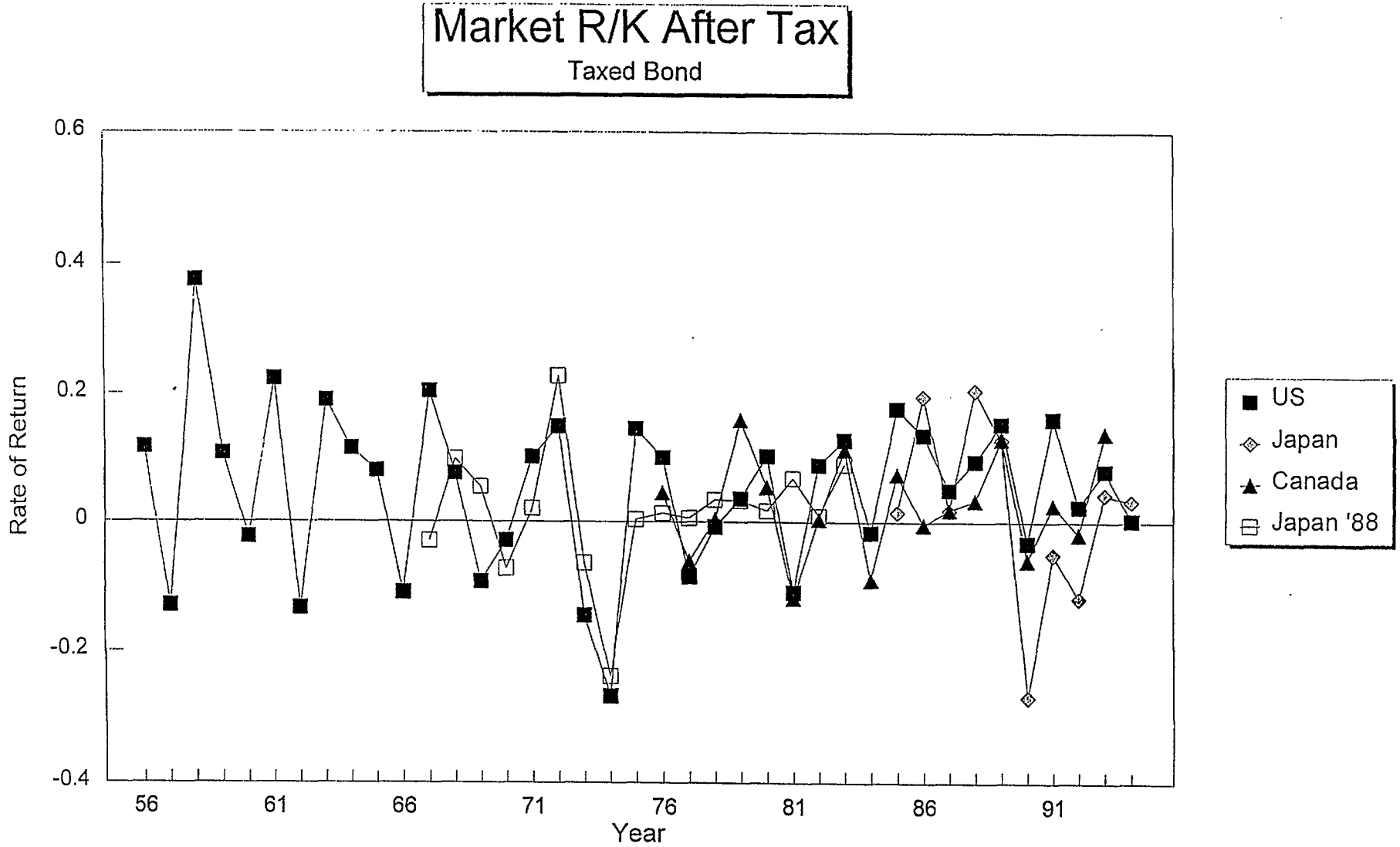

Market R/K After Tax
Taxed Bond
0.6
0.4
0.2
0
-0.2
-0.4
Rate of Return
56
61
66
71
76
81
86
91
Year
US
Japan
Canada
Japan '88

FIGURE 3.3.4

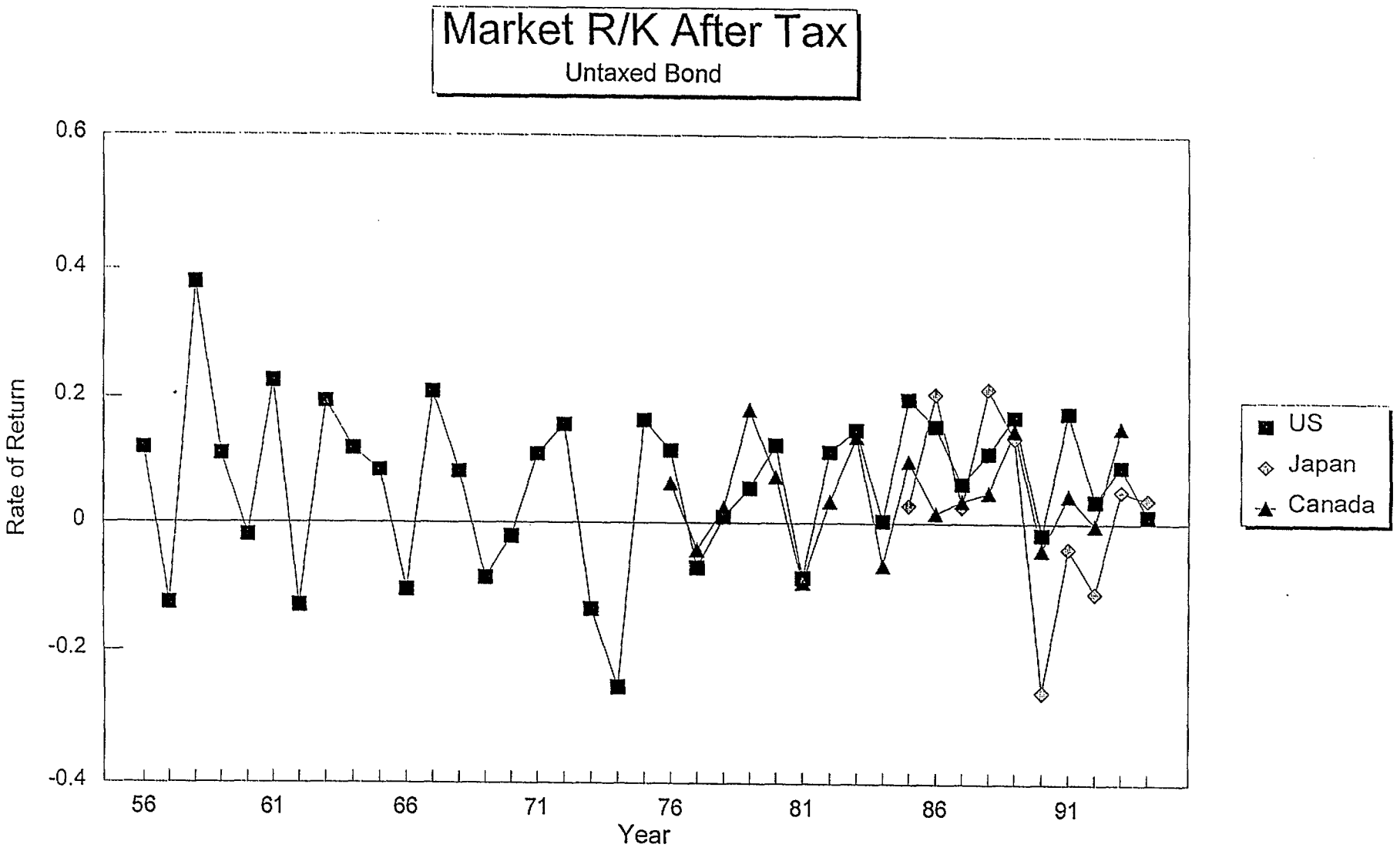

Market R/K After Tax
Untaxed Bond
Rate of Return
0.6
0.4
0.2
0
-0.2
-0.4
56
61
66
71
76
81
86
91
Year
US
Japan
Canada

FIGURE 3.4.1

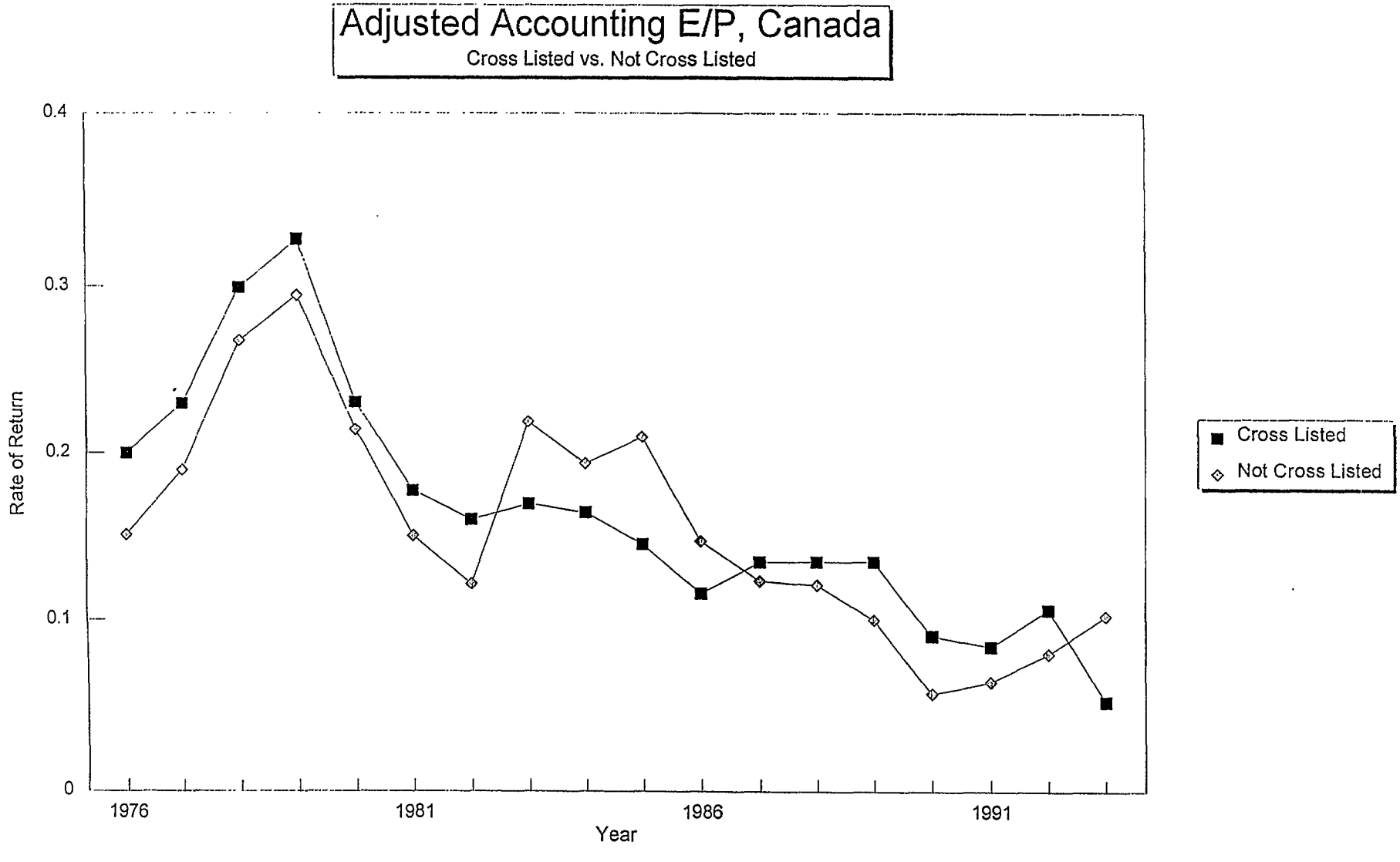

Adjusted Accounting E/P, Canada
Cross Listed vs. Not Cross Listed
0.4
0.3
0.2
0.1
0
Rate of Return
1976
1981
1986
1991
Year
Cross Listed
Not Cross Listed

FIGURE 3.4.2

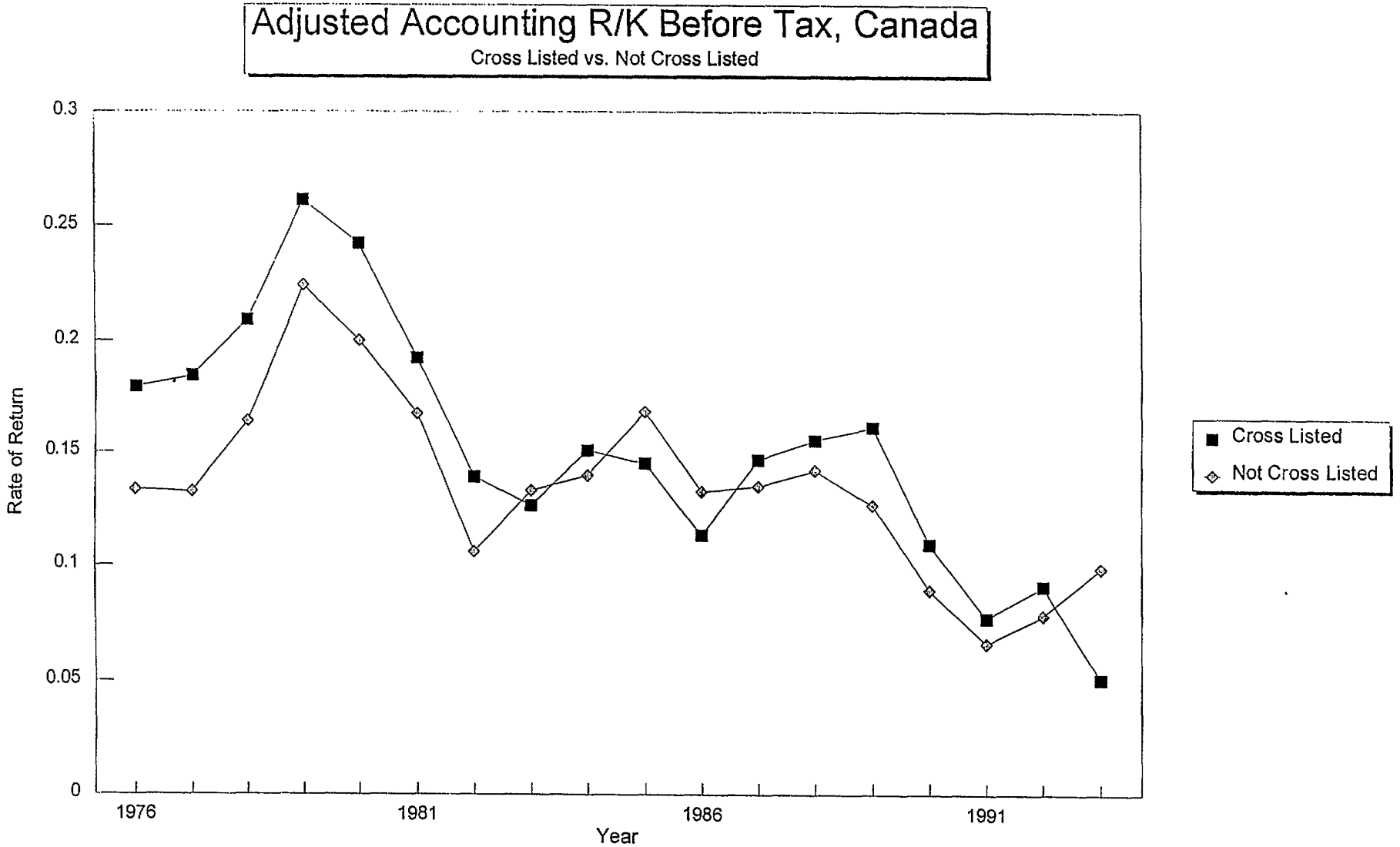

Adjusted Accounting R/K Before Tax, Canada
Cross Listed vs. Not Cross Listed
Rate of Return
0.3
0.25
0.2
0.15
0.1
0.05
0
1976
1981
1986
1991
Year
Cross Listed
Not Cross Listed

FIGURE 3.4.3

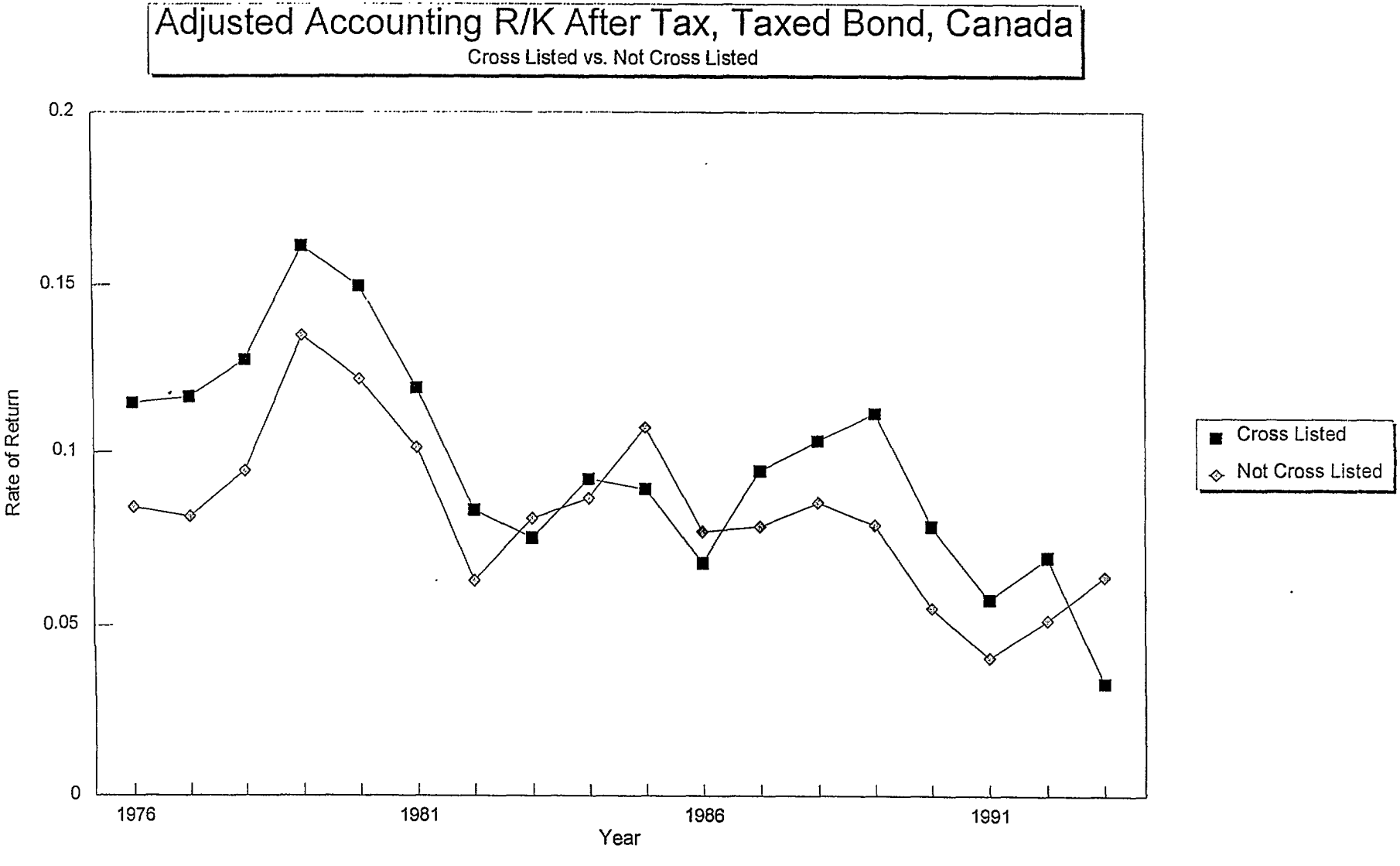

Adjusted Accounting R/K After Tax, Taxed Bond, Canada
Cross Listed vs. Not Cross Listed
0.2
0.15
0.1
0.05
0
Rate of Return
1976
1981
1986
1991
Year
Cross Listed
Not Cross Listed

FIGURE 3.4.4

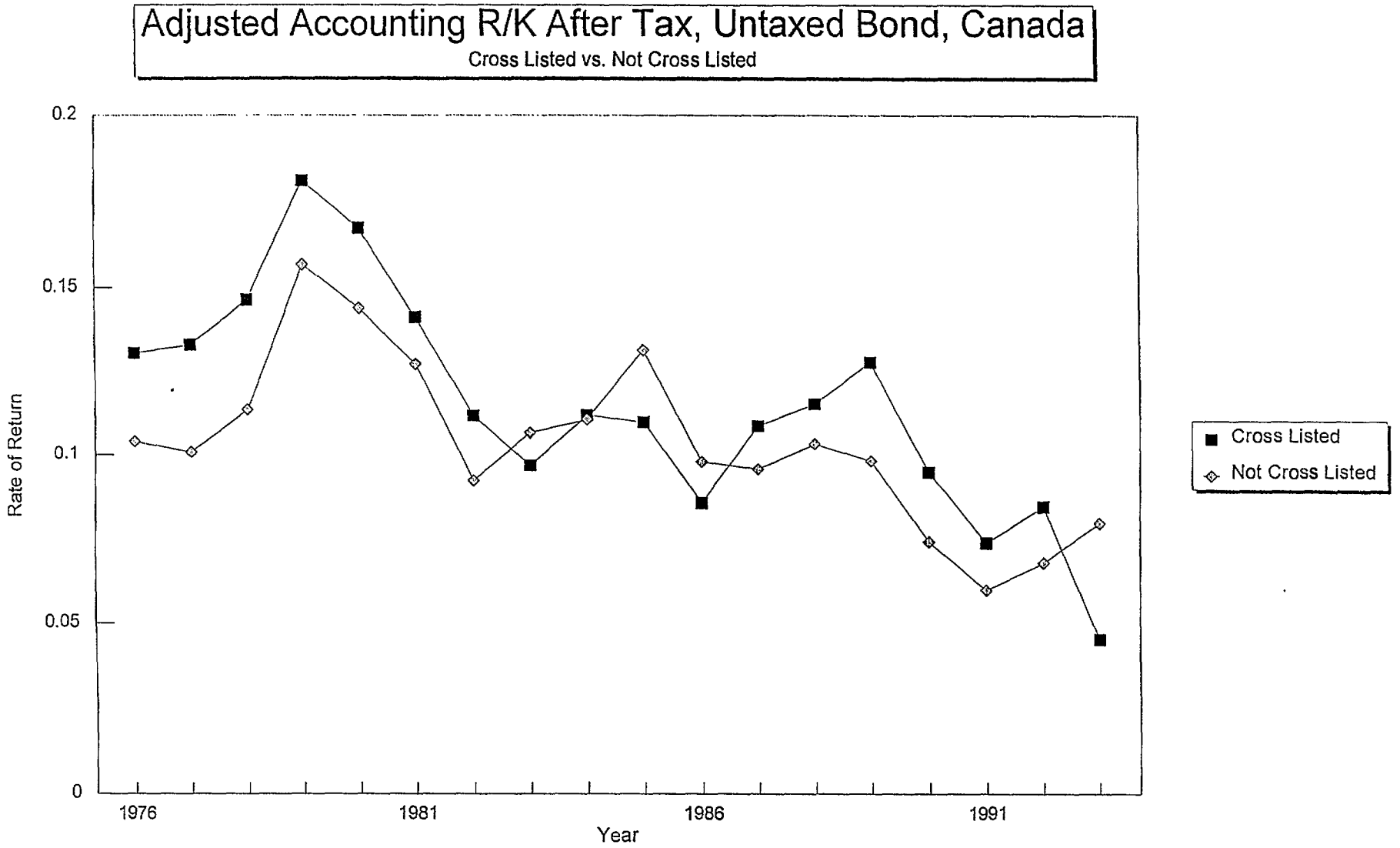

Adjusted Accounting R/K After Tax, Untaxed Bond, Canada
Cross Listed vs. Not Cross Listed
0.2
0.15
0.1
0.05
0
Rate of Return
1976
1981
1986
1991
Year
Cross Listed
Not Cross Listed

FIGURE 4

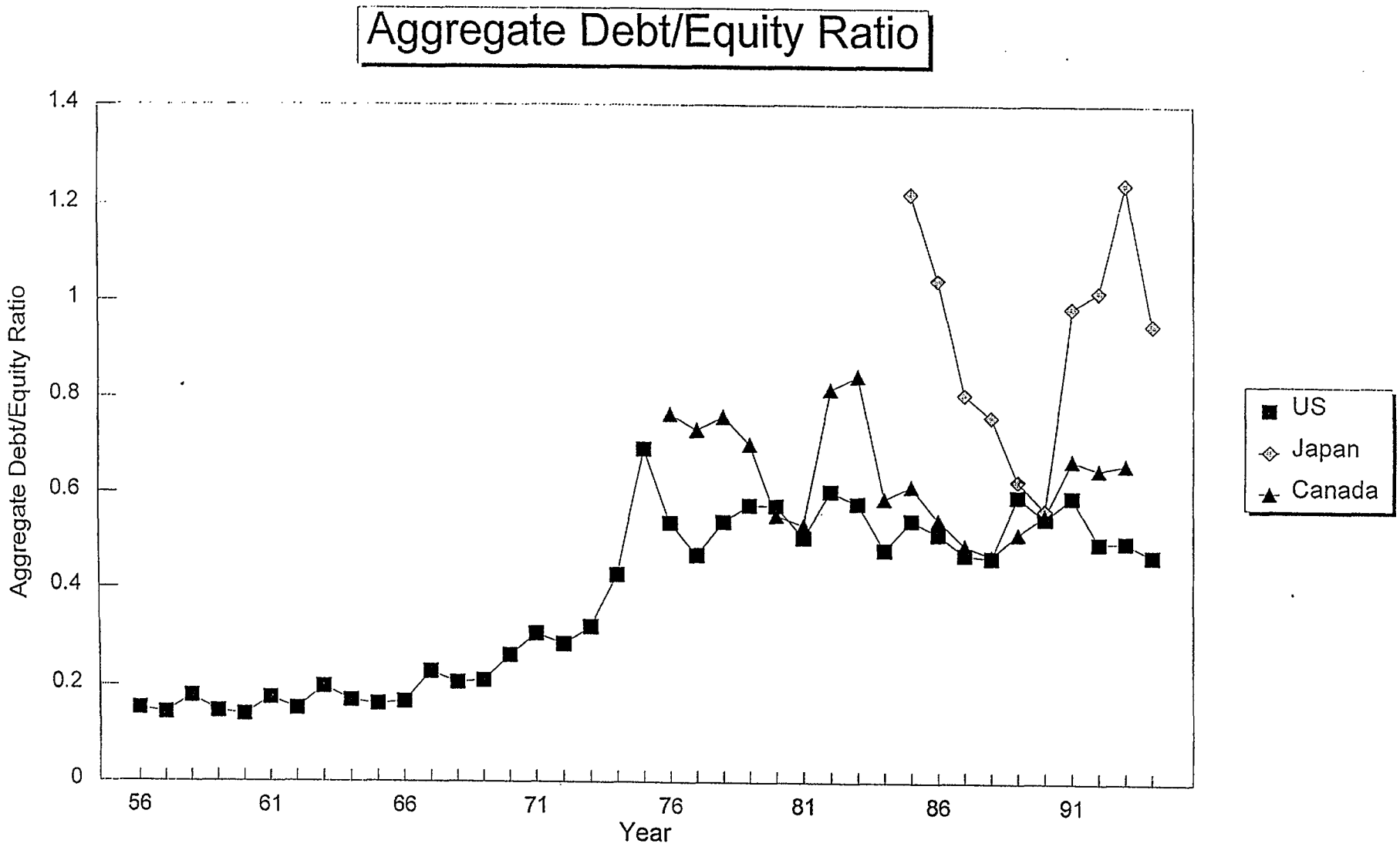
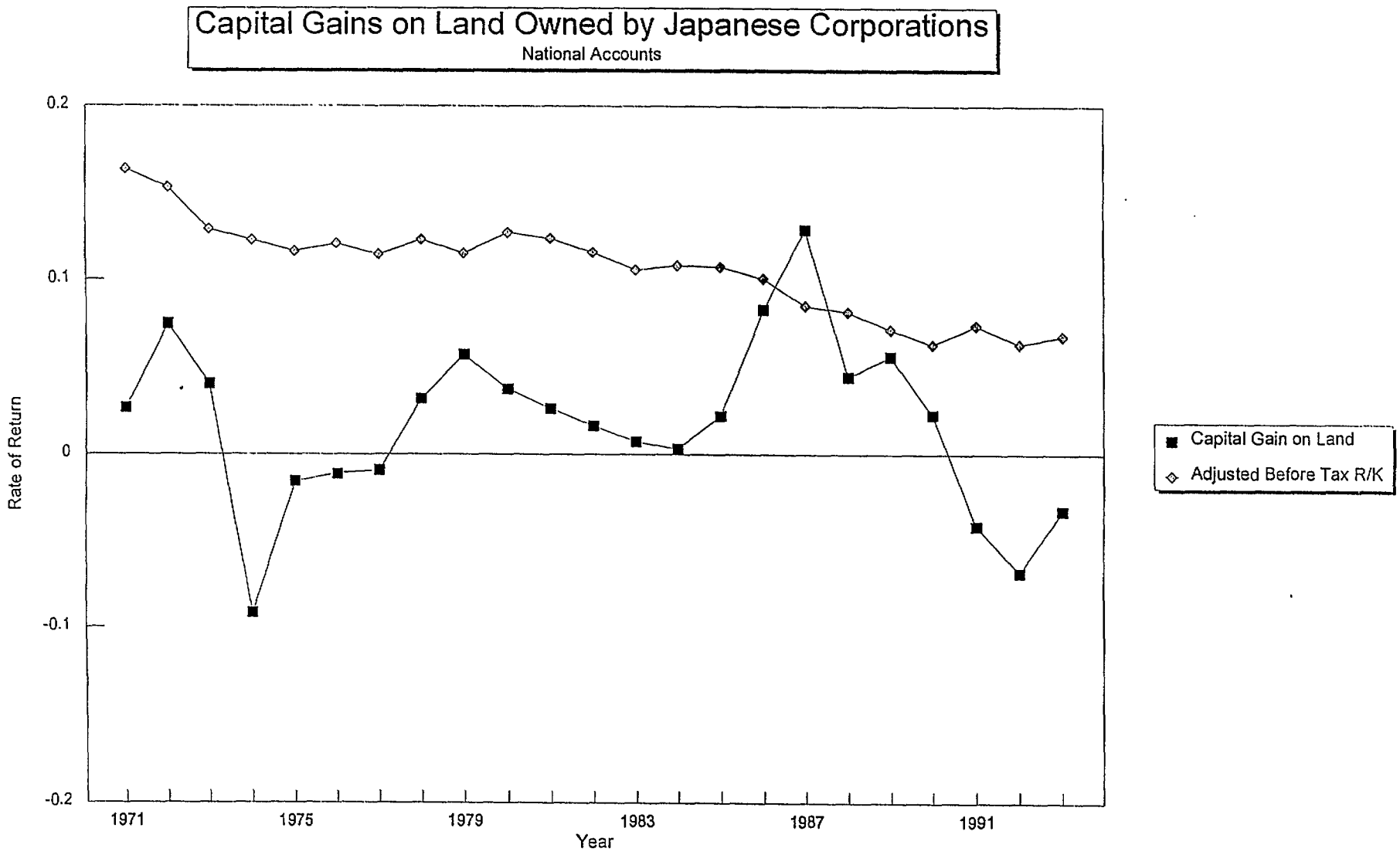

Aggregate Debt/Equity Ratio
Aggregate Debt/Equity Ratio
1.4
1.2
1
0.8
0.6
0.4
0.2
0
56
61
66
71
76
81
86
91
Year
US
Japan
Canada

FIGURE 5


Capital Gains on Land Owned by Japanese Corporations
National Accounts
0.2
0.1
0
-0.1
-0.2
Rate of Return
1971
1975
1979
1983
1987
1991
Year
Capital Gain on Land
Adjusted Before Tax R/K

The Impact of Taxation on Capital Markets

An International Comparison of Effective Tax Rates on Capital

Duanjie Chen *(University of Toronto)*

Kenneth J. McKenzie *(University of Calgary)*

Draft - Please Do Not Quote

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The Impact of Taxation on Capital Markets
An International Comparison of Effective Tax Rates on Capital

Duanjie Chen *(University of Toronto)*
Kenneth J. McKenzie *(University of Calgary)*

Executive Summary

This paper examines the potential impact of taxation on capital accumulation by calculating *marginal effective tax rates* (*metrs*) on capital for Canada and selected other countries. The *metr* on capital is a summary measure of the distortion in the rate of return to capital caused by the imposition of personal and corporate taxes. The paper also investigates the implications of risk and irreversibility for the impact of taxation on investment. By measuring the size of the distortion caused by the tax system some insights may be gained into the potential impact of taxation on capital accumulation, and therefore on economic growth.

The underlying motivation is that the "transmission mechanism" by which the tax system may affect growth and productivity is via its impact on investment in capital. Personal and corporate taxes can drive a wedge between the gross- and net-of-tax rates of return on capital. The size of this wedge is measured by the *metr* on capital. Economic theory suggests that this will in turn lead to a reduction in investment and capital accumulation, as well as to the introduction of inter-sectoral and inter-jurisdictional distortions to the extent that *metrs* vary by industry and location. These distortions potentially lead to an inefficient amount of capital employed in the economy, and to an inefficient allocation of capital across sectors and jurisdictions.

Some recent empirical research suggests that tax driven changes in the cost of capital can have a significant impact on investment. Moreover, there is some evidence that investment in physical

capital is an important determinant of productivity growth, and therefore plays an important role in promoting overall economic growth. This suggests that it is important to investigate the implications of taxation for capital accumulation. This paper takes the first step in this investigation by measuring the distortion to the return to capital suggested by the tax system.

The international comparison of *metrs* focuses on Canada and the other G7 countries - the U.S., the U.K, Germany, Italy, Japan and France - as well as Mexico and Hong Kong. Calculations are presented under three assumptions regarding the origin of investors - that they are domestic savers, Canadian multinational corporations, or U.S. multinational corporations. In terms of the *metr* facing domestic savers investing in capital in their own country, Canada compares favourably with the other countries. In particular, the *metr* facing domestic investors in Canada is the second lowest of the nine countries studied; only Hong Kong's is lower. This suggests that Canada's tax system results in a lower disincentive to invest in capital than some of its key competitors on international markets.

Regarding the tax incentives provided for Canadian multinational firms to invest abroad rather than at home, we find that the *metr* facing Canadian multinationals investing elsewhere is generally higher than the *metr* on domestic investment in Canada; again, the exception is investments in Hong Kong. As such, the tax system in Canada relative to the other countries does not appear to provide a substantial incentive for capital to leave the country.

We also calculate *metrs* for U.S. multinationals investing in Canada and elsewhere. We find that, again with the exception of Hong Kong, the *metr* facing U.S. multinationals investing in Canada is the lowest of those studied. Indeed, for the manufacturing sector the *metr* on a U.S. multinational investing in Canada is lower than the *metr* on a U.S. company investing at home. These calculations suggest that, all else being equal, Canada's tax system acts to attract investment from the U.S.

We also examine the variation in *metrs* across provinces and sectors within Canada. We find that the variation in *metrs* across provinces is quite pronounced. This suggests that the tax system encourages an inefficient allocation of capital across the provinces. Moreover, there are substantial inter-sectoral distortions, as *metrs* vary significantly by industry. The inter-sectoral variation in *metrs* is suggestive of a tax system which may act to impede overall economic growth by distorting the allocation of capital within the country.

When risk is incorporated into the analysis, the *metrs* on capital increase substantially, as does the inter-sectoral variation. Thus, the tax system appears not to only discriminate against riskier investments, but also inter-sectoral distortions are more pronounced in the presence of risk.

Recent attention has focused on the implications of irreversibility for investment decisions. An investment is irreversible when the capital is (partly) sunk, and disinvestment or the conversion of capital to other uses is costly. It is shown that when capital is both irreversible and risky, *metrs* increase further still, as does the inter-sectoral variation. The implication is that if capital is both irreversible and risky, the tax system may impinge upon investment decisions to a much greater extent than previously suspected.

In light of the evidence linking lower taxes to higher investment, and higher investment to higher growth, the policy implications of the results are potentially quite important. Although we find that Canada's tax system compares relatively well internationally, there is nonetheless scope for improvement. Moreover, Canada's tax system displays a great deal of inter-sectoral and inter-provincial variation in effective tax rates, and discriminates significantly against risky and irreversible capital. Given recent evidence that it is not so much the level of savings and investment that matter for economic growth, but rather whether that investment is allocated efficiently, the presence of these distortions suggest scope for growth enhancing changes to the tax system as it relates to capital.

I. Introduction

The purpose of this paper is to examine the potential impact of taxation on the accumulation of physical capital by calculating *marginal effective tax rates* (*metrs*) on capital for Canada and selected other countries. The *metr* on capital is a summary measure of the distortion to the return to capital caused by the imposition of personal and corporate taxes on capital. We also investigate the implications of risk and irreversibility for the impact of taxation on investment. By measuring the size of the distortion caused by the tax system, we are able to gain some insights into the potential impact of taxation on capital accumulation, and therefore also on economic growth.

The paper investigates just one aspect of the process linking taxation to growth. The underlying motivation is that the "transmission mechanism" by which the tax system may affect economic growth and productivity is via its impact on investment in capital. Personal and corporate taxes on capital drive a wedge between the gross- and net-of-tax rates of return to capital. The size of this wedge is measured by the *metr* on capital. Neo-classical economic theory, and its extensions, suggest that this will in turn lead to a reduction in investment and capital accumulation, as well as to the introduction of inter-sectoral and inter-jurisdictional distortions to the extent that *metrs* vary by industry and location. These distortions can lead to an inefficient amount of capital employed in the economy, and to an inefficient allocation of capital across assets and jurisdictions, potentially impeding economic growth and productivity.

Recently, much of the research on economic growth has focused on the role of externalities in technology development and human capital accumulation within the context of the so-called "new growth theory".[1] As a consequence of this focus, the role of investment in physical capital in

[1]See, for example, Romer (1986).

promoting growth has perhaps been somewhat overlooked. Recent empirical evidence, most importantly De Long and Summers (1991), has resurected the traditional view that investment in physical capital, most particularly machinery and equipment, is an important determinant of productivity growth, and therefore plays an important role in promoting economic growth. Using disaggregated investment data for several countries, De Long and Summers (1991) find that over the period from 1960 to 1985 each extra percent of GDP investment in equipment was associated with an increase in GDP growth of one third of a percentage point per year. This is a very strong association, which the authors suggest, for numerous reasons, is causal.

Moreover, some recent empirical evidence, such as Auerbach and Hassett (1992) and Cummins and Hassett (1992), also based upon disaggregated data, suggests that taxes on capital can have a significant impact on investment. Some of the estimates of Cummins and Hasset (1992), for example, suggest that the elasticity of investment with respect to tax driven changes in the user cost of capital are in the neighborhood of unity. Again, this is a very strong relationship.

As such, there is good reason to investigate the potential impact of taxation on capital accumulation. In this paper we examine the first stage in this transmission process by measuring the distortion to the return to capital resulting from the tax system.

The remainder of the paper is organized as follows. In section II we outline the basic methodology we use to calculate *metrs*. Section III follows with an international comparison of *metrs* among the G7 countries - Canada, the U.S., the U.K., Germany, Japan, France and Italy - as well as Mexico and Hong Kong. In this section *metrs* are calculated under different assumptions regarding the country of origin of the investors. In section IV we undertake an inter-sectoral and inter-provincial comparison of *metrs* for Canada. Section V considers the implications of risk and

irreversibility for the measurement of *metrs*. Section VI concludes the paper with a summary of the key results and policy implications.

II. Basic Methodology

In this section we explain the methodology employed to investigate the potential impact of taxation on capital accumulation. While the basic approach is well established, various modifications are required to facilitate an international comparison and incorporate risk and irreversibility. Although a formal derivation based upon neo-classical investment theory is possible, we choose instead to follow a more intuitive approach, so as to provide a basic understanding of the methodology to a broader audience.[2,3]

To consider how taxes may impinge upon capital investment decisions, it is useful to begin by considering an economy without any taxes at all. Moreover, presume for the moment that all of the funds for investment in capital are provided by domestic savers. In such an economy firms invest in projects which generate a rate of return up to and in excess of a "hurdle" rate required by the financial market. This hurdle rate reflects the real (inflation adjusted), net-of-depreciation rate of return that investors (debt and equity holders) could earn in the next best alternative investment opportunity with similar characteristics.[4] If we presume that the proportion of investment financed by debt is β, the expected rate of inflation is π, the nominal interest rate on debt is i, and the nominal

---

[2]See Boadway (1987) for a formal derivation.

[3]Some of what follows is based upon McKenzie and Mintz (1992).

[4]By "similar characteristics" we primarily mean risk, although other factors, such as liquidity, could also be important. In the discussion which follows, for simplicity we ignore risk and these other factors. Risk considerations will be discussed later in this section.

required rate of return on equity is ρ, then the hurdle rate of return is a weighted average of the required rate of return on debt and equity, or $R=\beta i+(1-\beta)\rho-\pi$.[5]

If we assume that investment is continuously divisible, and that the marginal revenue product of capital (the increment to revenue arising from investing in one more unit of capital) eventually declines as the amount of capital employed increases, value maximizing firms will invest in capital up to the point where the rate of return on the last unit of capital employed is just equal to the real opportunity cost of the funds tied up in that capital, R, plus the loss in the value of the capital due to economic depreciation, δ. The sum $R+\delta$ is referred to as the cost of capital. Denoting the marginal revenue product of capital by $MRP_K(K)$, the equilibrium condition is $MRP_K(K)=R+\delta$, where capital is accumulated up to the point that the marginal unit breaks even in these sense that it earns just enough to cover the cost of capital.[6] This condition implicitly determines the demand for capital by domestic firms as a function of the rate of return on capital net-of-depreciation, R.

We are now in a position to see how domestic taxes on capital, levied on either or both of the suppliers and demanders of capital, can affect capital accumulation when funds are provided by domestic savers. Investors are concerned about the rate of return on their capital net of both corporate and personal taxes. Consider first the imposition of personal taxes on interest income and on the return to equity. Denoting by m the personal tax rate imposed on nominal interest income, and by c the effective tax rate on equity, the weighted average net-of-personal tax real hurdle rate of return becomes $R''=\beta i(1-m)+(1-\beta)\rho(1-c)-\pi$. In capital market equilibrium, in the absence of risk and capital market imperfections other than taxes, the after-tax rate of return on equity must equal the

[5]In the absence of taxation, or other capital market imperfections, and risk i=ρ.

[6]We are implicitly treating capital as the numeraire.

after -tax rate of return on debt; thus $i(1-m)=\rho(1-c)$, which implies that $\rho=i(1-m)/(1-c)$, in which case $R^n=i(1-m)-\pi$.

The imposition of corporate taxes affects investment by altering the cost of capital. There are several ways in which this can occur, depending upon the details of the tax system. Here we present a somewhat stylized representation; details will vary by country.[7] As discussed above, firms will accumulate capital up to the point where the rate of return generated by the last unit of capital is just equal to the cost of capital. To yield R^n after personal taxes, the marginal investment must earn $R=\beta i+(1-\beta)\rho-\pi$ after corporate taxes (and net-of-depreciation). Denote by R^g the gross-of-corporate tax, net-of-depreciation rate of return required to yield R after corporate taxes - treating capital as numeraire, $R^g=MRP_K-\delta$. R^g will reflect various provisions of the corporate tax system For example, the deductibility of nominal debt interest expenses for corporate income tax purposes lowers the nominal cost of debt finance to $i(1-u)$, where u is the statutory corporate income tax rate. Nominal interest deductibility thus lowers the cost of capital to the firm by reducing the weighted average opportunity cost of finance to $R^f=\beta i(1-u)+(1-\beta)\rho$.[8] The cost of capital is also lowered by the reduction in the effective purchase price of capital due to the presence tax depreciation allowances and investment tax credits (ITCs). A company that is provided with an ITC at the rate ϕ and annual depreciation allowances that generate a reduction in taxes of uA in present value terms, A being the present value of the tax depreciation allowances on one dollar of capital[9], faces an effective purchase

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[7]These details are incorporated in the calculations performed later in the paper.

[8]Note that the required rate of return to equity, ρ, is not deducted.

[9]In the absence of various provisions such as the half-year rule (which is included in subsequent calculations but ignored here for simplicity), in Canada A is the infinite sum $A=(1-\phi)\sum_t \alpha(1-\alpha)^t/(1+R^f)^t=(1-\phi)\alpha/(R^f+\alpha)$, where α is the declining balance Capital Cost Allowance (CCA)

price of capital that is lowered by the amount $\phi+uA$ per dollar. Recognizing that the incremental revenue generated by an additional unit of capital is taxed at the statutory tax rate, leaving $MRP_K(1-u)$ after-tax, the firm's value maximization condition becomes $MRP_K(1-u)=(R^f+\delta-\pi)(1-\phi-uA)$, whereby the after-tax, marginal revenue product of capital is equal to its gross-of-depreciation after-tax user cost. Using this equilibrium condition, and recalling the definition of R^g above, the gross-of-corporate tax, net-of-depreciation rate of return on a marginal unit of capital is:

$$R^g = (R^f+\delta-\pi)\left[\frac{1-\phi-uA}{1-u}\right]-\delta \qquad (1)$$

Equation (1) reflects the imposition of a corporate income tax. Other types of taxes may be levied on the capital as well. For example, capital may be subject to a sales or property transfer tax, special capital levies may apply, as may property taxes. Some jurisdictions also levy a gross receipts tax. Equation (1) may be modified to take all of these types of taxes into account. For example, denoting by t_m the effective sales or property transfer tax rate, by t_c the effective capital tax rate, by t_p the effective property tax rate, and by t_g the gross receipts tax rate, R^g becomes,[10]

$$R^g = (1+t_m)(R^f+\delta-\pi)\left[\frac{1-\phi-uA+t_c(1-u)/(\alpha+R^f+\pi)}{(1-u)(1-t_c)}\right]+\frac{t_p}{1-t_g}-\delta \qquad (2)$$

The imposition of both personal and corporate taxes affect the level of investment in the economy by driving a wedge between the after-tax rate of return required by savers (R^n) and the

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rate. This reflects the reduction in the tax deprecation base by the ITC. In other countries slightly different approaches may be taken; these differences are reflected in the subsequent calculations.

[10]See Chen and Mintz (1993).

before-tax rate of return generated by firms (R^g). The *marginal effective tax rate (metr)* on capital is a summary measure of the distortion to the return to capital caused by the imposition of the various taxes levied on capital. It is defined as the hypothetical rate of tax, τ, which if applied to the gross-off tax rate of return R^g would just yield the net-of-tax rate of return R^n. The *metr* thus solves $R^g(1-\tau)=R^n$, giving

$$\tau = \frac{R^g - R^n}{R^g} \qquad (3)$$

A *metr* may be computed using the above expressions for R^g and R^n for various types of capital in different countries, each imposing different tax systems and facing different interest rates, economic depreciation rates, inflation rates, etc. It is a convenient summary measure which allows us to evaluate and compare a diverse set of international corporate and personal tax systems in an economically meaningful way. By comparing the *metrs* across countries we may gain some insight into the potential impact of the tax systems on the incentive to invest in capital in the various jurisdictions. Specifically, the higher the *metr* the greater the disincentive to invest in a particular type of capital in a particular jurisdiction. It should be noted that if tax incentives are generous enough *metrs* can also be negative (i.e., R^g can be less than R^n), in which case the tax system provides a subsidy to investment. If the *metr* is zero, the tax system is said to be neutral with respect to investment - i.e., taxes do not impinge upon the investment decision.

The presentation to this point has assumed that capital for domestic investment is provided by domestic savers. If capital is provided by foreign investors the analysis must be modified slightly. In terms of the above framework, the expressions defining the net-of-tax rate of return, R^n, and the

after-tax opportunity cost of finance, R^f, must be altered to account for the presence of foreign investors. For example, if we presume that the investor is a multinational corporation from another country, the relevant cost of finance becomes:

$$R^{f'} = [\beta' i'(1-u') + (1-\beta')\rho'] \frac{1-\gamma}{1-x} + \gamma [i(1-u) - \pi + \pi'] \qquad (4)$$

where β' is the debt to asset ratio in the home country of the multinational, i' is the cost of debt in the home country, u' is the statutory corporate income tax rate in home country, ρ' is the cost of equity in the home country, γ is the proportion of funds borrowed within the host country, x is the weighted average withholding tax rate in the host country, i is the cost of debt in the host country, u is the statutory corporate income tax rate in host country, π' is the inflation rate in the home country, and π is the inflation rate in host country. Equation (4) simply states that the cost of finance to a foreign multinational investor is the weighted average cost of funds raised in the home and host countries. The former is the weighted average cost of financing at home net of withholding taxes payable in the host country, and the latter is the after-tax cost of debt in the host country adjusted by the difference in inflation rates between the home and host countries.[11] In the case of investments undertaken by multinationals, R^f in equations (1) and (2) is replaced with the $R^{f'}$ in equation (4), and the inflation rate π used in equations (1) and (2) is replaced with π'.

Similarly, the net-of-tax rate of return required by a foreign multinational investor is:

$$R^{n'} = [\beta' i'(1-u') + (1-\beta')\rho - \pi'](1-\gamma) + \gamma(i-\pi) \qquad (5)$$

[11]See Mintz and Tsiopoulos (199?).

·This is the net-of-tax rate of return on capital required by the suppliers of capital, including the multinational and its creditors in the host country.

Another important consideration which has been ignored in the above discussion is the implications of risk for the measurement of *metrs*. This has been the subject of numerous studies. Most of these studies stress the importance of distinguishing between different sources of risk. For example, Gordon (1985), Bulow and Summers (1984) and Gordon and Wilson (1989) make the distinction between *capital risk* and *income risk*. Income risk refers to uncertainty regarding future net revenues, arising from the stochastic movement of output or current input prices. Capital risk refers to uncertainty regarding the economic rate of depreciation, due to stochastic replacement prices for capital or physical rates of depreciation. Whether risk is of the nature of income or capital risk has important implications for the size of the distortion caused by the tax system.

Consider income risk first. If the tax system grants full loss offsets, whereby companies effectively receive a full refund for taxable losses as they are incurred - a maintained assumption throughout the paper - the tax liability of the firm fluctuates perfectly with its income.[12] The government therefore shares equally in both the profits and losses of the company. In other words, the government shares in 100u% of the profits and absorbs 100u% of the income risk. The implication of this is that the cost of bearing income risk is implicitly fully deducted under a full loss offset tax system, and no additional distortions are introduced due to the presence of income risk - i.e., the *metr* on an income risky investment is the same as an otherwise identical riskless investment.

The implications of capital risk are very different. In most countries, including those

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[12]This presumes that the statutory corporate tax rate is flat, and does not change with corporate profits.

considered in this paper, tax depreciation allowances are based upon the *ex ante*, or original purchase price of the asset, with no adjustment for subsequent changes in the market value. This means that tax depreciation allowances do not fluctuate with unanticipated changes in the replacement value of capital, which is reflected in the economic rate of depreciation. The implication of this is that the tax system does not deduct the full opportunity cost of bearing capital risk. The presence of capital risk may be introduced into the above framework by adding a *systematic* capital risk premium, h^C, to the economic depreciation rate.[13] The sum $\delta+h^C$, is referred to as the risk adjusted economic rate of depreciation. Rather than equation (2), the expression for R^g then becomes,

$$R^g = (1+t_m)(R^f+\delta+h^c-\pi)\left[\frac{1-\phi-uA+t_c(1-u)/(\alpha+R^f+\pi)}{(1-u)(1-t_g)}\right]+\frac{t_p}{1-t_g}-(\delta+h^c) \qquad (6)$$

As shown by Jog and Mintz (1989) and McKenzie and Mintz (1992), the presence of capital risk typically increases the *metr* on capital due to the failure of most tax systems to account for the capital risk premium in the tax depreciation rate. Thus, corporate tax systems tend to provide a disincentive to invest in capital risky assets. The implications of capital risk for the measurement of *metrs* will be explored further below.

Another potentially important consideration which has been ignored in the above formulation is the implications of adjustment costs. The implicit assumption made above is that capital can be instantaneously adjusted to its optimal level. This is not likely to be the case in practice, as delivery lags, installation costs and imperfectly competitive capital markets can give rise to costs associated

[13]The capital risk premium is *systematic* because it reflects the correlation of the economic rate of depreciation with the market.

with quickly adjusting the level of capital. Two types of adjustment costs have been considered in the effective tax rate literature. McKenzie (1993) explores the implications of the presence of continuous, convex adjustment costs for the neutrality of a corporate income tax system which relies on historic, or *ex ante* depreciation allowances. Convex adjustment costs mean that the cost of installed capital increases at an increasing rate with the amount of capital employed. McKenzie (1993) shows that in the simultaneous presence of risk and convex adjustment costs the neutral tax depreciation rate - the tax depreciation rate that generates a *metr* of zero - will be stochastic.[14] The important implication is that in the simultaneous presence of convex adjustment costs and risk it is virtually *impossible* to design a neutral *ex ante* corporate tax system which relies on historic cost depreciation. Moreover, McKenzie (1993) shows that even when the tax system grants full loss offsets, in contrast to the traditional case considered above if convex adjustment costs exist the presence of income risk does affect the *metr*. While lack of data precludes presenting *metr* calculations for investments which take place in this type of environment, it is nonetheless important to realize the implications of the presence of convex adjustment costs.

McKenzie (1994) considers a different type of adjustment costs. In this formulation adjustment costs are linear, as is implicitly assumed in the standard approach considered above, but investment is assumed to be *irreversible* in the sense that disinvestment can occur only slowly over time through depreciation - i.e., it is infinitely costly to adjust capital downwards. The idea that many, if not most, types of investments are at least partly irreversible has become the focus of much of the recent investment literature. If capital is valuable primarily in the use for which it was originally

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[14]McKenzie (1993) assumes that the tax system provides full cost of finance deductibility by allowing the opportunity cost of equity finance to be deducted at the corporate level along with the cost of debt.

intended and/or it is very costly to reverse investment decisions or to convert capital to other uses, then the presence of different types of risk has important implications for how taxes may affect investment decisions. When capital is irreversible and there is capital and/or income risk, there are benefits to delaying capital investments which are not present when an investment is fully reversible. When this is the case, an investment can be thought of as a *real option*, where the decision to undertake the investment is analogous to exercising a financial call option. As discussed by McKenzie (1994), this idea can be incorporated into the framework established above by increasing the cost of capital to account for the opportunity cost of exercising the real investment option - i.e., the investment must earn an additional return to compensate for the fact that making the investment now precludes making it in the future when more will be known about the economic environment. Moreover, McKenzie (1994) illustrates that the distinction between capital and income risk discussed above plays an important role in the presence of irreversibility. Specifically, *metrs* are higher in the presence of both capital and income risk, even when there are full loss offsets. He also stresses another important distinction regarding the source of risk, distinguishing between *systematic* vs. *unsystematic* income and capital risk, the former reflecting the correlation of the stochastic variable with the market while the latter reflects the idiosyncratic variance of the stochastic variable. Below, some illustrative calculations showing the implications of risk and irreversibility for the measurement of *metrs* will be presented. To do this, R^g must be augmented as follows,

$$R^g = (1+t_m)(R^f+\delta+h^c+H-\pi)\left[\frac{1-\phi-uA+t_c(1-u)/(\alpha+R^f+\pi)}{(1-u)(1-t_g)}\right]+\frac{t_p}{1-t_g}-(\delta+h^c+H) \qquad (7)$$

where H is the opportunity cost of exercising the real investment option, which is a function of

systematic capital and income risk (h^C, h^I) and unsystematic capital and income risk (σ^2_C and σ^2_I).[15]

Finally, the rate of return expressions presented above are for depreciable capital. Similar expressions can be developed for inventory capital and land. For inventories, the relevant expression for domestic investors is:

$$R^s = \frac{(1+t_m)(R^f - \pi + u\pi\xi)}{(1-u)(1-t_g)} + t_c \qquad (8)$$

where t_m is the sales tax on inventory (if applicable), and ζ= for First-in First-out (FIFO) accounting method and 0 for Last-in First-out (LIFO) or tax indexation (as in the case of Mexico).[16] For land the relevant expression for domestic investors is:

$$R^s = \frac{(1+t_m)(R^f - \pi)[1 + t_c(1-u)/(R^f + \pi)]}{(1-u)(1-t_g)} + \frac{t_p}{1-t_g} \qquad (9)$$

For international investors, the formulas are the same except that the real cost of finance should be the one relevant to the international investors. That is R^f should be replaced by R^{f*}.

III. International Comparison of METRs

In this section we present calculations of *metrs* for the G7 countries - Canada, the U.S., the U.K., Germany, Italy, France, and Japan - as well as for Mexico and Hong Kong. Mexico is included due to its close economic relationship with Canada under NAFTA. Hong Kong, with perhaps the

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[15]See McKenzie (1994) for the specific form of the expression for H.

[16]See Boadway, Bruce and Mintz (198?).

most neutral tax system in the world, is included for comparative purposes. Only the manufacturing and service sectors are included in our international comparison, as these are by far the largest targets of foreign direct investment. *Metrs* are calculated for four broad asset categories - equipment, buildings, land and inventories - and then aggregated together to form an overall, or aggregate *metr* for each country.

In this section we present three basic sets of calculations. All of the calculations assume that capital is mobile in an open economy, and thus that the required return to debt and equity is fixed by international financial markets. They differ, however, in who the marginal investor is presumed to be. Under one set of calculations the marginal investor is presumed to be a domestic investor in the country under consideration - for example, a *metr* is calculated for capital in Germany financed by German investors. The second set of calculations presumes that the marginal investor is a Canadian multinational corporation - for example, a *metr* is calculated for capital in France, or Italy, or Germany financed by a Canadian multinational. The third set assumes that the marginal investor is a U.S. multinational - for example, a *metr* is calculated for capital in Canada, or Japan , or Hong Kong financed by an American multinational. While we have no way of knowing the country of origin of the marginal investors, by comparing the *metrs* facing Canadian firms investing abroad to the domestic *metr* in Canada, we can determine whether the international tax regime provides an incentive for Canadian firms to invest at home rather than abroad. Similarly, by comparing the *metrs* on U.S. multinationals investing in Canada to other countries, we can determine whether U.S. investment in Canada is discouraged or encouraged relative to other countries. Of course other assumptions regarding the origin of the marginal investor are possible, but we think that these are the most relevant.

We begin with a brief review of the statutory corporate tax treatment in the countries included in the study. At least a cursory understanding of the tax systems in the various countries is required in order to understand the differences in the *metrs* that we present below.

III.1 An Overview of the Statutory Tax Treatment

Table 1 presents a summary of some of the key aspects of the tax codes for the nine countries included in our study. We discuss some of the key elements below.

III.1.1 Corporate Income Tax (CIT)

Germany imposes the highest statutory tax rate at the federal level, followed by Japan and Italy. Five countries - Canada, the U.S., Germany, Italy and Japan - also impose income taxes at the sub-national (state/provincial) level. In all of these countries except Canada and Italy the provincial income tax is deductible for national income tax purposes. As a result, the combined nation-wide income tax rates range from a high of 57% in Germany to a low of 16.5% in Hong Kong.

The corporate income tax systems in the U.K., Mexico and Hong Kong are the simplest by virtue of their single national rate, with no sub-national tax. By way of contrast, Japan imposes three different types of local income taxes: a corporate enterprise tax (CET), a corporate inhabitants tax (CIBT), and an inhabitant per capita tax (IPCT). The IPCT is payable as a lump sum depending on the size of the corporation, regardless of net income or national tax liability. The CET is deductible for national income tax purposes, while the CIBT is levied like a surtax on national tax liabilities, with a rate that varies across locations.

Table 1 Corporate Tax Provisions, 1995

	Canada	U.S.	U.K.	Germany	France	Italy	Japan	Mexico	H.K.
CIT									
National	29.12%	35%	33%	48.38%	33-1/3%	36%	37.5%	34%	16.5%
Local	8.9-17%	to 12%	No	5 - 25%	No	16.2%	see the text	No	No
Inv. allowance									
Structure	15%Atl.	No	No	No	No	No	No	No	20%
Machinery	15%Atl.	No	No	No	No	No	No	No	60%
Tax depr. rate									
Manufacturing									
Structure	8% DB	39 year	4% SL	4% SL	5% SL	3% SL	4% SL	5% SL	4% SL
Machinery	36%DB	29%DB	25% DB	15% SL	15% SL	13% SL	10% SL	10% SL	4% SL
Service									
Structure	11%DB	39 year	4% SL	4% SL	5% SL	3% SL	4% SL	5% SL	4% SL
Machinery	33%DB	29%DB	25% DB	15% SL	15% SL	13% SL	10% SL	10% SL	4% SL
WH tax on div									
To Canada		10%	10%	15%	15%	15%	10%	No	No
To US	10%		10%	5%	15%	10%	10%	No	No
Property tax									
Structure	Yes	Yes	Yes	0.6%	Yes	0.4-0.6%	1.7%	Yes	Yes
Machinery	Yes/No	Yes/No	No	No	No	No	1.4%	No	No
Land	Yes	Yes	Yes	0.6%	Yes	0.4-0.6%	2.0%	Yes	Yes
Business tax	No	No	No	No	3.5 - 4%	No	No	No	No
Capital tax	0 - 0.6%	No	No	No	No	No	No	1.8%	No
Property transfer tax	No	No	1%	No	6.4%	3 - 8%	3%	2%	No
Inventory acct.	FIFO	F/LIFO	FIFO	LIFO	FIFO	LIFO	F/LIFO	LIFO	FIFO
Tax indexation	No	No	No	No	No	No	No	Yes	No

The second most complicated system is Germany. There are two income tax rates at the national level: one applied to retained earnings and another levied on distributed profits (at rates of 45% and 30% respectively). A solidarity surcharge of 7.5% is then levied on assessed corporate income taxes after the deduction of an imputed tax credit on dividends received from German companies. Local trade taxes are imposed at different rates by municipalities, based on capital employed and on business income. These local taxes are deductible for national income tax purposes.

In France, local business taxes, described below, are based on income, property, payroll and other criteria, and are deductible for national income tax purposes. In the U.S., state income taxes are deductible for national income tax purpose. Canada and Italy are the only countries where federal and provincial governments share the same or similar income tax base.

Hong Kong has the most generous tax depreciation system. An initial write-off is allowed for both buildings and machinery, at the rates of 20% and 60% respectively. A regular annual deduction is then applied on the remaining balance at a rate of 4% per annum, using the straight line method.

Canada's depreciation system is also relatively generous in comparison to the other countries, with an average declining balance depreciation rate of about 10% for buildings and over 30% for machinery. Manufacturing enjoys even faster depreciation rates for machinery and equipment. Canada also grants a 15% investment tax credit for investment occurring in the maritime provinces. The other countries grant similar tax depreciation allowances, with the rates in France perhaps somewhat more generous than the others.

III.1.2 Dividend Withholding Taxes

The dividend withholding tax rates shown in Table 1 are bilateral treaty rates relevant to Canadian and U.S. investors. As the table shows, with the exception of Mexico and Hong Kong which do not impose such a tax, the rates in other countries range from 5% to 15%.

III.1.3 Other Taxes on Capital

Property Taxes

Property taxes are mainly imposed by local governments and are generally deductible for income tax purpose, the exceptions being Germany, Japan and Italy. In Germany, a 0.6% federal property tax is imposed on property owned by corporations which is deductible for income tax purpose. In Japan, in addition to a national property tax imposed on both real estate and depreciable assets at 1.7% and 1.4% respectively, there is also a new land value tax at 0.3% imposed on large corporations. All of these property taxes are deductible for income tax purpose. In Italy, the tax (ICI) rate ranges from 0.4% to 0.6% of the register value of real estate, according to the percentage established by each municipality, but it is not deductible for income tax purpose. In Canada, the property tax is imposed by municipal governments, with the base and rates varying according to location. Similarly, property taxes in the U.S., the U.K., France, and Mexico are decided by local governments. In Hong Kong, the property tax rate is 15% on the property's net rental value. However, corporations carrying on an active business are exempt from the property tax because income from property is aggregated with other income and subject to the profits tax.

Taxes on the Transfer of Immovable Property

In Italy there is a registration tax on the transfer price of land and buildings, with rates ranging from 3% to 8%. France levies a registration duty on the transfer of properties. The rate on the sale of buildings used by companies that set up or acquire plants is 6.4%. In Japan, an acquisition tax of 3% or 4% of the taxable value of real estate is imposed on land and other real property at the time of acquisition. In Mexico, the states impose a 2% tax on the acquisition value of property.

Business Taxes

France imposes a business tax on all taxpayers carrying on business. The taxable base is the "annual rental" or "deemed rental" value of the company's tangible fixed assets plus 18% of gross salaries and benefits in kind. The rate varies according to location but minimum amounts apply and the base tax may also be limited to a percentage of turnover. In 1995, the maximum percentages ranged from 3.5% to 4% depending upon the turnover.

In Japan, a business office tax is imposed at the rate of Yen600/sq.m and 0.25% of the annual payroll.

Capital Taxes

In Canada half of the provincial governments (British Columbia, Manitoba, Ontario, Quebec, and Saskatchewan) impose a capital tax on non-financial firms, with rates ranging from 0.225% to 0.6% of paid-up capital.

In Mexico, there is a tax on business assets of 1.8%.

III.2 Comparative Analysis of METRS

Table 2 presents our estimates of the *metrs* for investments in capital employed in manufacturing and services undertaken by Canadian multinational firms, U.S. multinationals[17], and domestic investors in the G7 countries, Mexico and Hong Kong. Although, as discussed above, property taxes can play a significant role in some countries, the estimates presented in Table 2 exclude the impact of property taxes. This is because for many of the countries included in the study, property taxes are levied at the local level and assessment procedures often vary widely within each country. As such, there are no reliable estimates of national averages. We therefore decided to omit property taxes from our calculations rather than present calculations that we know would be flawed and possibly misleading. It should be noted that in some cases the inclusion of property taxes can have a marked impact on the *metrs*. For example, by including the property taxes, the *metr* for Japan increases by over 15 percentage points, while the *metrs* for some of the other countries go up by only about 2 percentage points. All of the other taxes discussed above, including the other taxes on capital, are included in the analysis.

Looking first at the calculations for domestic investors, our calculations indicate that Hong Kong faces the lowest *metr* of the countries included in the study, for both services (3.7%) and manufacturing (11.9%). This is a natural result of its very low corporate income tax rate, very

[17] *Metrs* for U.S. multinationals are estimated under the assumption that the U.S. firm is in an "excess credit" position for U.S. tax purposes. This implies that the amount of taxes paid to all foreign governments on dividends and other qualifying sources of income remitted to the home country are greater than the firm's U.S. tax liability on this income. In other words, the amount of U.S. tax owing on the remitted income is assumed to be zero. The estimates also ignore the U.S. interest allocation rules that result in U.S. interest being allocated for foreign subsidiaries based on the share of foreign net assets to world wide assets. See Altshuler and Mintz (1995) for a formal theoretical analysis.

generous investment allowances, and the lack of any other taxes on income or capital. By way of contrast, Italy is the highest taxed country overall, facing *metrs* of 43.3% and 34.5% on manufacturing and services respectively. This is the combined effect of its high corporate income tax

Table 2 METR for Canadian and US Multi-nationals vs. Domestic Investors in Nine Countries, 1995

	Canadian Multi-nationals		United States Multi-nationals		Domestic Investors	
	Manuf.	Service	Manuf.	Service	Manuf.	Service
Canada			20.2	21.0	22.6	16.7
The United States	23.0	20.7			27.5	19.4
The United Kingdom	21.3	18.0	22.8	20.1	24.6	17.2
Germany	34.6	32.0	34.5	32.3	35.7	20.0
France	28.3	26.4	29.5	28.0	29.1	23.5
Italy	36.9	34.8	37.8	36.1	43.3	34.5
Japan	35.0	33.2	37.5	36.1	40.4	33.7
Mexico	30.5	28.8	30.8	29.4	34.1	28.8
Hong Kong	8.3	4.4	8.6	5.2	11.9	3.7

rate (the second highest of those studied), very low tax depreciation allowance, relatively high property transfer tax and high rate of inflation (which tends to increase the *metr*). The *metr* for Japan is the second highest due mainly to its relatively high CIT rate and low tax depreciation allowances. Germany faces the third highest *metr*, due primarily to its high statutory CIT rate. Mexico, although

it imposes a relatively low statutory CIT rate, is fourth highest, mainly because of its low tax depreciation allowances and high capital tax rate (1.8%). The U.K., the U.S. and France face the next highest *metrs*. Common features of these countries are fairly moderate CIT rates and tax depreciation allowances. Moreover, for the most part these three countries impose relatively low other taxes on capital, the exception being France which levies a fairly significant business tax, ranging from 3.5% to 4% of total turnover, and the highest property transfer tax at 6.4%. Domestic investors in Canada face the second lowest *metrs* of the countries studied - 22.6% for manufacturing and 16.7% for services. Only domestic investors in Hong Kong face lower rates. This is mainly because of relatively generous tax depreciation allowances in Canada and a low inflation rate.

Our calculations therefore indicate that compared to domestic investors in other countries, Canadian investors face relatively low *metrs* on capital. As such, overall it appears that Canadian investors do not face substantial disincentives to invest in capital relative to domestic investors in other countries. This would suggest that, again relative to other countries, the corporate tax regime in Canada does not unduly impede economic growth by restricting capital investment.

Note also from Table 2 that manufacturing is taxed at a higher rate than services in all of the countries considered. This primarily reflects the fact that the debt to asset ratio in the service industry is much higher than manufacturing in each of the countries. As such, the service industry faces a lower after-tax cost of finance due to the deductibility of debt interest, and hence a lower effective tax rate. As illustrated by Germany, Italy, and Japan, the higher the statutory income tax rate, the greater the gap in *metrs* between manufacturing and services.

Consider now the *metrs* facing Canadian and U.S. multinationals as foreign investors in other countries. For manufacturing the *metrs* facing multinational investors are lower than the domestic

counterpart *metrs* in all cases except U.S. investors in France. In the service industry, multinationals are taxed at a higher rate than their domestic counterparts except for Canadian investors in Japan. Thus, in manufacturing the tax systems in other countries tend to favour foreign investors over domestic investors, while in services the opposite is true. This is primarily due to two factors. First, foreign investors face a lower cost of financing (see equation (4)) because of the double deduction of interest costs in both the home and host countries (remember, we consider only "excess credit " case for U.S. investors). Second, foreign investors face a lower net-of-tax rate of return in the host country (see equation (8)) due to cheaper equity from home. However, because of the lower leverage ratios in manufacturing, the reduction in the cost of finance for foreign investors more than offsets the higher net-of-tax rate of return. As a result, multinationals face a lower *metr* than their domestic counterparts. For the service industry, the opposite is true, because of the much higher debt to asset ratios.

Comparing Canadian multinationals investing in the U.S. to U.S. multinationals investing in Canada, the U.S. multinationals in Canada face a lower *metr* in manufacturing but slightly higher *metr* in services. This is mainly a result of the difference in statutory income tax rates between the two countries. That is, the Canadian CIT rate for manufacturers is lower than the American's (35% vs. 38% including provincial/state levies), while for services, the Canadian rate is higher (43% vs. 38%). Furthermore, the depreciation rates in Canada are somewhat lower than in the U.S., which significantly offsets the difference in the CIT rates and narrows the gap in *metrs* for the service industry.

Note also that the *metrs* facing a Canadian firm on a domestic investment in Canada (22.6% for manufacturing and 16.7% for services) are lower than the *metr* facing a Canadian multinational

investing abroad in every case except Hong Kong. This suggests that by and large the tax system offers no incentive for Canadian firms to invest abroad rather than at home.

The *metrs* facing U.S. multinationals investing in other countries are generally higher than Canadian ones, the exception being Hong Kong, although the gap in manufacturing is somewhat narrower than in services. This suggests that all else being equal, U.S. multinationals are more likely to invest in Canada than elsewhere (with the exception of Hong Kong).

IV. Intersectoral and Interprovincial METR's for Canada

The *metrs* presented for Canada in the previous section are aggregated over the ten provinces. Yet *metrs* can vary substantially across provinces, due not only to differences in the tax systems but also to differences in industrial structure. Also, the calculations presented above are restricted to investments in manufacturing and services. Other sectors face quite different *metrs*. In this section, we present *metrs* for various industrial sectors in each of Canada's ten provinces.

Table 3 summarizes some of the key provincial corporate tax rates for 1995. As the table shows, the general provincial corporate income tax rate ranges from a low of 8.9% in Quebec to a high of 17% in Saskatchewan, Manitoba and New Brunswick. All of the provinces impose a lower CIT rate on "small" business, ranging from 5% to 10%. Alberta, Ontario, Prince Edward Island and Newfoundland also grant a tax credit for manufacturing and processing (M&P), which results in a lower CIT rate. Furthermore, five provinces including British Columbia, Saskatchewan, Manitoba, Ontario and Quebec impose a capital tax on non-financial firms which is deductible for income tax purposes. The rates range from 0.3% to 0.64%.

Table 3 Provincial Corporate Tax Rates (%) for Non-Financial Industries, 1995

	Corporate Income Tax			Capital Tax (Max. Rate)	Mining Tax	Oil & Gas Royalty*
	General	Small	M&P	NA		
British Columbia	16.5	10.0	NA	0.30	13.0	14.1
Alberta	15.5	6.0	14.5	NA	12.0	16.8
Saskatchewan	17.0	8.0	NA	0.60	NA	17.3
Manitoba	17.0	9.0	NA	0.30	20.0	19.0
Ontario	15.5	9.5	13.5	0.30	20.0	9.7
Quebec	8.9	5.8	NA	0.64	18.0	NA
New Brunswick	17.0	7.0	NA	NA	16.0	NA
Nova Scotia	16.0	5.0	NA	NA	15.0	NA
PEI	15.0	7.5	7.5	NA	NA	NA
Newfoundland	14.0	5.0	5.0	NA	15.0	NA

* This is an effective royalty rate adopted from Chen, Mintz, Scharf and Traviza [1995].

The provinces also impose special taxes on the mining and oil and gas sectors. Mining tax rates range from 12% in Alberta to 20% in Manitoba and Ontario. Saskatchewan imposes a basic royalty on uranium at 5% and a graduated royalty according to annual profits. There is a similar levy on potash producers. The details of the Saskatchewan system make it difficult to calculate *metrs* for mining without more information, so no calculations were attempted. P.E.I levies no mining taxes. Provinces also levy stumpage fees on forestry companies, and royalties on oil and gas producers. The former are deductible for income tax purpose while the latter are not.

Table 4 provides some information on the industrial structure of each province. As the table shows, Ontario accounts for the largest share of all industries except oil and gas, which is highly

concentrated in Alberta.

As a reference for the following comparative analysis, Table 5 provides the parameters for capital structure, debt to assets ratio and economic depreciation rates used in our calculations.

Table 4 Industrial Distribution among Provinces*

	A,F&F	Mining	O&G	Manuf.	Constr.	Transp.	Comm.	Utility	Trade	Service
BC	14.9	18.1	5.0	8.9	13.2	18.3	11.2	11.2	11.3	12.5
Alberta	18.2	7.1	85.4	5.5	12.0	15.8	14.9	14.9	9.7	11.3
Sask.	16.2	8.2	8.6	1.2	4.3	6.0	2.8	2.8	2.8	3.2
Manitoba	6.9	6.3	0.5	2.3	3.8	5.5	4.4	4.4	3.6	3.5
Ontario	20.5	30.7	0.5	52.1	33.9	29.9	32.3	32.3	43.3	40.3
Quebec	15.0	17.9	0.0	25.6	24.5	19.0	26.5	26.5	23.3	22.9
NB	2.3	4.1	0.0	1.7	2.9	1.9	3.3	3.3	2.1	2.0
NS	3.9	2.8	0.0	1.9	3.1	20.4	2.1	2.1	2.3	2.6
PEI	0.9	0.0	0.0	0.1	0.4	0.3	0.3	0.3	0.3	0.3
Nfld.	1.2	4.7	0.0	0.7	2.0	1.2	2.2	2.2	1.3	1.4
Aggregate	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Adopted from Chen, Mintz, Scharf and Traviza [1995].

Table 6 presents *metrs* by industry and by province for 1995. *Metrs* are calculated for both "large" (L) and "small" (S) firms in ten industries in each of the ten provinces, with the "combined" (C) figure determined as a weighted average of large and small firms. In addition to corporate income taxes and capital taxes, the *metr* calculations for the mining industry include mining taxes and those for oil and gas include royalties.

Table 5 Other Parameters (%) for Metr Calculation

	A,F&F	Mining	O&G	Manuf.	Constr.	Transp.	Comm.	Utility	Trade	Service
Capital Str.*										
Buildings	20.1	43.8	43.8	30.0	23.9	61.6	52.9	64.5	21.3	24.6
Machinery	14.7	8.5	8.5	47.8	54.8	31.9	44.9	31.8	13.0	52.7
Inventory	7.0	3.5	3.5	16.9	13.5	1.8	0.0	3.1	50.8	5.4
Land	58.2	0.9	0.9	5.4	7.9	4.7	2.1	0.7	14.9	17.3
Expl.&Dev.		43.2	43.2							
D/A Ratio**	25.0	40.0	40.0	29.0	24.0	49.0	46.0	41.0	38.5	44.0
Econ. Depr**										
Buildings	6.0	11.8	11.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Machinery	16.0	16.0	16.0	17.0	22.0	12.0	8.0	4.0	16.0	16.0

* Adopted from Chen, Mintz, and Rolph [1995]. Numbers in some sectors do not add up to 100% due to rounding.

** Adopted from Mintz ???

Focusing first on the intersectoral comparison, as Table 6 shows, the mining, service, and communication industries are the most tax-favoured sectors in virtually every provinces, while oil and gas, construction, and trade are the least favoured. These results reflect not only differences in the tax treatment of the sectors, but also variations in capital structure, the debt to asset ratio, and economic depreciation rates. In general, the lower the debt to asset ratio, the higher the economic depreciation rate, and the larger the share of inventory, the higher are the *metrs*. This is because, other things equal, a lower debt to asset ratio results in a lower deduction for interest payments and hence a higher cost of finance. Also, the higher the economic depreciation rate the higher the cost of capital. Moreover, inventory capital tends to be taxed at a high effective rate due to the taxation of inflationary price changes because of the use of the first-in-first-out (FIFO) for tax purposes (except for agriculture, fishing and forestry).

Table 6 Intersectoral and Interprovincial METRs, Canada, 1995

		A,F&F	Mining	O&G	Manuf.	Constr.	Transp.	Comm.	Utility	Trade	Service
BC	C	18.4	0.4	33.7	22.7	22.6	16.6	15.7	21.2	27.3	13.0
	L	33.8	1.0	34.8	26.1	39.6	21.2	16.1	22.6	37.0	19.8
	S	14.3	-1.7	29.9	12.9	17.8	7.2	4.5	7.8	16.2	6.3
Alberta	C	15.7	-3.4	38.0	19.4	19.5	14.1	13.0	18.6	24.3	11.0
	L	31.2	-4.1	39.0	22.5	37.0	18.3	13.4	19.8	34.1	17.0
	S	11.6	-1.0	34.8	10.4	14.6	5.7	3.5	6.1	13.3	5.0
Sask.	C	17.8	na	35.8	24.1	21.7	17.9	17.8	23.2	27.8	13.8
	L	35.8	na	36.3	28.4	41.6	23.6	18.4	24.8	39.3	22.0
	S	13.0	na	33.9	11.3	16.2	6.4	4.0	6.9	14.7	5.6
Manitoba	C	18.0	-3.1	38.6	22.8	22.0	16.6	15.9	21.5	27.1	13.0
	L	34.2	-3.7	39.2	26.5	40.0	21.5	16.4	22.9	37.5	20.1
	S	13.6	-1.3	36.6	12.2	17.0	6.8	4.3	7.3	15.5	6.0
Ontario	C	18.0	5.6	12.4	21.0	22.1	16.1	15.1	20.6	26.6	12.6
	L	32.9	5.7	11.9	23.9	38.7	20.6	15.6	21.9	36.2	19.1
	S	14.0	5.2	14.5	12.6	17.4	7.0	4.4	7.5	15.9	6.1
Quebec	C	15.3	5.2	na	19.9	18.9	14.9	14.4	18.9	23.8	11.4
	L	29.8	5.4	na	23.2	35.0	19.4	14.8	20.2	33.3	17.8
	S	11.5	4.8	na	10.2	14.4	5.6	3.5	6.0	13.1	4.9
NB	C	2.6	-78.3	na	-18.2	-40.7	-20.1	-20.6	-4.7	15.8	-36.4
	L	22.7	-83.0	na	-11.1	4.4	-12.5	-19.9	-2.8	28.1	-22.7
	S	-2.8	-61.8	na	-39.1	-53.2	-35.5	-38.1	-24.2	2.0	-50.0
NS	C	1.0	-77.9	na	-20.1	-44.9	-21.3	-21.7	-0.6	14.4	-37.8
	L	21.6	-82.9	na	-12.6	2.3	-13.7	-20.9	-3.8	27.0	-24.1
	S	-4.5	-60.3	na	-41.8	-58.0	-36.7	-38.9	-25.4	0.1	-51.5
PEI	C	2.4	na	na	-28.9	-40.7	-21.5	-22.6	-6.6	14.9	-37.6
	L	20.5	na	na	-25.6	0.2	-14.8	-21.9	-4.9	25.9	-25.5
	S	-2.4	na	na	-38.4	-52.0	-35.2	-37.9	-23.9	2.4	-49.7
Nfld.	C	0.5	-58.2	na	-32.5	-45.8	-22.8	-23.5	-7.7	13.2	-39.1
	L	19.4	-60.6	na	-29.3	-1.9	-15.9	-22.9	-5.9	24.8	-26.8
	S	-4.5	-49.9	na	-41.8	-58.0	-36.7	-38.9	-25.4	0.1	-51.5
Aggregate	**C**	**15.8**	**-6.4**	**37.7**	**19.4**	**17.8**	**14.2**	**12.4**	**18.2**	**25.1**	**10.1**
	L	**31.2**	**-6.8**	**38.6**	**22.6**	**35.6**	**18.8**	**12.9**	**19.5**	**34.8**	**16.7**
	S	**11.7**	**-5.0**	**34.6**	**10.3**	**12.8**	**4.8**	**1.6**	**5.0**	**14.2**	**3.4**

The high *metrs* on oil and gas are due primarily to crown royalties which are not very cost sensitive and are not deductible for income tax purpose. The construction and trade industries face the second and third highest *metrs*. For construction, this reflects its low debt to asset ratio (at 24% the lowest of the sectors studied); for trade, this reflects its large inventory share (51% of total capital).

Mining is the lowest taxed industry due to generous write-offs for exploration and development expenditures as well as various resource-related allowances at both the federal and provincial level. The presence of negative *metr* indicates that the preferential tax treatment actually subsidizes investment in the mining industry.

The communications, service and transportation industries are among the lowest taxed non-resource based industries. The low effective tax rates in these sectors are the combined result of high debt to assets ratios and small shares of inventories in their capital structure.

Manufacturing faces a surprisingly high *metr* in light of its relatively low statutory income tax rate. This is due mainly to its relatively low debt to asset ratio (i.e. 29%). Similarly, the *metr* for agriculture, fishing and forestry is rather high in relation to its low statutory income tax rate in some provinces for similar reasons.

Utilities are taxed at a lower effective rate than manufacturing and agriculture, fishing and forestry despite its higher statutory tax rate. The main reason for this is its lower economic depreciation rate.

Turning now to an interprovincial comparison of *metrs*, Table 6 shows that for large firms in all industries, Saskatchewan is the highest taxed province. This is the combined effect of its high provincial CIT rate (17%) and high capital tax rate (0.6%). For a similar reason, in all industries

except mining and oil and gas, the second to fourth highest taxed provinces are Manitoba, British Columbia, and Ontario. Alberta and Quebec jockey for positions five and six, depending upon the industry. In the case of highly leveraged industries (e.g. transportation, communication, utilities and service), investors benefit less from the lower CIT rate in Quebec, and Quebec's high capital tax rate (0.64%) further offsets the effect of its low CIT rate. In the case of manufacturing, Alberta faces a low *metr* due to its low statutory tax rate. In the four Atlantic provinces, the 15% federal investment tax credit significantly lowers the *metr* in all industries. Indeed, for many industries in these provinces, the *metr* is negative, indicating a government subsidy offered through the tax system. The positive *metr* for the trade sector is mainly due to its large share of capital invested inventories, which does not qualify for the investment tax credit. The differences in *metrs* among the four Atlantic provinces reflect minor differences in the provincial CIT rates.

Since there is no provincial capital tax imposed on small firms, the ranking of *metrs* across provinces for small firms primarily reflects differences in provincial CIT rates, as well as the presence of the federal investment tax credit in the Atlantic provinces.

For the mining industry, as mentioned above, fast write-offs and various resource allowances for corporate income tax purposes give rise to negative *metrs*, indicative of a tax subsidy to investment. In general, the higher the CIT rate, the greater the value of the tax subsidy. However, variations in provincial mining taxes further distort investment in mining across provinces. As a result, mining investments in the three Atlantic provinces face significant tax subsidies, while mining firms in B.C., Ontario and Quebec still pay some tax on marginal investments, but at a significantly lower effective rate than other industries in these provinces.

On the basis of the intersectoral comparison of *metrs* it would appear that Canada's tax system

results in a very uneven set of tax incentives across industries. Some industries are highly taxed at the margin (oil and gas and trade), while others face very low, even negative, *metrs* (mining and services). This intersectoral variation in *metrs* suggests potential efficiency costs which could impede economic growth. A similarly high degree of variation in *metrs* across the provinces, with particularly low and even negative rates in the Atlantic provinces, suggests more scope for efficiency losses due to interregional distortions. Thus, although Canada's tax regime as a whole appears to be relatively competitive internationally, there is scope for improvement within the country, where distortions among provinces and industries are quite substantial.

V. The Impact of Risk and Irreversibility

The calculations presented above ignore the presence of risk and irreversibility in capital investments. These factors are considered here, as intersectoral *metrs* for Canada are calculated accounting for risk and irreversibility.

We begin by introducing capital risk, while ignoring irreversibility. As discussed in section II, in the absence of irreversibilities the presence of income risk has no impact on *metrs* if full loss offsets are provided (or corporations are otherwise fully taxpaying). One of the problems in measuring *metrs* on risky capital is that it is difficult to measure the risk premium associated with capital risk. In this section we follow Bulow and Summers (1984), Jog and Mintz (1989), and McKenzie and Mintz (1992), who argue that the market value of a firm is equal to its asset value, so that fluctuations in market value reflect changes in the value of the firm's underlying assets, and therefore fluctuations in the economic rate of depreciation. This implies that we may use sectoral capital asset pricing model (CAPM) estimates for our capital risk premiums. Not everyone supports

this approach, however. Gordon and Wilson (1989), for example, point out that it is the correlation between the economic cost of depreciation and consumption that is really relevant, and this correlation may well be negative. If this were the case, the use of CAPM estimates for the capital risk premiums would not be appropriate.

We present calculations for *metrs* in the presence of capital risk for Canada only, as lack of data prevent us from presenting similar calculations for other countries.

Seven-year average capital risk premiums by industry estimated using the CAPM are presented in Table 7[18]. Since we lack access to market valuations for agriculture and fishing, we exclude agriculture, forestry and fishing from our analysis. As Table 7 shows, the mining industry has the highest capital risk premium and construction and utilities the lowest.[19]

As explained in section II, in relation to the pre-determined tax depreciation allowance, capital risk can lead to a significant increase in *metrs*. Table 7 confirms this by providing a comparison of *metrs* for large-sized firms by industry for two cases: no capital risk vs. capital risk.

Note from Table 7 that in some cases the presence of capital risk can have a very significant impact upon the *metr*. In other cases the impact is modest. For example, the *metr* for oil and gas increases by 24 percentage points in the presence of capital risk, while for mining it is virtually unchanged and in construction it increases by just over 4 percentage points. The differences in the impact of capital risk can be accounted for in part by the differences in the capital risk premiums across sectors. For example, the risk premium in oil and gas is one of the highest at 4.2%, while

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[18] The risk premium estimates were provided by Prof. Vijay M. Jog, Carleton University. They are a part of his on going study of the sectoral cost of capital in Canada.

[19] This is despite the fact that precious metals are excluded from the CAPM estimates for mining.

construction has the lowest risk premium at 1.6%. In general, the higher the capital risk premium, the higher the *metr*.

Table 7 Marginal Effective Tax Rate (%) for Large-Sized Firms, 1995

Capital Risk vs. Riskless

	Risk Premium*	No Capital Risk	With Capital Risk
Mining	5.6	-6.8	-6.2
Oil and Gas	4.2	38.6	62.6
Manufacturing	3.8	22.6	32.1
Construction	1.6	35.6	39.9
Trans. & Storage	2.6	18.8	28.8
Communication	3.2	12.9	24
Utility	1.5	19.5	25.7
Trade	3.6	34.8	49.3
Services	3.7	16.7	29.8

* Adopted from an ongoing study conducted by Prof. Vijay M. Jog as noted in the text.

However, there are other reasons for the differental impact of capital risk across the sectors. These investigated in Table 8, which presents *metrs* which account for capital risk under a different set of assumptions. Specifically, in Table 8 we presume that all industries have the same capital risk premium of 4%, as well as the same debt to equity ratio of 40%. This allows us to investigate some of the other reasons for the differential impact of capital risk. In general, the higher the statutory income tax rate, the greater the impact of capital risk on the *metr*. As column 3 of the table shows, with the highest combined income tax rate at around 50%, in the oil and gas industry a 4% capital

risk premium increases the *metr* by 23 percentage points. In contrast, with the lowest combined income tax rate at 35%, in the manufacturing industry a 4% capital risk raises the *metr* by only 6 percentage points.

Table 8 Impact of Capital Risk on METRS: A Sensitivity Simulation

	METR No Capital Risk with actual D/A ratio	METR Capital Risk = 0.04 with actual D/A ratio	METR Capital Risk = 0.04 Debt/Assets = 0.40
Mining	-6.8	-6.1	-6.1
Oiling & Gas	38.6	61.9	61.9
Manufacturing	22.6	32.5	28.4
Construction	35.6	45.1	38.9
Trans. & Storage	18.8	33.3	37.4
Communication	12.9	26.4	29.5
Utility	19.5	33.8	34.2
Trade	34.8	50.4	49.9
Service	16.7	30.6	32.5

Note also from Table 8 that the higher the debt to asset ratio, the lower the impact of capital risk on *metrs*. Comparing columns 3 and 4, the *metrs* for industries with actual debt to asset ratios higher than 40% are higher in column 4 than in column 3. In contrast, *metrs* for industries with actual debt to asset ratios lower than 40% are lower in column 4 than in column 3.

Capital risk also tends to increase *metrs* more for non-depreciable assets, especially land. Thus, sectors with high shares of land and inventories are affected more by capital risk. As column 4 in Table 8 shows, with a similar combined income tax rate and assuming the same capital risk

premium and debt to assets ratio, the *metr* in communications is lower than construction, transportation, utilities, trade and services. This is mainly due to its zero share of capital in inventory and very low share of land (2%) compared with the other industries.

In the mining industry, capital risk does not raise the *metr* materially. The main reasons for this are: 1) capital risk does not affect the effective tax rate on investment in exploration and development which are fully expended and account for over 40% of capital investment in mining; 2) fast write-offs for the key depreciable assets and various resource allowances offset the impact of capital risk; and 3) when the cost of capital is negative due to the government subsidy on investment, the presence of capital risk can actually lower the *metr*.[20]

So what are we to conclude about the implications of capital risk for capital accumulation? First, *metrs* increase substantially in the presence of capital risk. This suggests that the distortionary impact of taxes may be much higher than suggested by *metr* calculations which ignore risk. As such, taxes may discourage capital accumulation more than previously suspected. Second, in general *metrs* increase as the amount of capital risk increases. This suggests that the tax system discriminates against risky investments vis-a-vis less risky investments, giving rise to yet another type of distortion in the economy. Third, due to variations in the capital risk premium across sectors, as well as differences in key tax parameters across industries, the presence of capital risk increases the variability in *metrs* across industrial sectors. This means that intersectoral tax distortions are even more pronounced than suggested by calculations which ignore capital risk.

Table 9 illustrates the implications of the irreversibility of capital in a risky environment for non-resource firms in Canada. The *metrs* are calculated under the assumption that systematic income

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[20]See Boadway, McKenzie and Mintz (1989).

Table 9 Marginal Effective Tax Rates, 1995

Risky and Reversible vs. Irreversible Investments*

	Riskless	Capital Risk Reversible	Capital Risk Irreversible
Manufacturing	22.6	32.1	38.8
Construction	35.6	39.9	47.9
Trans. & Storage	18.8	28.8	43.2
Communication	12.9	24	38.2
Utility	19.5	25.7	41.2
Trade	34.8	49.3	54.7
Service	16.7	29.8	41

*See McKenzie (1994) for details on calculations. The irreversible case assumes σ^2=.10

risk is zero, systematic capital risk is measured by the CAPM estimates presented in table 7, and that total unsystematic risk, which incorporates the variance in both income and the replacement price of capital, is σ^2=.10.[21] As can be seen from the table, irreversibility has significant implications for the distortionary effect of taxes. The *metr* on capital increases by a low of about 8 percentage points for manufacturing to a high of over 15 percentage points for utilities. As such, the presence of irreversibility in a risky environment substantially increases the disincentive to invest caused by the tax system. Moreover, the variance in *metrs* across sectors is also increased. This implies that the tax system may act to discourage risky, irreversible investment to a much greater extent than

[21]See McKenzie (1994) for more details.

previously thought, and may also generate much larger inter-sectoral distortions.

VI. Summary and Conclusions

The purpose of this paper has been to examine the potential impact of taxation on capital accumulation by calculating *marginal effective tax rates* (*metrs*) on capital for Canada and selected other countries. The *metr* on capital is a summary measure of the distortion caused by the imposition of personal and corporate taxes on capital. We also investigate the implications of risk and irreversibility for the impact of taxation on investment. By measuring the size of the distortion caused by the tax system, we are able to gain some insights into the potential impact of taxation on capital accumulation and economic growth.

As discussed in the introduction, we investigate just one aspect of the process linking taxation to economic growth - the impact of taxation on the rate of return to capital.

In our international comparison of *metrs* we include Canada and the other G7 countries - the U.S., the U.K, Germany, Italy, Japan and France - as well as Mexico and Hong Kong. We present calculations under various assumptions regarding the home country of the investors. In terms of the *metr* facing domestic savers investing in capital in their own country, Canada compares favourably with the other countries. In particular, the *metr* facing domestic investors in Canada is the second lowest of the nine countries studied; only Hong Kong's is lower. This suggests that Canada's tax system discourages capital investment somewhat less than most of its key competitors on international markets.

In terms of the tax incentives provided for Canadian multinational firms to invest abroad rather than at home, we find that the *metr* facing Canadian multinationals investing elsewhere is

generally higher than the *metr* on domestic investment in Canada; again, the exception is Hong Kong. As such, the tax system in Canada relative to the other countries does not appear to drive capital out of the country.

We also calculate *metrs* on capital for U.S. multinationals investing in Canada and the other countries. We find that, again with the exception of Hong Kong, the *metr* facing U.S. multinationals investing in Canada is the lowest of those studied. Indeed, for the manufacturing sector the *metr* on U.S. multinationals investing in Canada is lower than the *metr* on U.S. companies investing at home. This suggests that, all else being equal, Canada's tax system acts to attract investment from the U.S.[22]

We also examine the variation in *metrs* across provinces and sectors within Canada. We find that the variation in *metrs* across provinces is quite pronounced. This suggests that the tax system encourages an inefficient allocation of capital across the provinces. Moreover, there are substantial inter-sectoral distortions, as *metrs* vary significantly by industry. Again, this inter-sectoral variability suggests a marked departure from an efficient allocation of capital across uses, and is of suggestive of a tax system which may act to impede overall economic growth by distorting the allocation of capital within the economy.

When we incorporate risk into the analysis we find that *metrs* increase substantially, as does the inter-sectoral variation. Thus, the tax system appears to not only discriminate against riskier investments, but the inter-sectoral distortions caused by taxation are more pronounced in the presence of risk.

Recent attention has focused on the implications of irreversibility for investment decisions.

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[22]It should be stressed that these results are conditional upon the U.S. company being in an "excess" foreign tax credit position.

An investment is irreversible when the capital is sunk, and disinvestment can not occur costlessly. We find that when irreversibility is coupled with risk *metrs* increase further still, as does the inter-sectoral variation. The very important implication is that if capital is irreversible and risky, the tax system may impinge upon investment decisions to a much greater extent than previously suspected.

We think that the policy implications of these results are potentially quite important. In light of some recent emperical evidence linking lower taxes to higher investment, and higher investment rates in turn to higher productivity and growth, the scope for growth enhancing changes to the capital tax system becomes evident.[23] Although we find that internationally Canada's tax system as it relates to capital compares relatively well, there is nonetheless scope for improvement. Moreover, Canada's tax system displays a great deal of intersectoral and interprovincial variation in effective tax rates, and discriminates significantly against investments in risky and irreversible capital. In light of De Long and Summers' (1991) arguements that it is not so much the level of savings and investment that matters for economic growth, but rather whether that investment is allocated "appropriately" (read efficiently), the presence of these distortions suggests some cause for concern.

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[23]See Auerbach and Hassett (1992), Cummins and Hassett (1992) and De Long and Summers (1991).

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Investing in Canada: Estimation of the Sectoral Cost of Capital in Canada and Case Studies for International Comparisons

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Investing in Canada: Estimation of the Sectoral Cost of Capital in Canada and Case Studies for International Comparisons

Vijay Jog

Executive Summary

This paper has four objectives: its primary objective is to provide estimates of cost of capital for Canadian industrial sectors. In addition, the paper presents three case studies which deal with country and exchange risk, company and sector specific risk and the impact of using alternative methodology of estimating cost of capital for a specific sector. These three case studies, together with the Canadian cost of capital estimates, address practical issues in estimating cost of capital and the impact of cost of capital differences on the competitiveness of Canadian firms and on Canada's ability to attract foreign capital for green-field investments in Canada.

The empirical estimates of Canadian sectoral cost of capital address the issues of costs of both debt and equity and adjust for the sectoral differences in capital structure. The cost of equity estimates are based on the capital asset pricing model. Since in most cases the annual cost of company specific debt was unavailable, the cost of debt had to be estimated in a more complex manner. The individual company debt cost are estimated by adjusting for the individual company's risk levels by using six different standardized criteria. Similarly adjustments are made to account for differences in short- and long-term debt proportions in individual companies. The sample companies are those which were listed on the Toronto Stock Exchange for years 1988-1994. The paper also provides estimates of systematic risk, real cost of equity and capital, and capital structure. Overall, the results of the study indicate that during the period 1988 to 1994 the range for real sectoral costs of capital is between 6.8 and 11.1 percent averaging 8.99 percent. The order of the sectors relative to one another has remained fairly constant during the period with utilities & pipelines having the lowest cost of capital and gold & silver having the highest cost of capital. Our results are quite robust over time with little change in the overall ranking of the sectors.

The first case study concentrates on the cost of capital differences between U.S. and Canada for the pulp and paper sector. Since such a cross-country comparison requires an estimation of country risk and foreign exchange risk premia, the study attempts to measure these differences empirically. Our results show that Canadian corporations which intend to raise financing from the U.S. capital markets face a differential of more than 0.74 percent simply because of the fact that they have their operations in Canada and face another 1.20 percent as a foreign exchange risk premium. These premiums result in the Canadian cost of capital which is 1.67 per cent higher than the U.S. counterpart in this sector. This difference has a direct negative impact on the attractiveness of investment in Canada even if Canadian corporations have identical operating cost structure to their U.S. counterparts.

The second case study uses the dividend growth model to estimate cost of capital differences using the regulated telecommunications sector. Without adjusting for the differences in leverage, the cost of capital premium paid by Canadian telcos compared with U.S. telcos is about 1.3 per cent. Adjusting for the differences in capital structure increases the differential to 2 per cent. The higher Canadian cost of equity accounts for 1.75 per cent of this 2 per cent difference in the cost of capital. Meanwhile, the cost of debt, net of tax shield, accounts for a modest 25 basis points. This is a surprising result, given that U.S. telcos would appear to have a higher level of business risk and a more competitive environment. If anything, they should face a higher cost of equity capital.

The third case study compares Canada with Finland. Using historical capital structure, Finnish companies' real cost of capital is estimated as approximately 6.70% compared to the real cost of capital in the U.S. of 6.90% and Canada of 8.57%. Thus, historically speaking, Finnish pulp and paper companies have held a significant cost of capital advantage over Canadian firms. However, Finland has been undergoing significant changes to its financial and economic systems. As the restructuring proceeds, It is estimated that Finnish firms will face real cost of capital somewhere in the range of 10.05% to 11.26%, and hence will suffer a substantial decline in their competitive advantage.

Overall, our study indicates that there is a significant cost of capital disadvantage to firms in a country where the real rates continue to be high, where the country risk premium exists, where the firms compete with foreign firms with a different capital market regime, and whose export markets treat them as swing suppliers. Our use of Canadian data and Canadian estimates can be viewed as an attempt to empirically determine the magnitude and the impact of these issues from a Canadian perspective. Although our results are based on specific models using data on publicly-traded firms, the overall results indicate that the cost of capital differences do exist between U.S. and Canada and are of sufficient magnitude so as to have an impact on the relative attractiveness to invest in Canada. Some of this differential can be attributed to the differences in the risk free rates across the two countries and some to the foreign exchange variations. Neither is under the control of an individual firm and is a consequence of both the fiscal and monetary policy differences between the two countries.

INTRODUCTION

This paper has four objectives: its primary objective is to provide estimates of cost of capital for Canadian industrial sectors. In addition, the paper presents three case studies which deal with country and exchange risk, company and sector specific risk and the impact of using alternative methodology of estimating cost of capital for a specific sector. These case studies highlight some of the delicate and practical issues in cross-country estimation and comparisons of cost of capital and the reasons for some of the observed differences. Two of the three case studies deal with Canada - U.S. comparisons in specific sectors whereas the third case study highlights some of the issues in comparing cost of capital between Canada and one of its major European competitors (Finland) as it applies to the pulp and paper sector. These three case studies, together with the Canadian cost of capital estimates, address practical issues in estimating cost of capital and the impact of cost of capital differences on the competitiveness of Canadian firms and on Canada's ability to attract foreign capital for green-field investments in Canada. Due to the vast territory that is being covered in the paper, we have deliberately kept the review of the literature in this area to a minimum. We do not claim that the methodologies followed in this paper would satisfy all the readers of this paper; we appeal to the reader's pragmatism and a sense of realism about what is desired and what is empirically attainable.

With these caveats in mind, the paper is organized as follows: the first section deals with the empirical estimates of Canadian sectoral cost of capital. These estimates are based on the standard notion of the weighted average cost of capital which reflect the rates of returns demanded by shareholders and debt holders in order to earn appropriate risk-adjusted rates of returns. The cost of equity estimates are based on the capital asset pricing model using data of companies listed on the Toronto Stock Exchange for years 1988-1994. The second section deals with a Canada - U.S. comparison of cost of capital with special emphasis on the country and exchange risk premia. The results from this analysis are used to highlight the impact of the cross-country differences in cost of capital on the competitiveness of a green-field investment in a Light-Weight Coated mill in each of the two countries. Next, the paper deals with comparing the cost of capital differences for the regulated telecommunication sector in the two countries. This comparison uses the dividend growth model for estimating the cost of equity. This section also highlights the practical difficulties of dealing with differential inflation rates and varying capital structures in a cross-country cost of capital comparison. The fourth section provides a practical example of difficulties faced in comparing cost of capital for the Canadian pulp and paper sector with its counterpart in Finland. Both countries in this sector compete in the North American capital and product markets and are each other's main competitors. This section not only highlights the methodological challenges but also the challenges in data collection and estimation. The paper ends with a summary and conclusion.[1]

CANADIAN ESTIMATES OF SECTORAL COST OF CAPITAL[2]

Traditionally, management has focussed much of its attention on maximizing operating

returns through such methods as increasing sales, creating economies of scale, reducing production costs, minimizing working capital, etc. In order for companies to remain viable in this increasingly competitive and globalized environment, maximizing operating returns will continue to be the foundation of maximizing firm value. However, at the same time, management must not overlook the importance of cost of capital in maximizing firm value.

Unfortunately, estimation of the appropriate cost of capital continues to be a debatable subject. The reasons for this debate are many; the most important of which is the debate on the appropriate model for estimating the risk-return tradeoff. This debate is further complicated by the differences of opinions about the openness of the economy, the identification of the marginal investor in an increasingly global world, the ever increasing importance of the tax exempt investors in the country and the relevance of the user cost of capital typically used by economists in estimating the sectoral cost of capital. Since each one of these debatable areas can be (and has been) a subject of a series of papers, the challenge continues to defy a solution which could be acceptable to all.

It is neither the intent nor the objective of this paper to cover the entire water front of this debate; ours is a much narrower perspective. In this section, we assume one particular model of the return generating process for our estimation of cost of capital and provide empirical estimates based upon its usage with the available data. Before providing the methodology that we employed to estimate the cost of capital, we first provide a brief discussion of the two main schools of thought in the cost of capital estimation literature. We then follow it with a brief discussion of the basic tenets underlying the of the Capital Asset Pricing Model (CAPM) and capital structure theory. Together, these models form the underlying foundation of our methodology and our subsequent empirical work. No attempt is made to justify the use of the CAPM but simply to explain how it is applied in this study. The limitations of the model are well described in any standard finance textbook and many papers exist which debate vigorously the usage of the model and its empirical verification; thus, there is little need for further elaboration here.[3] Also described in this section are the types and sources of information used to estimate the costs of capital for individual sectors followed by the description of the estimation process of various components in the cost of capital. The section ends with the aggregate results and conclusions.

The Cost of Capital Estimation Literature

At least two schools of thought are evident in the existing cost of capital estimation literature. We use the term 'country averages' for those studies which attempt to estimate an overall country specific cost of capital. We use the term 'micro estimates' for those studies which use company specific data to derive cost of capital estimates.

The "Country Averages" Approach

A typical recent study in this area is the one published by NABST (1990).[4] The main objective of this study was to investigate whether or not the cost of capital in Canada

is significantly different (higher) from that estimated for other countries. Based on an approach which relies on estimating an aggregate price-earnings ratio and adjusting it for depreciation and inflation, the report concluded that the overall cost of capital in Canada is higher than that of many of its trading partners except the U.S. The report also provided some possible reasons for this relatively high cost of capital. In addition, some policy prescriptions to overcome this relative disadvantage were also discussed. In the appendix of the report, there was a brief discussion on why an approach based on the concept of Modern Portfolio Theory is unreliable and, therefore, was not used by the study team. Also provided were some estimates of company specific costs of capital using a variant of the well-known dividend growth model. These estimates were used mainly to corroborate the macro-results.

Although useful as an overall exercise, the approach along the lines used in the NABST study is not without difficulties, thereby limiting its usefulness for corporate decisions. Some of its main limitations are: its use of a country level price-earnings ratio; the variety of adjustments made to it to arrive at a country-wide cost of capital; lack of attention to country-wide differences in industrial structures; dependence on P/E ratios of aggregate indices with radically different industrial composition; and inability to analyze the sectoral differences in the cost of capital within the country and across competing countries.

Thus, by using the country-wide estimates of macro-economic variables, this type of approach does not lend itself to any conclusions about sectoral or company specific differences. More specifically, the country-level cost of capital estimates and comparisons are of little use to a company which is contemplating an investment decision. If the cost of capital problem is considered to be a serious issue for the corporate sector in terms of its competitiveness with other companies in the similar sector in a competing country, a better approach would be to compare sectors by matching companies across the various countries either at the level of sectoral indices or by choosing a subset of similar companies in each country. Thus, for the purpose of competitiveness analysis, the relevant comparisons must be based on micro-estimates and should account for, as a minimum, the sectoral level differences across competing countries.[5]

Another approach in determining country-level cost of capital is found in the literature on marginal effective tax rates (METR). A recent paper by Bruce (1992) provides a good description of the approaches used in the METR studies and discusses some additional limitations of the NABST type approach. As the main purpose of these studies is to evaluate how differences in country specific tax systems affecting investment decisions, these studies simply assume that the cost of capital for the Canadian corporate sector is determined at the international level by invoking the 'open economy' notion of Canada. By keeping the cost of capital the same for all asset classes and sectors, these studies then concentrate on their main purpose namely, the determination of marginal effective tax rates across sectors and asset classes. Thus, these studies also are of no relevance to a corporate decision maker since many of them simply assume identical capital structures and identical costs of debt and equity for all sectors regardless of the fact that there are systematic

differences in their underlying business risk, debt-equity ratios and costs of equity and debt. As far as we know, the only study which explicitly accounts for the differences in the cost of capital in the estimation of METR is by Jog and Mintz (1990). Their results indicate that the assumption of varying sectoral cost of capital has a significant impact on the estimates of METR.

The "Micro" Approach

For simplicity, all studies under this category can be classified as belonging to the corporate finance, company-based approach. These studies explicitly account for differences in capital structure (amounts of debt versus equity) and in costs of individual sources of capital (costs of debt and equity) at the company level. In many cases, these studies differ only in the way they estimate the costs of equity capital; the methodology used to estimate the cost of debt and the overall cost of capital is essentially identical.[6]

As many of these approaches and their limitations are well described in any standard corporate finance text book, these are reviewed only briefly below. Under this approach, there is almost a consensus on the fact that there are three main models for estimating the company-specific cost of capital. These are: the Capital Asset Pricing Model (CAPM), the Dividend Growth Model (DGM), and the Arbitrage Pricing Model (APM). A model which seems to be more popular in the investment dealer community is a model based on the Price-earnings ratio.[7] This is sometimes used as a 'quick and dirty' method of estimating the cost of equity capital as an inverse of the P/E ratio. This method has two major shortcomings: it relies on an accounting measure (earnings) and it completely ignores the differential growth rates in companies with same current earnings. Thus, this method is considered to be the most unreliable and is almost never recommended for use in the decision making framework.

As this section uses the latter (CAPM) approach to estimate the company specific cost of equity, its underpinnings are explained in more detail below.[8] The dividend growth model (DGM) is used in estimating the cost of capital in one of the case studies and is described in that section.[9] As reported by Jog and Srivastava (1994), almost one-third of Canadian firms indicate using a 'risk premium' concept in estimating their cost of equity - a concept which underlies the development of CAPM. Similarly, 14 percent of Canadian firms claim to use the DGM method to estimate their cost of equity capital.

Briefly, the CAPM relies on the simple concept that investors hold a diversified portfolio and require compensation (i.e. a higher expected return) for the risk that cannot be diversified away.[10] The CAPM provides a convenient way to quantify this non-diversifiable (or systematic risk) risk by measuring the beta of the firm. In other words, the return expected by the shareholders is made up of what they could earn in a risk less investment plus a risk premium proportional to the systematic risk coefficient of their stock. The higher the beta, the higher would be the expected return and consequently the higher would be the cost of equity for the firm. The actual risk premium would be determined by the beta coefficient times what is expected from

holding a well-diversified portfolio (e.g. the TSE300 index or the S&P500 index); the latter by definition would have a beta of 1.0.

In the context of the CAPM, the risk-return relationship takes the following form:

$$R_S = R_F + \text{Risk Premium} \qquad (1)$$

with the risk premium given by

$$\text{Beta x (market return - risk free return)} \qquad (2)$$

replacing (2) into (1)

$$R_S = R_F + \text{Beta } (R_M - R_F) \qquad (3)$$

where,

R_S = the expected return on a security
R_F = the risk free return
R_M = the expected return on the market portfolio

Figure 1 illustrates that a security should, on average, provide the investor with a return that could be earned by investing in a risk free investment plus a reward for taking risk (the security's risk premium). The risk premium equals the excess return that could be earned by holding a widely diversified portfolio times the beta of that particular security. This intuitively appealing formulation does not imply that this will return would be realized each and every time, but on average, the relation must hold. Note that in equation (3), R_F and $(R_M - R_F)$ are economy-wide measures which should apply to any stock.

A straightforward application of the CAPM is the determination of a firm's cost of equity capital. Once the beta of the firm's stock is determined, the cost of equity can be calculated as:

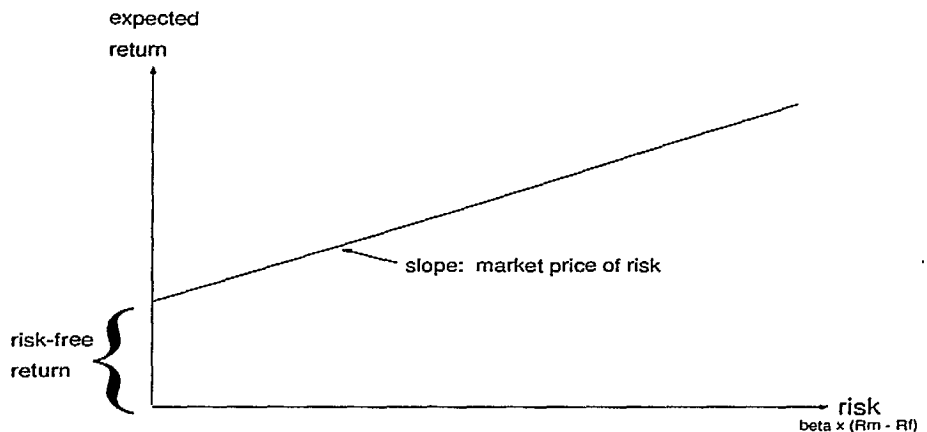
$$\text{cost of equity} = \text{risk free rate} + \text{equity beta x market risk premium} \qquad (4)$$

Three practical comments are in order here. First, a holding company would have to use as many costs of equity capital as it has main lines of business since the riskiness of the cash flows will generally be different from one line of business to the next. Second, each project can be seen as a mini-firm in itself for which a beta must be determined. And third, for a private firm or conglomerate, one must estimate the beta measures of independent, similar firms operating in the same industry.

Capital Structure

In addition to equity capital, firms also resort to debt capital to finance their investments. On the one hand, debt capital provides a lower cost source since interest paid on debt is tax-deductible. On the other hand, high reliance on debt also

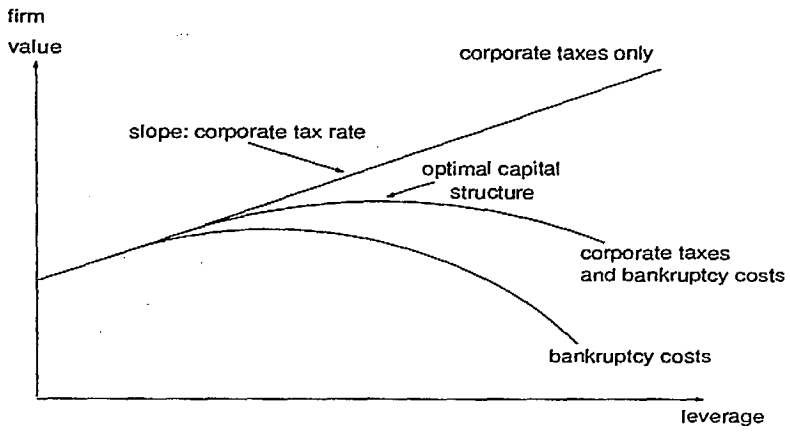
Figure 1
Relationship in Capital Markets Between Risk and Expected Return



expected retrun on security = risk-free return + risk premium

risk premium = (security's measure of risk) x (market price of risk)

Figure 2
Theory of Capital Structure



brings a higher possibility of bankruptcy or financial distress if the firm is unable to meet its interest obligations. Clearly then, the costs of equity and debt also depend upon the capital structure (i.e., debt-equity ratio) of the firm. Intuitively, firms belonging to sectors which face higher variability in their business would resort to lower reliance on debt whereas firms in sectors facing lower level of fluctuations in their earning streams would choose to rely on higher level of debt.

In general, this trade-off between a lower after-tax cost of debt and a potentially higher probability of bankruptcy implies that the financing decisions of a firm must be made such that they maximize the value of the firm. Therefore, the impact on firm value and costs of raising capital of using various combinations of debt and equity to finance investments on firm value must be clearly understood prior to making capital structure decisions.

As taxes play a very important role in the capital structure decisions, it is useful as a starting point to assume the case where there exists no taxes or bankruptcy costs; it is in this case that Modigliani and Miller (1958) were able to show that the value of a firm would be independent of its capital structure; varying the degree of financial leverage would neither increase nor decrease the market value of the firm.

However, the value of the firm is affected when corporate taxes are introduced since interest payments are deductible for tax purposes. This deductibility provides a tax-based incentive in the financing decision to rely on debt financing. This is depicted as the line labelled 'corporate taxes only' in Figure 2.

An important element in the decision about the appropriate level of debt is the notion of bankruptcy risk. The risk of bankruptcy means that the firm may be obliged to pay costs to lawyers etc. owing to bankruptcy proceedings. Moreover, the possibility of bankruptcy may cause disruption in normal business relations - the potentially bankrupt firm may not be able to offer credible guarantees for its products or enter into long term contracts with its customers and suppliers because of the threat of default.

Higher levels of leverage (debt) are associated with higher levels of bankruptcy risk . As such, both equity and debt investors will demand higher returns for the increasing levels of financial risk which in turn, will reduce the value of the firm. This is illustrated as the curve labelled 'bankruptcy costs'. The dilemma management is faced with when determining its optimal capital structure is at what point the costs associated with bankruptcy risk outweigh the benefits associated with the tax shield of the interest payments when increasing financial leverage. In theory, the optimal level is the maximum of the curve that incorporates both the corporate taxes and bankruptcy costs (the curve labelled 'corporate taxes and bankruptcy costs'). In practice however, estimating the exact optimum level of debt at which firm value is maximized (or cost of capital is minimized) is difficult, if not impossible. It should also be noted that the systematic risk of the firm's equity would not only reflect the underlying business risk faced by the firm but also the financial risk faced by the firm. The latter associated with the level of debt and the firm's ability to pay fixed interest obligations. The firm's cost of capital would thus depend upon the level of debt and associated costs of

equity and debt - the so-called weighted average cost of capital (WACC).

Cost of Capital - Empirical Estimation

The empirical estimates of the cost of capital presented in this paper are based on this basic framework of the CAPM and weighted average cost of capital. The individual components required for the estimation are outlined below.

Cost of Equity

The CAPM was used to compute the cost of equity. The use of the CAPM requires estimates of the risk-free rate, the equity beta, and the market premium.

Risk-Free Rate

To estimate the risk-free rate an approach found in financial literature by Myers (1993) was used. Under this approach the annual risk-free rate is estimated by subtracting a maturity premium of 1.2 per cent from long term government bond yields. Government of Canada long term yields that existed at the end of each year in the study were used and were obtained from the CANSIM database.

Table 1 provides the inflation rate and the real and nominal risk-free rates, used in the estimation of cost of capital.

Equity Betas

Equity betas were computed by regressing each company's monthly return with the corresponding monthly returns of the TSE300 index. The regressions were conducted on a rolling five year basis based on the 60 months immediately preceding the years for which the estimates are to be reported.[11] Due to the nature of the linear regression calculation it is possible that the beta calculated for an individual firm may not have a great deal of explanatory power. This is due to the fact that the linear relationship represented by beta may only be useful over a specific range. If the returns used to calculate beta for a specific firm are highly volatile, the beta for that firm may not be indicative of the relationship between the stocks returns and the TSE. To adjust for this problem, Vasicek (1973) has suggested the following formula which compresses the betas of the sample, in our case the sector, toward the mean.

$$\beta_i^* = \beta_i * (\sigma^2_{industry} / (\sigma^2_{industry} + \sigma(\beta_i)^2) + \beta * (\sigma(\beta_i)^2 / (\sigma^2_{industry} + \sigma(\beta_i)^2) \quad (5)$$

Where

β_i^* = Vasichek Beta for stock *i*

β_i = calculated beta for stock *i*

β = Average of the sector betas

$\sigma^2_{industry}$ = Variance of the sample betas in the corresponding industry sector

$\sigma(\beta_i)^2$ = Variance of the returns used to calculate beta for stock *i*

Under this correction, the more uncertain the individual beta, the higher is the weight given to the mean beta of that sector. The end result of this adjustment is that we have a more robust series of beta values for the firms in our study.

Market Risk Premium

There is no one ideal method for estimating market risk premium; in various rate studies and papers, any number from 4 percent to 8.5 percent has been used. All estimations in this paper use a six per cent market risk premium.[12] Clearly, any change in this premium may affect the cost of capital accordingly.

Cost of Debt

A simple method of obtaining a company's cost of debt is to use the current yield on the company's existing debt. However, the main obstacle encountered when using this approach is that many companies do not have their debt trading publicly and, therefore, their current yields are not available. Even in cases where the debt is traded publicly, a current yield is only available if the debt is actively trading, otherwise the yield will not reflect current market conditions.

Since in most cases the annual cost of company specific debt was unavailable, the cost of debt had to be estimated in a more complex manner. First, the yield of all long term corporate bonds was collected from the CANSIM database. This yield, shown in Table 2, was used to represent the median of all corporate bond yields. The median yields were then adjusted to reflect differences in the individual company's risk levels that exist. To obtain the differences that exist between companies we used six different standardized criteria (Table 3).

Once the differences were computed, the individual companies were then ranked (weighing each criteria equally) and assigned to one of 20 groups according to their ranking - the best ranked companies being assigned to group one, the second best companies to group two, and so on. The groups were then assigned to one of seven bond ratings. Assigning a bond rating to them made the yield calculations straight forward since spreads between bond ratings are available from many sources. Table 4 illustrates the groups, the corresponding bond ratings, and the spreads that were used to compute the yields.

Cost of Preferred

Since market data related to the current yields on preferred equity is also very limited, measuring the cost of preferred equity can also be complex. To simplify the estimation procedure, we analyzed the spread between the yields on bonds and preferred equity over a nine year period to determine if the cost of equity could simply be estimated in relation to the cost of debt. Government of Canada bond yields and preferred equity index yields were obtained from the Preferred Share Quarterly

Table 1
Risk-Free Rates

	1994	1993	1992	1991	1990	1989	1988
Nominal	7.96%	5.92%	7.34%	7.77%	9.31%	8.49%	9.16%
Inflation	0.23%	1.70%	2.09%	3.78%	5.01%	5.13%	3.99%
Real	7.71%	4.15%	5.14%	3.84%	4.09%	3.20%	4.97%

Table 2
Average Annual Corporate Bond Yield
For Single-A Rated Companies

	1994	1993	1992	1991	1990	1989	1988
Yield	9.95%	8.02%	9.70%	10.74%	11.74%	10.75%	11.13%

Table 3
Six Criteria Used to Rank Companies For Cost of Debt Adjustments

	Criteria	Formula
1.	Profitability	ebit / total assets
2.	Debt service capability	ebit / interest
3.	Profitability	revenues / total assets
4.	Liquidity	net working capital
5.	Equity-to-debt	(# shares * closing price) / long term debt
6.	Size (total tangible assets)	total assets - intangible assets

* ebit represents earnings before interest and taxes.

Table 4
Cost of Debt Estimates Obtained by Adjusting the Median Yield of All Companies to Reflect Differing Characteristics of Each Company

Groups of Companies Based on Rankings of Combined Six Criteria	Assumed Bond Rating	Adjustment to Median Bond Yield
1	AAA	- 95 basis points
2,3,4	AA	- 55 basis points
5,6,7,8	A+	- 25 basis points
9,10,11,12	BBB	+ 75 basis points
13,14,15	BB	+ 125 basis points
16,17,18	B	+ 275 basis points
19,20	CCC...	+ 600 basis points

* 1st Group Represents the Least Risky (Best) Companies; 20th the most risky companies.

prepared by Burns Fry Limited and were compared on a monthly basis for the years 1985 to 1993. The spread between the government bond yields and preferred equity yields over the nine year period is illustrated in Figure 3. As expected, the government of Canada bond yield has been higher than the preferred equity yield.[13] The average spread for the period was 0.66 per cent.

Since the above comparisons involved comparing low-risk government securities with higher-risk corporate securities, an adjustment was necessary to reflect the spread that has existed between corporate bond yields and corporate preferred yields. To adjust the GOC bond yields to reflect the higher risk level associated with corporate single-A rated bonds, we compared the historical yields on Government of Canada bonds with the historical yields on corporate single-A rated bonds that are provided in ScotiaMcLeod's Handbook of Canadian Debt Market Securities. We found that the corporate single-A bond yields have been approximately 1.30 to 1.50 per cent higher than the government yields. Thus, adding this adjustment to the 0.66 per cent spread between the Government of Canada bond and preferred equity yields gives a spread of 1.96 to 2.16 per cent between corporate single-A bond yields and preferred equity yields.

Therefore, having estimated the spread that exists between corporate bond yields and preferred equity yields, we estimated the cost of preferred equity by subtracting the spread (rounded to 2.00 per cent) from the cost of debt estimated above.[14]

Capital Structure

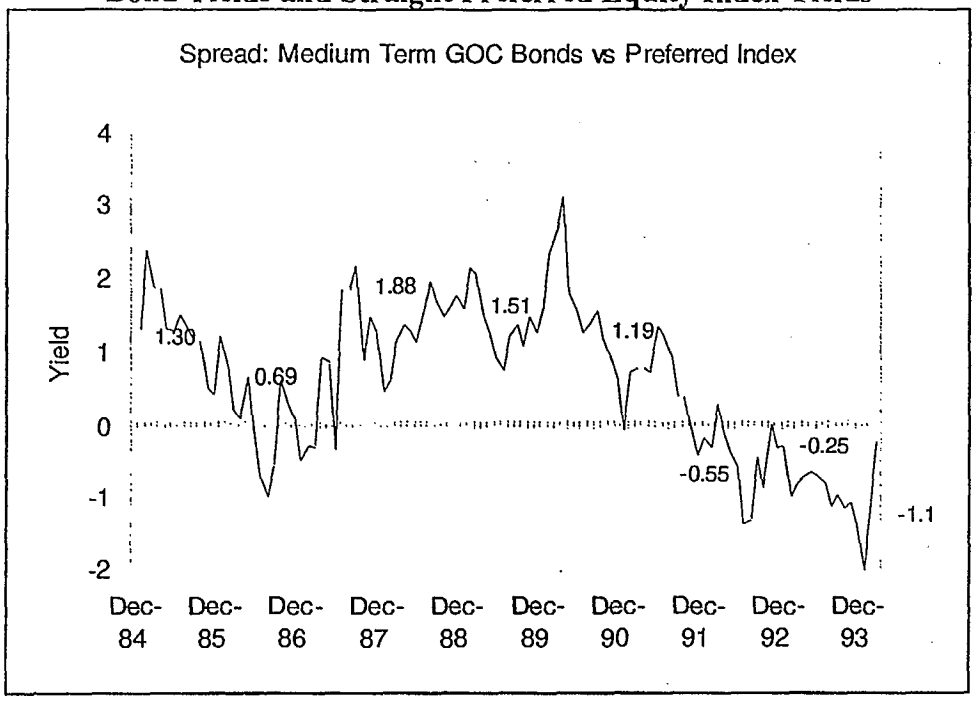
Market Value of Debt

Due to the unavailability of data regarding the market value of bonds, the market value of debt was assumed to equal the book value of debt. To ensure that firm's usage of permanent short term debt as a substitute for long term debt does not affect our estimates, we have made one adjustment. Specifically, it was assumed that in most cases, the value of a firm's current assets should at least be equal to the value of current liabilities. The first step then, was to calculate net working capital (current assets minus accounts payable) for each firm. If a firm had short term debt greater than net working capital, it was assumed that the additional short term debt was actually long term debt and this difference was added to the long term debt for the firm.

Market Value of Equity

The market value of common equity was computed by multiplying the year end market price by the number of shares outstanding at year end. The market value of preferred equity was computed under the assumption that the preferred dividend payment is a perpetuity. As such, the market value was computed by dividing the preferred dividend by the cost of preferred equity.

Figure 3
Spread Between Government of Canada Medium to Long-Term Bond Yields and Straight Preferred Equity Index Yields



Market Value of Firm

The market value of the firm equals the sum of the market values of debt, common equity and preferred shares.

Effective Tax Rate

The effective tax rate was computed from the accounting-based data by dividing taxes paid by pre-tax income. In some cases, where this calculation produced meaningless values caused by various tax adjustments not reflected in the financial statements, the tax rate was assumed to equal 34.5 per cent. Again, a different rate would change the estimation of the overall cost of capital.

Weighted Average Cost of Capital (WACC)

The formula used to compute the WACC equals:

$$WACC = k_d*(1-T)*(D/V) + k_e*(E/V) + k_p*(P/V) \quad (6)$$

where,

k_d = cost of debt, before tax,

k_e = cost of common equity,

k_p = cost of preferred equity,

D/V = market value of long term debt to market value of the firm,

E/V = market value of common equity to market value of the firm,

P/V = market value of preferred equity to market value of the firm,

V = market value of the firm equals D + E + P, and

T = effective tax rate.

Sectoral Estimates - Averaging of Company Results

In order to compute the sectoral cost of capital from the individual company estimates, some method of averaging was necessary. Two methods were used. The first method computes a simple arithmetic average of all of the companies' cost of capital within a given sector. The second approach computes a weighted average of all companies in a given sector. In the latter case, the weights that were used were the market values of the firm.

RESULTS

The weighted average costs of capital were computed annually for all (714) companies and were then grouped into 22 industrial sectors allowing the results to be presented in a reasonable manner. Exhibit 1 shows the groupings of companies represented by the 22 sectors.

Exhibit 1

Sectoral Groupings of Firms

1	Metals & Minerals
2	Gold & Silver
3	Specialty Stores
4	Paper & Forest Products
5	Technology
6	Industrial Products
7	Real Estate
8	Transportation & Environmental Services
9	Communications
10	Merchandising
11	Financial Services
12	Conglomerates
13	Integrated Oils
14	Oil & Gas Producers
15	Oil & Gas, Mining, or Forest Services
16	Autos & Parts
17	Beverages & Tobacco
18	Food Processing
19	Household Goods
20	Biotechnology & Pharmaceutical
21	Utilities & Pipelines
22	Services

Main Results - Sectoral Costs of Capital

Table 5 shows the average beta for each of the sectors 22 sectors listed above. Table 6 presents the corresponding cost of capital estimates in real terms by sector for each year of the study as well as the overall average cost of capital of the seven years considered.[15] These results show only the weighted average approach to

computing the sectoral cost of capital. The reason for not using the simple averaging is that with simple averaging very small companies which represent a small portion of a sector will be given equal weight in computing the sectoral cost of capital thus providing potentially misleading results. Figure 4 illustrates graphically the overall sectoral WACCs presented in Table 6. The figure was created such that the cost of capital increases as one moves from the left side of the graph to the right. The ordering was determined by sorting the sectors by their overall WACCs as shown in Table 6. Thus, the horizontal axis may be viewed as a relative measure of risk with the least risky sectors (with the lowest cost of capital) being positioned to the left and the progressively riskier sectors positioned to the right. Thus, Figure 3 demonstrates the relative risk-return relationship (i.e. higher levels of risk are associated with higher costs of capital).

The results illustrated in Figure 4 show that the utilities and pipelines sector has the lowest cost of capital averaging just under seven percent real which is consistent with its low beta (i.e. risk). At the other end of the spectrum, the golds and silvers sector has the highest hurdle rate averaging just over eleven percent real, which is consistent with its higher level of risk as measured by beta.

To test for the robustness of the cost of capital estimates over time, the WACCs of each sector were ranked in ascending order for each of the seven years in the study. The rankings, presented in Table 7, show that the results are quite robust over time with little change in the overall ranking of the sectors. At the bottom of Table 7, the value of Pearson year-to-year correlation coefficients are provided. This measure compares the correlations between the sectoral rankings of a given year with the rankings of the previous year. As the coefficients show, the correlations are high indicating the rankings across time are fairly consistent.

Impact on the WACC of Changing the Market Risk Premium

Table 8 presents the impact of changes of plus or minus 1% to the market premium (assumed to equal 6.0%) on the WACC. The results show that changes to the market premium assumption have a linear impact on the sectoral costs of capital. For instance, in the merchandising sector a 1% reduction in the market premium from 6.0% to 5.0% results in the WACC being reduced by -0.55% while a 1% increase in the market premium from 6.0% to 7.0% results in the WACC increasing by 0.55%. Thus, one is able to adjust the sectoral WACCs according to one's own market risk premium assumption.

Sectoral Capital Structures

The overall capital structures of the sectors are illustrated in Figures 5 and 6, which provide calculations based on both market values and book values. The figures present the sectoral equity-to-firm values computed by using the simple averages and the weighted averages of the companies in a sector. Overall, the capital structures do not differ significantly when market values are used as opposed to book values with the exception of the Utilities & Pipelines; Communications, Beverages & Tobacco and

Table 5
Average Beta for Canadian Sectors

Sector	1987	1988	1989	1990	1991	1992	1993	1994
Metals & Minerals	1.46	1.43	1.36	1.28	1.31	1.18	1.08	1.11
Gold & Silver	1.33	1.27	1.19	1.12	1.12	1.02	1.28	1.36
Specialty Stores	0.86	0.83	0.84	0.82	0.86	0.86	0.86	0.80
Paper & Forest Products	1.20	1.26	1.36	1.26	1.30	1.21	1.16	1.10
Technology	1.02	1.03	1.04	1.00	1.04	1.18	1.16	1.13
Industrial Products	0.98	1.01	1.02	0.97	0.99	1.10	1.04	1.03
Real Estate &	0.92	0.88	0.94	0.99	1.07	1.20	1.12	1.06
Transport & Environ Servs	0.76	0.83	0.85	0.87	0.88	0.88	0.90	0.69
Communications	0.79	0.82	0.85	0.90	0.90	0.94	0.79	0.82
Merchandising	0.78	0.76	0.78	0.78	0.76	0.81	0.87	0.84
Financial Services	0.98	0.95	0.96	0.94	0.95	0.84	0.98	0.90
Conglomerates	1.18	1.24	1.22	1.26	1.26	1.35	1.24	1.18
Integrated Oils	1.09	1.04	1.05	0.94	0.87	0.58	0.75	0.73
Oil & Gas Producers	1.14	1.12	1.12	1.03	0.98	0.75	0.88	0.86
Oil & Gas, Mining &	1.32	1.30	1.26	1.12	1.04	0.85	0.98	0.97
Autos & Parts	0.83	0.83	0.91	0.79	0.83	0.78	0.79	0.75
Beverages & Tobacco	0.79	0.81	0.85	0.80	0.80	0.83	0.76	0.75
Food Processing	0.72	0.77	0.80	0.81	0.78	0.82	0.87	0.77
Household Goods	0.86	0.86	0.87	0.82	0.85	0.96	1.00	0.92
Biotechnology & Pharmac	0.87	0.89	0.96	0.96	1.02	0.91	0.95	0.97
Utilities & Pipelines	0.47	0.48	0.54	0.56	0.58	0.61	0.57	0.63
Services	0.92	0.90	0.92	0.96	0.98	1.04	0.99	0.97

Table 6
Real Weighted Average Cost of Capital (WACC)

Years/Sector	1994	1993	1992	1991	1990	1989	1988	Overall
Utilities & Pipelines	9.30	6.44	7.37	6.35	6.18	5.25	6.41	6.76
Real Estate	8.96	6.48	7.08	6.75	6.44	6.05	7.31	7.01
Transportation &	9.85	7.64	8.28	7.30	7.16	6.37	7.94	7.79
Communications	11.39	7.68	9.09	7.45	7.34	6.57	8.40	8.27
Autos & Parts	10.70	8.14	8.80	7.66	7.22	7.56	8.59	8.38
Food Processing	10.90	8.23	8.63	7.40	7.93	7.26	9.09	8.49
Merchandising	11.55	8.47	9.05	7.77	8.03	7.28	8.74	8.70
Beverages & Tobacco	11.05	8.05	9.43	8.06	8.04	7.50	9.10	8.75
Household Goods	11.64	8.93	9.47	7.64	7.37	7.27	9.13	8.78
Services	11.64	8.53	9.35	7.92	7.96	7.23	8.82	8.78
Integrated Oils	11.26	7.88	8.11	7.99	8.65	7.97	10.20	8.87
Specialty Stores	11.63	8.68	9.40	8.16	7.92	7.39	8.95	8.88
Conglomerates	11.80	8.98	8.61	8.29	8.44	8.05	9.60	9.11
Oil & Gas Producers	11.46	8.62	8.72	8.32	8.81	8.56	9.51	9.14
Financial Services	11.90	9.00	9.13	8.48	8.45	7.89	9.55	9.20
Industrial Products	12.33	9.13	9.67	8.12	8.08	7.78	9.30	9.20
Paper & Forest Products	11.88	9.21	9.74	8.83	8.74	8.73	10.20	9.62
Biotechnology &	12.57	9.29	10.03	9.68	9.12	8.21	9.46	9.77
Oil & Gas, Mining or Forest	13.19	9.72	9.17	8.99	9.59	9.24	11.00	10.13
Metals & Minerals	12.95	9.57	10.55	9.45	9.57	9.69	11.79	10.51
Technology	14.02	10.71	11.45	9.35	9.04	8.56	10.45	10.51
Gold & Silver	15.30	11.44	10.50	9.64	9.84	9.64	11.63	11.14
Average of Sample	11.69	8.67	9.17	8.16	8.18	7.73	9.33	8.99%

Table 7
Rankings of Sectors By WACC

Sector	1994	1993	1992	1991	1990	1989	1988	Overall
Utilities & Pipelines	2	2	2	1	2	1	1	1
Real Estate	1	1	1	2	1	2	2	2
Transportation &	3	3	4	3	3	3	3	3
Communications	8	4	10	4	5	4	4	4
Autos & Parts	4	7	8	7	4	11	5	5
Food Processing	5	8	6	5	10	8	12	6
Merchandising	10	9	9	8	9	6	6	7
Services	12	10	13	9	7	5	7	8
Household Goods	13	14	15	6	6	7	9	9
Integrated Oils	7	5	3	10	14	14	18	10
Beverages & Tobacco	6	6	16	14	12	10	10	11
Specialty Stores	11	12	14	13	8	9	8	12
Conglomerates	14	13	5	12	13	13	13	13
Industrial Products	17	16	17	11	11	12	11	14
Oil & Gas Producers	9	11	7	15	17	18	14	15
Financial Services	16	15	12	16	16	15	16	16
Paper & Forest Products	15	17	18	17	15	17	17	17
Biotechnology &	18	18	19	22	19	16	15	18
Oil & Gas, Mining or Forest	20	20	11	18	21	20	20	19
Metals & Minerals	19	19	20	19	20	21	22	20
Technology	21	21	22	20	18	19	19	21
Gold & Silver	22	22	21	21	22	22	21	22
Pearson Year-to-Year Correlation Coefficient	0.97	0.81	0.76	0.93	0.95	0.94	N/A	N/A

Figure 4
WACC for Industries in Canada.
Overall (1988 - 1994)

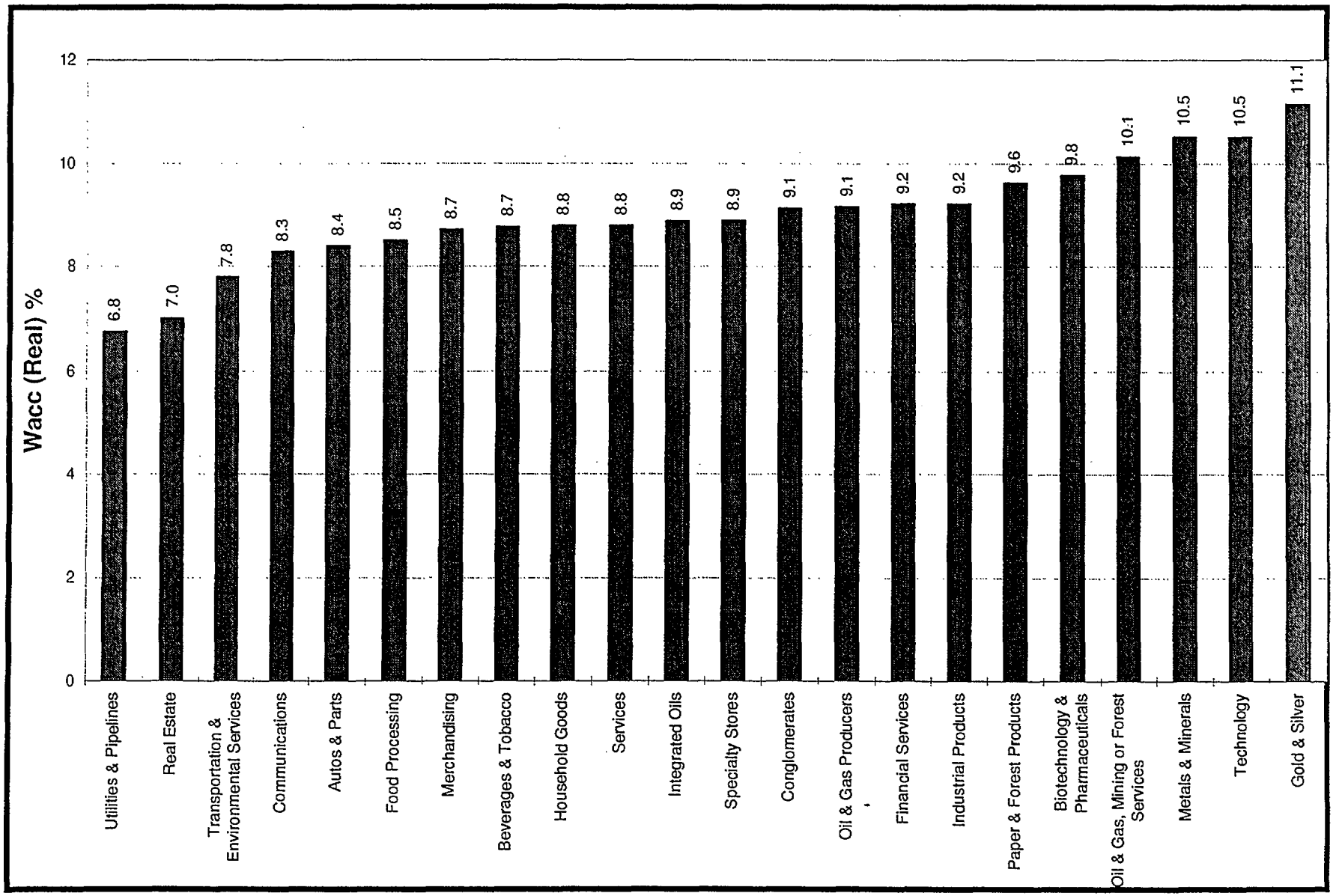


Table 8
Real Weighted Average Cost of Capital (Overall)
Impact of Plus/Minus 1 Per Cent Change in Market Premium

Sector	5% MRP	6% MRP	Change WACC	7% MRP	Change WACC
Utilities & Pipelines	6.43	6.76	-0.32	7.08	0.32
Real Estate	6.63	7.01	-0.38	7.39	0.38
Transportation & Environmental	7.32	7.79	-0.47	8.26	0.47
Communications	7.70	8.27	-0.58	8.85	0.58
Autos & Parts	7.79	8.38	-0.59	8.97	0.59
Food Processing	7.89	8.49	-0.60	9.09	0.60
Merchandising	8.15	8.70	-0.55	9.25	0.55
Beverages & Tobacco	8.13	8.75	-0.62	9.37	0.62
Services	8.12	8.78	-0.66	9.44	0.66
Household Goods	8.13	8.78	-0.65	9.42	0.65
Integrated Oils	8.26	8.87	-0.61	9.47	0.61
Specialty Stores	8.24	8.88	-0.64	9.51	0.64
Conglomerates	8.48	9.11	-0.63	9.74	0.63
Oil & Gas Producers	8.40	9.14	-0.74	9.89	0.74
Financial Services	8.47	9.20	-0.73	9.93	0.73
Industrial Products	8.49	9.20	-0.71	9.91	0.71
Paper & Forest Products	8.85	9.62	-0.77	10.39	0.77
Biotechnology & Pharmaceuticals	8.93	9.77	-0.84	10.61	0.84
Oil & Gas, Mining or Forest Services	9.24	10.13	-0.89	11.02	0.89
Metals & Minerals	9.58	10.51	-0.93	11.44	0.93
Technology	9.56	10.51	-0.95	11.46	0.95
Gold & Silver	10.07	11.14	-1.07	12.21	1.07

Figure 5
Capital Structure: Equity to Firm Value %
(Book Values)

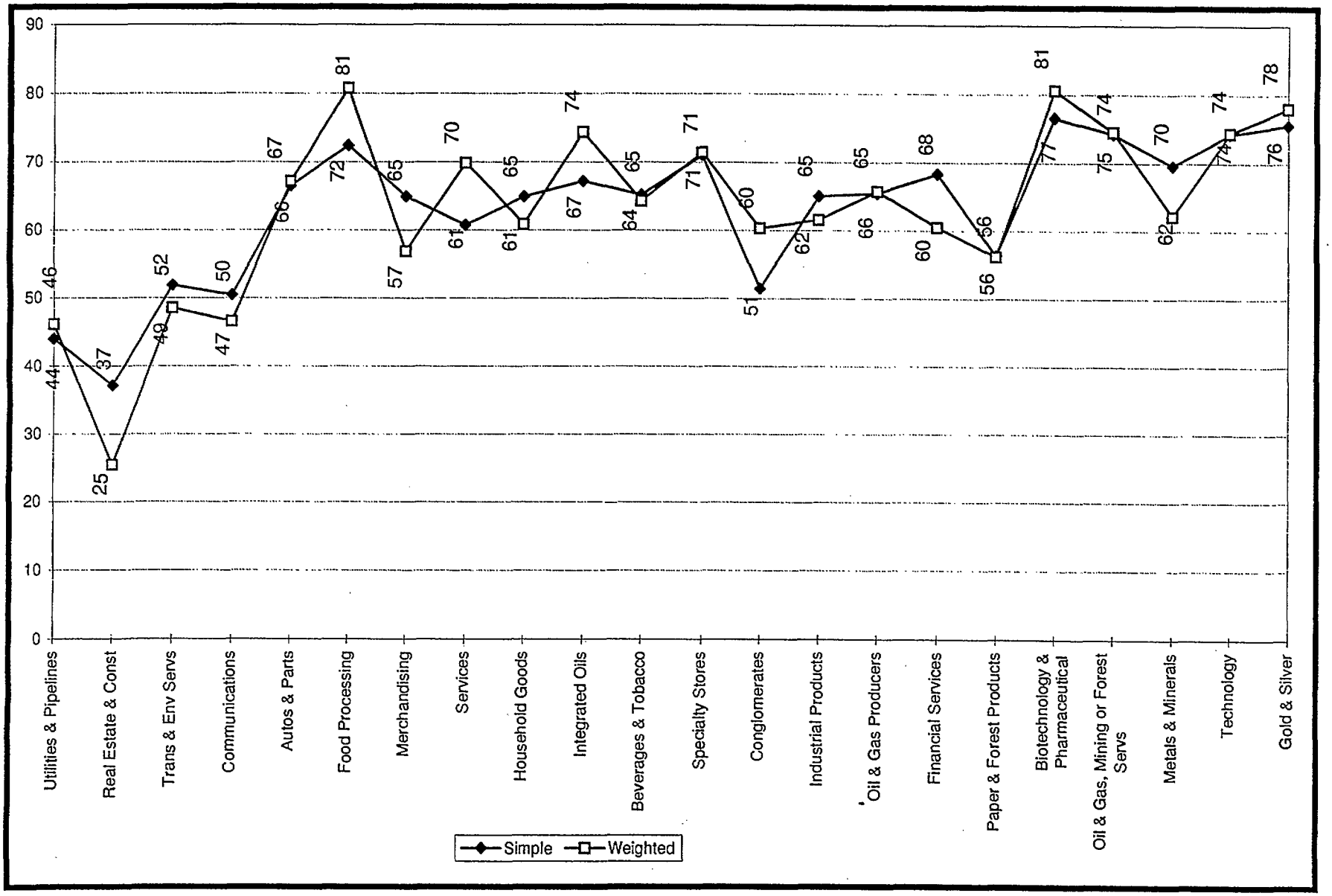
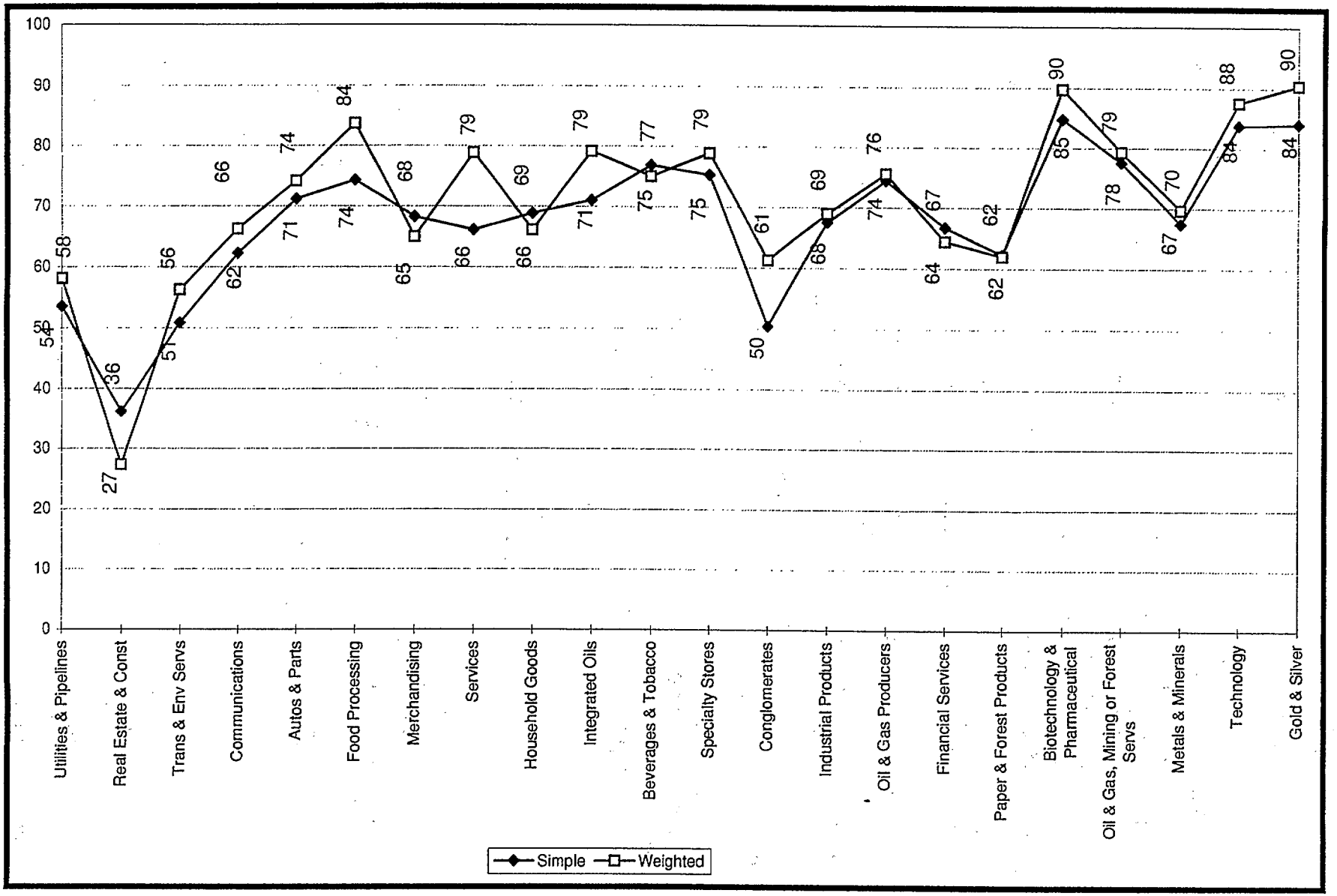


Figure 6
Capital Structure: Equity to Firm Value %
(Market Values)



Technology sectors where differences of greater than ten per cent exist.

In most sectors the amount of equity financing relative to total financing is in the range of 50 to 75 per cent with the weighted average being 62 per cent for book values and 72 percent for market values. In the real estate sector however, the amount of equity financing used is considerably less than in all other sectors; in this sector the equity-to-firm ratio averages 37 percent (based on simple averages) for both book and market value based calculations. It is for this reason that the real estate sector has the second lowest WACC since the sector relies to a much larger extent on the much lower after-tax cost of debt as its major financing source.

When looking at Figure 5 one would expect to find that as one moves across the sectors from left to right, the amount of equity financing would tend to increase. This is because the sectors to the left of the figure have lower WACCs implying the perceived level of business risk associated with these sectors is relatively low, thereby, offering the firms the opportunity to issue higher levels of debt without materially affecting their cost of equity.[16] The results in Figure 5 tend generally to support this hypothesis with the exception of the Paper & Forest Products and Conglomerates sectors where their equity-to-firm value ratios are somewhat low given their relative levels of WACC.

Overall, the results of the study indicate that during the period 1988 to 1994 the real sectoral costs of capital have fallen between 6.8 and 11.1 percent averaging 8.99 percent. The order of the sectors relative to one another has remained fairly constant during the period with utilities & pipelines having the lowest cost of capital and gold & silver having the highest cost of capital.

CASE STUDY 1: COUNTRY AND EXCHANGE RISK PREMIA[17]

In this section, we turn our attention to the estimation and comparison of the cost of capital between Canadian firms which may choose to raise funds in the U.S. and U.S. firms raising funds in the U.S. There are a variety of reasons why a Canadian firm may choose to raise both debt and equity financing in the U.S. One predominant reason for export oriented Canadian firms is simply to reduce their exposure to exchange rate fluctuations, another is the size of the domestic capital markets, which may not provide financing at attractive rates.

Since one of the main components of relative cost of capital is the risk free rate, we first concentrate on the differences between the risk free rates in two countries; differences are analyzed with respect to inflation, country and exchange rate risk. Next, the impact of foreign exchange exposure and company specific effects on the cost of capital is examined using the forest product sector as an example; exchange rate exposure exists for those companies which have their cash inflows and outflows denominated in more than one currency. Within this section, a numerical example is provided to illustrate the relative importance of the Canadian cost of capital

disadvantage on a typical investment project. The example focuses on an investment decision to build a typical mill for producing Light Weight Coated (magazine) paper; a product that is primarily sold to the U.S. market.

DIFFERENCES IN THE RISK-FREE RATE BETWEEN CANADA AND THE U.S.

As noted in the previous section, the cost of capital computation under the CAPM framework reveals that cross-country differences in the cost of equity and debt may arise, in part, from the fact that there exist cross-country differences in the risk-free rates. Thus, to measure the differences in the cost of capital that exist between Canada and the U.S., a comparison of the risk-free rates between the two countries is in order.[18]

Nominal and Real Risk-Free Rates

To measure the difference in the risk-free rates between Canada and the U.S., we compare the yields on three-month Canadian and U.S. treasury bills (t-bills). The historical yields on three-month Canadian and U.S. t-bills that existed during the 10 year period from 1983 to 1992 (inclusive) are illustrated in Figure 7. The figure illustrates that historically Canada has had a higher risk-free rate (9.68%) than the U.S. (6.90%) with the historical spread between Canadian and U.S. treasury bills averaging 2.78 per cent (Figure 8). This suggests that Canada has had on average a significantly higher risk-free rate than the U.S.

One reason for the higher Canadian risk-free rate could simply be due to the cross-country differential in inflation, since the above rates are given in nominal terms. Since Canada, during this ten year period, had an inflation rate that was approximately 0.90 per cent higher than in the U.S. (which is lower than the 2.78 per cent spread), the real spread between the Canadian and U.S. risk-free rates is reduced to 1.88 per cent.

Exchange Risk and Country Risk

As Canada has traditionally been a net importer of capital relying largely on the U.S., it is necessary to evaluate this 1.88 per cent spread that exists between the Canadian and U.S. real risk-free rates, from the viewpoint of a U.S. investor. A U.S. investor, investing in Canadian government securities (denominated in Canadian dollars) faces two risks: an exchange rate risk and a country risk. The former arises from the changes in the exchange rate during the investment holding period and the latter arises from a premium, if any, a U.S. investor would demand from investing in Canadian government security.

To isolate exchange rate risk from the Canadian/U.S. spread, we take the viewpoint of a U.S. investor and consider two investment options. The first option simply involves investing in a U.S. three month t-bill. The second option involves investing in a Canadian three month t-bill and hedging the associated exchange rate exposure. Since the second option eliminates exchange rate risk associated with the Canadian

Figure 7
Canadian and U.S. 3 Month Treasury Bills

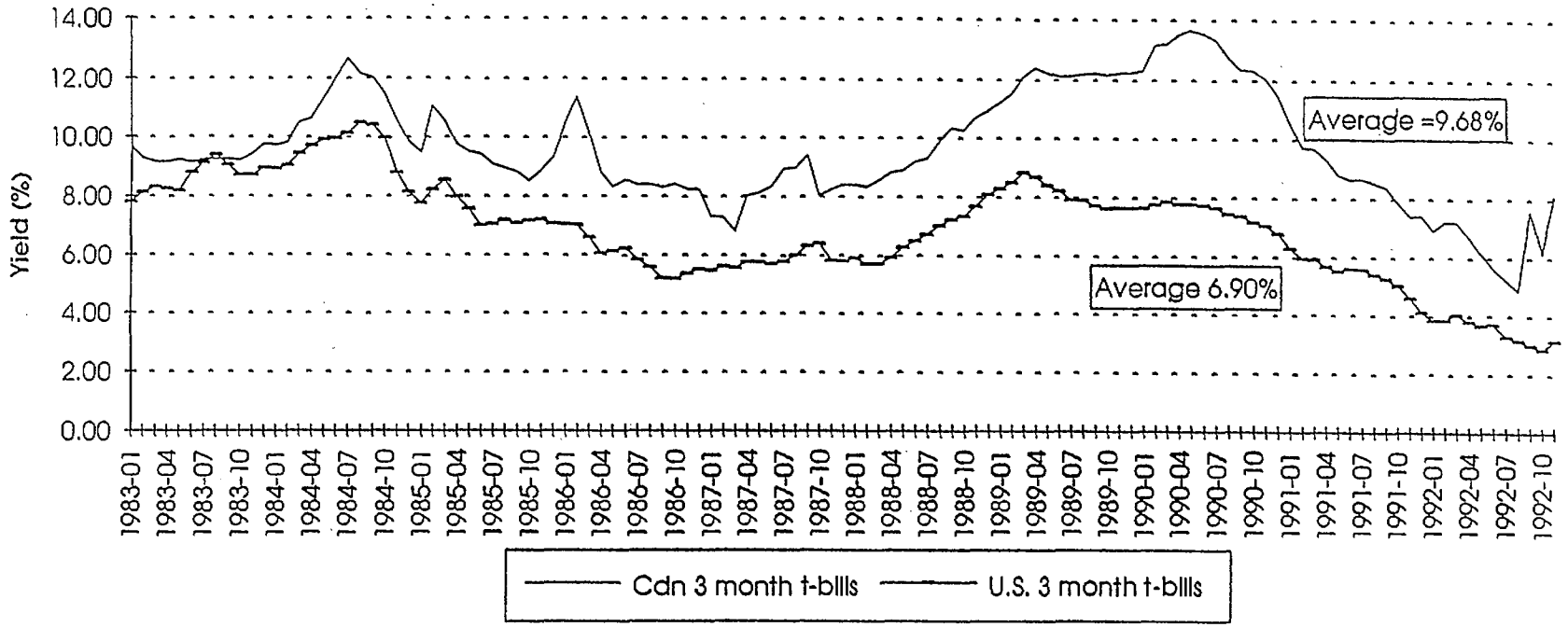
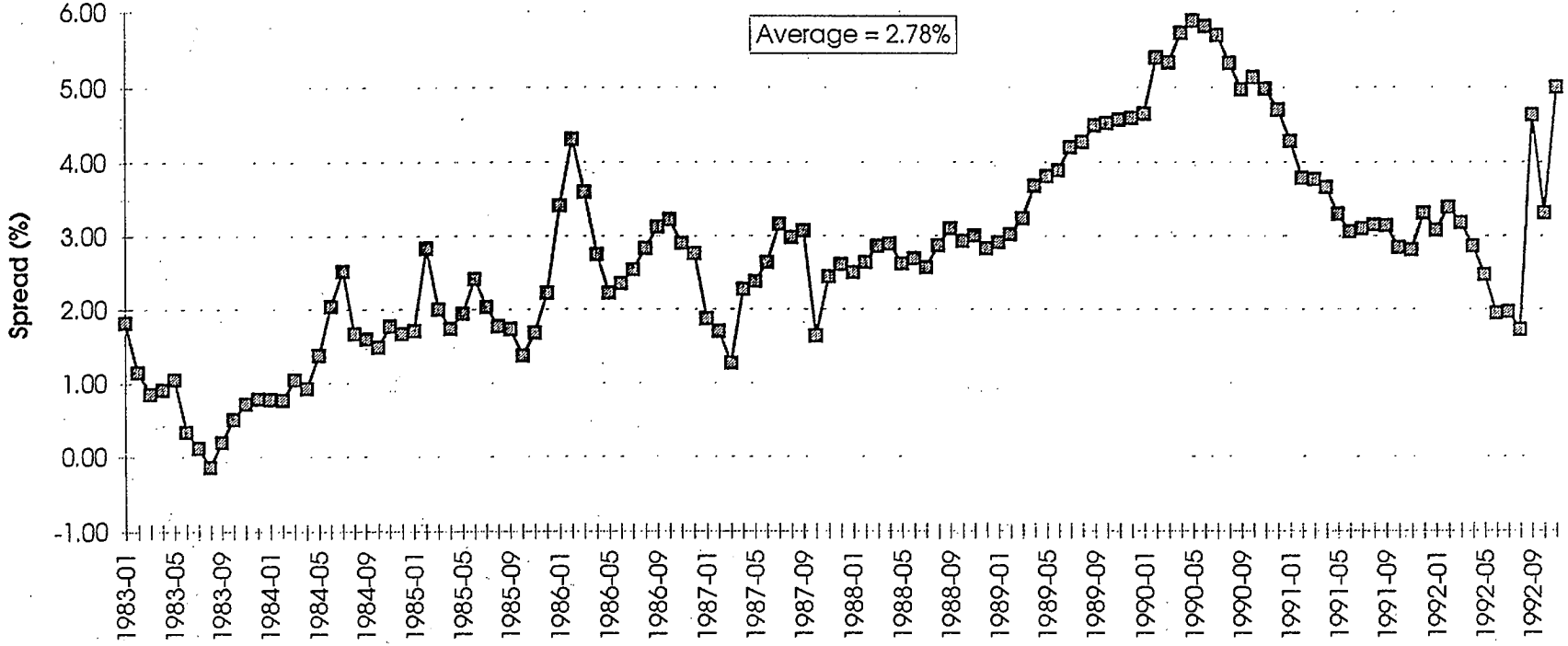


Figure 8
Spread Between Three Month Canadian and U.S. T-Bills



denominated investment, any difference in the return between the second and first option must be due to country risk.

The following example illustrates how this can be accomplished using forward rates between Canadian and U.S. dollars.

In January, 1991, Canadian three-month t-bills yielded 10.58%, U.S. three month t-bills yielded 6.30%, the Canadian/U.S. spot exchange rate was $1.1629, and the three month forward Canadian/US exchange rate was $1.1730 (i.e. a 101 basis point premium [1.1730 - 1.1629]). The hedged yield for a U.S. investor investing in a three month Canadian t-bill and converting the proceeds back to U.S. dollars at the end of three months at the three month forward exchange rate equals:

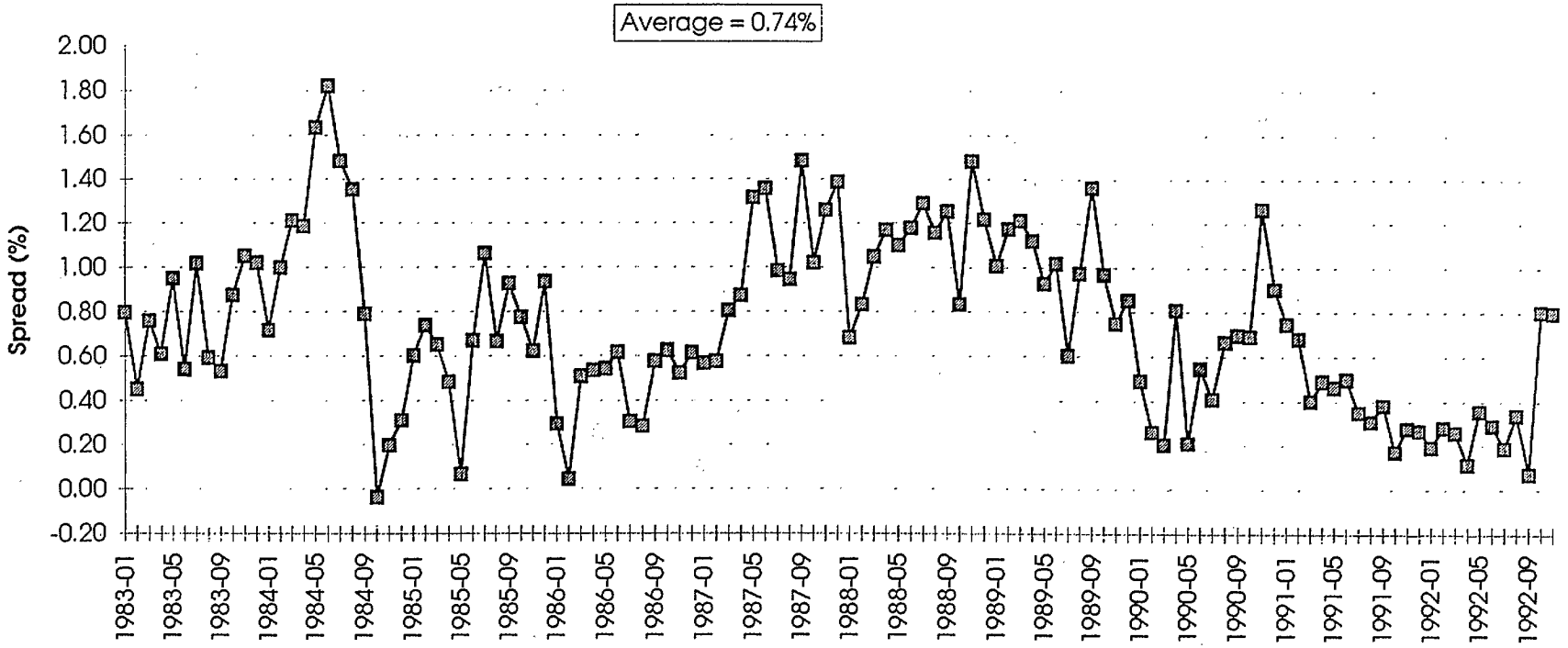
Beginning investment	*$US*	*1.0000*
convert to $Cdn	*$Cdn*	*1.1629*
Ending investment		
1.1629 + (1.1629.1058*3/12)*	*$Cdn*	*1.1937*
convert to $US (@ 1.1730)	*$US*	*1.0176*
3 month return		*1.76%*
Annual return		***7.04%***

This illustrates that a U.S. investor could have earned, in U.S. currency, 7.04% on an annualized basis by investing in a three month Canadian t-bill and hedging the currency exposure. In contrast, by simply investing in a U.S. three month t-bill the yield is 6.30%, 74 basis points lower which reflects the Canadian country risk premium.

Using this technique of accounting for the exchange risk faced by the U.S. investor in investing in Canadian t-bills, the historical absolute spreads shown in Figure 8 can be adjusted. These are shown graphically in Figure 9. For the 10 year period, the adjusted spread was 0.74% which represents the average additional yield investors demand for Canadian investments relative to U.S. investments in order to compensate themselves for the additional level of country risk they face when investing in Canada. Therefore, of the 1.88 per cent real spread in the risk-free rates that exists between Canada and the U.S., we may conclude that 0.74 per cent is attributable to country risk and 1.14 per cent (1.88 - 0.74) is attributable to exchange risk.

A second method that can be used to measure the magnitude of sovereign country risk is to compare Canadian government securities with U.S. government securities, with both securities being issued in the same currency, thereby eliminating exchange rate and inflation risk. For example, a study by Lessard et al (1983) compared yields on U.S. dollar denominated short and long-term bonds issued by both the Canadian and U.S. governments and government agencies in the Euro-markets and U.S. yankee markets. Their study found that Canadian issuers averaged approximately 7.75 per cent corresponding to an incremental yield differential that averaged approximately 0.80 per cent. This finding is consistent with the 0.74 per cent yield

Figure 9
Spread of Hedged $US Investment in Canadian T-Bills vs $US Investment in US T-Bills



differential obtained above.[19] The composition of the three components making up the spread between the Canadian and U.S. risk-free rates is illustrated in Figures 10 and 11.

Thus, even after adjusting for the exchange rate risk, U.S. investors received (or required) a 0.74 percent higher yield from investing in Canadian t-bills. The reasons for this differential can be many: the impact of variations in world economic activity on Canada, shifts in relative prices of natural resources; and endogenous forces, such as monetary, fiscal, regulatory and labour market policies. Thus, this historical difference of 0.74 percent between the two types of government securities, adjusted for the exchange rate risk, can be termed as a country risk premium faced by Canadian government on its sovereign debt. If Canada as a country faces this differential, it can easily be claimed that its' corporations which intend to raise financing from the U.S. capital markets must face a differential of more than 0.74 percent simply because of the fact that they have their operations in Canada. This added differential is, of course, impossible to measure but can be termed as a country risk premium faced by Canadian corporations simply because they are located in Canada.

FOREIGN EXCHANGE EXPOSURE AND COMPANY SPECIFIC RISK IN THE FOREST SECTOR

Thus, Canadian corporations face at a minimum a country risk premium of 0.74 per cent and an exchange risk premium of 1.14 per cent for both the costs of equity and debt from U.S. investors. However, there may be an additional risk premium that will be demanded for those companies which have foreign exchange exposure due to the companies' dependence on the U.S. markets (i.e. a business risk premium). For example, any Canadian export oriented firm is affected by the volatility of exchange rates since it has revenues which are denominated in U.S. dollars and costs which are denominated in Canadian dollars. Unfortunately, it is not possible to empirically determine this additional premium due to the simple fact that it is impossible to find two firms, one in the U.S. and the other in Canada, which are identical in all respects except for their ownership and location. An indirect way of estimating (or detecting) whether any premium exists is to compare the yields on Canadian bond issues denominated in U.S. dollars with their counterpart U.S. firms. This spread would represent the impact of foreign exchange exposure and the country risk premium on the cost of debt.[20]

Because the Canadian forest product sector relies to a large extent on U.S. markets for its revenues, this sector is appropriate for making such a comparison. Accordingly, bond yields for a small sample of Canadian and U.S. pulp and paper companies have been obtained. In all cases, the bonds are issued in U.S. currency and the yields are those that are obtained by the U.S. investor. The average Canadian and U.S. debt costs, after being standardized for different maturities, are compared to determine the average spread between the two (the spread reflecting the difference in the cost of debt (before tax) between the two countries). The sample results are illustrated in Figure 12.

Figure 10
Spread in Canadian and U.S. Risk-Free Rates
Inflation Differential

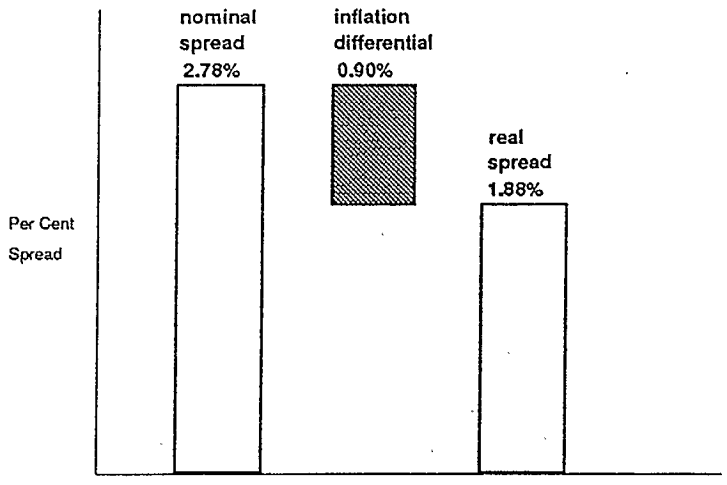


Figure 11
Spread in Canadian and U.S. Risk-Free Rates
Country and Exchange Risk Premia

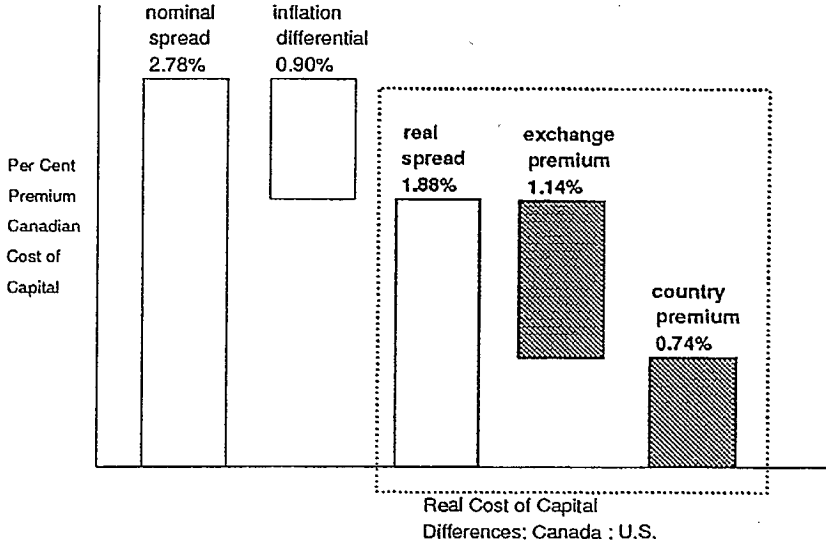
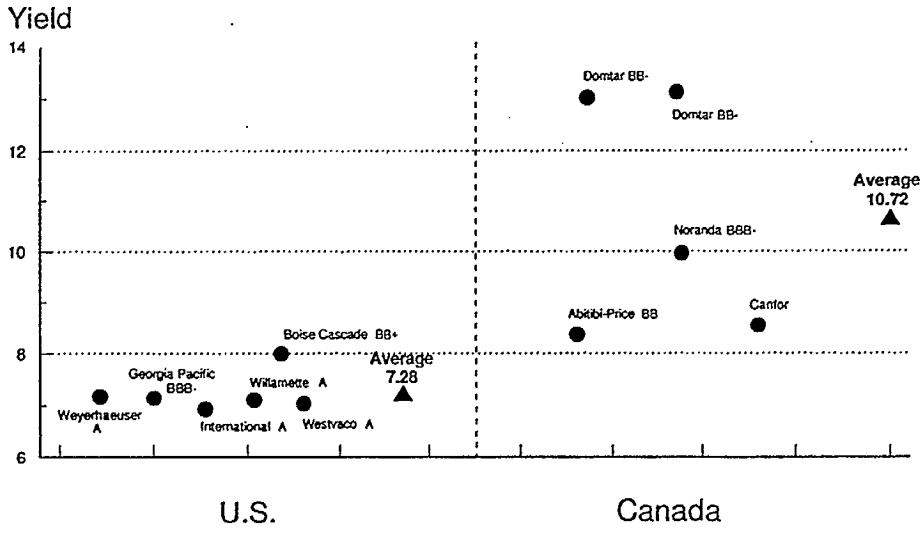


Figure 12
Sample of Debt Costs For Canadian and U.S. Pulp and Paper Companies
(maturities standardized to 20 years)

Canada/U.S. Comparison of U.S. Denominated Bonds



The average cost of debt for Canadian companies is 10.72% and the average cost of debt for U.S. companies is 7.28% providing a spread of 3.44%. The spread however, includes more than the country risk premium, as company and product mix specific factors (illustrated by the debt ratings) are embedded within the individual costs of debt. It is also possible that this difference in the ratings may reflect the fact that the Canadian companies are located outside the U.S. and are automatically considered riskier. In any event, the debt ratings of Canadian companies are approximately two grades below that of the U.S. companies. If it is assumed that each level of down-grading results in an average increase of 3/4 of a per cent in the cost of debt, then the average Canadian cost of debt is approximately 1.50 per cent higher than the average U.S. cost of debt because of the lower debt ratings. Thus, if the 1.50 per cent company/industry specific premium is removed from the total spread of 3.44 per cent, then the spread without company/product mix specific distortions becomes 1.94 per cent.

Having estimated the spread between the Canadian and U.S. cost of debt for the forest product sector, it is also necessary to estimate the spread in the cost of equity. However, estimating the spread in the cost of equity using the same approach as that used for the cost of debt is more complex and beyond the scope of this paper.[21] As an approximation, it is reasonable to assume that the differential costs of equity will be at least equal to the 1.94 percent differential for debt securities. Note that this differential already includes the 0.74 percent premium associated with the sovereign risk. Thus, these results imply that the corporate debt and equity securities face an additional (minimum) 1.20 percent foreign exchange exposure risk premium for both debt and equity securities.

An Example: Light Weight Coated Paper Mill

To illustrate the impact of the 1.94 per cent higher debt and equity financing costs on relative attractiveness of investing in Canada, we provide an example of an investment decision with respect to a representative and state-of-the-art light weight coated (LWC) paper mill located in Canada relative to an identical mill located in U.S.[22]

The calculation of the weighted average cost of capital (WACC) for an LWC mill located in the U.S. is presented in Table 9 (column 2). The cost of equity was estimated using the CAPM which requires estimates of the risk-free rate, the market premium, and beta. Historically, the real risk-free rate (estimated from three month U.S. t-bills less inflation) has averaged 2.97%. To convert the real risk-free rate to a nominal rate, an expected inflation rate of 2.25% was assumed giving an expected nominal risk-free rate of 5.28%.[23] The expected market premium was assumed to equal 6%. The equity beta of 1.21 was used as an estimate for the systematic risk of equity resulting in the cost of equity was estimated to equal 12.54%.[24] The cost of debt (before-tax) was assumed to be 0.88 per cent higher than the nominal risk-free rate and equals 6.16%. Applying a tax rate of 34% gives an after tax cost of debt of 4.07%. Using the typical capital structure of 40% debt and 60% equity in the forest

Table 9
WACC for a Canadian and U.S. LWC
Mill Assuming a 1.94 Per Cent Spread
in The Costs of Debt and Equity

Real RFR (avg)	**2.97**	
Expected Inflation	**2.25**	
Nominal RFR	**5.28**	
Market Premium	**6.00**	
	U.S.	**Canada**
Cost of Debt (Kd):		
Tax Rate	0.34	0.34
Cost of Debt (b.t.)	6.16	8.10
Cost of Debt (a.t.)	4.07	5.35
Cost of Equity (Ke):		
Equity Beta	1.21	1.21
Cost of Equity	12.54	14.48
Capital Structure:		
% Debt	0.40	0.40
% Equity	0.60	0.60
WACC (nominal)	9.15	10.82
Inflation	2.25	2.25
WACC (real)	**6.90**	**8.57**
Spread (real)		**1.67**

sector, the U.S. WACC was computed to equal 9.15% nominal and 6.90% real.

To compute the Canadian WACC, the costs of equity and debt for the Canadian located mill were obtained by adding the 1.94 per cent country and exchange premium to the U.S. costs of debt (before tax) and equity. Assuming the same capital structure for the Canadian mill, the real WACC is estimated as 8.57 per cent. Table 9 (column 3) summarizes the results of these computations. Comparing the real Canadian and U.S. WACCs reveals that the Canadian WACC is 1.67 per cent higher than the U.S. WACC.

This difference in the Canadian and U.S. WACCs has a considerable impact on the attractiveness of an LWC mill investment. Table 10 compares the net present value (NPV) of an LWC mill located in Quebec with the NPV of an LWC mill located in the U.S.. As the table illustrates, the 1.67 per cent higher Canadian WACC reduces the NPV by a very significant $137 million, from $151 million to $14 million.

CONCLUSION

This case study illustrates some of the challenges in estimating cross-country differences in cost of capital using the 'micro' approach. The illustration is based on a specific sector and using the data from a specific time period. Using an example of the forest product industry, we have shown that, for export oriented Canadian companies whose revenues are denominated in a foreign currency and costs in a domestic currency, a foreign exchange (business) risk premium exists. As an example, companies in the forest product sector with exchange exposure bear debt and equity costs that are 1.94 per cent above their U.S. counterparts implying a 1.20 per cent foreign exchange risk premium. The impact of this foreign exchange differential further decreases the competitive advantage for Canadian locations and companies. It has been shown that for a typical Canadian LWC paper mill the disadvantage reduces its NPV by $137 million. Thus, a small difference in cost of capital can have a major impact on location choices.

Case Study 2: A CASE OF PUBLIC UTILITIES[25]

The aim of this section is to uncover differences in the cost of capital between firms in Canada and the U.S. which can be attributed to differences in "country risk" using a competing model for calculating cost of equity. Our choice of the competing model for calculating cost of equity is the "Dividend Growth Model" (DGM, hereafter). Our choice of a sector for this usage is the telecommunication sector. We choose this sector for illustration for the following reasons. First, this sector is regulated and faces similar risks in the two countries. Second, like other regulated utilities, this sector has enjoyed somewhat stable cash flows and has maintained a relatively stable dividend stream. Several telcos in both countries have been privatized with shares publicly traded on the open market. Further, we believe that the business environment and

Table 10
NPV Comparisons For an LWC Mill Located in Quebec and the U.S.

	U.S.	Canada, with 1.94 % differential in costs of debt and equity
WACC	6.90%	8.57%
NPV	$151 M	$14 M
Difference From U.S.	N/A	$137 M

risks faced by telcos in the U.S. and Canada are sufficiently similar for the case study Wherever relevant, we also discuss the impact of the differences in the business environment between U.S. and Canada on our estimation process. The section is organized as follows: after briefly discussing the DGM framework, we discuss the regulatory environment as it affects our analysis. Then we describe our sample and a brief comparison of the business risk faced by Telcos in the two countries. It is then followed by the description of data, empirical estimation procedure, results, and conclusion.

The Dividend Growth Model

The underlying rationale for the Dividend Growth Model for calculating the cost of equity is that the discount rate (or yield) makes the present value of the investment equal to its market value when it is used for discounting all future cash flows (ad infinitum):

The Dividend Growth Model used for estimating the cost of equity was developed by Gordon and Shapiro (1956) and requires an estimate of future dividends that can be expected from holding shares of a company. Essentially, it implies that the current price equals the future dividend stream discounted at the required rate of return (i.e., cost of equity). By assuming a constant growth rate in dividends, the cost of equity under this model can be described as:

$$K_e = D_1/P_0 + g$$

where K_e is cost of equity, D_1 is next period's dividends, P_0 is the current price and g is the estimated growth rate. Thus, the dividend growth model implies that if one can estimate growth rates for the company of interest, one can estimate the company cost of equity.

A variety of approaches have been used to estimate the growth rates in empirical work. These include analysts' estimates, historical time series estimates, and sustainable growth rates based on retention and book return on equity.

Telco Regulatory Environment

The telco regulatory environment, on the whole, is very similar in Canada and the U.S. In both countries, there has been a mix of national and state/provincial regulatory jurisdictions. Competition is permitted in both countries in most market segments; however, local service remains largely under the control of regulated monopolies. Meanwhile, both countries require that telco's regulated businesses must not cross-subsidize its non-regulated (competitive) businesses. Another notable difference relates to long distance telecommunications services. Since the breakup of AT&T in 1984, the U.S. Baby Bells have been excluded from the right to deliver long distance services. However, they retained "local long distance" toll

services within their own areas, and this business has been largely protected from competition. Canadian firms, by contrast, continue to participate significantly in both local and long distance services. Finally, both countries continue to distinguish between the carriage and content functions in the delivery of local network services. Accordingly, telephone industry investments in programming and in the provision of information services and other forms of "content" are not yet allowed among Baby Bells in the U.S., and face regulatory restrictions in Canada.

Given this similarity in regulatory policy orientation, not to mention the proximity of the two countries, and their participation in the same dramatic technological innovations, it is not surprising that the telecommunications regulatory climate has gone through similar changes in both countries in the recent past. However, although regulatory changes in Canada have tended to parallel actions taken in the U.S., they have done so to a lesser degree and at a later date. For the U.S. has tended to be quicker than Canada in relaxing the telco regulatory regime and in permitting greater competition. For example, U.S. telecom users were allowed to interconnect third-party terminal equipment in the mid-1970s, several years in advance of Canada. Also, long distance services were opened up to competition in the U.S. in the mid-1980s, whereas the Canadian long distance market remained a monopoly until June, 1992. Finally, the Canadian industry has been slower to accept resale operators.

This leadership in the U.S. regarding the deregulation of telecommunications services continues to this day. The U.S. is opening up "local" telecommunications services markets to competition more rapidly than Canada, permitting greater competition for business services. For example, as of 1992 in 43 states in the U.S., new entrants in the industry (called "competitive access providers") can provide lower cost intra-state ("local long distance") telecommunications service and thereby undermine both Baby Bell toll revenues and local network access charges. In addition, long distance service providers will be able to by-pass Baby Bell local access charges by linking up with wireless systems. As a result, the local monopolies enjoyed by U.S. telcos have come under greater and increasing competitive pressure.

The difference between Canada and the U.S. regarding the regulatory environment does not relate merely to the extent and speed of the deregulation of telecommunications services. It also relates to the form of the telco regulations themselves. Traditionally, regulatory commissions have sought to control monopoly service rates through "rate of return" regulation. Here the aim is to constrain the monopoly firm's profits. However, under such a regime, there is less incentive to achieve lower costs (or avoid inefficient investment) since profit margins are capped. As a result of this shortcoming, many of the U.S. regulatory agencies have switched to forms of "incentive" regulation. A popular kind of incentive regulation is called "price cap". Here the agency controls prices rather than profits by limiting increases in regulated rates according to a formula that reflects the costs of providing regulated services, taking into account productivity gains. Another feature of some of these forms of incentive regulation is to permit

the telco to make excess profits, but require that this excess be shared with rate-payers.

In Canada, by contrast, the C.R.T.C. and provincial boards that have regulated Canadian telephone companies have continued to make use of the traditional rate base / rate of return regulation that is applied in most monopolistic utilities. While it is true that incentive based schemes are not without their own problems, they would appear to be an advance on the traditional approach. Thus, here too, the Canadian regulatory environment lags behind the U.S. It should be pointed out, however, that the C.R.T.C. has been investigating the possibility of moving towards an incentive based system (Proceeding 78-92) and a decision is expected shortly on this matter.

The Companies in our Sample

Our U.S. sample consists of the seven regional bell operating companies (or "Baby Bells"): Ameritech, Bell Atlantic, Bell South, NYNEX, Pacific Telesis, Southwestern Bell and US West. These companies are all very large and of roughly equal size. In terms of the 1992 market value of invested capital (debt and equity), the value of these firms ranged from $20.4 billion (US West) to $32.8 billion (Bell South), with an average of $25 billion (US). It should be noted that most of these firms have international businesses (including non telecommunications activities such as cable TV companies). Some also derive modest shares of their total revenues from other non-telecommunications businesses such as financial services and real estate. Thus there is a mix of foreign ventures, cable TV, financial services and real estate that have an impact on their consolidated balance sheets.[26]

The Canadian sample consists of the following companies: BC Tel, Maritime Tel, Newtel, Quebec telephone, Island Telephone, and Bruncor. The largest of these companies, BC Telephone, had a 1992 market value (debt and equity) of $3.7 billion (Cdn). Maritime Telegraph and Telephone is the second largest firm in the Canadian sample with a market value of $1.3 billion, including the $130 million value of its subsidiary, Island Telephone. The remaining three companies have market capitalizations ranging from $500 million to $900 million.

The market value of the entire Canadian sample is only $7.4 billion (Cdn), or roughly one-quarter of the size of the average U.S. Baby Bell. The largest Canadian telco, Bell Canada, has a book value of debt and equity which is roughly equal to that of the smallest U.S. Baby Bells. If Bell Canada were added to the Canadian sample, it would increase the (1992) book value of that sample from $5.7 billion to $19.9 billion. Unfortunately, Bell Canada's common shares are not publicly traded. Consequently, we cannot estimate the market value of its common equity.[27] Telus (largely made up of AGT), which is the third largest telecommunications company in Canada, was also excluded from our sample. It was not until the fall of 1990 that Telus became a private company. Accordingly, we had inadequate data for Telus for 1989 and 1990.

Among our Canadian sample, all but NewTel and Bruncor get all their revenues from telecommunications services. In the case of Bruncor, which has lines of business in real estate and financial services, 80% of assets and 95% of sales are derived from its telecommunications firm, NBTel. In the case of NewTel, 96% of both assets and sales are derived from its telecommunications firm, Newfoundland Telephone.

Comparison of Business Risk: U.S. versus Canada

As a result of differences in the regulatory environment and the nature of diverse operations of sample companies, it is necessary to briefly discuss the potential differences in their respective business risks. The most notable difference exists in the degree of protection available to sample companies in the local market and the long-distance market.

Unfortunately, It is difficult to get a precise ratio of monopoly versus competitive revenues for our U.S. and Canadian samples. With regard to our Canadian firms, and including Bell Canada, almost half of all 1992 revenues were derived from long distance services; another 36 per cent came from local services, and 16 per cent from "other services" such as directory advertising, equipment sales and cellular telecom revenues. Within this mix, it is estimated that approximately 20 per cent of Canadian telecommunications services were offered on a competitive basis. (Table 11)

In the U.S, by contrast, only 10 per cent of 1992 revenues came from long distance services, which, in our study time period, continued to be largely a monopoly business for the Baby Bells. About two-thirds of telecom revenues were derived from local services and access charges, which are largely, but not entirely a monopoly haven. Meanwhile, about 25 per cent came from "other services" such as directory advertising, equipment sales and cellular services. (Figure 13)

Although we are unable to derive an exact percentage of U.S. revenues that derive from competitive businesses, we can safely say that our U.S. firms have a higher business risk and face more competition than our Canadian firms. This is augmented by the fact that the Baby Bells would appear to be more involved in foreign ventures and non-telecom businesses which carry more risk.[28]

Data and Methodology

We report our results based on the years 1989 to 1992. A simple average of the four years of results is used in our final U.S. - Canada comparison. Not surprisingly, we encountered a number of challenges in empirical estimation of cost of capital. We can group these challenges into five types: unavailability of data on market values of debt and preferred shares due to non-trading, ability to estimate future growth rates, the time of the year at which the required market values are used for the estimation purposes, the complexity of details including those associated with deferred taxes and minority interest, and some issues with respect

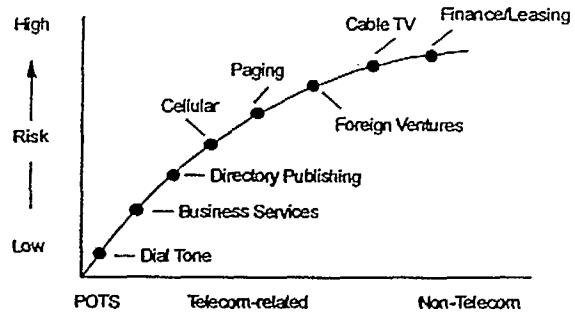
Table 11
Telecommunications Services Line of Business Comparison
U.S. Telcos versus Canadian Firms - 1992

Line of Business	U.S. Telcos	Canadian Firms
Local Service and Access Charges	66%	36%
Long Distance Service	10%	48%
Other Telecom Business*	24%	16%
TOTAL	**100%**	**100%**

*Includes directory publishing, terminal equipment sales & rental, cellular telecom
Canadian firms include Bell Canada

Figure 13

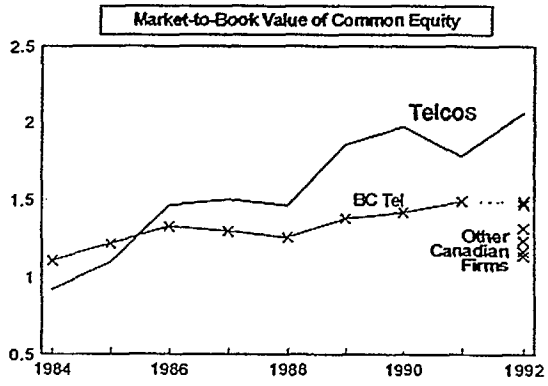
As a Proportion of Total Revenues, A Larger Share of Baby Bell Revenue Derives From Riskier Businesses



POTS = Plain Ordinary Telephone Service

Figure 14

Even With the Highest Market-to-Book Premium among our Canadian Sample, BC Tel is Still Below the U.S. Telcos.



U.S. value based on simple average of seven Telcos.

to the what part of the short-term debt that should be considered long-term debt.

Summary of Results

Cost of Debt

We assume that all telcos have what amounts to AAA debt ratings, and thus have the same (pre tax) cost of debt, namely, 25 basis points above the long term government bond of the given country. A more refined methodology would have been to use provincial bonds (e.g. Quebec) as our point of reference. Had we done so, the cost of debt differential between Canada and U.S. would have been greater. (Table 12)

Cost of Preferred Equity

The U.S. telcos do not have any preferred shares outstanding in our time period. Meanwhile, 5 per cent of the market value of firms in our Canadian sample is made up of preferred equity. To estimate the cost of preferred equity, we used historical yield data, when available. For BC Tel and Island Telephone we used the long government bond minus 75 basis points. One might consider using a wider spread over corporate bonds(up to 200 basis points) to estimate preferred share yields. However, given the small volume of preferred equity, such adjustments have a negligible impact. (Table 13)

Cost of Common Equity

Canadian firms have higher dividend yields than the U.S. telcos. Also, despite a lower return on equity, the retention ratio is higher in Canada (35% versus 24%), resulting in a higher value for the dividend growth rate. Thus, both in nominal and in real terms, the cost of equity for firms in the Canadian sample is significantly higher than it is for firms in the U.S. sample.[29] (Table 14)

Capital Structure

The final challenge arises as a result of the different capital structure found in the two countries, especially in market value terms. On a book value basis, U.S. companies have an average of 41% debt and 59% common equity. Meanwhile, Canadian firms are more levered, having 46% debt, 6% preferred shares, and 48% common equity. However, on a market value basis, it is a different story altogether. The market value based capital structure of U.S. firms is 27% debt and 73% common equity. Canadian firms, meanwhile, have market weights which are not too far removed from their book value weights: 44% debt, 4% preference shares and 52% common equity (Figure 14). This difference between the relative market-to-book ratios of equity between the two countries has an impact on our estimates of cost of capital especially those based on the market value weights.[30] As will be seen below, we have attempted explain the impact of this difference on our WACC

Table 12

Average Cost of Debt: 1989 - 1992
U.S. Telcos

	Nominal			*Real*	
Company	**Pre-tax Cost of Debt**	**Effective Tax Rate**	**After Tax Cost of Debt**	**After Tax Cost of Debt**	**Market Value of Debt % of Firm Value**
Ameritech	8.2%	30.7%	5.7%	1.8%	22%
Bell Atlantic	8.2%	32.2%	5.6%	1.7%	29%
Bell South	8.2%	33.1%	5.5%	1.6%	24%
NYNEX	8.2%	26.8%	6.0%	2.1%	31%
Pacific Telesis	8.2%	37.0%	5.2%	1.3%	26%
Southwestern Bell	8.2%	28.7%	5.9%	1.9%	25%
U.S. West	8.2%	30.5%	5.7%	1.8%	32%
INDUSTRY	**8.2%**	**31.3%**	**5.7%**	**1.7%**	**27%**

Average Cost of Debt: 1989 - 1992
Canadian Telcos

	Nominal			*Real*	
Company	**Pre-tax Cost of Debt**	**Effective Tax Rate**	**After Tax Cost of Debt**	**After Tax Cost of Debt**	**Market Value of Debt % of Firm Value**
BC Tel	10.1%	43.6%	5.7%	2.7%	36%
Bruncor	10.1%	44.7%	5.6%	2.6%	52%
Island Telephone	10.1%	41.6%	5.9%	2.9%	48%
Maritime T&T	10.1%	42.3%	5.8%	2.8%	47%
NewTel	10.1%	47.4%	5.3%	2.3%	52%
Quebec Telephone	10.1%	37.1%	6.3%	3.3%	40%
INDUSTRY	10.1%	**43.4%**	**5.7%**	**2.7%**	**44%**

Table 13
Cost of Preferred Equity: 1989 - 1992
Canadian Telcos

Company	Nominal Cost of Preferred Equity	Real Cost of Preferred	Market Value of Debt % of Firm Value
BC Tel	9.1%	6.0%	4%
Bruncor	7.3%	4.3%	3%
Island	9.1%	6.0%	5%
Maritime T&T	7.7%	4.7%	8%
NewTel	7.9%	4.8%	7%
Quebec	9.2%	6.1%	1%
INDUSTRY	**8.4%**	**5.3%**	**5%**

Table 14

Average Cost of Common Equity: 1989 - 1992
U.S. Telcos

Company	Nominal Dividend Yield	Return on Common Equity	Growth Rate	National Cost of Common Equity	Real Cost of Common Equity	Market Value of Debt % of Firm Value
Ameritech	5.8%	16.5%	4.9%	10.7%	7.9%	60%
Bell Atlantic	5.5%	15.2%	3.0%	8.5%	6.7%	45%
Bell South	5.6%	12.3%	2.5%	8.2%	8.6%	47%
NYNEX	-	-	-	-	8.2%	45%
Pacific Telesis	5.4%	14.2%	3.4%	8.8%	6.7%	41%
Southwestern Bell	5.7%	13.0%	3.5%	9.2%	8.0%	59%
U.S. West	-	-	-	-		
INDUSTRY	**5.6%**	**14.2%**	**3.4%**	**9.0%**	**7.7%**	**52%**

Average Cost of Common Equity: 1989 - 1992
Canadian Telcos

Company	Nominal Dividend Yield	Return on Common Equity	Growth Rate	Nominal Cost of Common Equity	Real Cost of Common Equity	Market Value as % of Firm Value
BC Tel	6.2%	12.6%	4.9%	11.1%	7.9%	60%
Bruncor	7.1%	11.5%	2.7%	9.8%	6.7%	45%
Island Telephone	6.6%	12.3%	5.1%	11.8%	8.6%	47%
Maritime T&T	6.5%	12.1%	4.8%	11.4%	8.2%	45%
NewTel	7.6%	10.4%	2.3%	9.9%	6.7%	41%
Quebec	7.3%	13.6%	3.9%	11.2%	8.0%	59%
INDUSTRY	**6.5%**	**12.2%**	**4.3%**	**10.9%**	**7.7%**	**52%**

estimates.

Weighted Average Cost of Capital

Based on these assumptions and analysis, Table 15 shows the results of market value-based cost of capital for the telcos in two countries. The (real) cost of capital, when weighted by the market value of debt, preferred equity and common equity, is about 1.3 per cent higher for telcos in Canada: 5.4% versus 4.1% (Table 15). Had we used book values to weight the cost of capital, then the gap between Canada and the U.S. would have been 1.6 per cent (Table 16).

Impact of Capital Structure

It is clear that our estimates of cost of capital are affected by the differences in the market-to-book ratio of equity across the two countries. In order to compare the cost of equity in the two countries on a similar basis, we need to remove the impact of leverage. For example, if we recalculate Canada's cost of capital using U.S. market value proportions of debt and equity, it increases from 5.4% to 6.1% - an almost two percentage point higher than the U.S.

We can break down the components of this two per cent differential in the cost of capital by progressively substituting Canadian values into our U.S. sample: 1) If we use Canada's higher tax rates with respect to the tax savings firms enjoy from the tax deductibility of interest payments (and abstracting from their impact on net income), then the U.S. cost of capital would drop by 26 basis points; 2) If we then subject our U.S. sample to the real cost of debt faced by our Canadian firms, the cost of capital would increase by 51 basis points, less the 26 basis points from Canada's larger tax shield, or a net increase of 25 basis points; and 3) Finally, if we insert into our U.S. sample the real cost of equity faced by Canadian firms (with the impact of leverage removed, i.e. 7.4%), then the U.S. cost of capital increases by 177 basis points, reaching 6.1%. Thus approximately 1.75% of this 2% difference in the cost of capital originates from Canada's higher cost of equity (Table 17).

Summary and Conclusions

Without adjusting for the differences in leverage, the cost of capital premium paid by Canadian telcos compared with U.S. telcos is about 1.3 per cent. Once we normalize for leverage, the cost of capital differential increases to 2 per cent. The higher Canadian cost of equity accounts for 1.75 per cent of this 2 per cent difference in the cost of capital. Meanwhile, the cost of debt, net of tax shield, accounts for a modest 25 basis points.

This is a surprising result, given that U.S. telcos would appear to have a higher level of business risk and a more competitive environment. If anything, they should face a higher cost of equity capital.

Table 15

Weighted Average Cost of Capital: 1989 - 1992
U.S. Telcos

Company	Real Cost of Debt	Real Cost of Preferred Equity	Real Cost of Common Equity	Weighted Average Cost of Capital
Ameritech	1.8%	-	6.6%	5.5%
Bell Atlantic	1.7%	-	4.4%	3.6%
Bell South	1.6%	-	4.1%	3.5%
NYNEX	2.1%	-	-	-
Pacific Telesis	1.3%	-	4.7%	3.9%
Southwestern Bell	1.9%	-	5.1%	4.3%
U.S. West	1.8%	-	-	-
INDUSTRY	**1.7%**	**-**	**5.0%**	**4.1%**

Weighted Average Cost of Capital: 1989 - 1992
Canadian Telcos

Company	Real Cost of Debt	Real Cost of Preferred Equity	Real Cost of Common Equity	Weighted Average Cost of Capital
BC Tel	2.7%	6.0%	7.9%	5.9%
Bruncor	2.6%	4.3%	6.7%	4.4%
Island Telephone	2.9%	6.0%	8.6%	5.7%
Maritime T&T	2.8%	4.7%	8.2%	5.4%
NewTel	2.3%	4.8%	6.7%	4.3%
Quebec Telephone	3.3%	6.1%	8.0%	6.1%
INDUSTRY	**2.7%**	**5.3%**	**7.7%**	**5.4%**

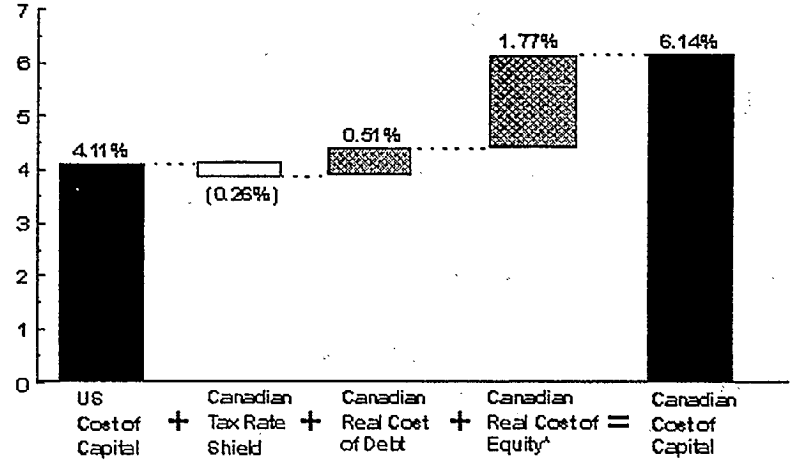
Table 16
Impact of Market and Book Value Weights On Weighted Average Cost of Capital

Weighted Average Cost of Capital

	Based on Book Values	Based on Market Values	Difference: (Market minus Book)
Canada	5.26%	5.40%	0.14%
U.S.	3.64%	4.11%	0.47%
Difference: (Canada minus U.S.)	1.62%	1.29%	

Table 17

Most of the Difference in the Cost of Capital Accounted for By Canada's Higher Cost of Equity



^ Relevered to fit US Capital Structure

However, we find that the cost of equity capital is higher for Canadian Telcos; a difference we can attribute to a variety of factors including the higher country risk faced by Canadian firms. It should be kept in mind that our analysis has been performed in "real" terms. However, U.S. inflation during the 1989 to 1992 period has been approximately 1 per cent higher than Canada. This means that, in nominal terms, the cost of capital faced by Canadian telcos is only one percent above the U.S.

Case Study 3: Cost of Capital - Canada and Finland[31]

The objective of this section is two-fold. First, we want to estimate the ex-ante cost of capital for the Finnish pulp and paper industry. Second, we want to compare the cost of capital in Finland to that in Canada for this sector. The reason for choosing the Finnish pulp and paper sector for comparison is the fact that many Finnish firms in this sector compete with Canadian firms in the North American product markets. If they are advantaged due to a lower cost of capital, it would have a direct impact on the cost competitiveness of the Canadian firms.

Not surprisingly, there is the inherent difficulty in obtaining the necessary data required for such comparisons. Moreover, our analysis shows that there are significant differences between North Canadian and Finnish firms in the areas of capital structure and those arising from the major restructuring of the Finnish economy in the late 1980s and early 1990s. These differences may increase even more over the next few years. These differences require us to pay specific attention to the issue of using the actual ex-post data to estimate the ex-ante components.

In general, this section follows a format similar to the one used in the sections above. It adopts a perspective of estimating marginal cost of capital in Finland with the U.S. as the benchmark. Having this common base allows for easy comparison of results between Finland and Canada.

The cost of capital estimation is conducted as follows: after a brief overview of the Finnish economic situation, we document the risk-free rates in Finland and the U.S. Next, we examine the factors responsible for yield spreads between Finnish and U.S. corporate bonds, and estimate the cost of debt in Finland . Then, we turn our attention to the cost of equity. Finally, the cost of debt and equity are combined to obtain the cost of capital.

FINNISH ECONOMIC SITUATION

In many respects, Finland is similar to Canada. It is a northern country, historically deriving its competitive advantage from its abundant natural resources. Over the past few decades, its economy has been moving away from the raw material-based industries toward service sectors. In the 1960s, primary production industries were responsible for over a third of Finnish economy. By 1990, primary

production shrank to merely 10%, with the service sector swelling to 60%.

In the past, Finnish Government has followed an 'interventionist' policy. Although only 5% of Finland's work force is directly employed by the government, it has played an active role in the economy at both the macro- and micro-level. Throughout the 1980s, Finland had experienced a healthy rate of economic growth. However beginning in 1990, the situation changed dramatically. A combination of high real interest rates and a high Finnish Markka (FIM), the disappearance of Finland's largest trading partner (USSR), declining competitiveness due to high wages and taxes, and a general deterioration of economic situation in Europe resulted in a negative growth rate of GDP in Finland. In 1991, production in Finland dropped by 6.4%, and in 1992, it further declined by another 3.6%. The rate of unemployment has increased from approximately 3.4% in 1990 to unprecedented high levels of 18.5% by October 1993.

Similar changes can also be observed in the Finnish financial markets. In 1987, Finland established a money market. In 1990, it reduced restrictions on foreign investment. In 1992, Finland discontinued the tax-exempt status of government bonds. The government has also started to phase out its subsidies and loan guarantees to the business sector.

In January 1993, the Finnish Government implemented a major reform of corporate income taxation via a legislation introduced in Parliament in September 1992. The main aspect of the reform was to impose a uniform tax rate of 25% on all types of corporate income (corporations do not pay local or church tax, nor are they liable to any form of capital tax). The new corporate tax rate is now the lowest among the OECD countries.

Due to the structural changes, currently taking place in Finland, using the historical data going back many years may be inappropriate to extrapolate the future. Hence, at times, we have relied on our personal judgement to choose the appropriate time intervals of historical data to estimating the ex-ante cost of capital.

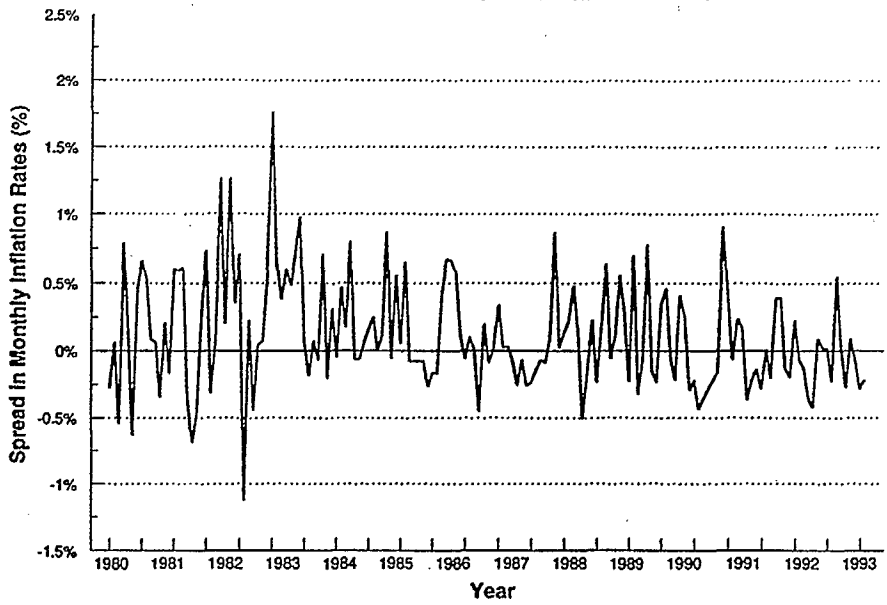
Inflation Rates

Between September 1980 and July 1993, the inflation rate in Finland has averaged approximately 5.77% a year. Over the past decade, increases in consumer prices in Finland have generally remained above those in the U.S. On average, the difference in inflation rates has been 1.42% a year.

The spread in monthly inflation rates between Finland and U.S. is shown on Figure 15. In examining the data, we find that over time, the spread has narrowed: between 1980 and 1985, it averaged 2.4% a year; since 1986, the average spread dropped to ½% a year. However, the rate of inflation has also decreased over time. The ratio of spread-to-inflation has declined by a smaller proportion than the spread itself. Between 1980 and 1985, the ratio was approximately 39%. Beginning in 1986, the ratio declined to approximately 20% and, has more or less,

Figure 15

SPREAD BETWEEN MONTHLY INFLATION RATES: U.S. AND FINLAND



stabilized.

Therefore, we assume that in the future, inflation rate in Finland will continue to exceed that in the US by a factor of 1.20. As such, based on the projected rate of inflation in the US of 2.25% a year, we estimate Finnish inflation rate to average out 2.70% a year.

Risk-Free Rate

Since its introduction in 1987, the HELIBOR rate (*Hel*sinki *I*nter*b*ank *O*ffered *R*ate) has been calculated by the Central Bank of Finland as the average of offered rates for certificates of deposit (CD) quoted daily by the five largest banks. The Central Bank intervenes in the market one to two times a week by also bidding for government bills in an effort to guide the interest rates. Prior to HELIBOR, the Central Bank kept tight control over the system and adjusted money market rates in line with the monetary objectives at the time.

The risk-free rate in Finland has remained in double digits for a long time. However, in 1992, it declined significantly to below 7%. The nearly flat structure of the yield curve indicates the expectation that interest rates will remain low for the foreseeable future.[32]

Between September 1980 and July 1993, the 90-day Finnish HELIBOR rate has been set, on average, 4.92% above the US Treasury Bill rate (Figure 16). From the point of view of an American investor, Finnish CDs provide higher returns than the US T-bills, but also subject an investor to additional risks. The spread between the Finnish and US rates represents a premium for the sovereign exchange rate risk and country risk. Table 18 provides a summary of real and risk free rates in this period.

As can be seen, Finnish investors, buying CDs in Finland, would have earned, on average, 3.28% a year more in real returns (in Finnish currency) than their American counterparts who would have invested in U.S. T-bills (Figure 17).

Country Risk Premium

We now construct a series of rates of return for a U.S. investor from investing in 3-month Finnish CDs. The difference between this return and the U.S. T-Bill return would then indicate the implicit 'country risk premium', charged by the US investors on Finnish risk-free securities. We use 3-month forward exchange rates to eliminate the exchange rate risk for a U.S. investor investing in Finnish CDs. Using the data from September 1980 to July 1993, the average spread in rates is found to be 1.29%, which was attributed to the country risk premium (Figure 18). The difference between the spread in nominal risk-free rates (4.92%) and the sovereign country risk premium (1.29%) is deemed to be compensation for the sovereign exchange rate risk. We also examine the spread between yields on 5-

Figure 16

NOMINAL RISK-FREE RATES: U.S. AND FINLAND

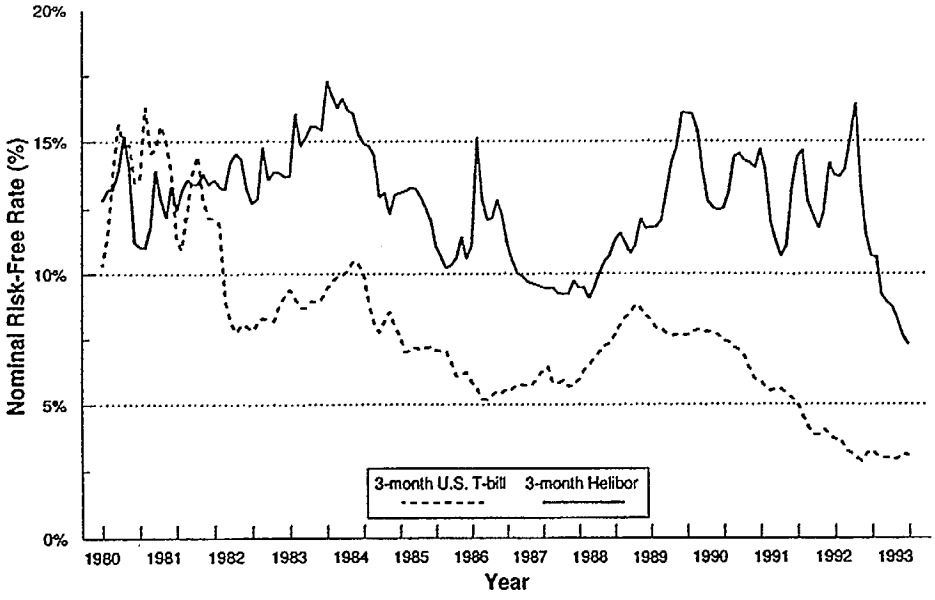


Figure 17

REAL RISK-FREE RATES: U.S. AND FINLAND

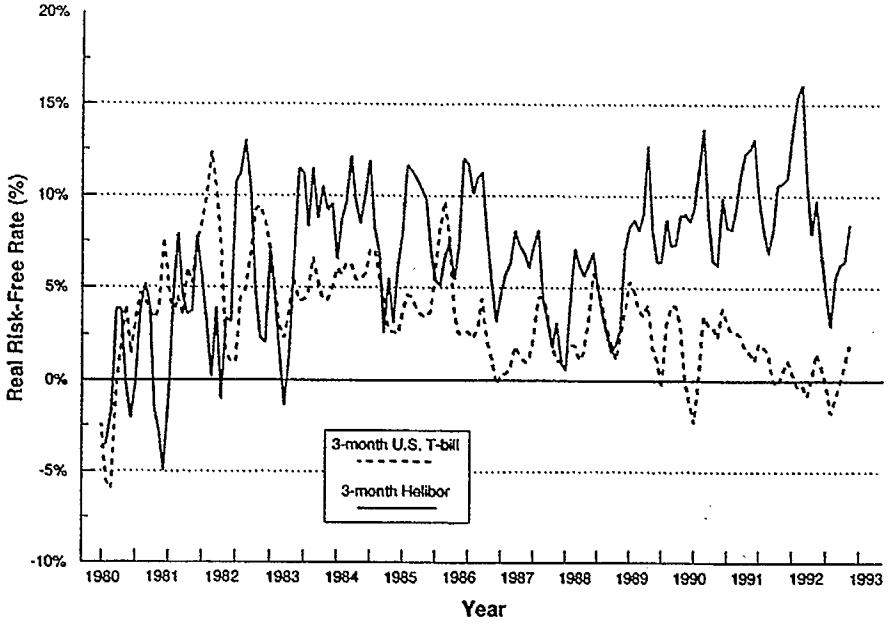


Figure 18

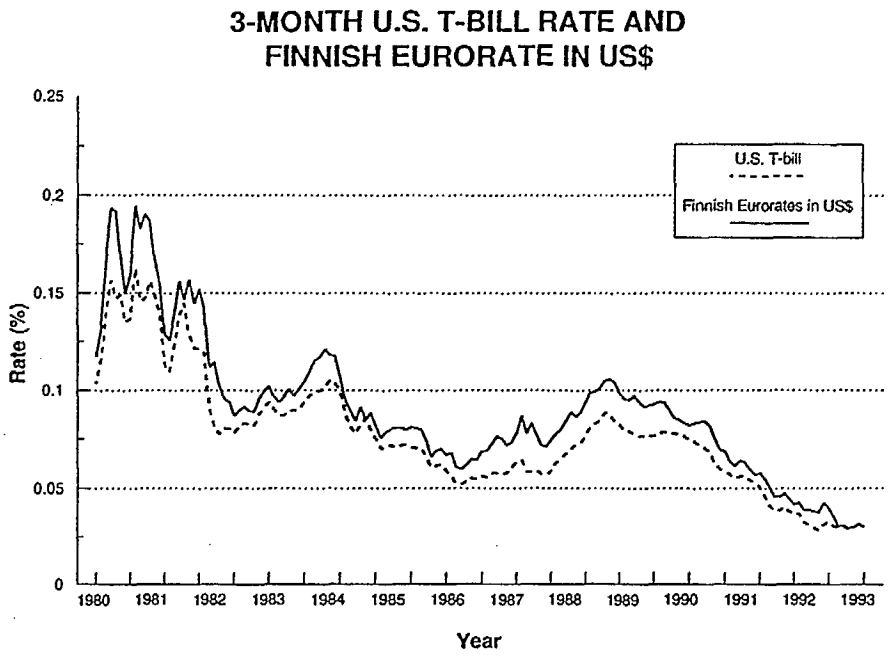

3-MONTH U.S. T-BILL RATE AND
FINNISH EURORATE IN US$
U.S. T-bill
Finnish Eurorates in US$
Rate (%)
0.25
0.2
0.15
0.1
0.05
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
Year

TABLE 18:
RISK-FREE RATES OF RETURN

	Nominal Risk-Free Returns	Real Risk-Free Returns
Finnish HELIBOR, FIM	12.63%	6.49%
US T-Bills, US$	7.71%	3.21%
Spread	4.92%	3.28%

TABLE 19: COUNTRY RISK PREMIUM FOR FINLAND AS MEASURED BY DIFFERENCES IN RISK-FREE RATES

	1980-1989	1990-1993	1980-1993
Country Risk Premium	1.49%	0.76%	1.29%
Other Premium	2.39%	6.84%	3.63%
Total Spread	3.88%	7.60%	4.92%

year Government of Finland Eurobonds denominated in US$ and on 5-year US Government bonds. Although, the sample size is limited (5 observations), the results appear to be relatively consistent with the findings described above.[33] On average, investors demanded a 1.49% premium on Finnish Eurobonds over similar bonds issued by the US Government.

However, over the last decade, the amount of premium charged for the country risk has been declining. A regression of monthly premiums, from 1980 to 1993, produces a negative, statistically significant, coefficient.[34] In fact, between January 1990 and July 1993, the average country risk premium measured approximately 0.76%. (Table 19) Such observations are in keeping with the hypothesis that country risk declines as the country becomes more and more integrated with the outside world. We will use 0.76% as an estimate of the sovereign country risk premium in the foreseeable future.

For the purpose of this analysis, we assume that the country risk premium in Finland will not decline much further. We feel that Finland is quite similar to Canada in many respects, and we do not see a reason for its country risk to be below that of Canada.

Differences in Yields on Corporate Debt: Finland and US

We now examine the differences between yields of Finnish corporate debt and the U.S. corporate debt. We proceed based on the assumption that the spread in the yields of two equally rated bonds, one issued by an American pulp and paper company and one by a Finnish company, is present due to three factors: sovereign country risk premium, corporate country risk premium, and corporate exchange rate risk premium. An implicit assumption is made that premiums for maturity and industrial risk in Finland and the U.S. are the same.

Table 20 presents nominal yields on industrial bonds in Finland and the US. Over the past five years, the difference in nominal rates between the two countries has been approximately 2.96%. We feel that this spread is fairly representative of the future, especially considering that the average value of FIM over this period, in terms of US$, has been in line with its long-term historical average. Since Finnish financial markets have recently been undergoing substantial changes, it is not useful to examine spreads in yields over a longer period of time.

Table 21 compares real yields on Finnish industrial bonds to real yields earned on the U.S. industrial bonds, with each security denominated in its respective domestic currency. Over the last five years, real rates in Finland have been on average 2.4% higher than the rates in the US. Over the same time period, the average difference in inflation rates between the two countries has been just over ½% and the difference in nominal rates averaged a bit under 3.0%.

Some readers may argue that by looking at differences in yields, an up-trend can be detected over the last five years. We agree, but we do not expect such pattern

TABLE 20: Nominal Bond Yields-
Finland and US

YEAR	Average Yields on Industrial Bonds:		Difference Between Nominal Rates in the Two Countries
	Finnish Issues in FIM	American Issues in US$	
1988	10.6%	9.9%	0.7%
1989	11.9%	9.7%	2.2%
1990	13.3%	9.8%	3.5%
1991	12.6%	9.3%	3.3%
1992	13.8%	8.7%	5.1%
1993: Jan-April	11.7%	N/A	N/A

TABLE 21: Real Bond Yields-
Finland and US

YEAR	Average Yields on Industrial Bonds:		Difference Between Real Rates in the Two Countries
	Finnish Issues in FIM[1]	American Issues in US$[2]	
1988	4.1%	5.5%	(1.4)%
1989	5.5%	5.1%	0.4%
1990	8.4%	3.7%	4.7%
1991	8.7%	6.2%	2.5%
1992	11.7%	5.8%	5.9%
1993: Jan-April	9.8%	N/A	N/A

1. Nominal rates on issues with maturity of between 3 and 6 years were obtained from Bulletin,Suomen Pankki, Finlands Bank, June-July 1993. Inflation rates were calculated based on the monthly price index provided by Statistics Finland.

2. Composite average of monthly nominal yields on industrial bonds provided by Moody's Industrial Manual, 1993. Inflation rates in the US were calculated from the price index obtained from CANSIM database, D139105.

to continue. In fact, we expect to see a reversed trend over the next few years. The growth in the spread has been largely a compensation for the substantial devaluation of FIM. Between 1990 and second quarter of 1993, FIM lost approximately 40% of its value against the US$. In September 1993, the currency was trading at approximately FIM 5.78 to a US$. This is about 20% below the Finnish currency's historical average.

Assuming that in the future FIM will trade at its historical average rate vis-a-vis the US$, investors would anticipate FIM to appreciate from its current levels. An increase in the value of Finnish currency would be beneficial to foreign investors holding FIM-denominated securities. As such, the spread between the yields of Finnish industrial bonds and the US industrial bonds is expected to narrow from its 1992 levels.

Cost of Debt

As previously mentioned, we estimate the cost of debt in Finland relative to the cost of debt in the U.S. Table 22 provides the estimation methodology for estimating cost of corporate debt by using the U.S. as the base case. Similarly, we provide similar estimates for Canada.

Using the estimated the nominal cost of debt in the US at 6.16% and adding the corresponding premiums, we can estimate that the after-tax cost of debt in Finland is approximately 6.84%. This can be compared to the after-tax cost of debt in the US of 4.07%, which is 2.77% lower than in Finland. In Canada, nominal cost of debt is also lower than in Finland. Comparing the real cost of debt, we find that Finland, again, has the highest cost of debt of the three countries. The real cost of debt in Finland is 4.03%; in the US, it is 1.78%; and in Canada, it is 3.03%.

It is important to point out that this estimated cost of debt would apply to corporations raising capital without the backing of government guarantees. In the past, the widely available government guarantees eliminated the need for a premium compensation for industrial risk, hence, *ceteris paribus*, the cost of corporate debt use to be lower.

Cost of Equity

Again, we use the capital assets pricing model (CAPM) to estimate the cost of equity. This poses a variety of challenges. First, it is very difficult to obtain a historic estimate of market risk premium in Finland over the 3-month risk-free rate simply because Finnish money markets have only recently began to develop. Tuutti (1992) estimates that the stock market premium has been 6.8 per cent above the long-term government bonds (average yield of 9.5 per cent).[35] Malkamaki (1993) provides an estimate of the market risk premium over the short term interest rates as 9.3%. The short-term interest rates were computed from the Eurofutures market for the Finnish markka based on the US Treasury-bill rates.[36] Malkamaki's study also shows that average rolling beta for a sample of pulp and

TABLE 22: Cost of Debt-
Finland, U.S., and Canada

	Finland (%)	Canada (%)	Spread: Finland - Canada (%)
US Risk-Free Rate - Real plus: Expected Inflation	2.97 2.25	2.97 2.25	
US Risk-Free Rate - Nominal plus: Debt Premium	5.28 0.88	5.28 0.88	
Nominal Cost of Debt in the US	6.16	6.16	
Premium due to country and corporate risk	2.96	1.94	1.02
Nominal Cost of Debt less: Tax Shield on Debt	9.12 2.28	8.10 2.75	1.02 (0.47)
After-Tax Cost of Debt less: Expected Inflation Rate	6.84 2.70	5.35 2.25	1.49 0.45
Real Cost of Debt	**4.03**	**3.03**	**1.00**
% Above the US Real Cost of Debt	2.25	1.25	1.00

paper companies over 17 years (1972-1989) has been approximately 1.[37] A more recent study by Yli-Olli (1993) for the period of 1988 to 1991 calculates betas of 5 Finnish pulp and paper companies which range from 1.14 and 1.26, with a weighted average beta of 1.2.[38]

Using beta of 1.2 and market premium of 9.3%, the nominal cost of equity for the Finnish pulp and paper industry can be estimated as 19.20% (Table 23). Because of the relatively high market risk premium and the higher nominal risk free rate, the cost of equity in Finland is significantly higher than Canada and the U.S. [39]

Capital Structure

The capital structure of the Finnish pulp and paper industry is highly levered, especially when compared to the capital structure of the North American industry. The debt-to-equity ratio of Finnish firms is in a range of 3:1 to 4:1.[40] Such abnormal degree of leverage is possible because Government of Finland has traditionally guaranteed many corporate loans. On average, over US$1.5 billion is outstanding in such loan and bond guarantees.[41]

In Finland, the structure of debt itself is also different from that in North America. Long-term financing is primarily done through loans from financial and pension institutions. These private corporate loans make up at least 85% of Finnish companies' long-term debt, with some firms using 100% loans as the form of long-term debt financing. Capital markets are rarely used to raise long-term financing. Only two out of nine companies in our sample had bonds as a component of their long-term debt (4% in one case, and 30% in the other).

In the capital markets unguaranteed by government loan guarantees, such capital structure may not be possible. As Finnish markets continue to evolve, capital composition of Finnish firms is expected to change. The transformation of capital structure is expected to be affected by the following two factors: First, Finnish financial markets are finding it increasingly difficult to finance large deals internally, and hence, domestic companies must often turn to Euromarkets. Second, in order to integrate the Finnish economy with that of other countries, the Government of Finland is forced to reduce its guarantees of loans to business.

As a result, capital structure of Finnish companies is expected to fall more in line with that observed in other developed countries. Consequently, aside from using the current capital structure in Finland to estimate cost of capital, we consider the WACC in Finland under three possible scenarios: Capital structure of Finnish firms remains as it is; Capital structure of Finnish firms resembles that in Sweden; and Capital structure of Finnish firms resembles that in the U.S.

WACC Using Current Finnish Capital Structure

If the capital structure in Finland were to remain the same as it has been in the past (i.e., debt-to-equity ratio of 3.5:1), the weighted cost of capital for the Finnish

forest industry would be about 9.58% nominal and 6.70% real:

Nominal $WACC_{\text{Finnish Cap. Structure}}$ = (6.84%)(0.778) + (19.20%)(0.222) = 9.58%

Real $WACC_{\text{Finnish Cap. Structure}}$ = [(1+ 9.58%) / (1+ 2.70%)] -1 = 6.70%

As such, Finnish firms face real cost of capital much lower than U.S. and especially Canadian companies.[42]

It is important to note that it is only during the past few years, as the government loan guarantees to business are being reduced, the cost of funds in Finland is becoming more representative of the true forces of demand and supply. During the 1980s however, Finnish companies have experienced significant advantage in the cost of capital due to their higher reliance on debt. In some years, the cost of debt for Finnish companies was even below the cost of debt for the U.S. This, combined with the highly levered capital structure, gave Finnish pulp and paper firms an advantage over their North American competitors so that they could easily cover their shipping costs and still compete on price in the North American product markets.

Impact of Using Alternate Capital Structures

Since the historical and current capital structure of Finnish firms is so much different than their North American counterparts, it is interesting to evaluate the impact of potential changes to capital structure on our cost of capital estimates. There is, of course, no unambiguous method to determine what the equilibrium capital structure of Finnish firms would be. We consider two potential scenarios: first, we use the capital structure of Swedish firms as a benchmark and then we use U.S. firms as another benchmark.

Our examination of the capital structures of eight Swedish pulp and paper companies between 1984 and 1991 reveals that the average debt-to-equity ratio has remained relatively constant from year to year, as well as from company to company, at approximately 1:1. The highest debt-to-equity ratio was found to be in the neighborhood of 2:1, and the lowest - approximately 0.2:1.[43] In contrast, capital of pulp and paper of North American companies is generally comprised of 40% debt and 60% equity.

We can now apply these capital structures to the corresponding costs of equity and debt. Note that we are not re-leveraging equity betas to account for the reduction in the proportion of debt. We believe that investors view high-ratio government-backed corporate loans not as debt, but rather as a form of equity. Hence, they do not perceive the high amount of debt as a source of additional financial risk, usually associated with leverage.[44] The results of this analysis are shown in Table

TABLE 23:
Cost of Equity - Finland, U.S, and Canada

	Finland	U.S.	Canada
3-month Risk-Free Rate - Nominal	8.04%	5.28%	7.22%
Equity Beta	1.20	1.33	1.33
Market Premium	9.30%	6.00%	6.00%
Nominal Cost of Equity	19.20%	13.26%	15.20%
less: Expected Inflation	2.70%	2.25%	2.25%
Real Cost of Equity	**16.07%**	**11.01%**	**12.95%**

TABLE 24:
Real Cost of Capital Under Assumptions of Various Debt-to-Equity Ratios

	Finland	U.S.	Canada
Finnish Capital Structure	6.70	N/A	N/A
Swedish Capital Structure	10.05	N/A	N/A
North-American Capital Structure	11.26	6.90	8.57

24.

Assuming that the capital structure of Finnish pulp and paper firms shifts toward debt-to-equity ratio of 1:1, Finnish companies may face cost of capital of approximately 13.02% nominal and 10.05% real. This is significantly higher than the estimate of the cost of capital of 9.58% nominal and 6.70% real, under the current highly levered capital structure. These figures clearly demonstrate that if pulp and paper companies in Finland were competing on equal basis with the US firms, their financial costs, in real terms, would be higher than their counterpart firms in North America.

If we assume that the capital structure of the Finnish pulp and paper industry would be similar to that in North America, then Finnish companies would pay approximately 4.56% more for their capital because of the dramatic decline in leverage. In addition, they would pay another ½% to ¾% due to the increase in the cost of debt. On balance, if the Finnish pulp and paper industry were facing North American capital structure, its real cost of capital would be higher by over 4% compared to the U.S. firms and approximately 3 percent over Canadian firms.

Summary and Overview

For years, Finnish companies enjoyed a relatively easy access to inexpensive capital. This was the result of widely available government guarantees of business loans, which, in turn, allowed Finnish companies to maintain highly levered structures and borrow at rates almost the same as the Government of Finland. Using historical capital structure, Finnish companies' real cost of capital is estimated as approximately 6.70% compared to the real cost of capital in the U.S. of 6.90% and Canada of 8.57%. Thus, historically speaking, Finnish pulp and paper companies have held a significant cost of capital advantage over Canadian firms.

However, Finland has been undergoing significant changes to its financial and economic systems. As the restructuring proceeds, it is expected that the capital structure of Finnish companies will resemble, at the very least, that of Swedish firms, and possibly even that of North American firms. Further, the cost of debt is expected to rise as it begins to reflect the forces of demand and supply more accurately. It is estimated that Finnish firms will face real cost of capital somewhere in the range of 10.05% to 11.26%, and hence will suffer a substantial decline in their competitive advantage.

OVERALL SUMMARY AND CONCLUSIONS

In this paper we provide estimates of cost of capital for Canadian industrial sectors based on our analysis of publicly traded firms listed on the Toronto Stock

Exchange. These estimates are based on a specific model of the return generating process namely, the Capital Asset Pricing Model. The paper provides estimates of systematic risk, real cost of equity and capital, and capital structure. The estimates are provided on an average basis. These estimates can be used only if the firm or the project is expected to correspond to an average firm in that sector. If that is not the case, it would be inappropriate to use these estimates on an 'as is' basis for undertaking an investment decision.

The three case studies presented in this paper are based on the work of many individuals. These studies are neither meant to be exhaustive or definitive; they simply illustrate the methodological and empirical challenges in estimating cost of capital of firms in a cross-country context. The studies clearly illustrate that the country risk premium as observed in differential real rates provides an unambiguous cost of capital advantage to U.S. firms. If one adds the corporate risk premium demanded by investors, then the cost of capital disadvantage for a typical Canadian firm is almost 2 percentage points. Since our analysis assumes that the market risk premium and the systematic risk of Canadian firms is same as that for the U.S. firms, we believe that our estimates are conservative at best. Knowing that Canadian firms in many sectors are thought as the swing suppliers to the U.S. markets and the fact that Canada is a net importer of capital, we believe that the cost of capital disadvantage is even higher in magnitude.

This two percent difference in cost of capital, though small in magnitude, has the potential to divert investment away from a Canadian location, all else being equal. This also indicates that for Canada to compete, it must provide a higher degree of operational efficiency and cost advantage to counteract against the two percent cost of capital advantage enjoyed by the U.S. firms. One of our case studies also attempts to estimate cost of capital faced by a sector in a third country, in our case Finland, with Canada and U.S. Our analysis indicates that the historical closeness of lenders and borrowers in Finland has allowed Finnish firms to benefit from a much lower cost of capital. With the opening of capital markets and a continued withdrawal of the Finnish government from its involvement in the corporate sector, we expect this advantage to disappear in the coming years. However, the speed of this change is very hard to estimate given the continued close relationship between banks and the corporate sector in Finland as well as many other countries around the world.

Our study indicates that there is a significant cost of capital disadvantage to firms in a country where the real rates continue to be high, where the country risk premium exists, where the firms compete with foreign firms with a different capital market regime, and whose export markets treat them as swing suppliers. Our use of Canadian data and Canadian estimates can be viewed as an attempt to empirically determine the magnitude and the impact of these issues from a Canadian perspective.

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Endnotes

1. All three case studies are based on data available as of June 1993, at the latest. Hence the results presented here are illustrative rather than prescriptive.

2. This section is based on the work conducted by Vijay Jog and Jim Douglas in early 1994. It has been updated by Vijay Jog and Colin Pattison in the fall 1995.

3. For the most recent papers relevant to the applicability of this framework, see Fama and French (1992), Kim (1995), Kothari et al (1995).

4. Also see Ando and Aurbach (1988), Finance Canada (1992), Hatsopoulos (1983), Porter (1992), and Shoven and Topper (1992).

5. We ignore here evidence based on survey results. For example, Jog and Srivastava (1993) report that Canadian CEOs/CFOs perceive at least some significant disadvantage in terms of all three factors of competitiveness: the cost of capital, labour and material as well as the availability of equity capital.

6. See, for example, Patterson (1993) and Booth (1993).

7. In a study on corporate financial decision making of Canadian firms, Jog and Srivastava (1994) report that, in addition to the dividend growth model and risk premium type models, companies also use accounting rates of return, P/E ratio, and subjective estimates for estimating their cost of capital. Similar conclusions are found in the U.S. survey results, see Gitman and Mercurio (1982) and Kim et al. (1986).

8. A recent critic of CAPM's validity in the U.S. can be found in Fama and French (1992). If one believes in their results, one could estimate cost of equity for companies using the following formulation: $K_e = R_f + B_s$ * firm size + B_{bm} * book-to-market ratio, where firm size is the market capitalization of the firm's equity, B_s and B_{bm} are the sensitivities to these factors. The average risk premium can be estimated using cross-sectional regressions of the type used in testing the Arbitrage Pricing Model by Chen, Roll and Ross (1986). It is beyond the scope of this paper to test the validity of the Fama and French hypothesis for Canada.

9. This approach is quite useful in determining the cost of equity for regulated sectors where companies have a long history of dividend payments and follow stable and predictable capital structures. This method is used in many rate hearings.

10. Since this topic is covered quite extensively in any standard finance or investments textbook, no attempt is made here to provide further details.

11. For companies which the monthly return data was not available or which had unsatisfactory R-squared (less than 0.1) or t-values (less than 1) statistics associated with the regressions, sector averages were used.

12. See Damodaran (1995) on this issue.

13. Note that preferred equity is much less liquid than government bonds implying that a lag exists in the preferred equity market when adjusting to market conditions. Thus, it is probable that the negative spread that exists in the 1990s is the result of the government bond yields falling immediately in response to the changing market conditions while the preferred equity yields are much slower to respond to the changing market conditions.

14. In any event, any changes to this assumption would have only a marginal impact on our estimates since preferred shares account for less than 5 percent of the aggregate capital.

15. Although not shown here, the WACC under the Myers approach in which inflation is removed at the end of the WACC calculation was also calculated for each sector. However, as the results were virtually identical, these are not shown here.

16. Recall that the sectors were positioned from left to right according to their relative levels of WACC; the left-most sectors having the lowest WACCs and the right-most sectors having the highest WACCs.

17. This section is based on a report written by Jim Douglas while he was a consultant to Industry Canada; the work was conducted jointly by Vijay Jog and Jim Douglas with assistance from Don Tate. The example uses updated estimates of cost of capital, capital structure and systematic risk to ensure consistency with the results in the previous section.

18. Note that further differences may exist due to differences in the degrees of systematic risk (betas) between the two countries, yet it is assumed in this paper that the systematic risk does not vary between the Canada and the U.S.

19. Even after some search, it was difficult to find well-traded Canadian government bonds denominated in U.S. dollars that can be matched with their U.S. counterparts.

20. Exchange risk is not relevant since the bonds are denominated in U.S. dollars and therefore the U.S. investor is concerned with converting Canadian interest and principal payments received to U.S. dollars.

21. More specifically, it would require using a model such as the international CAPM and an adjustment for the capital structure to determine the cost of equity capital for the forest sector product companies in both countries. Due to time constraints, this is beyond the scope of this paper.

22. The choice of an LWC paper mill is mainly for illustration purposes since the authors had access to some work in Industry Canada on the competitiveness of the Forest product sector. All of the operating and capital costs associated with the mill were provided by an internationally renowned engineering consulting firm.

23. Throughout this paper, the relationship between nominal and real rates is estimated as: nominal rate = (1+real rate)* (1+ inflation) - 1.

24. The beta value of 1.21 and the average debt-equity ratio of 40:60 for 1992 are based on the results shown in section 1.

25. This section is based on work by Walter Sims of Industry Canada in May 1993.

26. Non - telecom businesses may have accounted for as much as 8 per cent of Baby Bell revenue in 1992.

27. The degree of difficulty associated with the estimation of Bell's market value is illustrated by Halpern and Jog (1995).

28. Meanwhile, things are changing in Canada as well. With the recent C.R.T.C. ruling regarding the opening up of long distance service to competition, a large chunk (virtually half) of Canadian telecom business revenue has lost its monopoly protection. As a result, the business risk faced by Canadian firms is also increasing.

29. Note that the data from US West and NYNEX has been excluded: their poor financial performance and low cost of equity in our time period was deemed to be unrepresentative.

30. We can speculate that this higher market-to-book ratios in the U.S. may have to do with expectations about more positive regulatory changes, positive impact of the incentive based regulations which allow U.S. telcos to pass on the benefits of efficiency improvements to shareholders rather than the consumers.

31. This section is based on a study conducted by Igor Kotlyr while he was a consultant to Industry Canada. The example uses updated estimates of cost of capital, capital structure and systematic risk to ensure consistency with the results in the previous sections.

32. In October 1993, the yield on 11-year Government bonds was approximately 7.60%; on 8-year: 7.45%; on 5-year: 6.65%; on 2-year: 6.3%; on 1-year: 6.1; 3-month: 6.65%.

33. The following are yields on 5-year government bonds. Nov 1981: Finnish Eurobond (14.75%), US (12.61%), Δ (2.14%). April 1982: Finnish Eurobond (15.25%), US (13.87%), Δ (1.38%). Sept 1982: Finnish Eurobond (13.625%), US (11.76%), Δ (1.865%). Jan 1983: Finnish Eurobonds (11.50%), US (10.23%), Δ (1.27%). Nov 1987: Finnish Eurobonds (9.125%), US (8.32%), Δ (0.805%).; where Δ represents the difference.

34. Results of regression (monthly country risk premium against time) September 1980 through July 1993: constant = 1.94%, R^2 = 0.23, x-coefficient = (0.0084)%, st. error = 0.0012%, t-stat = (6.72).

35. This is based on Petri Tuutti recently completed, unpublished graduate thesis at the Helsinki School of Economics. The thesis dealt with the ex-ante cost of equity capital for Fiskars, a large Finnish metal company.

36. Average excess return from 1972 to 1989 is approximately 3.1% a year. This figure is similar to the projection of the ex-ante market premium of 3.0% made by Professor Matti Viren of Turku School of Economics and Business Administration.

37. 3-year rolling beta mean (1972-1989): Enso-Gutzeit 0.767; Kymmene 1.088; Tampella 0.935; United Paper Mills 1.247. Based on monthly observations.

38. Weighted average beta based on weekly data (1988-1991) is 1.21. Financial structure was used as the relative measure of weight. Individual betas are: Enso 1.14; Kymmene 1.26; Serla 1.25; Yhtyneet (part of Repola) 1.10; Tampella 1.21.

39. In estimating the Finnish cost of equity and comparing it to the US and Canada, it is recognized that the use of different indexes as the bases for regressions may have led to imprecise estimates of relative riskiness of pulp and paper industries in the three countries.

40. Based on the analysis of financial statements for a sample of nine Finnish pulp and paper companies (Enso-Gutzeit, Kymmene, Metsa-Serla, Kemi, Veitsiluoto, Metsa-Botnia, Sunila, Tampella, Ahlstrom) for years 1989 through 1991.

41. Moody's International Manual, 1992, page 1465.

42. This result is critically dependent on the expected market risk premium of 6 percent used in the estimation of cost of capital in North America. In the earlier work, a higher risk premium of 8.8 percent was envisioned: under that assumption, the Finnish firms enjoy an even higher advantage over their Canadian counterparts.

43. Our sample included: ASSI AB, Billerud AB, Kornas Aktiebolag, MODO, Munksjo AB, NCB, Stora, Svenksa Cellulosa.

44. Also note that the relatively high market risk premium in Finland may already reflect the overall higher reliance on debt by all Finnish companies.

VENTURE CAPITAL FINANCING OF ENTREPRENEURSHIP IN CANADA*

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Venture Capital Financing of Entrepreneurship in Canada

Executive Summary

This paper has three main contributions. The first contribution is to provide previously unreported overview information about venture capital investment in Canada using a data set generously made available to us by Macdonald & Associates Ltd. The second contribution is to infer four important empirical regularities (or "stylized facts") requiring explanation from this information. The third contribution is to set out a theoretical structure that is consistent with these stylized facts. Some preliminary econometric analysis is also presented. This combination of factual information and theoretical structure provided in the paper provides a foundation for further research on the venture capital industry and for relevant public policy analysis.

The data set that has been utilized in this study has several important features. It is the most comprehensive and detailed data base about Canadian venture capital investments currently in existence, it is up-to-date, and it provides financial information about the investee firms, along with information about the decisions and practices of venture capitalists. From this data we make a number of interesting observations. First, to give some sense of the size of the industry, we estimate that there is approximately $300 million to $350 million of new venture capital investment annually by Canadian venture capitalists in Canadian companies, and there was at least $3 billion in Canadian venture capital funds under management in Canada in 1995.

Interestingly, the geographical pattern of venture capital activity does not match the geographical pattern of economic activity. Relative to overall economic activity, venture capital activity is relatively high in Quebec and relatively low in Ontario and in Atlantic Canada. As expected, "high-tech" industries make up a relatively large share of venture capital investments. Investee firms are somewhat older than expected, as fully 10% of the post-1990 venture capital investments were made in firms founded before 1974, and one third of the investments were made in firms founded before 1984. The data also show that early stage investments are smaller (by about 35% on average) and much less numerous than later-stage investments. Thus we conclude that venture capital activity emphasizes expansion and growth stages rather than the startup phase of a company's life cycle. Note, however, that much later stage investment occurs in companies that did receive start-up financing.

Investees pay significant levels of tax (on average) and spend about 3% of revenues on R&D, which is about equal to the overall Canadian average and therefore somewhat lower than expected, given the "high-tech" nature of the investee population. The track record of financial returns to venture capital investments is particularly interesting. Many investments provide relatively low returns, but this is offset by a small number of "hits" that do very well. This general pattern is supported by information on employment growth, as aggregate growth exceeds median growth. Most investee firms grow slowly, but a few grow very rapidly.

The average venture capital equity (or ownership) share in investee firms is about 35%. The majority of Canadian venture capital investments are not syndicated as each round of investment is provided by a single venture capitalist in most cases, and about half the sample firms get only one round of venture capital. In comparison to the US, we find that syndication is much less common in Canada, especially in the early stages. While venture capital investments can include both debt and equity, we observe that about two thirds of Canadian investments are pure equity.

Exit behaviour is particularly interesting. A substantial minority of investments (about 18%) are

terminated by being written off - the venture capitalist loses the entire investment. Only a comparable share of investments (16%) are terminated following initial public offerings of stock (IPOs) (and these are generally successful investments). A substantial share of investments (13%) are terminated in third-party acquisitions, and these also tend to be successful investments. The largest category of exit (37%) is through management or company buyouts, as company insiders buy out the venture capitalist. Indeed, if we eliminate uncategorized exits (most of which are probably management buyouts) and writeoffs, company buyouts account for 50% of remaining exits.

From this information, we distilled four empirical regularities that any successful theory of venture capital must accommodate. First, a theory must provide a reason for the existence of a specialized venture capital industry. Second, it must explain the emphasis on development rather than startup. Third, it must explain the pattern of exit, where "insider" buyouts dominate, and finally it must be consistent with the skewed pattern of returns.

The theoretical framework we offer focuses on informational issues. Specifically, we view asymmetric information and limited liability (with low collateral) as the central features of venture capital investment. Both major forms of asymmetric information, "hidden information" (leading to adverse selection) and "hidden action" (leading to moral hazard) are included in our analysis. The model we present is complicated even though we abstract from several important features of the venture capital industry. We believe that this information-based approach is consistent with the major stylized facts characterizing the industry. For example, if inside information is important, it is not surprising that most exit is through company buyouts or acquisition by informed outsiders.

Our model implies that informational asymmetries lead to market failure, causing possible underfinancing. If adverse selection and moral hazard are important, it will be difficult for investors to earn a reasonable return in the industry, even if there are many potentially worthwhile projects, leading to under-investment. Venture capitalists exist precisely because they can reduce information-based market failures through careful selection, monitoring, and other means. The more skilled the venture capitalist is in reducing these sources of market failure, the more efficiently the venture capital sector will function. In a brief illustration of econometric analysis, we consider the implications of our theory for variations in the extent of venture capital ownership, then estimate the effect of venture capital ownership on several measures of success, including taxes paid, taxes per unit of assets, and revenues per unit of assets. We also provide a review of the relevant literature in an appendix.

VENTURE CAPITAL FINANCING

1. Introduction

Entrepreneurial firms in Canada have been growing in relative importance. For example, the rate of new business registrations approximately doubled between 1979 and 1989. Furthermore, the entrepreneurial sector is particularly interesting because of its close relationship to innovation and technological progress. However, despite the observed growth of this sector, it is often claimed that entrepreneurial activity in Canada is not as vigourous as it should be. More specifically, concerns have been raised about possible gaps or failures in financing the entrepreneurial sector.

One important source of financing for the entrepreneurial sector is the venture capital industry. Indeed, venture capital activity is normally defined as the provision of equity and mixed[1] financing to young privately-held firms. Despite the significance of the entrepreneurial sector and the resulting importance of venture capital, relatively little is known about the Canadian venture capital industry. There is, by comparison, a much larger body of data and analysis related to other parts of the financial sector such as banking, insurance, real estate finance, and stock markets.[2] The primary objective of this paper is to take a step in the direction of addressing this lack of information by providing an empirical overview of venture capital financing in Canada.

Even the US venture capital industry has not been subject to much rigorous empirical scrutiny, although recent work by Lerner (1994a,b) and Gompers (1995) provides a strong start in this direction. The venture capital industry has not been as closely studied as other parts of the financial sector in part because little of the relevant information is in the public domain, as almost all of the firms that venture

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[1] Venture capitalists may provide equity investments, debt investments, or mixtures of debt and equity. In addition, they often provide managerial advice to their investee firms. Aside from venture capital, the other main sources of entrepreneurial finance include bank loans, equity provided personally by the entrepreneur, and financing from other firms (including suppliers or customers), government grants, and family and friends.

[2] For example, in the standard (and very good) finance text, Brealy et. al. (1992), only 3 pages out of over 1000 are devoted to venture capital. Admittedly, much of the material in any finance text is general material that applies to all investments, but this is still very light coverage.

capitalists invest in (referred to as "investees") are privately held and therefore are not subject to the same reporting requirements as public companies. Public information is also more limited in the venture capital industry because there is no organized secondary exchange for venture capital investments that provides summary information. Furthermore, regulatory scrutiny of venture capital has been modest compared to the level of regulatory scrutiny of banks, insurance, and stock exchanges, so the potential information that arises from regulatory proceedings and requirements is also relatively sparse. In addition to limited data availability, academic interest in the area seems to have been less than the level of interest in banking, stock markets, and other parts of the financial sector.

The best available data on the Canadian venture capital industry is collected, using two surveys, by Macdonald & Associates Ltd. One of these surveys is supported financially by the Business Development Bank of Canada (BDC), and some of the information from this survey is reported in the annual (since 1993) BDC publication, "Economic Impact of Venture Capital". We have very fortunately been allowed access, on a confidential basis, to an anonymous version (in which names of firms have been removed) of the Macdonald & Associates database for this study. Using this database we are able to provide previously unreported overview information about the Canadian venture capital industry.

In addition to reporting summary information, we infer from the data a set of broad empirical regularities or "stylized facts" that we see as important aspects of the industry. We then provide a theoretically-based explanation of these empirical regularities. In addition, we provide some preliminary econometric analysis of one central hypotheses that emerges from our theoretical analysis.

Thus, our paper provides useful new information about venture capital activity in Canada, along with a theoretical structure for interpreting this information and a brief econometric investigation of one key theoretical point. We emphasize that this paper is only a small step in a larger effort directed toward providing a better understanding of the venture capital industry. We believe that such an understanding is an important input to both public policy formulation and business practice in the area.

Section 2 describes the database used in the paper. Section 3 reports overview information drawn

from the database, and section 4 distills a set of "stylized facts" from this information. Section 5 provides a theoretical structure for interpreting the data, and section 6 contains some brief econometric results. Section 7 is devoted to concluding remarks. A literature review is provided as an appendix.

2. The Data Set

As indicated in the introduction, the data used for this study were collected by Macdonald and Associates and made available to us on a confidential and anonymous basis. In addition, no individual firm-specific information is reported or discussed in our analysis.

The data are derived from two surveys. The first survey, referred to as the "investment survey", began as an annual survey in 1991 and became quarterly in 1994. It asks approximately 55 Canadian venture capital providers to identify the firms they invest in (i.e. their investees) and to provide some financial information about each investee. Investees are recorded in the database and follow-up information on them is requested in subsequent investment surveys. The investment survey asks about the amount and stage of each investment and also seeks information about the venture capitalist's ultimate divestiture of its holdings in each investee.

The survey seeks to obtain comprehensive information from all Canadian venture capital providers. There is, however, no precise definition of venture capital providers, and some relevant firms may be missed from the survey. It is also possible that some surveyed venture capitalists do not report all of their investments. Macdonald and Associates estimate that the investment survey identifies 90% to 95% of the underlying population of Canadian firms supported by Canadian venture capitalists. The survey is also sent to other investors (i.e. investors other than venture capitalists) who have investments in the venture-backed investees in an effort to get full information about the investee firms. The information from this survey covers the period from 1991 through the first quarter of 1995.

The second survey is an annual survey, referred to as the "economic impact" survey, that began in 1993. This survey seeks additional information about the investees identified in the investment survey. Thus economic impact information is sought about each investee that received an investment in or after

1991. Retrospective information was also requested. Suppose, for example, that an investee received an investment in 1991. The venture capitalist making the investment would have received a 1993 economic impact questionnaire asking for information about this investee going back as far as 1987. In many cases not much retrospective information could be provided, but the database contains economic information on a reasonable number of investees going back as far as 1987. The date of the investee's original startup (which in some cases is well before 1987) is also reported.

The response rate for the economic impact survey over its three year life has varied between 56% and 74% (i.e., information has been received on 56% to 74% percent of the targeted investee firms). If the investment survey identifies 90 to 95 percent of the relevant underlying population, then the effective sample coverage is between 50% (.9 times 56%) and 70% of the underlying population. The economic impact survey collects balance sheet and income statement information on the investees (including revenues and taxes paid). It also collects information on the structure and amount of their employment, on the industry they are in, and on the specific venture capital investments made in them.

A typical investee enters the data set when it receives its first investment from a venture capitalist. It may receive investments from additional venture capitalists as well. Subsequent rounds of investment may occur. Eventually, an investee leaves the sample. This occurs when all venture capitalists have either written off (in the case of failure) or "cashed in" their holdings in the investee. Thus, the data set contains a series of "life histories" for venture capital-backed firms.

A "record" refers to information for one particular investee firm for one particular year. There are 372 investee firms in the data available from the economic impact survey, but information on about 20 is significantly incomplete. The remaining 352 firms provide 1247 reasonably complete records, and therefore have an average of just under 4 records each. Of these firms, 343 can be successfully matched[3] with firms in the investment survey data base, but the number of complete records falls to 424, primarily

[3]All 352 investee firms must have originated in the investment survey data base, but 9 of them could not be matched with subsequent investment survey information.

because there are no records in the investment survey prior to 1991. In addition, for each investee, matches occur only in years when investments occur. Thus, for example, an investee firm that received an investment in 1992 but in no other years would be matched only for 1992. Thus, as there are 343 firms and only 424 complete records, most firms have only one or two years of matched records. The investment survey data also includes information on 476 additional Canadian investees.[4] For some purposes, complete matched records are necessary, but much interesting and relevant information is available from just the economic impact data (1247 records on 372 companies) or just the investment data.

This data set targets Canadian investees supported by the Canadian venture capital industry. A Canadian entrepreneurial company that received support from venture capitalists based in the US or Asia and had no support from Canadian venture capitalists would not be in our data set. This set of firms is probably fairly small, but there is no hard data on its magnitude. It seems unlikely that this omission introduces much systematic bias over most subjects of interest in the data.

One possible source of systematic bias in the data arises from the fact that only 56% to 74% of the targeted investees are reported on in the economic impact survey for any one year. The informational requirements of this survey are fairly high, so it is not surprising that compliance is not perfect. Some venture capitalists do not provide any economic impact information in a given year, and some provide information only on some of their investees, and some provide only partial information on a given investee. We might reasonably suspect some selection bias from this source, as it seems likely that the absent investees or incomplete investee records would be smaller and/or less successful firms.

Despite some possible selection bias, this data set remains an important and unique data source. First, the coverage of the target population is good, partly due to the efforts and reputation of Macdonald

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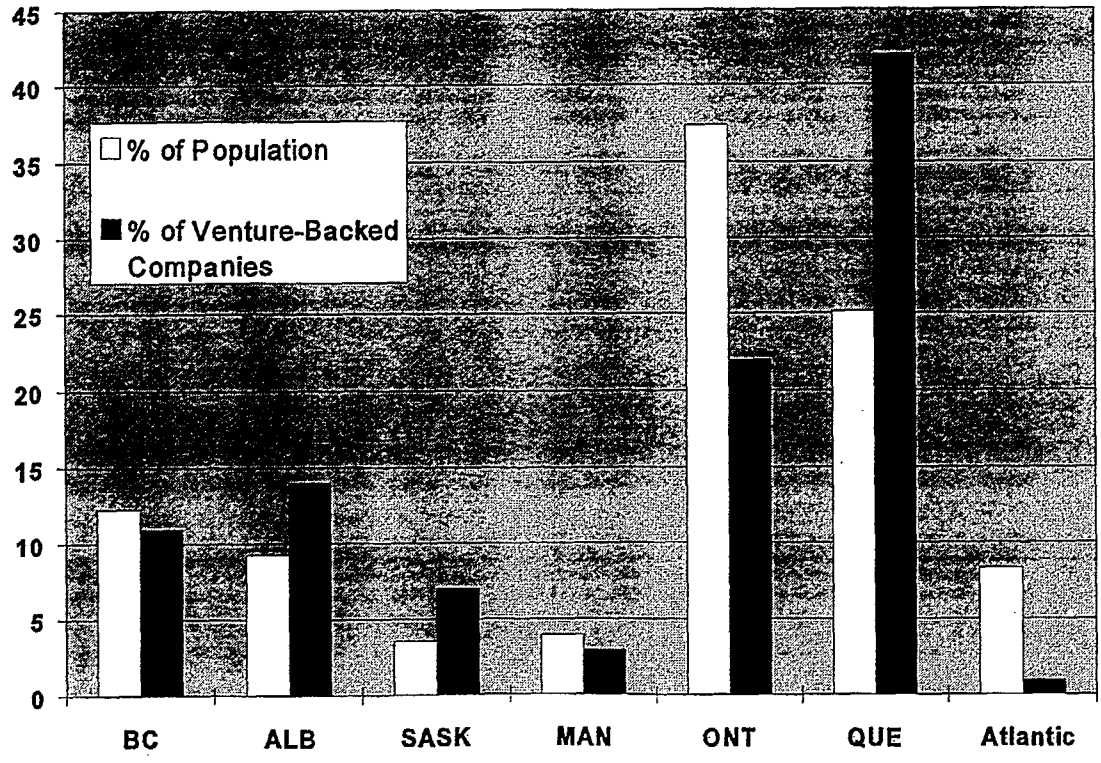
[4]These firms include investees for whom incomplete economic impact surveys exist, investees who received investments but who exited before an economic impact survey was completed, and firms that could not be matched, even though they are in both databases. Most importantly, they include the investees for whom economic impact surveys were not returned. There are also investment records for 79 US investees supported by Canadian venture capitalists. These (US) firms are not tracked by the economic impact survey. In total, there are 898 firms in the investee database, 819 of whom are Canadian.

& Associates and, for the Economic Impact Survey, partly because of the sponsorship and influence of the Business Development Bank of Canada. Second, the data set has a significant time-series dimension, so firms can be tracked through time, allowing age effects, business cycle effects and other dynamic considerations to be investigated. Third, there is information on revenues, employees, and taxes paid. Thus, the quality of information about measures of success is unusually high, and unique for data sets dealing with entrepreneurial firms.

3. An Overview of Venture Capital Backed Firms and Investments

We now turn to consideration of summary tables and diagrams that describe various aspects of the data. The summary statements apply to whatever subset of the 372 companies in the economic impact database for whom we have the relevant information. One noteworthy feature of the data is that the geographical pattern of venture capital activity is not as closely matched to the geographical pattern of

Figure 1: Canadian Population and Venture-Backed Firms: Percentage of Total by Region



economic activity as one might expect. As shown in Figure 1, venture backed activity is high in Quebec (relative to population) and low in Ontario and in the Atlantic provinces. Thus, for example, Quebec has 25% of Canada's population (and produces 23% of Canada's national output), but is the home of 42% of the venture-backed firms in the database. Ontario has almost exactly the reverse pattern. It has 38% of Canada's population, and produces 40% of Canada's output, but has only 22% of the venture backed firms. Atlantic Canada has almost no venture-backed activity (less than 1% of the total) despite having 8% of Canada's population. If there is any bias in this data arising from the absence of firms supported by foreign venture capitalists, it is probably to understate the extent of venture-backed activity in British Columbia, as anecdotal evidence suggests that a disproportionate share of venture capital originating in Asia supports firms in B.C.

The companies in the data set are somewhat older than might be expected. As shown in Table 1, fully 10% of the 367 companies for whom information on age is available were founded prior to 1974. As the data set is limited to firms that received at least one infusion of venture capital in 1991 or later, this means that some firms obtain venture capital financing long after being founded. In addition, this information appears to suggest that it takes longer than commonly perceived, and perhaps more venture capital than originally anticipated, to bring some investee firms to the stage at which exit is feasible.

Table 1: Age of Venture-Backed Companies

YEAR FOUNDED	NUMBER OF COMPANIES	PERCENT OF TOTAL
1994	22	(6%)
1993	21	(6%)
1992	17	(5%)
1991	25	(7%)
1984-1990	163	(44%)
1974-1983	81	(22%)
before 1974	38	(10%)
TOTAL	367	(100%)

A company may be founded well before it obtains its first venture capital investment. These data seem to suggest that venture capital is focussed on expansion of existing small companies rather than on the start-up phase.

Table 2 shows the industry breakdown (for 371 of the 372 companies). This table suggests that venture-capital financing is strongly focused on the "high-tech" sector in the sense that high-tech companies are much more strongly represented in this group of firms than they are in the economy as a whole. This perception is supported by anecdotal comments from the venture capital industry itself.

Table 2: Industry Classification

	NO. OF COMPANIES	(%)	HIGH TECH?
Manufacturing	91	(25%)	no
Miscellaneous	58	(16%)	mostly no
Consumer Related	50	(13%)	no
Computer (Hardware & Software)	44	(12%)	yes
Medical/Health	28	(7%)	yes
Electrical Components & Instruments	27	(7%)	yes
Communications	26	(7%)	yes
Energy/Environmental Technology	22	(6%)	yes
Industrial Equipment	13	(3%)	yes
Biotechnology	12	(3%)	yes
Total:	371	(100%)	

Table 3 shows aggregate employment information for 352 of the 372 investees in the data set. While average employee numbers were very similar in 1987 and 1994, the 1987 and 1988 years were based on a small and perhaps unrepresentative group of firms, reflecting the fact that only firms that received new venture capital infusions after 1990 are in the data set. It seems that 1993 and 1994 average employee levels were higher than earlier in the decade.

Table 3:Employment in Venture-Backed Firms: Levels and Annual Growth

(1) Year	(2) Average Employees	(3) Median Employees	(4) Aggregate growth of continuing firms	(5) Median growth per firm	(6) 60th percentile growth per firm	(7) # of firms 2-3/4-6
1987	176	105	-	-	-	24/-/-
1988	118	47.5	8%	1%	4%	52/22
1989	146	50	6%	4%	8%	102/52
1990	150	42.5	13%	3%	12%	136/102
1991	149	45	4%	0%	7%	199/136
1992	151	45	7%	0%	6%	236/194
1993	183	60	15%	12%	20%	221/178
1994	178	52.5	18%	10%	20%	270/203

Of considerable interest are the indicators of growth provided in Table 3. One indicator of growth is the aggregate annual growth rate of continuing firms, as shown in column 4. To see how this number is calculated, consider the 1994 year. There were 203 firms in the data that were present in both 1993 and 1994. Total employment in this group of 203 firms rose by 18% between 1993 and 1994. We might then say that the "representative" venture-backed firm grew by 18% over the year. To obtain column 5, we calculated a growth rate for each continuing firm, ordered the firms by growth rate, and selected the median (i.e. the middle) firm. Column 5 reports these median growth rates. Column 6 reports the growth rates for firms at the 60th percentile. We can see that the median growth rate is consistently and significantly less than the aggregate growth rate and even the 60th percentile growth rate is less than the aggregate growth rate for several years. This reflects the fact that growth rates are skewed in the sense that most firms grow modestly if at all in any given year, but a few firms grow very substantially. This is similar to the "hit" phenomenon associated with the music business or the movie business, where a few "hits" account for most of the profits.

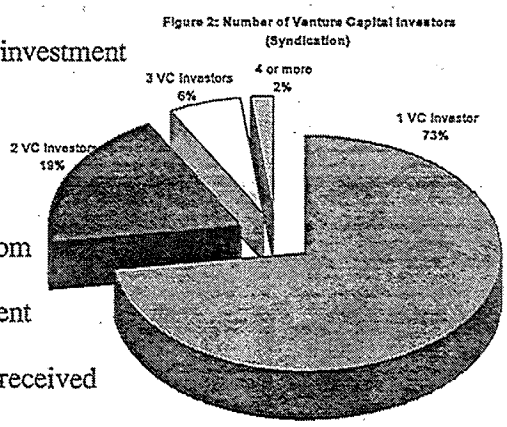
There are firms that leave the sample between any given pair of years. Column 7 shows the number of firms in the data and is used for calculating average and median employees, and the number of continuing firms available for calculating aggregate growth and median growth rates for each year. The number of continuing firms is always less than the total number of firms as there are new venture-backed firms each year. Thus, for example, in 1994 there were 203 continuing firms of the 270 in the data set. This implies that 18 (=221-203) of the firms from 1993 exited before the 1994 survey, and it implies that 67 firms (=270-203) entered the data set in 1994. Note that omitting exiting firms from growth rate calculations is unlikely to bias the growth rates upward. Investees may leave the sample because they are unsuccessful (bankruptcy), but more commonly they leave because they are successful enough for the venture capitalist to sell out at a profit (following, for example, an initial public offering). Thus, if we could take all investee firms for a particular year and look at their employment growth, irrespective of whether they left the sample or not, this growth might well be higher than reported in Table 3.

Table 4 provides summary financial information for 352 firms (1274 records). Some records fail to report the information for some variables, however. The number of records with the relevant information is indicated in column 5. All averages are in thousands of real 1994 Canadian dollars (i.e. nominal dollar amounts reported in the original data have been adjusted to properly account for inflation).This table shows that the data is skewed in the sense that there are a few large investees that make the averages much larger than the medians. Table 4 indicates that, on average, venture capitalists hold a (minority) share of 35% ownership in their investee firms. The data in Table 4 also imply that firms in the data set spend, on average, about 3% of their revenues on R&D. This is about the same as the overall ratio of R&D spending to revenues for the Canadian economy as a whole. Revenues per Canadian employee are $144,000, and the average long term debt to equity ratio is a conservative 0.81. The low debt-equity ratio may reflect the limited borrowing capacity of entrepreneurial firms. We note also that the average investee is profitable enough to pay nontrivial amounts of tax.

Table 4: Summary Financial Data: 1987-94 (in real $1994)

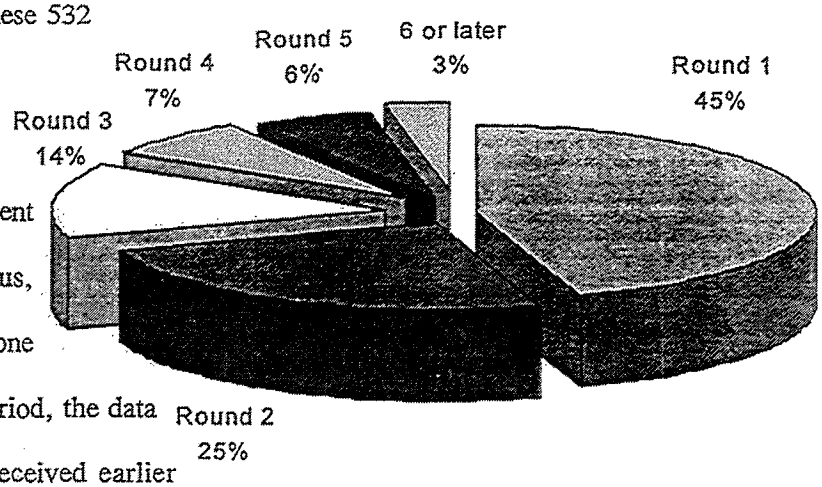
(1)	(2) MEAN ($000s)	(3) MEDIAN ($000s)	(4) STANDARD DEV.	(5) NO. OF RECORDS
TOTAL ASSETS	22074	5423	67758	1228
TOTAL EQUITY	8190	1821	23059	1224
VC-SHARE OF EQUITY (%)	35	30	30	1184
RETAINED EARNINGS	720	143	10076	1081
TOTAL FIXED ASSETS	9615	1967	40749	1208
LONG-TERM DEBT	6644	1176	27721	1107
REVENUE	23210	5902	54692	1237
PPE INVESTMENTS	1932	207	12194	1121
R&D EXPENDITURES	812	74	2073	1035
TAXES PAID	520	22	2753	981
# OF CAN. EMPLOYEES	161	50	306	1240

The next few tables and figures contain information about the structure of venture capital investment. This information is based on a subset of 343 investees for whom this information is available. In a given investment "round", an investee may receive money from more than one venture capitalist. This is referred to as "syndication." We refer to an infusion of capital (from one or more venture capitalists) in a given investment round as an investment "package". The 343 investees received 532 investment packages in total. As shown in Figure 2, approximately 73% (387 out of 532 investment packages) were stand-alone investments. About 19% of investment packages (102 out of 532) were syndicated across 2 venture capitalists, 6% (33 investment packages) had three venture capitalists involved, and 2% (10) had four or more.



A given investee might go through several investment rounds, as implied by the fact that 343 investees received 532 packages. These 532 investment packages included 734 individual investments by venture capitalists. In our data, each investment package is identified by round. Thus, even if a given investee received only one round of investment in our sample period, the data indicates whether this investee had received earlier rounds of investment. Figure 3 depicts the distribution of investment rounds for the 532 investment packages (covering 343 firms) in the data. Figure 3 shows that almost half (45%) of all investment packages were first round investments. However, some investees have received multiple rounds of investment (up to a maximum of 8.)

Figure 3: Investment Round



Information about rounds and numbers of investors is provided in cross-tabulation form in Table 5. Syndication, in which an investment round is shared among 2 or more venture capitalists, is much less common than stand-alone investment, as 73% of investment packages are not syndicated.

Table 5: Number of Venture Capital Investors at Each Investment Round

	Investment Round									
No. of Investors	1	2	3	4	5	6	≥7	Total	Percent	No. of Investments
1	177	95	57	27	19	9	3	387	73%	387
2	43	26	13	8	7	3	2	102	19%	204
3	16	10	2	2	2	1	--	33	6%	99
4+	6	--	1	--	2	1	--	10	2%	44
TOTALS	242	131	73	37	30	14	5	532	100%	734
	45%	25%	14%	7%	6%	2%	1%		100%	

Looking in particular at first round investments, we see that 177 out of 242 were not syndicated. This contrasts with the US, where Lerner (1994b) reports that about two thirds of first round investments in a sample of biotechnology firms were syndicated. Table 6 shows how many investments correspond to each stage in the entrepreneurial firm's life. It is based on 734 investments in the 343 firms in both the economic impact survey data and the investment survey data. It includes investments made between 1991 and the first quarter of 1995. As already noted, a given investee may obtain financing from multiple venture capitalists, and may receive multiple rounds of investment from a given venture capitalist. Each investment is recorded separately. An investment may include debt, equity, or both.

Table 6: Number of Investments by Stage and Year

	EARLY STAGES			LATER STAGES					
	SE	ST	ES	EX	AC	TU	WC	OT	COUNT
1991	1	37	--	66	7	13	--	18	142
1992	9	43	--	57	16	30	2	34	191
1993	4	44	--	84	7	18	16	26	179
1994	3	54	4	99	10	13	--	6	189
1995(Q1)	1	4	4	20	--	2	--	2	33
Total	18	182	8	306	40	76	18	86	734

Key: SE = seed, ST = start-up, ES = other early stage investments, EX = expansion, AC = acquisition, TU = turnaround, WC = working capital, and OT = other.

More than half of the "other" investments were management buyouts, in which an investee obtained investments from a venture capitalist to aid in buying out other investors in the company, including (quite possibly) other venture capitalists. As can be seen from this table, just about 27% of the investments are "early stage" investments. This is consistent with the implication of Table 1 that most investees are fairly mature.

Table 7 shows investment size by stage. The early stage average works out to be almost exactly $900 thousand per investment, while the late stage average works out to $1.4 million. Combining the fact

that early stage investments are both smaller (from Table 7) and less numerous (Table 6) than late stage investments, we can infer that the venture capital industry seems to focus more on growth and development of entrepreneurial firms, rather than on startup activity.

Table 7: Average Size of Investment by Stage and Year (in $000's)

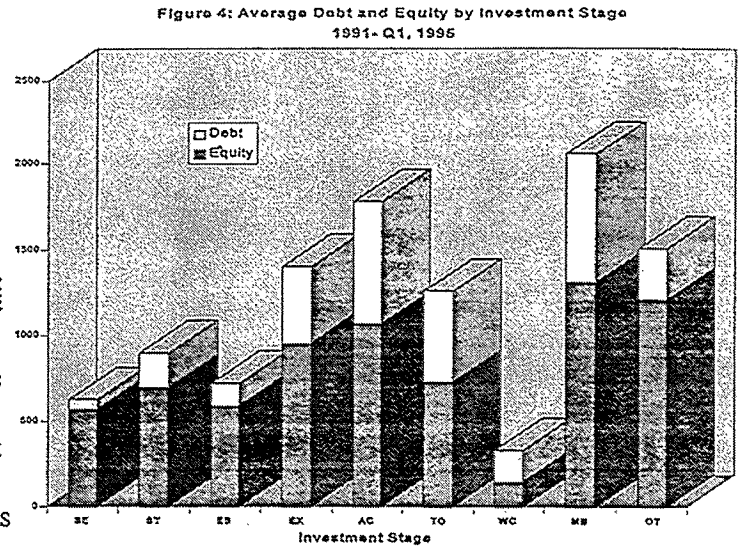
	EARLY STAGES			LATER STAGES					
	SE	ST	ES	EX	AC	TU	WC	OT	Total
1991	66	877	--	1350	2193	1549	--	1815	1336
1992	494	1032	--	1192	1414	645	480	1800	1156
1993	715	856	--	1969	1907	943	365	1024	1281
1994	983	945	1102	1297	2155	1239	--	1000	1254
1995	260	654	342	946	--	475	--	--	791
1991-95	589	924	722	1406	1822	967	378	538	1230

(Note that 1995 values are based on only a few data points.)

Putting together information from Tables 6 and 7 we can infer that in 1994 total new venture capital investment in the represented firms was about $237 million (189 investments at an average size of 1.25 million). Firms in this sample do not represent the entire population, but probably most large investments are included. A plausible rough estimate for total venture capital investment in 1994 would in the range of $300 - $350 million. By comparison, in 1994 U.S. venture capital firms invested roughly C$3.7 billion in 1000 companies. Given the relative size of the two economies, venture capital investment is of similar relative importance in both countries.

Venture capital investments may include both debt and equity, although "pure" investments are much more common. About 66% (415 out of 734) investments in the 343 investees with full records were all-equity, about 27% (198 out of 734) were all-debt, and the remaining 16% (121 investments) were mixed. A venture capitalist may provide equity at one stage and then debt at a subsequent stage, so mixed debt and equity holdings are more common than mixed investments.

Figure 4 gives some idea of the relative importance of debt and equity. This figure shows an average or representative investment for each stage. There are, for example, 18 seed investments in total. The total debt in these 18 investments is $1.04 million, giving an average of only $57 thousand. This average is low because most seed investments have no debt whatsoever. Figure 4 shows that equity is relatively more important at the early stages, and debt becomes more significant later, although equity remains more important in absolute terms for every stage except working capital.



Because some investees receive investments from more than one venture capitalist, the average amount received per investee exceeds the average investment. Table 8 shows the average and median amounts received (including debt and equity) by an investee in a given round of investment.

Table 8: Total Amount Received by Investee in an Investment Round (Debt + Equity)

	MEAN		MEDIAN		Number	
	early	late	early	late	early	late
1991	1204	2016	550	1000	27	78
1992	1526	1703	535	700	32	101
1993	1094	1833	530	750	37	103
1994	1328	1700	400	1000	44	105
1995	471	1215	260	681	9	18
1991-1995	1238	1774	568	800	149	405

Table 9 shows the average investment size by industry for early and late stage investments. As expected, general manufacturing is a large category as measured by number of investments. However,

compared to their overall importance in the economy, communications and computer-based endeavours are very heavily represented.

Table 9: Size of Investment By Industry

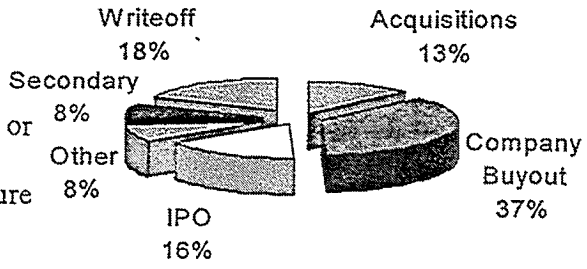
	Mean		Median		Number	
	early	late	early	late	early	late
Communications	1682	1818	500	750	33	87
Computer	784	2372	600	1600	17	43
Electrical components and instr.	611	1124	420	861	9	27
Energy and environm'l techn'y	1112	2078	645	630	11	27
Health	1197	2360	525	1200	14	27
Biotechnology	2101	998	1475	560	12	10
Industrial equipment	814	1366	350	825	9	14
Consumer related	807	2203	800	1000	16	57
Manufacturing	1301	1382	400	600	27	109
Miscellaneous	814	1485	375	640	24	74

The comparison of early and late stage investments varies by industry. In particular, biotechnology seems to require relatively heavy early stage investments, and is the only industry category for which early stage investments outnumber late stage investments. This could, of course, reflect the relative youth of this industry, as relatively few mature biotechnology companies exist.

Some of the most interesting information in the data set is related to exit by venture capitalists. Exit occurs when a venture capitalist either sells off or writes off its investment in an investee. Information is only available for 1992-1994 and the first quarter of 1995 (199 investee companies with 226 records.)

Figure 5 shows the distribution of exit by type. As can be seen from this figure, initial public offerings (IPOs) make up only a modest portion of total exits.[5] The largest cause of exit is company buyouts, which occur when the officers or management of the investee buy out the venture capitalist.

Figure 5: Distribution of Venture Capital Exits (Percentage of Exits)



From other information in the data set we are able to make rough estimates of the real return to the overall investment for each class of exit. IPOs and acquisitions (which occur when a third party acquires the investee) both yield fairly high returns. Company buyouts show large variance, but overall provide slightly negative real returns. Roughly speaking, one can divide the entire group of investments into three broad categories: about one third do very well, about one third represent out-of-pocket losses or complete write-offs, and the middle third provide nominally positive but disappointing returns (i.e. returns below the rate of return on risk-free investments). In addition, there is a "star" or "hit" phenomenon in the data. Of the 226 exits, we estimate that approximately 10% (22 investments) yielded annual real rates of return in excess of 50% per year.

4. Major Stylized Facts

Based on the information provided in Section 3, there are several major stylized facts that we wish to emphasize. Perhaps the primary observation is the simple fact that the venture capital sector exits at all. Venture capital firms constitute a specialized segment of the financial market that focuses on entrepreneurial companies. The research question arising from this observation is "why does this

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[5]An exit due to an IPO does not mean that the venture capital firm sold its shares on the date of the IPO. Regulation requires that venture capitalists keep most of their holdings for some period of time after the IPO. Furthermore, the underwriters of an IPO are normally even more restrictive in the limits they impose on the venture capitalist's ability to sell out. Typically the venture capitalist sells a small part of its holding at the IPO, and sells its remaining holdings in several pieces beginning six months or more after the IPO.

specialized financial sector exist"? What makes the entrepreneurial sector sufficiently different from established firms so as to justify a dedicated set of financial intermediaries to serve it?

A second important stylized fact is that the venture capital sector focuses on later stage financing. In our data, less than 3% of investments are "seed" investments and less than 30% are classified as early stage. Looking at the amount (rather than the number) of investments, early stage investments account for roughly 20% of investment. Furthermore, even if this sample accounts for only 40% to 50% of the underlying population, the total number of seed and start-up investments is low relative to overall startup activity. Thus an appropriate characterization of venture capital is that it carries out development financing for firms, and is not the major factor in actual startup activity. Thus any theory of venture capital must explain why start-ups would have relatively low representation in venture capital investment.

A third important stylized fact in the data is the nature of exit. Typical textbook treatments of venture capital activity give the impression that the standard outcome of venture capital investments is an initial public offering. At some point the firm becomes large enough and has strong enough prospects that it makes an initial share offering to the general public (an IPO) and becomes a publicly traded company. At or shortly after this point the venture capitalist typically sells its shares in the company.[6]

However, only a relatively small share of venture capital investments end in IPOs. In our data base, only 16% of investments end in IPOs. Almost as many end in acquisitions, as a third party (often a competitor, a supplier, or a customer) buys the firm outright. More than twice as many (37%) end in management buyouts. Thus, it is much more common for "insiders" (either company management or other firms that are close to the business) to buy out a venture capitalist than for a general public share offering to be made. Any theory of venture capital financing must explain or account for this dominance of "insider" activity at exit.

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[6]Note that venture capitalists do not always cash out their entire investment when an IPO occurs. Thus a few investees in the data are publicly traded companies in which venture capitalists have maintained investments. This may be due to regulatory escrow requirements or to expectation of future capital gains.

Finally, the other stylized fact that we wish to emphasize relates to rates of return. The variance of returns is large, and most investments generate either disappointing or negative returns. We emphasize that this does mean that there is anything "wrong" with the venture capital. Like several other industries (book publishing, music, movies) it is simply a fact that much of the profit in the industry comes from a relatively small number of "stars". High returns are associated with acquisitions and IPOs, although some management buyouts also provided very high returns. Management buyouts showed much higher variance in returns than the other forms of exit. One extremely valuable aspect of the data is that it contains enough information to estimate holding periods and rates of return, although this is a difficult estimation problem.

To recapitulate, any theory of venture capital activity must explain or accommodate the following empirical regularities.

i) The existence of a specialized financial industry (the venture capital industry) that focuses on emerging privately-held firms.

ii) Emphasis, within the venture-capital sector, on firms in the later stages of entrepreneurial development rather than on seed and start-up activity.

iii) The dominance of exit through "insider" buyouts rather than public share offerings.

iv) High variance in returns with many disappointments and some "stars".

5. A Theory of Venture Capital Finance

5.1. Main Elements of the Theoretical Framework

The key element of the entrepreneurial sector that we believe might explain the existence of venture capitalists[7] is asymmetric information. There is a large literature about asymmetric information,

[7]Very often the first explanation offered is the presence of "high-risk" in the entrepreneurial sector. However, basic financial theory would suggest that investments made in high risk ventures would be made by firms (or other investors) in the best position to diversify the associated risks and who were, in general, not risk averse. If anything, it is the large diversified financial intermediaries and investment firms who are in the best position to absorb or diversify such risks. The existence of relatively small specialized venture capital firms who are heavily invested in a few particular industries is therefore something of an anomaly if "higher risk" is the key factor that

and some attempts have been made to apply this theory to the venture capital sector. A review of this literature is provided in the appendix. We note here, however, that classic papers on asymmetric information include Akerlof (1970) and Jensen and Meckling (1976). Early attempts to apply these ideas to entrepreneurial finance include Amit et. al. (1990, 1993) and Brander and Spencer (1989).

There are two types of asymmetric information: hidden information and hidden action. Hidden information refers to a situation in which the entrepreneur has better information about the firm's prospects than investors do. Thus important information is hidden from the investor but known to the entrepreneur. As described more fully later, hidden information may give rise to adverse selection, in which low quality entrepreneurial prospects would dominate the venture capital market. The other form of asymmetric information is hidden action, (sometimes called moral hazard) which arises when the investor cannot observe the effort level of the entrepreneur. In its crudest form, moral hazard can lead to a situation in which the entrepreneurs can "take the money and run", while simply claiming bad luck as the reason for failure of the project. If adverse selection and moral hazard are more important in the entrepreneurial sector than among established firms, then we would expect the emergence of specialized investors (venture capitalists) who develop skills in selecting and monitoring investment targets. Thus the existence of the venture capital industry is explained by the benefits from specializing in selection and monitoring of investments.

Adverse selection and moral hazard might be particular problems in the entrepreneurial sector because of little collateral and limited liability . Firms in both the established sector and the entrepreneurial sector have limited liability, of course. The key difference is that established firms normally have substantial amounts of collateral that can be used to secure debt finance and that also reduce the "down side" risk of equity investments. For such firms, hidden information and moral hazard may be present, but they are less important to the investor because the investor is partially protected by collateral.

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distinguishes entrepreneurial firms from established firms.

Entrepreneurial firms typically have very little collateral, which implies that their limited liability is likely to be relevant to the investor in the sense that the investor may easily lose the entire investment if things do not work out well. (Recall that about one-fifth of the exits in our data were "write-offs".) In addition, the entrepreneur typically does not have much of a "track record" and therefore reputation is not as important in making assessments. For these reasons - the relative lack of collateral and track record, investors in the venture capital industry are more vulnerable to problems arising from informational asymmetries.

We assume that the entrepreneur has better information about the project than the venture capitalist. Perhaps, for example, the entrepreneur is an inventor who knows that some new product is really very close to being ready to sell, while the venture capitalist lacks the technical expertise to make such a determination. However, the opposite asymmetry may also arise. A venture capitalist may have a much more realistic appraisal of how well some new venture will do, both because the venture capitalist might know the market better, or because entrepreneurs might be prone to "optimistic bias". In our analysis we proceed on the supposition that entrepreneurs have better information about the project, but the alternative could also be investigated.

There exist very few (if any) theoretical studies that simultaneously consider the effect of moral hazard and adverse selection in the presence of limited liability. That is the task we undertake here. In order to focus on these aspects of venture capital finance we abstract from other important considerations. In particular we abstract from the risk-sharing aspect of venture capital finance, and accordingly assume that both the entrepreneur and the venture capitalist are risk-neutral. We also abstract from bargaining between the venture capitalist and the entrepreneur. In our analysis the venture capitalist simply offers a financing package to the entrepreneur and this package is either accepted or rejected. In addition, we do not focus on any direct contribution by the venture capitalist to the management of the project. Its only contribution is equity finance. The other major abstraction we make is to focus only on a single interaction between the venture capitalist and the entrepreneur rather than considering a series of staged investments

in a dynamic setting. All of these abstractions can be relaxed. Our first objective, however, is to focus as sharply as possible on the two informational asymmetries and on limited liability as we believe these issues are fundamental to venture capital financing.

We consider a one period model with several stages. The entrepreneur wishes to launch a new venture that requires a certain amount of capital I, which we assume to be exogenous. The project has some underlying quality, γ, which cannot be observed by the venture capitalist, but which is known to the entrepreneur.[8] γ is distributed according to probability density function $g(\gamma)$. Our analysis of the interaction between the entrepreneur and the venture capitalist starts after they have come into contact through some unspecified process[9].

In this first contact, the venture capitalist obtains the available information about the entrepreneur and about the project. Based on this information, the venture capitalist forms an opinion about how likely particular levels of success might be. The first "move" in the game is made by the venture capitalist, who offers a contract to the entrepreneur. This offer might be nothing at all, but if the offer is positive it includes a certain amount of equity capital, E^v, and an ownership share, s. For example, the venture capitalist might say: I am willing to provide one million dollars in return for 30% ownership in the firm.

The entrepreneur can accept or reject this offer. If the offer is accepted, the entrepreneur augments the equity capital in the firm by an amount $E^e > 0$, and borrows amount $B > 0$ from external lenders. Since the required investment is I, we have

$$E^v + E^e + B = I \qquad (1).$$

The face value of the debt (the amount that must be paid back) is denoted D. It will exceed B. This face value, D, will be determined in a competitive debt market, insuring that the debt offers the same expected

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[8]More commonly, the hidden information is assumed to be the ability or "type" of the entrepreneur. Both entrepreneur quality and project quality have the same implications.

[9]We acknowledge that different assumptions about the underlying process that matches entrepreneurs and venture capitalists may have a substantial impact on the model. See Amit et. al.. (1994) for an analysis of the matching mechanism.

return to lenders as alternative investments.

After financing is obtained, the entrepreneur provides an effort level (or "action"), a. This action causes disutility (or "cost") c(a) to the entrepreneur. The action a is unobservable to investors, creating a moral hazard problem. Finally, action a and the realization of some random variable z jointly determine the returns from the venture, denoted R. Figure 6 illustrates this sequence of events.

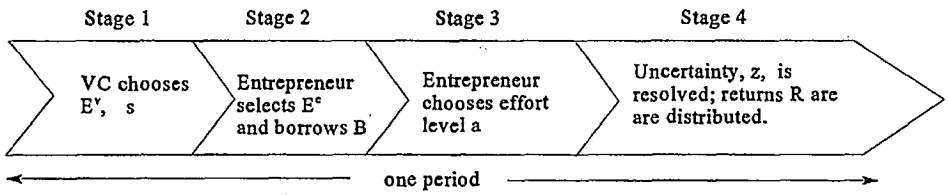

FIGURE 6: Structure of venture capital financing decision

Figure 6 presents the model as a four stage process. However, stage 4 does not require any decisions to be made, and need not have been identified as a separate stage. It simply represents the final resolution of the payoffs, and might be thought of as occurring at the "end" of stage 3. Stages 2 and 3 are separated from each other only for expositional purposes. The model is exactly the same if these two stages are combined and the entrepreneur's equity input and effort are determined simultaneously. Therefore, the model is essentially a two-stage game. We assume that the players are sequentially rational. In particular, in stage 1, the venture capitalist correctly anticipates the effects of its investment E^v and of the sharing rule s on the entrepreneur's decisions in stages 2 and 3, especially on the optimal effort level a. We impose this requirement of sequential rationality by analysing the model with the method of backward induction. Consequently, we consider stage 3 first.

5.2.1 Stage 3: The entrepreneur's effort decision

Here the entrepreneur takes E^v as given from the first stage, and takes B, D, and E^e as given from

the second stage. We assume that the entrepreneur wishes to maximize utility, which is taken to depend on the action (or effort level) a, and on the net income. The entrepreneur's expected net income, denoted y, depends on a, γ (the underlying project quality), the share of proceeds taken by the venture capitalist, s, on the equity participation, E^v and on debt D. The entrepreneur is taken to be risk neutral and therefore wishes to maximize expected income, net of any disutility associated with providing effort. Let the entrepreneur's utility be denoted U. The entrepreneur wishes to

$$\underset{a}{\text{Maximize}}\ U(a,y(a,s,\ldots)) = y(a,s,\ldots) - c(a) \tag{2}$$

where a capital U denotes the entrepreneur's expected utility.

Market uncertainty is represented by random variable $z \in [0, 1]$. Variable z can be thought of as the "state of nature". It is distributed according to probability density function f(z). z is ordered such that $z=0$ represents the worst possible state of nature (i.e. the worst possible realization), whereas $z=1$ describes the best possible outcome. Variable z influences the venture's terminal returns, R, which are also taken to be increasing in project quality and in the entrepreneur's effort. Thus we can write

$$R = R(a,\gamma,z). \tag{3}$$

We can implicitly define a critical state, z^*, in which the new venture is just able to repay its debt.

$$R(a,\gamma,z^*) = D \tag{4}$$

From (4), assuming a certain amount of mathematical regularity, we can use the implicit function theorem to write

$$z^* = z^*(a,\gamma,D) \tag{5}$$

The entrepreneur's income, y, consists of what is left over from returns R after paying off any debts (represented by D), and turning over share sR to the venture capitalist. Provided $z > z^*$, then R exceeds

D. If $z < z^*$, then $y = 0$. The expected value of entrepreneurial income can be written as

$$y = (1\text{-}s) \int_{z^*}^{1} (R(a,\gamma,z) - D)f(z)dz \qquad (6)$$

We can then substitute (5) into (6) into (2) and solve for the optimal effort level, a, as a function of γ and D. As D is predetermined in stage 2, and γ is exogenous, this formally completes the specification of a and z^*

$$a = a(\gamma,s,D) \; ; \; z^* = z^*(a(\gamma,s,D),\gamma,D) \qquad (7)$$

5.2.2 Stage 2: the Determination of Entrepreneurial Financial Structure

At the second stage, sequential rationality implies that the entrepreneur anticipates how his effort will be determined as a function of D (the face value of debt) in stage 3 and uses this knowledge in selecting his equity contribution in stage 2. This equity contribution will influence D, and therefore will influence the final effort decision and the resulting payoffs. The central analytical point in the analysis of the problem is the determination of D. Recall that investment I must be raised through a combination of E^v, E^e, and B (i.e. through equity and debt). However, in order to be willing to loan money to the entrepreneurial firm, outside lenders (assumed to be risk-neutral) must expect to earn the same expected return from this risky loan as they would from a riskless alternative at the risk-free interest rate, denoted i.

In order to simplify this calculation we assume that the entrepreneur's type is revealed at the beginning of stage 2. In practice we might expect lack of knowledge about the project's quality to persist and only gradually be eliminated, but this creates distracting algebraic complications that do not add to the main insight. The key point is that there is hidden information at the time that the venture capitalist decides on what offer to make to the entrepreneur. The loan market constraint is then captured in the following equation.

$$B(1+i) = D(1-F(z^*)) + \int_0^{z^*} R(z, \gamma; a^*) f(z)\, dz \qquad (8)$$

The left-hand side of (8) describes the lender's opportunity cost, which is the return that could be obtained if amount B were invested at riskless rate of return i. The right-hand side (RHS) of (8) shows the lender's expected return from lending money to the entrepreneurial firm. If the face value of the debt is D, then the lender will receive D with probability (1-F(z*)). This is the probability that $z \geq z^*$, which is the probability that the realization of uncertainty is sufficiently favourable that the entrepreneurial firm is solvent and able to pays its debts in full. Thus, the first term on the RHS of (8) is the expected value of being paid off in full. However, even if the lender is not paid off in full (i.e. if $z < z^*$), the lender still gets something. In particular, it receives the returns, R, earned by the firm. The second term on the RHS of (8) is the expected value of these returns over states of nature where entrepreneurial default occurs.

If there were enough collateral, then contracts could be written on this collateral, eliminating concerns about incomplete payment of debt and therefore eliminating the relevance of limited liability. In such a case lenders would receive the full amount D regardless of the state of nature. It would follow that D=B(1+i), and neither venture capitalists nor entrepreneurs would have to worry about the effects of informational asymmetries on debt markets. Thus it is the assumption that collateral is absent that makes condition (8) interesting (i.e. that prevents it from reducing to D = B(1+i).)

From (8) it is clear that D is a function of the amount borrowed, B, and therefore is also a function of underlying equity participation, as

$$B = I - E^v - E^e \qquad (1')$$

where I is exogenous. Substituting this in (1') and (7) into (8) allows us to eliminate a, z*, and B, and, in principle, solve for D as a (rather complicated) function of E^v, E^e, s, and γ (and exogenous variables i and I). We write this expression as

$$D = D(E^v, E^e, s, \gamma; I, i) \tag{8'}$$

Expression (8') is just the debt market constraint, expressed as a function of predetermined variables and exogenous variables. Note that this incorporates the correct anticipation by lenders of stage 3 incentives, as captured in expressions (7).

The entrepreneur's objective in the second stage is to maximize overall utility, subject to (7) and (8) (or (8')). We assume that the entrepreneur's cost of providing equity capital is given by $C(E^e)$. Thus, extending (2), the stage 2 utility of the entrepreneur is

$$U = y\{[a(\gamma, s, D(E^v, E^e, s, \gamma)), s, \ldots] - c(a(\ldots)\} - C(E^e)$$

$$= U(\gamma, s, E^v, E^e) \tag{9}$$

The entrepreneur then maximizes (9) with respect to E^e, taking s and E as predetermined, with γ as exogenous. (Exogenous parameters i and I also affect utility through their effect on a and y, but they are suppressed for notational economy.) Assuming that such a solution exits, it can be written as

$$E^e = E^e(\gamma, s, E^v; I, i) \tag{10}$$

The optimal amount of borrowed funds is then just $I - E^v - E^e(\ldots)$, and the optimal debt load follows from (8') with E^e at its optimal value.

5.2.3 First stage selection of the Venture Capital Contract

All solutions that have been derived (or, more precisely, assumed to exist) so far are dependent

on the exogenous parameters I and i, and on the venture capitalist's first stage choice variables E^v and s. In the first stage, the venture capitalist anticipates subsequent incentives that will arise in subsequent stages and therefore incorporates the solution functions in stages (2) and (3) in the first stage decision problem. This decision problem can be written as follows.

$$\max_{E^v,s} \int_{\gamma_1}^{\gamma_2}\int_{z^*}^{1} s\left[R(z,\gamma;a) - D^*\right] f(z)\,g(\gamma)\,dz\,d\gamma - C^v(E^v) \tag{11}$$

As shown in (11) the venture capitalist seeks to maximize an expected value taken over the relevant states of nature (i.e. over states more favourable than z*) and over the relevant range of γ. Recall that γ reflects project quality. This quality is unknown to the venture capitalist in stage 1. When the venture capitalist makes an offer, only certain entrepreneurs will accept the offer. If an entrepreneur has a project that is very good, he may prefer not to sell off a share of it to the venture capitalist. Conversely if the project is very poor, then it may not be worthwhile for the entrepreneur to go ahead. In either case the entrepreneur will decline the venture capitalist's offer. The highest quality project that elicits an acceptance from the entrepreneur is denoted $\gamma 2$, and the lowest quality project is $\gamma 1$. Only entrepreneurs with projects of quality between $\gamma 1$ and $\gamma 2$ will accept the venture capitalist's offer. Therefore, only this group of entrepreneurs are relevant for determining the expected return to the venture capitalist.

As incorporated in objective function (11), the venture capital firm gets positive benefits from its share of net returns to the entrepreneurial venture, but incurs an opportunity cost of equity, denoted $C^v(E^v)$. Expression (11) is therefore an expected net value of the investment. This expected value is taken over all relevant states of nature and over all relevant project quality levels. Maximizing this expression over E^v and s allows the venture capitalist to select the optimal contract, consisting of an amount of equity investment and a proposed ownership share. Note that the "cutoff" values $\gamma 1$, $\gamma 2$, and z* all depend on the values of s and E^V chosen by the venture capitalist, making the optimization indicated by (11) a

significant computational exercise.

5.3 . Solution and Interpretation of the Model

The model described in the preceding material captures what we see as the central features of venture capital investment. It is, however, a difficult model to solve. The greatest difficulty is created by the fairly complicated self-selection by entrepreneurs that occurs at the first stage. The model can be solved using numerical methods for particular functional forms and parameter values. We do not report on the solution here, but we do summarize the main insights to be gained from the model.

The uncertainty about projects is contained in the perceived distribution of γ. The distribution of γ can be thought of as reflecting the uncertainty, from the investor's point of view, associated with any particular project's quality. If the venture capitalist has better information about γ than other investors, this is reflected in a tighter distribution for γ. A tighter distribution allows better decisions to be made and gives the venture capitalist an advantage in making investments.

Similarly, the "monitoring problem" arises because action a is unobservable. If the venture capitalist can monitor the entrepreneur, we can think of this as changing the utility obtainable by the entrepreneur from a particular level of effort. More specifically, the venture capitalist would like to be able to punish low effort and reward high effort. It the venture capitalist can do this more effectively than other investors, this gives the venture capitalist an advantage.

Moral hazard and adverse selection create a market failure in venture capital financing, which might lead many worthwhile projects to be unfunded or under funded. The more skilled the venture capitalist is in reducing these sources of market failure, the more effectively this sector will function. Venture capitalists exist because they are better at this function than unspecialized investors. However, venture capitalists cannot eliminate adverse selection and moral hazard. Furthermore, these problems are

more acute for younger firms, and most acute for start-ups. This explains why venture capitalists focus on the later stage entrepreneurial firms. Later stage firms have a track record that provides information to the entrepreneur, and they have enough assets to reduce the problem associated with limited collateral under limited liability. By virtue of their expertise, venture capitalists are better at dealing with informational problems than other investors (on average), but this advantage shows up most in later stage entrepreneurial firms rather than at the start-up stage.

This theoretical structure can also explain the pattern of exit. If asymmetric information is important, and remains important even at the exit stage, then outside public investors will typically not be in the best position to evaluate the assets of the entrepreneurial firm. More commonly, it will be "insiders" who will in the best position to buy out the venture capitalist's position. These insiders might be management or officers of the investee, or they might be other firms in a related business. Thus if informational asymmetries are important, it is not surprising that IPOs account for only a modest fraction of exits.

Finally, the fourth empirical regularity we wish to explain is the pattern of returns. At this stage, our theory suggests only that the pattern of returns is a reflection of the underlying exogenous uncertainty associated with entrepreneurial projects. It is unclear whether the selection of financing process by the venture capitalist would magnify or reduce this underlying uncertainty. Magnification would arise if the best projects were the ones that received full financing, while lower quality projects also received less financing. Thus lower quality projects would suffer two handicaps: lower basic quality and suboptimal financing given their quality. This effect would increase the variance of observed returns over and above the underlying variance in quality.

6. Econometric Analysis

So far we have provided a descriptive overview of the venture capital industry in Canada and have

provided a theoretical structure that can be used as a basis for interpreting this information. Ideally, we would like to test the important principles underlying the theory in some formal and rigorous way. Designing and carrying out such tests is a difficult task, but we report here one preliminary step in this direction.

If moral hazard is important, then it is more important the higher the venture capitalist's share of equity. If the venture capitalist has very little ownership in the firm, then the entrepreneur and other private investors bear the full consequences of the entrepreneur's actions, leading to a strong incentive to provide an appropriate effort level. As the venture capitalist's ownership increases, the entrepreneur's incentive to provide effort weakens. At the extreme, if the venture capitalist owned the entire firm, then the entrepreneur would have little incentive to provide effort and a strong incentive to convert the firm's assets to personal consumption. This effect suggests that the performance of an entrepreneurial firm might decline as venture capital ownership rose. On the other hand, it is possible that higher ownership levels by the venture capitalist would allow more effective monitoring, which suggests a positive effect of venture capital ownership on performance. In an effort to measure the relative strength of these effects, it seems reasonable to regress some measure of the entrepreneurial firm's success on the extent of venture capital ownership.

Ideally, we would like to use profits as a measure of success. We do not have a direct measure of profits, but we do have taxes paid, which are a function of profits. Therefore, we can reasonably use taxes paid as proxy for profits. This is far from ideal, but considerably better than nothing, and better than the performance indicators used in much analysis. Most of the firms in the data set paid some taxes, but many paid zero taxes. In effect, taxes paid are truncated from below by zero: a firm does not pay negative taxes, even if profits are negative. This truncation requires the use of a Tobit estimator (or some other appropriate estimator.) The results of Tobit estimation for a regression of the venture capitalist's share of equity on taxes and on taxes per unit of assets are shown in Table 10. Table 10 also reports an ordinary least squares

regression of the venture capital share on revenues per unit of assets. These regressions also contain age of the investee (in log form) as an explanatory variable.

Table 10: Effect of Venture Capital Share on Performance					
Dependent Vbl	Expl. Variable	Coefficient	Std Error	t-Stat	P-value
Taxes Paid	VCshare	-19.95	4.74	-4.21	.000
	log(Age)	706	146	4.85	.000
	Const.	-1608	373	-4.31	.000
Taxes Paid/Assets	VCshare	-1.67	.71	-2.39	.019
(x10000)	log(Age)	106	21	4.86	.000
	Const.	-146	56	-2.61	.009
Revenues/Assets	VCshare	-4.73	1.66	-2.85	.004
(x1000)	log(Age)	250	52	4.78	.000
	Const.	968	129	7.48	.000

As can be seen from this table, the venture capitalist share appears to be negatively associated with performance measures. However, the total amount of variation explained by the venture capital share is low. Thus, while the coefficient on the venture capital share is significant, variations in this share are at most a minor determinant of performance.

We emphasize that the data are far from perfect. Taxes paid are not an ideal measure of performance and, in particular, do not provide much discrimination among the younger firms, most of whom do not pay taxes. Using age as a regressor "corrects" for this, but it means that this group of firms contributes little to the VC share parameter estimate. The asset variable is also relatively "noisy".

At the interpretative level, it is very important to note that these results do not mean that venture capital investment should be viewed as a negative influence, nor do they mean that other sources of finance

are better than venture capital. Venture capital investments could be an important positive influence on every firm in the data set, and could be the best source of financial capital available, and we could still observe a negative correlation between venture capital ownership and performance. What the negative correlation tells us is that the best performing companies tend to be those in which the venture capital ownership share is not too high. This is consistent with the "moral hazard" idea that the entrepreneur will perform most effectively when he or she has a large stake in the company. However, if financial requirements are high and the owner's sources are meagre, then a high venture capital share might well be the best option, even if there is an associated moral hazard problem, as the alternative might be outright failure of the company. It is also possible that venture capitalists might, on average, require a higher ownership share in firms with less attractive prospects precisely so as to compensate the venture capitalist for the anticipated weak performance. In any case, this table is intended only as an example of what can be done with this data set. More complete statistical analysis will be available in supporting documents from the authors.

7. Concluding Remarks

This paper provides previously unreported data about venture capital investments in Canada. In addition, it sets out a series of four empirical regularities or "stylized facts" about the industry that emerge from the data. We also provide a theoretical structure that is consistent with these stylized facts, along with some preliminary econometric analysis. This material provides a basis for further rigorous examination of the Canadian venture capital industry and for addressing the role of public policy toward the industry.

The data set that has been utilized in this study has several important features. It is the most comprehensive and detailed data base about Canadian venture capital investments currently in existence, it is up-to-date, and it provides financial information about the investee firms, along with information about the decisions and practices of venture capital firms. From this data we make a number of interesting

observations. First, the geographical pattern of venture capital activity does not match the geographical pattern of economic. Relative to overall economic activity, venture capital activity is relatively high in Quebec and relatively low in Ontario and in Atlantic Canada. As expected, "high-tech" industries make up a relatively large share of venture capital investments.

Investee firms are somewhat older than expected, as fully 10% of the post-1990 venture capital investments were made in firms founded before 1975, and one third of the investments were made in firms founded before 1984. The data also show that early stage investments are smaller (by about 35% on average) and much less numerous than later stage investments. Thus we conclude that venture capital activity emphasizes expansion and growth stages rather than the startup phase of a company's life cycle.

Investees pay significant levels of tax (on average) and spend about 3% of revenues on R&D, which is about equal to the overall Canadian average. The track record of venture capital investments is particularly interesting. Most investments do not do particularly well, and provide lower returns than alternative risk-free investments, but this is offset by a small number of "hits" that do very well. This general pattern is supported by information on employment growth, as aggregate growth is higher than median growth. Most investee firms grow slowly, but a few grow very rapidly.

The average venture capital equity (or ownership) share in investee firms is about 35%. The majority of Canadian venture capital investments are not syndicated as each round of investment is provided by single venture capitalist in most cases, and about half the sample firms get only one round of venture capital. While venture capital investments can include both debt and equity, we observe that about two thirds of Canadian investments are pure equity.

Exit behaviour is perhaps surprising. A substantial minority of investments (about 18%) are terminated by being written off - the venture capitalist loses the entire investment. Only a comparable share of investments (16%) are terminated in initial public offerings of stock (IPOs) (and these are generally

successful investments). A substantial share of investments (13%) are terminated in third-party acquisitions, and these also tend to be successful investments. The largest category of exit (37%) is through management or company buyouts, as company insiders buy out the venture capitalist. Indeed, if we eliminate uncategorized exits (most of which are probably management buyouts) and writeoffs, company buyouts account for 50% of remaining exits.

From this information, we distilled four empirical regularities that any successful theory of venture capital must accommodate. First, a theory must provide a reason for the existence of a specialized venture capital industry. Second, it must explain the emphasis on development rather than startup. Third, it must explain the pattern of exit, where "insider" buyouts dominate, and finally it must be consistent with the skewed pattern of returns.

The theoretical framework we offer focuses on informational issues. Specifically, we view asymmetric information and limited liability (with low collateral) as the central features of venture capital investment. Both major forms of asymmetric information, "hidden information" (leading to adverse selection) and "hidden action" (leading to moral hazard) are included in our analysis. The model we present is complicated even though we abstract from several important features of the venture capital industry. In particular, our model does not deal with the risk-sharing motive for venture capital investment, nor does it deal with the dynamics or staged structure of venture capital investment. It also does not address the role of bargaining between the venture capitalist and the entrepreneur, or the role of gradual learning about project quality. While all of these things are important aspects of venture capital and deserve scrutiny, we felt that the informational issues are the most central issues to focus on at this stage. We believe that this information-based approach is consistent with the major stylized facts characterizing the industry. For example, if inside information is important, it is not surprising that most exit is through company buyouts or acquisition by informed outsiders.

We did not emphasize the implication of our model that informational asymmetries lead to market failure, causing possible underfinancing. If adverse selection and moral hazard are important, it will be difficult for investors to earn a reasonable return in this industry, even if there are many potentially worthwhile projects. Venture capitalists exist precisely because they can reduce information-based market failures through careful selection, monitoring, and other means. The more skilled the venture capitalist is in reducing these sources of market failure, the more efficiently the venture capital sector will function.

Appendix: Literature Review

The modelling framework in this paper incorporates aspects of the theory of asymmetric information and the theory of finance and applies them to a financial contracting setting in which an entrepreneur may obtain funding from a venture capitalist. In particular, we suggest that moral hazard and adverse selection under conditions of limited liability create a link between the ownership structure of an entrepreneurial venture and its ultimate performance . By integrating these effects, we seek to capture the essence of the relationship between business founders and outside equity holders. This appendix provides a review of the relevant related literature.

Akerlof (1970) is normally regarded as the pioneering analysis of informational asymmetry. Akerlof described a situation in which sellers of used cars have "hidden" or private information about the specific quality of their vehicles, whereas buyers cannot discern quality differences prior to purchase. In this setting, there is reason to expect low quality cars (or "lemons") to dominate the market. This dominance of the market by low quality items is referred to as "adverse selection" as the market selects low quality items. Akerlof showed that adverse selection is inefficient in the sense that potentially efficient (i.e. Pareto-improving) trades will not take place. Thus hidden information causes market failure.

It was quickly recognized that adverse selection problems can arise in many circumstances, especially in insurance markets, where buyers of insurance know their true risk better than insurance companies (as in Pauly (1974)), and in labour markets, where workers know their ability better than potential employers (as in Spence (1973)). Spence also pointed out that one natural market response to adverse selection is "signalling", where the informed party (usually the seller of the high quality item) provides some "signal" of high quality to substitute for the inability of buyers to observe quality directly. Thus, for example, product warranties may be "signals" or indicators of high quality. Rothschild and Stiglitz (1976) emphasized the role of screening, under which the uninformed party offers a contract or set

of contracts that cause informed parties to self-select. Thus, for example, insurance companies may offer contracts that low-risk types will buy but high-risk types will not. In general, the efficient response of the buyer may be to offer such "screening" or "separating" contracts, but sometimes the efficient response is to offer contracts that do not induce screening, resulting in "pooling" of different quality classes.

The other major informational asymmetry is referred to as "hidden action" (as opposed to "hidden information"). Hidden action occurs when one party to a transaction takes an action that is not observed by the other party, and this action affects the returns to both parties. This problem was first discussed in insurance markets, where insured parties can take actions that either decrease or increase the risk of hazard. For example, after purchasing auto insurance, the insured party can either drive safely or dangerously. This problem was originally referred to as "moral hazard". Early influential work on moral hazard includes Pauly (1974) and Arrow (1973), who showed that moral hazard causes market failure in the sense that it causes failures of Pareto-efficiency.

Moral hazard problems are particularly important in many situations where one party acts as an "agent" for another party, as when a client hires a lawyer, or the seller of a house hires a sales agent. In these situations the "principal" cannot perfectly observe the effort (or other actions) of the agent. It was soon recognized that many situations of financial contracting are agency problems, and Jensen and Meckling (1976) argued that agency analysis was the key to understanding the modern firm. Thus, for example, the managers of the firm can be viewed as the "agents" of the owners, who might in turn be viewed as the "agents" of other investors in the firm. Classic papers on the agency problem include Holmstrom (1979) and Grossman and Hart (1983).

Agency theory also had an important influence in the debate over whether a firm's capital structure affects its value. In their influential article on the role of financing, Modigliani and Miller (1958) showed that in the absence of any market frictions, the value of a firm's cash-flow stream is independent of its

capital structure. In other words, whether a firm is financed with debt or equity or some combination should not affect its performance. If we then take account of the tax advantage of debt (as interest payments are deductible from corporate income) it follows that firms should be completely debt-financed (Modigliani and Miller, 1963). Given the indisputable fact that equity is an important financing tool, this cannot be the whole story. Most managers will say that the problem with relying excessively on debt is that the risk of bankruptcy becomes too high. Kraus and Litzenberger (1973) and Brennan and Schwartz (1978) solve for optimal capital structures based on the tradeoff between tax savings and bankruptcy costs. It turns out that agency problems are central to the existence of bankruptcy costs. In addition, agency problems create a role for equity (and debt) even in the absence of bankruptcy costs.

Our analysis focuses in part on the capital structure of venture-backed firms. We observe that both equity and debt are important in venture capital finance. The fact that firms have limited liability adds an important feature of financial contracting, as considered, for example, by Brander and Lewis (1986). Under limited liability, equity holders of firms will have an incentive to undertake riskier projects as debt increases in order to reap the fruits of the very good outcomes and have creditors bear the costs of the very bad outcomes. Thus, limited liability creates a link between the financial structure of a firm and its output market decisions (and hence its performance), enhancing the agency problems already present between owner-managers and providers of capital. This idea is one of the conceptual building blocks of our model.

The importance of limited liability has been investigated by Sappington (1983) who characterizes an optimal contract between principal and agent in a setting where the agent receives a private signal after contracting but before taking his action[10]. The optimal solution in this special case implies that in the very

[10]Another general treatment of moral hazard that deals with limited liability is provided by Innes (1990). Here the agent is an entrepreneur who owns a production technology but no capital. The implementation of the production technology requires an investment q and the agent's effort a. Innes shows that among monotonic contracts, debt contracts are optimal in that they will induce a higher action than any arbitrary contract, which makes both principal and agent better off. If the condition of monotonicity is relaxed, "live-or-die" contracts (according to which the principal gets all the profits below a cutoff value, and zero above) prove to be optimal.

bad states of nature the agent does not exert any effort. In our model, however, uncertainty about the firm's profits is not resolved to either party until after the action choice of the entrepreneur, which we believe to be the empirically relevant case. In a related paper Brander and Spencer (1989) show that moral hazard under conditions of limited liability indeed invalidates Modigliani and Miller's (1958) irrelevance result by creating a linkage between capital structure and output strategy (and firm value). The authors formally establish consequences of changes in debt and/or investment on effort level and output decisions. However, Brander and Spencer do not distinguish between inside and outside equity holders, and they abstract from the problem of adverse selection. Nevertheless, their two-stage model and the related solution method of backward induction are adopted in our modelling framework.[11].

Chan and Thakor (1987) examine the role of collateral under moral hazard and private information and conclude that collateral often efficiently resolves problems stemming from asymmetry of information. In other words, in such an informational setting (which is similar to the one that we explore in our model) insufficient collateral will lead to welfare losses. Despite the limitations of some of Chan and Thakor's assumptions for the characterization of the relationship between entrepreneur and venture capitalist[12], we can learn several things from their analysis. First, collateral (or lack thereof) plays an important role under asymmetric information and must therefore be considered. Second, results on market failures may depend heavily on assumptions about the notions of competition (between venture capitalists): the conceptualization of the equilibrium influences its characterization. Any results must therefore be interpreted very carefully.

The role of asymmetry of information in financial contracting in venture capital is widely

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Important distinctions from our model are the absence of adverse selection and of any risk-sharing issues (Innes assumes risk-neutrality for both parties).

[11] For further developments in the theory of capital structure that focus on the link between financial decisions and product markets see Maksimovic (1986).

[12]For example, they assume risk-neutrality of both principal and agent and therefore ignore risk-sharing aspects. In addition, banks do not provide equity capital and do not get actively involved in their investee's management.

recognized. Sahlman (1990), for example, postulates that contracting practices in the venture capital industry reflect uncertainty about payoffs and information asymmetries between venture capitalists and entrepreneurs. This distinction between market uncertainty on the one hand, and uncertainty resulting from an unequal distribution of information on the other, is also crucial for our analysis. In addition, Sahlman differentiates between problems related to private information about the skill level (adverse selection) and those related to the unobservable effort of the entrepreneur (moral hazard). He correctly argues that the lack of operational history aggravates the adverse selection dilemma, but does not mention the importance of collateral in that respect.

Amit et al (1993) suggest that venture capitalists be regarded as financial intermediaries. The authors thoroughly characterize the relevant informational problems and identify a series of research questions, some of which are addressed in our model. In another review paper on new directions in venture capital research, Barry (1994) emphasizes the relevance of private information of the entrepreneur with respect to the entrepreneur's abilities prior to contracting. Mitchel (1995) explicitly uses a principal-agent perspective to examine the (post-contracting) patterns of demand for accounting information by the venture capitalist. He finds a greater intensity of scrutiny of investee performance by venture capitalists than by investors in established firms and concludes that the former demand more detailed information more frequently to combat the moral hazard problem. Bates (1990) empirically explores the linkage between financial structure (especially the effects of debt) and firm performance[13], and hypothesizes that information asymmetry may be a potentially severe cause of market failure. Furthermore, the problem of overly optimistic and confident entrepreneurs which may create a bias, as pointed out by Kamien (1993).

In our model we attempt to highlight the implications of the moral hazard and adverse selection

[13]Bates finds that the amount of investment is "causally related to firm survival" (p.558) - which is quite intuitive - and that "reliance upon debt capital is clearly not associated with business weakness or heightened market failure" (op.cit.), which is a somewhat unexpected result, especially in the light of our model.

problems, in the presence of limited liability, on financing entrepreneurial ventures. Thus, we made a series of simplifying assumptions (e.g., risk neutrality for both the entrepreneur and the venture capitalist) that allow us to focus the discussion. We do not consider any contracting practices that may mitigate adverse selection and/or moral hazard. However, as a number of authors have pointed out, there is empirical and anecdotal evidence of a variety such practices which complicate the analysis of asymmetry of information.

Sahlman (1990), notes that staged investment which creates an option to abandon the venture is an important means for venture capitalists to minimize the present value of agency costs[14]. The active involvement of venture capitalists in the operation of their investee companies may mitigate the moral hazard problem as well[15].

Other suggested solutions engineered by the venture capital industry to overcome problems arising from the asymmetry of information include the use of convertible preferred stock (Barry, 1994) or syndication (Lerner, 1994). Lerner argues that syndicating first-round investments leads to better decisions about whether to invest. From the analysis of a sample of investment rounds in biotechnological firms he finds that syndication in early stages often involves experienced and highly reputed venture capitalists, which seems to corroborate his hypothesis.

Chan (1983) highlights the positive role of venture capitalists in mitigating the adverse selection problem in the market for entrepreneurial capital. He shows that an adverse selection result derives from the absence of any informed venture capitalists in the sense that only inferior projects are offered to investors. However, the introduction of informed investors may overcome this problem, leading to a

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[14]Admati and Pfleiderer (1994) and Hellman (1994) provide models of staged finance in the venture capital context. They are discussed below.

[15]This influence of the venture capitalist on probability distributions of a firm's success is explicitly modelled, for example, by Amit et al. (1994).

Pareto-preferred solution. The key question raised by this analysis is the empirical issue of whether venture capitalists are as well informed about the project's prospects as the entrepreneur.

Chan et al. (1990) provides a proposed explanation for various 'rules of thumb' contracting practices in venture capital, including absence of de novo financing, buyout options, performance requirements, and earnout arrangements. The central idea is that venture capitalists learn about the entrepreneur's ability as time proceeds, and then decide, in effect, whether to fire or retain the entrepreneur to manage the project. In a related paper, Hirao (1993) assumes that the agent's (i.e. the entrepreneur's) unobservable actions affect the learning process. As a result of the interaction of learning and moral hazard, she finds that a long-term contract is not equivalent to a series of short-term contracts.

Amit et al. (1990) present a principal agent model in which investors are uncertain about the entrepreneur's type when submitting bids for the company, but where this information asymmetry is resolved prior to actual contracting. The authors manage to relate the venture capital financing decision to the entrepreneur's skill level and predict which entrepreneurs will decide to enter into an agreement with venture capitalists. Amit et al. consider moral hazard problems, but have a limited treatment of moral hazard in which the entrepreneur's type becomes common knowledge between bidding and contracting. Also, entrepreneurs are assumed to be fully collateralized, which is an abstraction that eliminates the role of limited liability. Our current model can be viewed as an extension of this structure.

Amit et al. (1994) consider the role of different mechanisms for matching entrepreneurs and venture capitalists in mitigating adverse selection problems. They extend Rothschild and Stiglitz (1976) by incorporating some assumptions based on empirical regularities in the venture capital finance industry. Specifically entrepreneurs have private information about their types; venture capitalists can get involved in the management of investees (at some cost) and thus contribute to the venture's success directly; entrepreneurs may 'shop around' or venture capitalists may actively seek out attractive investment

opportunities. With a three stage game the authors examine possible pooling and separating equilibria. Our model ignores the relevance of the matching regime for deriving such equilibria, but we regard this as an important potential extension of our model.

In a recent attempt to characterize the contract that allows optimal continuation decisions with staged finance, Admati and Pfleiderer (1994) find that venture capitalists should prefer a fixed-fraction contract. This contract stipulates that the venture capitalist owns a certain fraction of the final payoffs, and also finances that same fraction of any future investment (if continuation of the project is desirable). This result explains why later stages are not fully financed by the lead venture capitalist. It also attributes a positive role to the venture capitalist as a financial intermediary between the entrepreneur and outside investors. These analysis hinges, however, on some very restrictive assumptions.

Following Adamati and Pfleiderer, Hellman (1994) builds a multistage model involving staged investment. While it could be interesting to examine the extent to which the staging of capital input helps in mitigating the adverse selection problem Hellman's focus is on explaining certain institutional features that he claims distinguish venture capital from more traditional methods of finance. For example, he explains that only a concentrated stake of the venture capitalist in investee companies will provide a sufficiently high incentive for active monitoring, which is necessary to avoid the problem of 'short-termism' generated by staged finance.

The work that has been reviewed so far is "model-based" theory. In addition, there is a substantial descriptive literature on the venture capital industry. Two valuable papers of this type are Tyebjee and Bruno (1984) and Fried and Hisrich (1994) which depict some activities undertaken by venture capitalists that may serve to diminish problems arising from asymmetry of information. For example, Tyebjee and Bruno suggest that venture capital financing involves the following sequential steps: (1) deal origination; (2) deal screening; (3) deal evaluation; (4) deal structuring; (5) post investment activities. Whereas steps

(3) - (5) have to do with the venture capitalist's actual choice problem and are explicitly dealt with in our model, (1) and (2) are more concerned with the construction of the choice set. While our model may be said to captures some basic (informational) difficulties that arise in these early screening stages, we do not consider such mechanisms as referral processes or active screening by venture capitalists (or signalling by entrepreneurs, respectively). That is, we do not model the matching process, although this issue was addressed analytically by Amit et. al. (1994).

Some other useful overviews of the venture capital industry include MacMillan et al. (1985, 1987) and Low and MacMillan (1988). It is widely asserted that formal theory-driven research with clearly stated assumptions, different theoretical perspectives, and formal decision models is relatively scarce in the literature on new venture financing. (See, for example, Low and MacMillan (1988), Amit et al. 1993, Barry (1994), and Hellman (1994).)

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VENTURE CAPITAL EXITS IN CANADA AND THE U.S.

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VENTURE CAPITAL EXITS IN CANADA AND THE U.S.

EXECUTIVE SUMMARY

Jeffrey G. MacIntosh .

Venture capitalists typically invest for a period of from 3-7 years. They exit by a variety of techniques, including sale of the firm to a third party, an initial public offering, a company buyback, or a write-off. This paper documents how Canadian venture capitalists have exited their investments, and the comparative profitability of various exit techniques. It also compares Canadian venture capitalist exits with those used by American venture capitalists. The paper documents other differences in the venture capital industries in the two countries.

The study draws on two earlier studies on venture capital exits, by Venture Economics Canada (now Macdonald & Associates), and Venture Economics. To update these survey results, questionnaires were sent to venture capitalists in Canada and in the United States, by Macdonald & Associates in Canada and by Venture Economics in the U.S. At the time of writing, only the results of the Canadian survey were in hand. Results of the U.S. survey will be incorporated prior to publishing.

In the earlier surveys, U.S. venture capitalists made slightly larger investments than Canadian venture capitalists. These investments were much more concentrated in the high technology sectors -- and especially on computer hardware and software -- than were Canadian investments. U.S. venture capitalists also invested comparatively more of their capital in early and expansion stage investments.

The three exit methods most commonly used by U.S. venture capitalists were IPOs, acquisitions, and write-offs. By comparison, the three most commonly used exit methods in Canada were write-offs, buybacks, and IPOs. In Canada, fewer investments were exited by acquisitions than in the U.S.

Anecdotal evidence suggests that the higher use of IPOs in the U.S. is at least in part because of greater institutional willingness to purchase IPOs, although regulatory factors may also have played a role. Canadian venture capitalists exit their American investments through IPOs at about the same rate as U.S. venture capitalists. This evidence is consistent with segmentation of Canadian and U.S. markets for small firms.

There are a number of plausible explanations for the higher write-off rate for Canadian than American investments. One explanation is greater skill on the part of U.S. venture capitalists. However, both countries experienced a large inflow of funds into the venture capital industry in the early 1980s. Because the Canadian survey terminates in 1985, some of the ultimately successful investments made in the early 1980s would not yet have come to fruition. The U.S. survey terminates in 1988, and may capture a larger share of the successful exits. The higher write-off rate may simply be an artifact of this timing difference.

In both countries, IPOs were the most profitable means of exiting investments. However, IPOs were used much more frequently in the U.S., especially for early stage investments.

Both the Canadian and U.S. data add support to the view that venture capital investing is driven by 'home runs', or a few spectacularly successful investments. A puzzle arises, however, in that venture capital returns (at least in the U.S., if not in Canada) do not seem to be normally distributed. There appear to be two sub-populations of investments; non-home runs (which appear to be normally distributed) and home runs (whose distribution cannot be determined from the studies examined here). Accounting for this bi-modal distribution is difficult.

Two further puzzles arise in the Canadian data in that riskier early and expansion stage investments did not command the expected risk premium, nor did smaller investments. The reasons for this are unknown.

Turning to the results of the later Canadian survey, proportionately more IPOs took place in Ontario than in the earlier period. The increase appears to have come at the expense of IPOs in Quebec.

Moreover, in the later period, investments were exited more often via IPOs and company buybacks. The higher usage of IPO exits may reflect a maturing and more experienced and skilful venture capital industry. However, such a conclusion must be tentative, given that the use of IPO exits is highly cyclical, and the later survey spans a period during which the IPO market was extremely active (particularly 1993 and the first part of 1994). It must also be regarded as tentative given that Canadian venture capitalists appear to have earned lower average returns in the 1992-1995 period than 1975-1985. However, the write-off rate was also considerably lower in the later period, supporting the view that venture capitalists have become more skilled.

In addition, venture capital managers appear to have focused their efforts more on the high technology industries in the later period. This increasing focus may reflect a higher degree of task specialization and higher levels of skill.

Canadian venture capitalists appear to have invested more in the later period in early and expansion stage financing, and less in acquisition and turnaround financing. The U.S. experience appears to run in the contrary direction.

The profitability of venture capital investing was lower in the 1992-95 period than in 1975-85. The most notable drop occurred in relation to IPOs, although company buybacks also experienced a large drop (despite being the most popular method of exit in the later period). IPOs also slipped to the second most profitable means of exiting investments, after secondary sales.

Early stage investments were exited far more often by IPOs in the later period. Both early and expansion stage investments had lower write-off rates in the later period. These comparisons suggest that Canadian venture capitalists have become more skilled over time (although again profits were lower in the later period).

IPOs were a much more frequent form of exit in the later period than the earlier. The increase is attributable to the increasing use of IPOs to exit high technology investments.

In the earlier period, large investments were the most profitable. The later period exhibits both change and discontinuity in profitability by size of investment. The smallest investments (under $200,000) were the most profitable, but the least profitable were those investments between $200,000 and $499,000.

There are a number of plausible explanations for differences in the Canadian and U.S. venture capital industries. These include market, regulatory, and tax factors. With regard to the former, it seems likely that U.S. venture capitalists and underwriters can exploit economies of scale better than Canadian venture capitalists. There are also greater economies of scale in U.S. product markets, facilitating the marketing and growth of high tech companies. U.S. institutional investors appear to be more receptive to IPOs than their Canadian counterparts. Because of defence and space-related spending in the U.S. that has not been matched in Canada, and other reasons (such as Canada's historical reliance on the resource-based sectors, and 'branch plant economy'), it seems likely that the supply of innovations has been, and is still higher in the U.S.

Regulatory factors have also likely played some role. These are partly explored in previous work. Finally, it appears very likely that tax factors have played a major role. Currently, the tax credits available to purchasers of Labour Sponsored Venture Capital Corporations have transformed the industry in Canada and have caused a massive inflow of funds. There are some troubling questions, however, about the governance of such funds, and their efficacy as a tool of public policy.

Differences in exit techniques used by venture capitalists in Canada and the U.S. are thus likely to be the product of the interplay of a number of factors. Few of these have been investigated to any significant degree. Thus, the results of the study highlight the need for further comparative study of the market, regulatory and tax environments in which venture capitalists in Canada and other countries do business.

I. INTRODUCTION

1. The Importance of Venture Capital

There have long been wealthy individuals willing to place money in promising young ventures. Alexander Graham Bell, for example, was financed by a wealthy Boston lawyer and a Salem leather merchant.[1] However, organized venture capital markets, in which institutional investors and wealthy individuals place money with professional venture capital managers for investing in promising small businesses, did not develop in the United States until the 1940s.[2] In both Canada and the U.S., significant funds were not placed with venture capital managers until the early 1980s.[3] Indeed, in Canada, the total funds under management grew from $350 million in 1980 to $3.3 billion in 1990, an increase (in nominal dollars) of nearly an order of magnitude.[4] Compared to the dollar value of activity in public securities markets through such transactions as mergers and acquisitions, MBOs and LBOs, and asset transactions, however, venture capital is still very much a niche market.[5]

This is not to say, however, that it is an economically unimportant activity. The newspapers, government reports, and academic papers have recently been full of accounts of how small and medium-sized businesses have been the prime generators of jobs over the past 30 years, and likely will continue to be in the future.[6] Moreover, venture capital firms invest heavily in high technology firms. Such firms tend to create high paying jobs for skilled workers (often scientists, engineers, technicians, etc.). They also tend to do a disproportionate amount of research and development work.[7]

The creation of high skill, high paying jobs in the knowledge sector is a vital part of Canada's economic future. As low skill, low wage jobs migrate to jurisdictions with a comparative advantage in unskilled labour, Canada must increasingly look to its high skill, value-added sectors for future economic growth.[8] The importance of the venture capital industry in facilitating this growth cannot be understated. Surveying the U.S. venture capital industry, Bygrave and Timmons comment that:[9]

> By mobilizing and later recycling scarce risk capital and entrepreneurial talent, venture capital firms have transformed our economy.
>
> This profound economic impact has been documented in numerous studies, among them, a recent survey by Venture Economics, Inc., and Coopers and Lybrand of 1,650

venture-capital-backed companies. The 235 companies that responded had been in existence an average of only 1.9 years but, for the years 1985 through 1989, had created 36,000 new jobs, $786 million in export sales, $726 million in research-and-development expenditures, and $170 million in corporate tax payments. The average firm employed 153 people, had $3.3 million in export sales, invested $3.1 million in R&D, and paid $723,000 in taxes. By any standard, these firms represent exciting and productive additions to the economy, with net growth far outstripping that of the majority of small businesses and giant corporations. In contrast to the Fortune 500 companies, which, on average, consumed $59,510 of equity capital per new job, these venture-backed companies required just $42,914 per job. What is more, their labor force consisted of more highly skilled professionals (53%) than does the labor force in general (13%), and they employed far fewer administrators (10%) than did the Fortune 500 (25%). These venture-capital-backed companies also generated nearly four times more export sales per dollar of equity than the Fortune 500 companies did.

2. What do Venture Capitalists do?

The above account assumes that venture capitalists add value to the enterprises they fund. Interestingly, this is not uncontroversial. In particular, Amit, Glosten, and Muller[10] have argued that the venture capital industry is subject to adverse selection. Entrepreneurs with truly promising ideas will generally not choose to bring a venture capitalist on board, given the high return (and degree of control) demanded by the venture capitalist. Rather, such entrepreneurs will fund their enterprises by other means. Only the least promising entrepreneurs will seek venture capital funding -- and venture capitalists, who are unable to distinguish between these and better quality ventures, will fund such ventures. Amit et al. argue that the poor profitability of venture capital investing in the late 1980s is evidence of this market breakdown.

At the present time, however, this account has not been generally accepted. Barry, for example, points out that U.S. venture capitalists earned extremely good returns in the 1970s and early 1980s.[11] Moreover, the evidence suggests that U.S. venture fund returns are, on average, at least commensurate with fund risk.[12]

Venture capitalists carefully screen prospective investments (often with the benefit of expert advice) and invest in but a small fraction of investment opportunities presented to them.[13] Syndication of investments among venture capitalists increases the efficacy of the screening process, since more than one venture capitalist will conduct "due diligence" on the prospective investee firm.[14]

Once a portfolio investment has been selected, Sahlman indicates four ways in which

venture capitalists protect themselves against opportunism on the part of the entrepreneur: (1) staging their investment commitments, so that they can back out at each stage; (2) structuring compensation schemes to properly motivate managers of portfolio firms; (3) becoming actively involved in management; and (4) taking steps to keep their investments liquid.[15]

Moreover, while venture capitalists have traditionally relied on 'home runs' to generate profits, there appear to have been an abundance of these in the past few decades. Some of the greatest corporate success stories of the 1970s, 1980s, and 1990s have been firms initially funded by venture capitalists, such as Mitel, Memotec, Newbridge, Corel, Apple Computer, Digital Equipment Corporation (the first 'home run'), Federal Express, Lotus Development Corporation, Genetics Institute, Sun Microsystems, Compaq Computer, etc.[16]

In understanding venture capital, it is particularly important to understand that venture capitalists fund high risk enterprises that are unable to secure financing through any other means. While the banks and other lending institutions are often excoriated in the press and by politicians for failing to lend to high risk small businesses, these institutions are simply not in the business of high risk lending.[17] Moreover, there are ample reasons why they should not be in the business of high risk lending.[18] The banks have made much of the fact that they are now willing to lend to high technology growth businesses. However, while this may involve higher risk than traditional lending against collateral, it is nonetheless not high risk lending. In order to secure such financing, a high technology business must have a proven product, a track record of sales, and sufficient accounts receivable to cover payments of principal and interest. This necessarily means that the banks will not provide capital in the early or expansion stages of a firm's development.[19] While a very few banks (like the Silicon Valley Bank in California and National Westminster Bank in England) have successfully partnered with venture capitalists for the purpose of engaging in somewhat earlier stage lending, this model has not yet been widely copied.

By contrast, venture capitalists have traditionally focused on providing funding in the early and expansion stages. Once the entrepreneur's own financial resources run out, and no further friends, relatives, business associates or Angel investors can be found, they are very often the only sources of funding.[20]

Venture capitalists are highly specialized providers of financing who (unlike bank

managers) are able to offer services in addition to pure financing. These include: (1) expert screening of investment opportunities; (2) structuring the deal (including manager remuneration, investment staging, etc.) to generate appropriate entrepreneurial incentives; (3) engaging in monitoring and providing useful advice; (4) securing additional sources of capital; (5) choosing the timing and means of exiting the investment.

3. The Importance of Exit

This paper deals with venture capital exits -- the means by which venture capitalists dispose of their investments. How important is exit? This question is perhaps best answered by pointing out that for a venture capitalist, there are two prices that dominate the investment decision: the entry (purchase) price, and the exit price. Both the venture capitalist's initial decision to make an investment, the cost of the investment, and the structuring of the investment will depend on the prospective profitability of available exit mechanisms. Entry and exit are thus inextricably linked. Effective exit mechanisms will tend to lower the early stage cost of capital, while ineffective exit mechanisms will have the contrary effect. For this reason, knowing how venture capitalists exit their investments is vital to understanding the venture capital investment process in Canada.

There is in fact empirical evidence that the prospective availability of various exits is a factor that is considered by venture capitalists at the stage of deciding whether to invest (and on what terms). For example, MacMillan et al. [21]sent questionnaires to U.S. venture capitalists to determine the criteria they used to select investments. Preliminary questioning resulted in the identification of 24 major criteria used by venture capitalists. MacMillan et al. asked the survey respondents to rank the importance of these factors on a scale from 1 to 4 (where 1 means the criteria is irrelevant, and 4 means that it is essential).

One of the criteria was "I require an investment that can be easily made liquid (e.g. taken public or acquired)". This criterion received an average score of 3.17, with a standard deviation of 0.89, and ranked 8th of the 24 factors.

Moreover, of the 5 financial criteria on the questionnaire, liquidity scored the second highest (after "I require a return equal to at least 10 times my investment within 5-10 years"), and the return and liquidity requirements were easily the two most important factors.[22] Of the 10 requirements most frequently ranked "essential", liquidity ranked sixth.[23] Forty-four percent

of venture capitalists surveyed indicated that they would refuse to invest absent liquidity, regardless of the potential of the project or the market.[24]

A further factor analysis isolated 6 factors which seemed to be particularly important in the venture capitalist's decision-making process. One of these was "bail out risk", which included both the timing and availability of exit mechanisms.[25]

MacMillan also divided the universe of venture capitalists into three groups: "purposeful risk managers", "determined eclectics", and "parachutists". For the latter, the availability of a reliable exit mechanism was controlling. Absent liquidity, such investors would decline to invest in a particular project.[26]

Others have confirmed these findings. Carter and Van Auken also surveyed venture capitalists, asking them to rate the importance of different factors in their decision-making process.[27] Unlike Macmillan et al., however, Carter and Van Auken attempted to determine whether investors with a preference for investing at the early or later stages of a firm's development had different evaluative criteria.

The results are striking. On a scale of 5, the mean rating given to "exit potential" by early stage investors was 2.46 (with a standard deviation of 1.17), which was the single most important factor (out of 21) in the investment decision. While the mean rating given to exit potential by later stage investors was only 1.94 (with a standard deviation of 0.83), this was still the fourth most important factor. It is perhaps understandable that exit would be seen as a less important factor for later stage investors, because the likelihood of finding a suitable investment is probably higher from the outset.

In addition, Carter and Van Auken found evidence that early stage investors were more interested in exiting via an initial public offering than were later stage investors. They concluded that this was consistent with the heightened risk of early stage investing, and the consequent requirement by early stage investors for high returns.[28]

4. The Importance of Initial Public Offerings as an Exit Mechanism

Of all the possible exit mechanisms, the initial public offering (IPO) occupies a place of central importance in venture capital investing. As the data below and other studies make clear, successful venture capital investing has historically been driven by one or more 'home runs' (spectacularly successful investments) in the investment portfolio.[29] A vastly greater share of

home runs are exited via IPOs than by any other method. So important is the IPO exit route that, after reviewing the history of the U.S. market, Bygrave and Timmons comment that:[30]

> A healthy IPO market gives the venture capital industry its vitality. Without IPOs the venture-capital investment process would not be viable.

Bygrave and Timmons note that IPOs can result in huge returns on the initial investment. Apple Computer, for example, yielded a return of 235 times the initial investment, Lotus 63 times, and Compaq 38 times.[31]

This does not mean that the IPO exit route is suitable for every investment, however. For one thing, there is very likely a strong selection bias operating. The most successful firms are sold into the public market, and less successful investments are disposed of by other means. Moreover, as discussed at greater length below, the public market may be more receptive to IPOs of particular types of firms than of others.

Nonetheless, this should not obscure the fact that the public markets can furnish huge investment gains for venture capital investors -- and gains that may not be realizable through other exit methods. This emphasizes the vital importance of ensuring that regulatory hurdles to accessing the public markets are cost-effective and not unduly onerous.

Indeed, it also emphasizes the vital importance of healthy secondary trading markets (i.e. the stock exchanges and over-the-counter markets). There is an inextricable link between primary and secondary markets. Securities can typically be sold into the public markets only if investors can anticipate some degree of liquidity following the offering.[32] Secondary markets also provide valuable information about how offerings should be priced. Thus, it is just as important to ensure that regulatory requirements in secondary markets are cost-effective as it is in the primary markets.

5. Empirical Regularities in the IPO Market; Venturing into the Dark Side

Studies in the U.S., Canada, and other countries have detected a number of empirical regularities in IPO markets.[33] For example, IPOs are typically underpriced in the short run.[34] IPOs are typically oversubscribed.[35] IPO markets are highly cyclical, with periods of intense activity followed by periods of inactivity.[36]

Of particular interest, however, is recent evidence suggesting that in the longer term, IPOs are overpriced.[37] A study by Loughran and Ritter, for example, finds that between 1968

and 1987 IPOs consistently underperformed the market, providing an average annual return of only 2% for investors in the five years following issuance.[38] They suggest that firms going public are able to time their market offerings near market peaks to maximize offering proceeds. Another study by Levis of U.K. IPOs suggests that IPOs exhibiting the best first-day performance may be the worst underperformers in the three years after going to market.[39] Levis suggests that the initial underpricing may be due to market overreaction at the time of issue. A study by Vijay Jog offers evidence of long term overpricing in the Canadian market as well.[40]

Interestingly, venture capitalists appear to play a role in this overpricing. A study by Lerner, for example, found that for a sample of biotechnology IPOs, the number of public offerings (but not private financings) peaked when equity values were at their maximum.[41] More experienced venture capitalists were better able to time market cycles than were less experienced venture capitalists. The venture capitalist thus appeared to play a key role in timing an IPO so that it occurred at the peak of the market.

The cyclicality of the IPO market may be related to long term overpricing. If there are periodic overvaluations of new issues (or particular types of new issues) in the public markets, then the Lerner study suggests that knowledgeable venture capitalists (and underwriters) are perhaps able to anticipate or detect such overvaluations, and rush their portfolio firms to market when market values are unduly high. Indeed, it is difficult to formulate other sensible explanations of the cyclicality of the IPO market. In an efficient market, whether the market is up or down will reflect fundamental factors. Firms brought to market should, on average, be fairly priced regardless of market condition.

This is the "dark side" of the IPO market in the sense that systematic overvaluation of new issues, whether cyclical or not, leads to allocative inefficiency. Systematic overvaluation means that too many investment dollars are being placed in undeserving investments, on the basis of risk adjusted return. Such dollars would be better invested in other activities.

Thus, while the IPO market is vital to the health of the venture capital industry, and hot issues markets are particularly good for venture capitalists, IPO markets may also lead to some allocative inefficiency. While this does not necessarily entail any further (or lesser) regulation of IPO markets,[42] it should be borne in mind in evaluating any proposal for regulatory reform.

II. THE UTILITY (AND PERILS) OF COMPARISONS BETWEEN CANADIAN AND U.S. EXIT MECHANISMS

The primary purpose of this paper is two-fold. First, to determine of Canadian venture capitalist exit strategies have changed over time. Second, to compare Canadian exit strategies with American (and whether similarities or differences have persisted over time).

There is both utility and peril in making inter-country comparisons. The utility arises from the identification of differences in exit techniques as between Canadian and U.S. venture capitalists. For example, given the importance of IPOs to the venture capital process, a comparative dearth of IPOs in Canada would be cause for concern.

The identification of differences is only the first step, however. Differences in exit methods may arise from market, regulatory, or taxation factors. Evidence is presented below, for example, that IPOs have been a less frequently used exit method in Canada. This may be partly caused by market factors. Given the small size of the Canadian market, and economies of scale in the offering of underwriting services, it is likely more difficult to niche underwriters (e.g. doing only high tech offerings) to survive in Canada than in the U.S. This may increase the relative cost of IPOs in Canada. Another market factor that may be at play is the often-voiced view that Canadian institutions are more risk averse than the U.S. counterparts, and tend to be less receptive to IPOs.

On the other hand, regulatory factors also clearly impact on the use of IPOs. It may be the case that Canada's regulatory environment is more demanding than that of the U.S., leading to higher costs. Market, regulatory, or taxation factors may all come into play.

The perils of Canada-U.S. comparisons arise from the many differences that exist between Canadian and U.S. markets. These differences are likely to make any univariate explanation of differences in exit techniques suspect. Some of these differences are briefly explored below.

1. Venture Capitalist Specialization

Canadian venture capitalists have funded both traditional and high technology businesses.[43] They have also tended to be generalists, rather than specializing in any particular industrial sector.[44] By contrast, U.S. venture capitalists have concentrated much more heavily on the funding of high technology businesses.[45] They also tend more than their Canadian

counterparts to be specialists, focusing their efforts on one particular industrial sector (such as computers, biotechnology, etc.).[46]

This is likely the product of economies of scale. A venture capitalist situation in Silicon Valley, for example, can afford to specialize in computer hardware or software because there is so much computer related entrepreneurial activity in that region. A venture capitalist in Toronto, by comparison, must consider a wider range of industrial sectors because of the comparative absence of concerted entrepreneurial effort in any one sector.

The higher degree of specialization in the U.S. is likely to result in U.S. venture capitalists adding more value to their portfolio firms than Canadian venture capitalists. This is a direct function of the nature of venture capital investing. As indicated above, venture capitalists add value in the following ways: (1) providing financing when other sources of capital are unavailable; (2) expert screening of investment opportunities; (3) structuring the deal (including manager remuneration, investment staging, etc.) to generate appropriate entrepreneurial incentives; (4) engaging in monitoring and providing useful advice; (5) securing additional sources of capital; (6) choosing the timing and means of exiting the investment.

Specialization in a particular industry is likely to result in higher value added in relation to all aspects of venture capital investing. A venture capitalist that invests only in computer software, for example, will come to know the software industry much better than a generalist. This will impart a superior ability to evaluate potential software investments.

By working with other venture capitalists, bankers, suppliers, and others on other software ventures, a specialist will also be more familiar with additional sources of financing than a generalist. A specialist will also likely have superior knowledge of how to package and market software products, how to successfully structure the deal to provide appropriate policing of and incentives to the entrepreneur, and so on.

The degree of specialization can thus be expected to affect the profitability of venture capital investing. But it may also impact on exit strategy -- and particularly on the use of IPO exits. There is evidence from the U.S. that the public markets regard the quality of the venture capitalists involved in earlier stages of funding (and involved in bringing the firm to the public market) as a signal of firm quality. As noted above, IPOs are typically underpriced in the short term. Megginson and Weiss find that IPOs involving venture capitalists are significantly less

underpriced than other IPOs.[47] Barry et al. extend this research, finding that the higher the quality of the underwriter, the lower the degree of underpricing.[48]

Thus, if U.S. venture capitalists have higher average skill levels than their Canadian counterparts (by virtue of greater specialization or otherwise), this will result in lower average underpricing when the firm goes public. This in turn will affect the relative attractiveness of exiting the investment through a public offering. While there is as yet no evidence regarding the comparative pricing of venture-backed and non-venture-backed IPOs in Canada, research is currently underway.[49]

2. Underwriter Specialization

Unfortunately, there is little systematic evidence on the comparative nature of Canadian and U.S. underwriting industries. However, anecdotal evidence suggests that secondary market distribution channels for small and medium sized firm are more well developed in the U.S. than in Canada. In the U.S., there appear to be proportionately more underwriters willing to bring small firms to the public market. While Canada does not entirely lack for underwriters willing to service the small end of the market,[50] the Economic Council of Canada reported in 1982 that:[51]

> while there are about four times an many national brokers in the United States as in Canada, there are about 34 times as many regional brokers (2,887 compared with 86 in Canada). Regional broker-dealers are crucial to the secondary and the initial-public-offering markets because they manage the majority of small offerings. In the 1972-80 period, regional broker-dealers managed 79 per cent of all initial public offerings in the United States and 92 per cent of the offerings of issues of less than $10 million in annual sales. In Canada, about three-quarters of the initial public offerings of industrial shares under $2 million in the 1970-72 period were managed by regional broker-dealers.

This research was done in the early 1980s and has not been updated. However, anecdotal evidence suggests that many of the regional dealers have been bought up by the national dealers, and integrated into the latter's national operations. The large national dealers will are typically not interested in any public offering below $15 million, or even $25 million.

Anecdotal evidence also suggests that U.S. underwriters play a more active role than their Canadian counterparts <u>after</u> a small firm goes public, functioning either as market makers (i.e. standing ready to buy or sell the firm's shares) or price quoters. Because the anticipation of secondary market liquidity is important inducement for effecting primary market sales, the

willingness of underwriters to play this dual role tends to ensure greater access to the primary market for small firms. The U.S. market is also characterized by the existence of niche underwriters that service the high technology market; there are no such players in Canada.[52]

While it is again possible that regulatory factors have played a role, these differences may again simply reflect economies of scale in underwriting. The greater concentration of small firm underwritings in particular regions of the U.S. may allow underwriters to exploit economies of scale associated with small firm offerings. More research is clearly indicated.

3. Economies of Scale in the Product Market

Canada's product market is small compared to the U.S. (the "one-tenth" rule of thumb applies). This has important implications for the development of small firms. As the (Ontario) Premier's Council stated, the smallness of the Canadian market can frequently mean that Canadian companies "must begin exporting their product without the benefit of a solid domestic sales base".[53] The U.S. market is sufficiently large that American firms are not at this disadvantage.

4. Tax Incentives

A number of U.S. commentators have detailed various changes to the tax structure in the U.S. which gave an enormous impetus to the development of the venture capital industry in the late 1970s and early 1980s.[54] Aside from research into the effects of Quebec's QSSP program, no similar research into the effect of the tax structure on venture capital financing appears to have been done in Canada.

However, it is undeniable that tax incentives associated with the Labour Sponsored Venture Capital Companies (LSVCCs) has had a major impact on both the size and structure of the venture capital industry in Canada. Since 1990, over 50% of the new money flowing into the venture capital industry has gone into LSVCCs and other funds created in response to government incentives.[55] This money is contributed by individuals, rather than institutional investors.

As a consequence, a vast majority of the beneficial owners of Canadian venture capital funds are individual investors. By contrast, the lion's share of contributed capital in the U.S. comes from public and private pension funds. As explored in Part IV, this may have consequences for the comparative efficiency of fund governance in Canada and the U.S.

The tax structure in the U.S. has also had an impact on the choice of vehicle through which venture capital investing takes place. Eighty percent of venture capital firms are organized as limited partnerships.[56] While non-tax reasons exist for structuring venture capital funds as limited partnerships,[57] Canadian venture capital funds are not typically organized as limited partnerships. The tax factor thus appears to have significant importance in the choice of fund organization. The choice of fund organizational form clearly has important implications for fund governance.

5. The Supply of New Technologies

Venture capitalists must necessarily rely on others to produce the ideas that they fund. This is an exogenous variable, and will likely vary from country to country.

There is good reason to believe that the supply of new technologies is greater in the U.S. than in Canada. Gompers notes that:[58]

> [m]any technologies and companies have been spawned from large corporations as a by-product of government-funded research... Spending on space and defense research created the electronics, modern communication, and computer industries.

Lacking major space or defense-related initiatives, spending on research and development (R&D) by the Canadian government has been much more modest[59] (although the government has provided generous tax incentives for R&D[60]).

Moreover, even aside from space and defense-related expenditures, U.S. firms have historically done more R&D than Canadian firms.[61] Canada has a resource-based economy. While resource-based firms may innovate in various ways to reduce their costs of production, a resource-driven economy is likely to produce fewer innovations than an economy built on an industrial base. Further, Canada's economy has also historically been a "branch plant" economy. Research and development work has often been done by foreign parent corporations, rather than in Canada.

The less abundant supply of new technologies has likely been a reason why Canadian venture capitalists have tended to be generalists, rather than specialists.

6. Regulatory Structure

Venture capitalists are subject to a variety of types of regulation that impact on the cost of carrying on business. Securities regulatory requirements, for example, have a significant

impact on the cost of taking a firm public.[62] Securities regulatory requirements also impact on other types of investors, such as Angel investors and "love capital" investors.[63] This has an indirect impact on venture capitalists. If fledgling firms cannot surmount the seed and start-up stages because of an inability to tap love capital or Angel investors, they may never get to the stage when a venture capitalist can provide further funding. It is clear that Canadian and U.S. regulatory environments are sufficiently different that these differences are likely to have had an impact on the relative cost of venture capital financing in the two countries.[64]

7. Governance Structures

Governance structures of U.S. venture capital organizations have been extensively studied.[65] In general, there are three agency problems that arise. The first arises between from the relationship between fund investors and fund managers. The last two arise from the relationship between fund managers and entrepreneurs. As Sahlman points out, in some contexts the entrepreneur can be regarded as the agent and the venture capitalist as the principal. In others, however, the venture capitalist assumes the role of agent, and the entrepreneur that of principal.[66]

Unfortunately, there appears to be little research examining the governance structures of Canadian venture capital organizations, at any of these three levels. However, anecdotal evidence suggests that there are important differences in how such firms are organized, and in compensation schedules for the venture capital managers. Moreover, both LSVCCs and government funds have unique governance structures.

For private funds, governance structure is an endogenous variable, rather than an exogenous variable. It will be responsive to changes in the environment, such as regulatory and tax changes, preferences of institutional investors, etc. For government funds, governance structures may be externally imposed, and hence an exogenous variable. This may lead to governance inefficiencies. LSVCCs are likely to be somewhere in between the two, with governance structures that are partly imposed and partly responsive to features of the environment in which the funds do business.

Differences in governance structures may lead not only to differences in profitability, but differences in exit preferences as well. A government fund, for example, may be more likely to sell its stake back to the entrepreneur than to exit by other means. Until further research is

undertaken, the effects of differences in governance structures as between Canadian and U.S. venture capitalists remain unknown.

8. Stock Market Cycles

As noted above, the health of the IPO market is an important barometer for the health of the venture capital industry, and IPO markets are highly cyclical. While these cycles are correlated in Canada and the U.S., they are not likely to be perfectly correlated. Thus, differences in the two countries in the use of IPOs and the comparative profitability of venture capital investing will likely reflect differences in stock market performance.

9. The Supply of Funds

i) boom and bust cycles

In theory, the cost of an investment should reflect only its innate risk and return. No rational investor will pay more for an investment than its net present value. Nonetheless, if investors in a particular industry are earning economic rents, other investors will bid for these profitable investments, dissipating these rents and resulting in normal risk-adjusted returns.

There is some indication that the early years of venture capital investing were characterized by economic rents.[67] A number of American commentators have suggested that this resulted in huge commitments of capital to the venture capital industry by pension fund investors in the early 1980s.[68] However, this inflow appears to have done more than merely dissipate rents; it may have resulted in sub-normal returns for a period of time owing to poor investment decisions by inexperienced venture capital managers. This in turn caused a large exodus of pension fund investors and a period of shakeout in which less successful funds were driven out of business. This in turn led to an increase in venture capital profits and the return of institutional investors.[69]

Venture capital investing may thus be subject to 'boom and bust' cycles, in which the supply of funds changes dramatically depending on current levels of success (and the general economic climate). In short, there is some evidence that the supply of funds to the venture capital industry is inversely correlated with profitability.

In general, Canada and the U.S. appear to have experienced similar cycles in capital commitments. However, the growing dominance of the LSVCCs has fractured this similarity. The generous tax incentives responsible for the creation of the LSVCCs have induced many

individuals to commit funds to LSVCCs; in 1994 alone, LSVCCs raised $532 million. As explored further below, this may result in many inexperienced managers being drawn into the venture capital business, affecting the returns realized both overall and via various exit strategies.

ii) price pressure

Above, it was argued that investors, as a group, may respond to fund profitability in a manner which creates alternating periods in which supra-normal and then sub-normal profits are earned by venture funds. Nonetheless, over the long term one would expect that in a competitive environment, on average venture funds will earn a normal return.

This may not be the case if some funds systematically overbid in their purchases of venture capital investments. This may be true of government funds. Government funds are typically created with the specific goal of funding early stage investments that cannot obtain private funding. Thus, such funds are almost certain to earn sub-normal profits, on a risk-adjusted basis.

The subsidization inherent in the LSVCCs occurs in another way; the investor in the fund receives generous tax credits (up to 40%) on her investment. However, some LSVCCs must meet statutory requirements to invest certain percentages of their committed capital by certain dates. Moreover, as explored further below, such funds may have a higher proportion of inexperienced managers (at least in the short term). Not least importantly, the capital commitments of such funds are so large that it may take years to invest these capital commitments.[70] In these circumstances, it seems likely that many LSVCCs will have a tendency to overbid for investments, resulting in sub-normal profits. Such behavior on the part of government funds and LSVCC will also likely depress private fund profits, since private funds must compete with the LSVCCs for investment opportunities.

In short, the supply of funds not only has an impact on the venture capital industries in Canada and the U.S., but is likely to have a differential impact.

10. Secondary Market Liquidity, and Institutional Investor Appetite for Small Firms

The liquidity of secondary market trading is an important determinant of the ability of small firms to sell securities in the primary market. While again the empirical record is slender, there is some reason to believe that secondary market trading mechanisms offer investors in

small firms greater liquidity in the U.S. than in Canada.

In part, this may result from differing appetites of institutional investors for small firms. Canadian institutions are often said to be more risk averse than U.S. institutions, and less predisposed either to buying small firm IPOs or to trade small firms in the secondary markets.

Institutional trading creates a public good, in the sense that an institutional decision to trade on one side of the market (i.e. buy or sell) creates an opportunity for someone else to trade on the other side of the market. By creating liquidity, institutional activity in secondary markets also facilitates public offerings by small firms. This emphasizes the importance of regulating institutional purchases in a manner which does not restrict the purchase of small firms.[71]

III. A COMPARISON OF THE EARLY STUDIES

Two early studies, one in Canada, and the other in the U.S., track the types of exits used by venture capitalists (and other relevant information).

1. Exit Techniques

The exit techniques examined in the two studies include the following:

a. initial public offering (IPO)

When a private firm first offers securities in the public market, it must comply with rigorous statutory and administrative disclosure requirements. Once the firm is public, the liquidity of the stock is typically much enhanced. The degree of improvement in liquidity will depend on the quality of the exchange, the extent of the public float, public interest in the stock, the quality and variability of market information concerning the stock, and other factors.

Venture capitalists typically do not sell their stock at the date of the IPO. Rather, they slowly sell their holdings into the public market over a period of months or sometimes even years.[72] This is a product of both regulatory and market factors. On the regulatory side, statutory and stock exchange "hold periods" and "escrow requirements" prevent venture capitalists from selling all of their holdings at the date of the IPO.[73] Progressively more shares may be sold as time elapses. On the market side, a venture capitalist selling all or a large part of its holdings at the time of the IPO sends a negative signal to the market about the quality of the firm being brought to market. This will adversely affect the offering price.[74]

b. acquisition

Sometimes a venture capitalist will exit when the entire firm is purchased by a third

party. Sometimes, this acquisition will be structured as a sale of all the shares of the company, in return for cash, shares of the acquiror, or other assets. Sometimes it will be structured as a sale of assets. Often the buyer will be a larger, established company seeking a foothold on the technology possessed by the selling firm. In some cases, the buyer will be another venture capitalist.

c. company buyback

In some cases, the company will repurchase shares previously issued to the venture capitalist.

d. secondary sale

The venture capitalist may also exit by means of a sale of its shares to a third party. This differs from an acquisition, in that only the shares of the venture capitalist are sold to the third party. This third party may be another venture capitalist, or a corporation seeking a foothold on the company's technology (as in an acquisition). It should be noted that although secondary sales may be (and frequently are) made by venture capitalists following an IPO, such secondary sales are classified as exits via an IPO.

Only the U.S. survey deals with secondary sales as a distinct method of exiting an investment. In the Canadian survey, secondary sales are not separately accounted for, and this may have resulted in the larger size of the "other" category in Table 2.

e. liquidation

Like the "secondary sale" category, this category appears only in the U.S. study. It is defined as "the sale of the assets of a portfolio company (as opposed to sale of the corporate entity itself) to one or more acquirors".[75]

f. write-off

Where the venture capitalist receives no proceeds for its portfolio company holdings, this is classified as a write-off. A write-off typically involves the failure of the company.

2. Time Periods Covered by the Studies

The Canadian study by Venture Economics Canada Limited (VEC) examines 167 exits taken between 1975 and 1985 by 22 venture capitalists. The U.S. study by Venture Economics (VE) examines 544 exits taken between 1970 and mid-1988 by 26 venture capital firms. Thus,

the two studies cover somewhat different time periods. This diminishes the comparability of the two studies, as discussed below.

3. Size of Investments Made

Table 1 indicates that on averages investments made by U.S. venture capitalists were somewhat larger than those made by Canadian venture capitalists. It should be kept in mind that the Canadian figures are in Canadian dollars, while the U.S. figures are in U.S. dollars.

4. Industry of Portfolio Firms

Table 2 indicates the distribution of exits by portfolio company industry for both the Canadian and U.S. studies. It is clear from this distribution that U.S. venture capitalists have historically been more focused on the high technology sector than their Canadian counterparts. In particular, there has been a much greater emphasis on computer hardware and software. Canadian venture capitalists have invested more in industrial products, consumer products, and energy related investments than their American counterparts.

5. Distribution of Exits by Portfolio Company Stage at Date of Investment

It has become common to categorize the financing provided by venture capitalists into different "stages".[76] The first stage is seed/startup financing. At this stage of development, the company has not yet started commercial manufacturing and production, but is developing a prototype and may have done some initial marketing. The second stage is expansion financing. During this stage, the firm is producing and marketing its product, but needs a further infusion of funds in order to expand production, engage in marketing, or refine the product. The third stage is acquisition financing. Such financing is provided to enable management to purchase a public or private company, or to purchase a product line from the company. The fourth stage is turnaround financing, which is provided to a company experiencing operational or financial difficulty, with a view to remedying its difficulties.

Table 3 shows the distribution of exits by portfolio company stage at the time of investment, for investments by both Canadian and U.S. venture capitalists. It can be seen that U.S. venture capitalists have historically invested much more heavily in early and expansion stage financing than Canadian venture capitalists.

6. Comparison of Different Exit Techniques

Table 1 reveals some interesting divergences in exit methods between Canada and the

U.S. In the U.S., the most common method of exit was through by means of an IPO (35%), followed by an acquisition of the entire firm (22%), and a write-off (21%). These three exit methods accounted for 78% of the total sample. By contrast, in Canada the most common method of exit was the write-off (at 32%), followed by a share buyback (22%), IPO (16%[77]), and acquisition (17%). These four exit methods accounted for 88% of the Canadian exits.

a. Frequency of IPOs

The data from these two studies appears to confirm the view that the IPO has been used much more frequently in the U.S. than in Canada. This may be because U.S. investors are more receptive to IPOs than their Canadian counterparts. Some support for this view is offered by the fact that one third of the time, investments by Canadian venture capitalists in U.S. portfolio firms were exited by means of an IPO,[78] a figure comparable to the rate at which U.S. venture capitalists used IPO exits (35%). This suggests that while U.S. markets may be more receptive to IPOs than Canadian markets, this receptivity is confined to IPOs involving U.S.-based firms. Otherwise, one would have expected that the U.S. IPO exit route would have been used more frequently to exit Canadian, as well as U.S. investments. This is consistent with other evidence suggesting that Canadian and American markets are segmented in relation to smaller firms.[79]

The Canadian study suggests that the tax incentives associated with the Quebec Stock Savings Plan ("QSSP") increased the number of Canadian IPOs in the 1975-85 period. One-quarter of the exits from Quebec companies were by means of IPOs (all occurring in 1984-85), compared to only 8% for Ontario companies.[80] Indeed, of the 26 IPOs in the Canadian sample, seven occurred in Quebec, as compared to 8 in the rest of the country (and 11 in the U.S.).[81]

b. Frequency of Company Buybacks

Another significant difference relates to the relative use of company buybacks in the two countries. In Canada, buybacks constituted 22% of the sample. In the U.S., they were only 6% of the sample. Like the differential rate of IPOs in the two countries, this may be an artifact of different market (or tax) conditions. Canadian venture capitalists exited only 11% of their U.S. investments via a company buyback, versus 22% for their entire sample of exits.[82] It may be that the tax environment in the U.S. is less friendly to the buyback, or (as suggested by the authors of the Canadian study) that Canadian entrepreneurs "are more concerned about regaining control of the company".[83]

c. Frequency of Write-offs

The number of write-offs also appears to differ significantly between the two countries. In the U.S., 21% of investments were written-off, versus 32% in Canada. It is also noteworthy that Canadian venture capitalists wrote-off their Canadian and U.S. investments at an identical rate (32%).[84] There are at least three plausible explanations for these differences.

i) less experienced venture fund managers in Canada

The higher write-off rate experienced by Canadian venture capitalists may reflect the influx of inexperienced venture capitalist managers in the period under examination.[85] This view is supported by the fact that the Canadian write-off rate shows a rising trend in the 1975-85 period.[86] Further, the average IRR realized on exits occurring in 1984-85 is also somewhat lower than the average IRR in the 1975-83 period.[87]

It is noteworthy, however, that 39% of the U.S. venture capital funds in the VE survey made their first investments in 1981-82.[88] Further, 75% of all investments in the 1970-88 period were made in 1980, 1981, 1982, or 1983.[89] This is reflective of a massive inflow of funds into the U.S. venture capital industry in the early 1980s and strongly suggests that the U.S. funds surveyed were also populated by a large number of inexperienced venture capitalists.[90]

This view is given credence by a number of histories of the U.S. venture capital industry. Historical accounts by Bygrave and Timmons and by Gompers discuss how the massive influx of funds into the U.S. venture capital industry in the early 1980s resulted in a large number of novice venture capital managers entering the industry.[91] Both accounts attribute the significant reduction in returns to venture capital funds in the mid to late 1980s to this influx of inexperienced managers.[92]

Thus, it appears that there was an inflow of inexperienced venture capital managers into the industry in <u>both</u> countries in the early 1980s, casting some doubt on the view that managerial inexperience accounts for the larger number of write-offs in Canada.

ii) lower skill, holding experience constant

An alternative view is that Canadian venture capital managers are less skilled at venture investing, <u>holding experience constant</u>. This hypothesis is given plausibility by the fact that Canadian venture capitalists have historically been generalists, while U.S. venture capitalists have tended to specialize in particular industrial sectors, with a much greater focus on the high

tech sector. Given the manner in which venture capitalists bring value to the firms in their portfolios, specialization is likely to result in higher returns. Specialized venture capitalists can bring a higher degree of expertise to their craft at all stages of the investment, including choosing and structuring the investment, raising funds from other parties at critical junctures, monitoring the investment, offering expert advice, and formulating exit strategies.[93]

iii) survey timing

The Canadian sample terminates in 1985, while the U.S. sample terminates in 1988. As noted, many of the investments in both the Canadian and the U.S. study took place in the early 1980s.[94] In venture capital investing, "the lemons ripen within two and a half years while the plums take seven or eight".[95] Had the Canadian study terminated in 1988, like the U.S. study, then perhaps more of the plums would have ripened and been harvested, lowering the percentage of exits taken as write-offs.[96]

iv) sum

Because of the timing difference in the surveys, the higher write-off rate in Canada is far from unambiguous evidence that Canadian venture capital managers were either less experienced than their U.S. counterparts, or less skilled holding experience constant. It is plausible that the timing difference completely accounts for the higher Canadian write-off rate.

d. Frequency of Acquisitions

It has sometimes been suggested that Canadian venture capitalists have more frequently exited their investments via an acquisition of the entire firm than have U.S. venture capitalists. The comparative Canadian and U.S. statistics suggest that this is not so. While 22% of exits by U.S. venture capitalists were through acquisitions, only 17% of Canadian exits were by acquisitions.

Indeed, as noted above, the U.S. study lists "liquidations" separately from acquisitions. If all these liquidations would have been classified as acquisitions in the Canadian study (this is unknown), then the 28% (rather than 22%) of all exits would have been effected via 'acquisitions'.

7. Changes in the Use of Exit Methods Over Time

The Canadian sample discloses some trends in exit methods over the 1975-85 sample

period. In particular, Table 4 shows an increasing reliance on IPOs. Out of a total of 40 exits between 1975 and 1980, only 4 (or 10%) were IPOs[97]. By contrast, out of 117 exits between 1981 and 1985, 22 (or 19%) were by IPO.[98]

The data also show a decreasing reliance on company buybacks. While 43% of all exits in the 1975-77 period were through buybacks, only 22% of all exits in 1984-85 were buybacks.[99]

Interestingly, there was also an increase in the percentage of write-offs over time. Between 1975-80, 23% of exits were write-offs. Between 1981-85, 33% were write-offs. As discussed above, this may reflect the fact that increased placement of funds with venture capitalists by institutional investors drew less experienced managers into the industry in the early 1980s.

The U.S. data, contained in Table 5, discloses somewhat different variations in exits over time. There appears to be no secular trend in the use of IPOs. In the period 1970-79, 32% of exits were via IPO, while in 1985-87 34% were via IPO. Variations in the interim appear to track variations in the business cycle.

In the U.S., the use of acquisitions appears to be essentially unchanged, while secondary sales have declined in popularity. The number of write-offs increased quite dramatically from mid-1984 to mid-1988, again probably reflecting the fact that many inexperienced venture capitalists entered the industry in the early 1980s.

8. Relative Profitability of Exit Methods

Table 6 indicates the relative profitability of various exit techniques. For Canada, profitability is calculated as an internal rate of return (per annum). For the United States, profitability is calculated as a "gain multiple" per annum, which is simply the total proceeds of disposition less the total purchase cost, divided by the holding period. While differences in computing profitability interfere with cardinal inter-country comparisons, they do not interfere with ordinal comparisons.

In the U.S., the IPO was the most profitable way of exiting a venture capital investment in the survey period, by a wide margin. Acquisitions, buybacks and secondary sales appeared to be about equally profitable means of exit, despite the fact (see table 1) that 22% of investments were exited via acquisition and only 6% and 8% respectively through a company

buyback or a sale in the secondary market.

In Canada, IPOs were also the most profitable means of exiting venture capital investments, with an average IRR of 197%. Share repurchase was the second most profitable way of exiting venture capital investments in the 1975-85 period, yielding an internal rate of return of 44% -- although removing one outlier results in an average return of 31%.[100] Acquisition was the third most profitable, yielding an IRR of 21%. Sales in the secondary market were not accounted for separately and may make up a sizeable portion of the "other" category in the survey, which constituted 10% of all exits taken.[101]

There is some indication, however, that a number of highly profitable acquisition investments may have skewed the Canadian sample results for IPO returns. Out of a total of 26 IPO exits, only four had an IRR in excess of 125%,[102] and these four investments accounted for 50% of the $16 million invested in companies that eventually were taken public.[103] All of these four investments were held for less than 24 months and may have been acquisition transactions. Given that the IRR calculation in the report is value-weighted,[104] these transactions clearly had a major impact on the average IRR. Indeed, acquisitions as a group were the most profitable form of investment, yielding an average IRR of 55%.[105] Of the 26 IPOs in the sample, 7 were acquisitions.[106]

Unfortunately, the data no longer exists, and so there is no way of checking to see if these four transactions involved investments in acquisition financings. The author of the Canadian study, however, has indicated her belief than not all of the four transactions involved acquisition financing. Moreover, even if these four transactions are removed from the sample, the distribution of returns reported in Table 7 still suggests that IPOs were the most profitable means of exiting investments.[107]

Acquisition investments do not appear to have exerted a strong influence on the healthy returns to U.S. IPOs. Out of a total of 544 exits, only 10 were IPO exits from acquisition investments.[108] While the "gain multiple" calculated by Venture Economics is a value-weighted statistic (treating all investments and exits as if they were a single investment),[109] most of the investments in the sample were early or expansion stage financing.[110] Thus, the handsome returns realized on IPO exits do not result from acquisition outliers.

This raises an interesting puzzle, which is why more investments were not exited through

IPOs, given the obviously superior returns to this exit technique.[111] Indeed, given the handsome returns, one wonders why any method of exit other than an IPO is ever used for any firm that has a positive net present value at the date of exit.

Figure 1, reproduced from the Venture Economics survey, gives graphical expression to this exit puzzle. Figure 1 highlights a surprising discontinuity in venture capital returns. The distribution of gains and losses appears to be a normal distribution strongly skewed to the left, with a startling spike at the upper tail of the distribution. While a spike will normally be produced by aggregating all occurrences above the cutoff point (as has been done in figure 1), the spike appears to be much larger than could be accounted for by aggregation of the right tail of the distribution. Figure 1 is a vivid illustration of the fact that most of the profit from venture capital investing in both Canada and the U.S. has historically been derived from 'home runs', or spectacularly successful investments with returns greatly in excess of those experienced on other investments.[112]

One explanation for the spike in figure 1 is that it reflects some innate feature of the underlying population of venture investments. That is, there are a small number of investments that, for whatever reason, turn out to be much more successful than other investments.

This seems counterintuitive, however. A priori, one would expect the distribution of returns to be normally distributed. If figure 1 is a correct representation of the underlying population of firms, there it may represent the superposition of not one, but two distinct populations of firms. The first population is normally distributed and skewed to the left, and consists of a combination of what a venture capitalist often label the "walking wounded" or the "living dead" (investments that may be profitable, but barely so, and lacking significant upside potential), and outright failures. The second population consists of 'home runs'. Unfortunately, because all of the cases making up the spike are lumped together in figure 1, we do not know whether the home runs are themselves normally distributed.

Another explanation for the right-tailed spike is that it is not an artifact of the underlying distribution of firms, but of the manner in which newly public firms are valued in the public market. Shiller, for example, has argued that IPOs are sold on the basis of rhetoric and emotion rather than investment fundamentals.[113] This "impresario" theory of IPOs is supported by evidence that, while initial public offerings are underpriced (on average) in the short run, they

tend to be overpriced in the long run (whether compared with a market index, or a cohort of similar firms that have previously gone public).[114] If this theory is correct, then the spike in figure 1 may be an artifact not of the underlying population of firms, but of overvaluation of a subset of firms that are brought to the public market.

This explanation also runs into problems, however. Figure 1 discloses that it is indeed only a subset of firms that are brought to the public market that are home runs. Ignoring the spike, the distribution of IPO returns is approximately normal and skewed to the right. Why would the public market vastly overvalue a subset of IPOs, and not all IPOs? If order for this to be the case, it must be that firms with certain characteristics become "hot issues" that are greatly overpriced compared with other public offerings.

This seems unsatisfactory. Why would a firm that is less than a 'home run', or which lacks certain arbitrary characteristics, be priced in a fundamentally different fashion than a firm which is a home run or which possesses these arbitrary characteristics? So long as the firm's shares are priced correctly based on prospective earnings and risk, they should be publicly marketable and correctly valued. Other attributes, such as industry, or the existence of a large upside potential, should be irrelevant except insofar as they impact on prospective risk or return. Thus, while Shiller's impresario hypothesis necessarily assumes investor irrationality, the "hot issues" theory appears to elevate this irrationality to a level that would seem difficult to sustain.

Moreover, despite the evidence that IPOs are overpriced in the long run, it is clear that many of the home runs realized by venture capitalists are indeed spectacularly profitable companies, such as Memotec or Mitel (in Canada), or Digital Equipment (the first venture capital home run), Compaq Computer, Apple Computer, Federal Express in the United States.[115] This suggests that there may indeed be two distinct populations of firms funded by venture capitalists -- those which are home runs, and those which are not. However, offering a sensible explanation for this bifurcation of the underlying population is difficult.

If the Shiller view is correct, the comparative dearth of IPOs in Canada might be explained by a higher 'emotional hurdle rate' in Canada, or the superposition of more demanding arbitrary criteria, before an IPO may be priced to be a home run. Indeed, the higher emotional hurdle rate may create greater difficulty in bringing from either of the underlying populations (home runs and non-home runs) to the public market. This view would be consistent with

anecdotal evidence gleaned from interviews with venture capitalists, suggesting that the Canadian market is less receptive to IPOs than the U.S. market.

In opposition to this view, however, Canada has long maintained an active market for speculative junior resource issuers. The existence of the Vancouver and Alberta stock markets has historically depended on the ability of promoters to float highly speculative mining, oil and gas companies. This would seem to pose a counterfactual to the hypothesis that Canadian investors are naturally risk averse and shy away from speculative new issues. Anecdotal evidence, however, suggests that it has been retail investors who have largely driven the Vancouver and Alberta markets. Institutional investors, whose presence is necessary to ensure the success of larger IPOs, have been much more risk averse than retail investors. This, apparently, is beginning to change.

9. Stage of Investment, Exit Method, and Returns

The Canadian survey indicates the relative profitability of exits for firms at various stages of development at the time of investing. In the time period under examination, leveraged buyouts were the most profitable investments, with an IRR of 55%. LBOs were followed by turnaround financings (23%), expansion financings (22%), and seed/startup financings (16%).[116] More generally, larger investments on average yielded greater profits.[117]

This data is counterintuitive. A priori, one would expect early stage financing to be the riskiest, and both early and expansion stage financing to be riskier than acquisition financing. And indeed, venture capitalist required rates of return are higher on early than expansion stage financing, and higher on expansion stage financing than acquisition financing.[118] Bygrave and Timmons adduce evidence suggesting that early stage investments are indeed riskier.[119]

Moreover, table 8 indicates that there are significant differences in the type of exit that a venture capitalist can expect to use for investments made at different stages. Leveraged buyout investments, for example, are much more likely to result in an IPO exit than an investment at the seed/startup stage. More generally, excluding turnaround investments, the later the stage at which the investment is made, the more likely that it will eventually be exited via an IPO (the most profitable form of exit). Again excluding turnaround investments, early stage financings have the largest write-off rate, followed by expansion stage financings and acquisitions. The comparative IPO and write-off rates for investments made at different stages appear to confirm

the additional risks of early stage investing. One would thus have expected deals to be priced so that early stage financings have the highest rate of return, followed by expansion financings, followed by acquisitions.

The Canadian survey also discloses that, on average, larger investments were more profitable.[120] This too is counterintuitive. Larger investments will generally be made in larger firms, more mature firms with established products and track records. Such investments should be less risky.

Turnaround investments appear to present a somewhat unique case. These are more likely to be exited via an acquisition or a company buyback than any other type of investment. The write-off rate is second only to that experienced with early stage investing. This is not surprising. Turnaround investments are made, by definition, in firms experiencing financial difficulties. A priori, one would therefore expect a low number of home runs, and a high number of write-offs for such investments (although it is easy to overstate the case; most small firms in the early or expansion stages will also be cash-strapped). The risk of turnaround investments appears to be reflected in the average return to such investments.[121]

There are thus two anomalies in the in the Canadian data. First, risky early stage financing did not result in a premium return when compared to expansion financing. Nor did expansion financing receive a premium return over acquisition financing. Leveraged buyout financing, which one would expect to be less risky than early or expansion stage investing, resulted in the highest average return in the 1975-85 period. This runs contrary to financial theory, in which riskier investments should earn a higher average return.

Second, larger investments earned a higher average rate of return. Larger investments will generally be less risky, and so this too is contrary to financial theory.

The U.S. Venture Economics survey does not indicate returns by stage of initial investment. It does, however, indicate the type of exits used for investments at different stages, and these results are reproduced in table 9. Table 9 reveals at least one startling contrast with the Canadian data; early stage investments were no less likely than acquisition investments to be exited via an IPO. Expansion stage investments were also exited by IPO a surprising 43% of the time. This may reflect the greater receptivity of the U.S. market to IPOs. It might, however, also indicate that U.S. venture capitalists are more skilled either at choosing

investments that are likely to be successful, or more successful at nurturing such firms and ultimately turning them into success stories.

Offering support to the view that U.S. venture capitalists are more skilled than Canadian venture capitalists is the fact that write-offs are lower in the U.S. for both early stage and expansion stage financing, although the difference is large only for expansion stage financing. This suggests that the skill advantage of U.S. venture capitalists is greatest in relation to expansion stage investments. However, as noted earlier, the timing difference in the two surveys may account for the difference in write-off rates. Thus, no firm conclusion can be drawn.

As in the Canadian data, however, the earlier the stage at which the investment was made, the higher the proportion of write-offs. This presents further evidence that early stage investments are riskier than later stage investments.

10. Investment Size and Exit Method

The Canadian survey discloses that the average investment in a firm that is eventually taken public is larger than the average investment in a firm that is exited via some other route.[122] Investments that are later repurchased by the firm are about half the size of investments in firms exited through IPOs.[123] Investments in firms exited via acquisitions were mid-way in size between those exited via acquisitions and IPOs,[124] as were investments that were eventually written off.[125]

The large size of investments in firms that were eventually taken public almost certainly reflects the influence of acquisition investments. Acquisition investments tend to be larger on average than early stage, expansion stage, or turnaround investments.[126] Such investments accounted for 7 of the 26 investments that resulted in IPOs.

The U.S. survey also indicates that larger investments are more likely to be exited via an IPO than smaller investments.[127] However, given the relatively small number of acquisition transactions in the U.S. sample, it does not appear likely that this result in driven by acquisition investments. The U.S. survey also indicates that smaller investments were more likely to be exited via a company buyback, a secondary sale, or a write-off than were larger investments.[128]

11. Summary of Differences Between Canadian and U.S. Venture Capitalists

In the periods surveyed, U.S. venture capitalists made slightly larger investments than Canadian venture capitalists. These investments were much more concentrated in the high

technology sectors -- and especially on computer hardware and software -- than were Canadian investments. U.S. venture capitalists also invested comparatively more of their capital in early and expansion stage investments.

The three exit methods most commonly used by U.S. venture capitalists were IPOs, acquisitions, and write-offs. By comparison, the three most commonly used exit methods in Canada were write-offs, buybacks, and IPOs. In Canada, fewer investments were exited by acquisitions than in the U.S.

Anecdotal evidence suggests that the higher use of IPOs in the U.S. is at least in part because of greater institutional willingness to purchase IPOs, although regulatory factors may also have played a role. Canadian venture capitalists exit their American investments through IPOs at about the same rate as U.S. venture capitalists. This evidence is consistent with segmentation of Canadian and U.S. markets for small firms.

There are a number of plausible explanations for the higher write-off rate for Canadian than American investments. One explanation is greater skill on the part of U.S. venture capitalists. However, both countries experienced a large inflow of funds in the early 1980s. Because the Canadian survey terminates in 1985, some of the ultimately successful investments made in the early 1980s would not yet have come to fruition. The U.S. survey terminates in 1988, and may capture a larger share of the successful exits. The higher write-off rate may simply be an artifact of this timing difference.

Over the 1975-85 period, Canadian venture capitalists exited via IPOs with increasing frequency. As discussed in Part IV, the trend towards increasing use of IPOs has continued into the 1990s. There does not appear to be any similar trend in the U.S. In both countries, IPOs were the most profitable means of exiting investments. However, IPOs were used much more frequently in the U.S., especially for early stage investments.

Both the Canadian and U.S. data add support to the view that venture capital investing is driven by 'home runs', or spectacularly successful investments. A puzzle arises, however, in that the venture capital returns (at least in the U.S., if not in Canada) do not seem to be normally distributed. There appear to be two sub-populations of investments; non-home runs (which appear to be normally distributed) and home runs (whose distribution cannot be determined from the studies examined here). Accounting for this bi-modal distribution is

difficult.

Two further puzzles arise in the Canadian data in that riskier early and expansion stage investments did not command the expected risk premium, nor did smaller investments. The reasons for this are unknown.

IV. RECENT CANADIAN EVIDENCE ON VENTURE CAPITAL EXITS

At the time of writing, the U.S survey data was not yet available. This, this draft of the paper will deal only with Canadian data on exits gleaned from a survey commissioned for this study by Macdonald & Associates, which historically has functioned as statistician for the Association of Canadian Venture Capital Companies. I am very grateful to Mary Macdonald and Ted Liu at Macdonald & Associates for their cooperation and helpfulness in carrying out this survey. While the U.S. results are not yet in, I am also very grateful to Jesse Reyes of Venture Economics (U.S.) for his cooperation in formulating and distributing the survey in the United States.

1. Data and Presentation of Results

The questionnaire was mailed to all members of the Association of Canadian Venture Capital Companies (ACVCC). Of the x members of the ACVCC, x responded. Their responses covered a total of 134 exits taken between 1992-1995 (inclusive). Given that the questionnaire was mailed in early November, 1995, and most of the questionnaires returned in November and December, the results for 1995 are not complete in relation to exits taken in the last two months of 1995.

A new category of exits -- "secondary sales" -- is included in the new survey. Table 11 indicates that secondary sales constituted 9% of the later (new) sample. It is noteworthy that in the earlier sample, 10% of all exits were placed in the "other" category, while in the later sample, only 1% fall in this category. This suggests that the "other" category in the earlier sample contains a large number of secondary sales.

Aside from changes like the one just noted, data was gathered in the new survey in the same format as the old survey. Old and new tables are presented alongside one another to enhance comparability. For example, table 10a presents the old data, while table 10b presents the new data.

Table 10 indicates the number of exits and new deals made in each year covered by the two surveys. The ratio of new deals to exits in the past four years has been high by historical standards, reflecting a significant flow of new funds into the venture capital business.[129] More than half of the new funds were placed by individual investors in labour sponsored venture capital funds ("LSVCCs").[130]

2. Size of Average Investment

Table 11 indicates the average investment size for investments exited by different techniques. Both the earlier and later samples are in nominal dollars. Unfortunately, it is difficult to convert to real dollars given that investments in the earlier were made over a 10 year period, and records of these investments no longer exist.

Assuming, however, that on average prices doubled between the earlier and later surveys, it may be surmised that in real dollar terms, the average investment did not vary substantially between the two periods.

3. Industry of Portfolio Firms

Table 18 indicates the distribution of exits by portfolio company industry. In general, Canadian venture capitalists focused somewhat more on high technology investments in the later period than in the earlier period.[131] Investments increased in biotechnology (from 1% of all investments to 3%), computer hardware and software (from 12% to 13%), electronics (from 5% to 8%), medical/health (from 5% to 17%). Clearly most of the overall increase in high technology investing comes from increasing investments in the medical/health area.

There was a substantial decrease in focus on energy/environmental investments (from 10% to 1%), and a slight decrease in investments in communications (from 10% to 8%) and consumer related products (from 16% to 13%).

These numbers should be interpreted with some caution, however, given the large number of investments classified as "other", "unknown", or "miscellaneous", as well as the use of slightly different classifications in the two surveys.[132]

4. Distribution of Exits by Region

Table 13 indicates where in the country (or outside of the country) exits were taken.

Table 13b indicates that the largest share of IPO exits in the current survey was captured by Ontario (47%: check figures), followed by the United States (33%: check figures), and

Quebec (8%). This is a substantial change from the previous survey, in which the United States captured the largest share of IPOs (35%), followed by Quebec (27%), and Ontario (19%). Given that the U.S. share of IPOs has remained stable, it would appear that Ontario has captured IPO business at the expense of Quebec. This likely reflects the discontinuance of the Quebec Stock Savings Plan, which, in the time period covered by the earlier survey, would have encouraged issuers to form companies and do their IPOs in Quebec.

Table 14 indicates the location of IPOs, by region and by year (or years, in the earlier survey).

5. Distribution of Exits by Portfolio Company Stage at Date of Investment

Table 16 shows the stage at which investments were made in the periods surveyed. As can be seen from table 16b, in the later period there was a very heavy concentration of investments in early and expansion stage financing. Together these two categories accounted for 94% of all investments, versus 63% in the earlier survey.[133]

Other figures compiled by Macdonald & Associates for the period 1989-1993 also show an increased tendency to invest in early and expansion stage financings, at the expense of acquisition and turnaround financing.[134] Interestingly, this trend runs contrary to the path that venture capital investing in the U.S. has taken.[135]

6. Frequency of Exit Methods Used

Table 11 indicate the frequency with which various exit methods were used in the two periods. Table 12 also indicates the distribution of exit types over time. There are some striking differences from the earlier survey.

a. Holding Periods

The holding periods (time from investment to exit) for early stage, expansion stage, and turnaround investments were comparable in the early and later periods, with a slight increase in early stage holding periods. Moreover, with the exception of buyouts, the same ordinal ranking existed, with early stage investments showing the longest holding period, followed by turnaround investments and expansion stage investments. The one substantial difference between the earlier and later surveys arises in connection with acquisition financing. In the earlier study, the 14 acquisitions in the sample had by far the shortest average holding period (2.4 years). In the later period, the 3 acquisitions in the survey had the longest holding period (7.61 years).

However, given the small number of acquisitions in the later period, the significance of this difference is questionable.

b. Frequency of IPOs

IPOs were used for 27% of all exits, versus 16% in the earlier period. The increasing use of IPOs may reflect the increasing receptivity of Canadian institutional investors to investments shares in young, growth companies.

The average holding period from initial investment to IPO was substantially longer (at 4.73 years) than in the earlier period (2.3 years). As discussed in Part II, this appears to reflect the fact that the earlier sample contained a number of acquisition investments exited via IPOs after very short holding periods. As revealed by Table 17b, there were no IPOs of acquisition investments in the 1992-95 period.

c. Frequency of Acquisitions

An acquisition was the exit vehicle used in 12% of the exits in the later period, versus 17% in the earlier period.

d. Frequency of Company Buybacks

Company buybacks appear to have increased in popularity from the earlier to the later period, with 22% of exits being taken as company buybacks in the earlier period, and 31% in the later period.

e. Frequency of Write-Offs

Table 11 indicates that write-offs declined as a percentage of total exits, from 32% to 20%. Table 17 also indicates that write-offs declined in relation to both early stage and expansion stage financing. This may well reflect both the increasing degree of experience and skill of Canadian venture capitalists over time.

f. Frequency of Secondary Sales

Since the earlier survey did not separately categorize exits by secondary sale, it is impossible to compare the frequency of secondary sales in the earlier and later periods. However, in the earlier survey, 10% of all exits were classified as "other". In the later survey, only 1% were classified as "other". It is likely that a large proportion of the "other" category in the earlier survey were in fact secondary sales. If so, then the frequency of secondary sales did not change substantially between earlier and later surveys.

7. Relative Profitability of Exit Methods

a. Profitability of Different Types of Exits

Table 16 discloses some surprising and interesting changes from the earlier survey in the profitability of investments by type of exit method. In the earlier survey, IPOs easily led the pack, with an IRR OF 197% (although see the qualifications noted in Part III). In the later period, IPOs were only second best, with an average IRR of just 21%.

Similarly, in the earlier survey, company buybacks resulted in an impressive average IRR of 44%. In the later survey, these resulted in an average IRR of only 8%. Acquisitions also resulted in a diminished average IRR (21% in the earlier survey, and only 12% in the later survey). Secondary sales (which were not separately tracked in the earlier survey) easily led the way in the current results with an average IRR of 38%.

In general, there was a reduction in the profitability of venture capital investments, with average IRR falling from 23% to 16%, despite the lower write-off rate and greater success at bringing portfolio firms to the public market in the later period.

b. Distributions of Profitability by Exit Method

Table 20 indicates some differences in the distribution of profits by exit method, and sheds additional light on why average profits are down despite more public offerings and fewer write-offs.

Buybacks and acquisitions appear to have distributions that are strongly skewed to the low end of the range of profitability. This is similar to the earlier survey. However, compared with the earlier survey, these distributions appear to have shifted further to the low end of the range of profitability.

As in the earlier survey, IPOs have a broader distribution of profitability than other exit methods. However, once again the distribution appears to have shifted over time to the low end of the range of profitability. A greater number of both IPOs and buybacks resulted in losses than was the case in the earlier survey.

c. The Relative Profitability of Large and Small Investments

Table 21 reveals another difference from the earlier survey. In the 1975-85 period, the larger investments were the most profitable. In the later period, the smallest investments (under $200,000) were the most profitable, with an average IRR of 40%. Curiously, however,

investments in the range $200,000 - $499,000 were the least profitable, with an average IRR of only 3%.

d. The Relative Profitability of Different Stage Investments

Table 16 indicates that the profitability of investments in different stages also appears to have changed somewhat over time. In the earlier period, the most profitable investments were those in acquisition financing. Turnaround and expansion financing were about half as profitable, with early stage investments trailing. In the later period, acquisition financings were also the most profitable, although the sample (3 exits) may be too small for this result to be meaningful. Turnaround investments were the second most profitable, although again the sample is small (6 exits). It should also be noted that the profitability of the six turnaround investments was entirely driven by two highly profitable turnaround investments (the remaining four being write-offs). This, and the earlier survey results, suggest that turnaround investments are quite risky. The expectation would therefore be that they should yield a high average return.

Early stage investments appear to have been equally profitable in both periods, while expansion financing was substantially less profitable in the later period.

e. Changes in Profitability Over the 1992-1995 Period

Table 22 indicates that exits taken in 1995 were substantially more profitable than those taken in 1992-94.

f. Other Information Relating to Profitability

Tables 23 and 24 contain information not compiled for the earlier survey. Table 23 indicates that partial exits (in which the venture capitalist only partly exited its investment) were the most profitable. This might be the case for two reasons. First, a venture capitalist that anticipates a bright future for a portfolio company will be less likely to liquidate its entire position in that company. Second, liquidation of the entire position may send a negative signal to the market (or the purchaser) about the venture capitalist's view of the firm's future. This may result in a poorer exit price.

Table 24 indicates that exits in response to market conditions were more profitable than those that were pre-planned or which came about as the result of an unsolicited offer. This may offer support to the view that venture capitalists can time their exits to exploit market windows of opportunity.[136]

8. Stage of Investment and Exit Method

Table 17 indicates how investments made at various stages were exited. The samples of acquisition and turnaround investments are so small that no firm conclusions about exit technique may be drawn. Early stage and expansion financings were exited in broadly similar ways in the 1992-1995 period.

A comparison with earlier results indicates dramatic changes to the manner in which early stage financings were exited. Many more were exited by IPOs and company buybacks than in the earlier period. Far fewer were exited via write-offs. This evidence is consistent with the view that Canadian venture capitalists have become more skilled.

While the use of exit techniques does not appear to have changed dramatically over time for expansion stage financings, one noteworthy change is lower write-off rate in the later period. This too is consistent with growing skill levels.

9. Investment Size and Exit Method

Table 11 indicates some continuity in the relationship between the size of investment and the type of exit taken. In the later period, investments exited by IPOs and acquisitions were much larger, on average, than investments exited by other means. However, investments exited by IPO were the largest investments in the earlier period, while investments exited by acquisition were the largest investments in the later period. Indeed, investments exited by acquisition grew substantially in size in both nominal and (very likely) real dollar amounts.

By contrast, investments that were ultimately written-off appear to be much smaller, in both nominal and real dollar terms, than investments that resulted in write-offs in the earlier period.

10. Riskiness of Investments in Different Stages

There are a number of clues as to the relative riskiness of various types of investments in the sample. One is the write-off rate. As in the earlier survey, excluding turnaround investments, the write-off rate is highest for early stage investments, followed by expansion stage investments, and acquisition financing. This is what one would expect, for reasons articulated in Part II.

Turnaround investments are a special case, as such investments are made in ailing firms. Both surveys suggest a high write-off rate for turnaround financing, which in turn suggests that

Turnaround investments are a special case, as such investments are made in ailing firms. Both surveys suggest a high write-off rate for turnaround financing, which in turn suggests that such financing is inherently risky. This observation squares with anecdotal evidence that the required rate of return on turnaround investments is second only to that of early stage financings.

The distribution of investment results is also pertinent to the issue of risk.

Finally, average returns should be correlated with risk. On this basis, the riskiest investments would be acquisition and turnaround investments, followed by early stage and expansion financing. This ranking does not appear to accord with expectations based on required rates of return.

11. Riskiness of Investments by Size of Investment

[To be added later]

12. Character of Companies Engaging in IPOs

Table 17 indicates that firms receiving investments at the early or turnaround stages were more likely to be candidates for IPOs in the later period than in the earlier period.

Table 19 indicates that most of the increase in the use of IPOs between earlier and later periods is associated with high technology companies. In the earlier period, high technology companies were no more likely to be exited via IPOs than non-technology investments. In the later period, they were much more likely to be exited via IPOs.

Investments in high technology companies will typically be very risky, but will also have very large upside potential. It may be that the potential for explosive growth (and profits) is one of the factors that makes it easier to bring a portfolio company to the public market. If so, this might offer support to Shiller's view that it is excitement, rather than fundamental analysis, which sells IPOs and which accounts for their poor average long-term performance.

13. Summary of Differences Between 1975-1985 and 1992-1995

In summary, there appears to be little change in the average size of the investment between the two periods. However, in the later period, proportionately more IPOs took place in Ontario. The increase appears to have come at the expense of IPOs in Quebec.

Moreover, in the later period, investments were exited more often via IPOs and company buybacks. The higher usage of IPO exits may reflect a maturing and more experienced and skillful venture capital industry. However, such a conclusion must be tentative, given that the

regarded as tentative given the results of the current survey with respect to average returns, discussed below. However, the write-off rate was also considerably lower in the later period, supporting the view that venture capitalists had become more skilled.

In addition, venture capital managers appear also to have focused their efforts more on the high technology industries in the later period. As argued earlier, this increasing focus may reflect a higher degree of task specialization and higher levels of skill. Indeed, Macdonald suggests that increasingly venture managers have technical and scientific backgrounds, to facilitate evaluation of prospective investments.[138] Thus, both the lower write-off rate and the higher degree of industry focus support the view that the Canadian industry has matured and venture capital managers have become more skilled (although again important qualifications are noted below).

Canadian venture capitalists appear to have invested more in the later period in early and expansion stage financing, and less in acquisition and turnaround financing. The U.S. experience appears to run in the contrary direction.

The profitability of venture capital investing was lower in the 1992-95 period than in 1975-85. The most notable drop occurred in relation to IPOs, although company buybacks also experienced a large drop (despite being the most popular method of exit in the later period). IPOs also slipped to the second most profitable means of exiting investments, after secondary sales.

Early stage investments were exited far more often by IPOs in the later period. Both early and expansion stage investments had lower write-off rates in the later period. These comparisons suggest that Canadian venture capitalists have become more skilled over time.

IPOs were a much more frequent form of exit in the later period than the earlier. The increase is attributable to the increasing use of IPOs to exit high technology investments.

In the earlier period, large investments were the most profitable. The later period exhibits both change and discontinuity in profitability by size of investment. The smallest investments (under $200,000) were the most profitable, but the least profitable were those investments between $200,000 and $499,000.

14. Have Canadian Venture Capitalists Become More Skilled?

Venture capital investing is a young industry in Canada. As in the U.S., substantial funds

were not committed to the venture capital industry until the early 1980s. It is natural to expect that as venture capital managers gain experience in picking portfolio companies, sheparding them through the growth process, securing other sources of funding, and choosing appropriate exit techniques, they will become better at what they do.

As the industry matures and the economy grows in size (allowing for greater exploitation of economies of scale associated with task specialization), it also seems natural to expect that Canadian venture capitalists will tend to become more specialized in the types of firms they invest in.

There is some evidence that this has been the case in Canada. This and other sources confirm that Canadian venture capitalists are increasingly focusing on the high technology sector, like their American cousins.[139] Write-off rates have declined substantially from the earlier survey. More portfolio firms, especially firms that first received funds in their early stages, are being brought to the public market.

Many of the exits in the 1992-95 current sample will have resulted from investments made in the late 1980s and early 1990s. This was a period during which there was a substantial "shakeout" in the venture capital industry in Canada. Declining fund profitability in the mid to late 1980s resulted in reduced financial commitments from institutional investors. New capital in 1989 dropped to $200 million from $600 million the year before, and stayed at that level in 1990.[140] Indeed, netting out profits returned to investors and new funds raised, there was a net outflow of funds in 1990 and 1991.[141] This shakeout is likely to have eliminated the weaker venture capital managers and left only the more capable managers.

However, the 1992-95 period also appears to have been less profitable than the 1975-85 period. This reduction in profitability appears to be inconsistent with the hypothesis that venture capital capitalists acquired greater skill and experience over time. Moreover, the supply of funds to venture capital managers slowed considerably between 1988 to 1992. Assuming the stock of quality investments did not change, this might have reduced demand for new investments, lowering the purchase price of such investments. The expectation would be that this would result in enhanced profits.

The diminished profitability of venture funds in the 1992-95 period is not, however, necessarily inconsistent with the hypothesis that venture capital managers have become more

skilled.

A large number of factors will have an influence on the profitability of venture capital investing. The supply of quality investments will obviously have a major influence on the profitability of venture investing. It may be that the supply of quality investments was greater in the 1975-85 period than in 1992-95 period. During the earlier period, the venture capital industry was still young. Given that venture capitalists supply funds typically not available from other suppliers of capital, it is not unreasonable to suppose that there was a 'backlog' of quality projects awaiting funding in the 1970s and early 1980s. The large inflow of funds in the early and mid-1980s would have reduced or eliminated this backlog of quality projects, resulting in greater competition among funds for deals in the later 1980s and early 1990s.[142] Increasing competition would increase the average deal price, resulting in reduced profits upon exit.

Yet another factor operating on profitability may have been pressure from institutional investors from short term profits. It has often been suggested that, because mutual fund managers are evaluated on a quarterly basis, they pressure corporate managers for short term profits. Gompers has suggested that, coincidental to greatly increased pension fund investments in venture funds in the early to mid-1980s, venture capitalists were also pressured to achieve short term results. Consequently, many made unwise investment decisions.[143]

It Gompers is correct, institutional pressure may also have affected the profitability of the venture fund industry in Canada. In the early to mid-1980s, as in the U.S., much of the inflow of funds into the venture capital industry originated with pension funds. However, as discussed further below, in the late 1980s the character of the Canadian industry started to change with the growing dominance of the LSVCCs. By 1993, institutional investors constituted a small part of the universe of venture fund investors.[144] Thus, while institutionally-generated short term focus may have been a problem in the mid to late 1980s, it is likely to be of diminishing importance in the future (and of importance only for private funds with institutional investors)[145].

The argument that institutional investors are responsible for inducing a short term focus in their investee firms, however, remains speculative. There is in fact evidence suggesting that institutional investors do not inappropriately discount long term prospects of firms in which they invest.[146] This evidence suggests that Gompers' argument is either incorrect or overstated.

Other factors may have played a role, however, in generating lower profits in the 1992-95 period. In particular, it seems highly likely that in the past 3 decades Canadian product markets have become significantly more competitive. The high technology business in particular has greatly matured both in the U.S. and Canada, and the number of competitors in areas like computer hardware and software has increased substantially.

The free trade agreements (the FTA, followed by NAFTA -- in addition to GATT) have also played a hand in rendering Canadian markets more competitive. These agreements have opened up many Canadian markets to U.S. and Mexican competitors.

Added to this is the fact that the profitability of Canadian firms was generally quite poor in the 1992-95 period. Canadian firms have struggled to overcome the effects of the recession that plagued both Canada and the U.S. in the early 1990s (as well as the effects of the free trade agreements). Indeed, over the past few years, investing in the stock market has lagged investing in T-bills.[147] Viewed against this background, the returns to venture capital investing appear to be quite attractive.

Lastly, but not least importantly, the nature of the venture capital industry has changed dramatically over the past 10 years. LSVCCs and government funds now account for a much larger share of the venture capital market than was the case in 1975-85. As discussed further below, these funds may not pursue profitability with the same zeal as privately run funds.[148] This is a factor that may have affected venture capital returns in 1992-95, and is increasingly likely to do so in the future. This strongly suggests that looking at venture capital profits in the aggregate is likely to be misleading. It is probably more instructive to examine the profitability of different types of venture funds. The diminished profitability of venture funds in the 1992-95 period may be consistent with some venture capital managers (i.e. those associated with private funds) having acquired greater experience and skill, and others (i.e. those associated with LSVCCs and government funds) being relative newcomers to the business, with less experience and skill.

V. THE IMPORTANCE OF EXITS IN THE INFORMAL VENTURE CAPITAL (OR "ANGEL") MARKET

This study examines only exit mechanisms used by venture capitalists in the "formal"

venture capital market. It is also important to know how informal venture capitalists -- or "Angels" -- exit their investments. Angels are high net worth individuals who have often themselves run a successful small business, and who have money to invest in other small businesses.[149] They typically invest in amounts ranging from about $10,000 to $200,000, although some Angel investments are in the million dollar range or greater. Because many venture capitalists will not invest less than $500,000 or $1,000,000, and because young high technology businesses typically cannot secure a bank loan or line of credit, Angel investors play a vital role in the funding of small high tech businesses.

It would thus be very useful to know how Angel investors exit their investments. Further, it would be useful to have information about the relationship of Angel investors to formal venture capitalists. Do Angel investors invest in fundamentally different types of enterprises than formal venture capitalists, as one commentator has asserted?[150] Or it there a 'handshake' between Angel investors and formal venture capitalists, with the former exiting their investments by selling to venture capitalists (or bringing venture capitalists in as co-venturers)?[151] Is there a role for government in bringing Angel investors and formal venture capitalists together, to smooth the transition from one stage of financing to another?

The importance of exits from the Angel market may be even more important than that of exits from the formal venture capital market. While precise figures on the size of the Angel market are impossible to obtain, it has been variously estimated that the Angel market is from 2 to 10 times the size of the formal venture capital market. In the U.S., for example, the formal venture capital market raises about $4 billion per year. By comparison, Wetzel has estimated that the Angel market is on the order of $40 billion per year;[152] Pavey puts it at $50 million per year.[153] In Canada, new commitments to the formal venture capital market have ranged from about $200 million to $1 billion per year.[154] Riding et al. have estimated that the Canadian Angel market is on the order of $500 million to $1 billion. Thus, it is difficult to overstate the importance of the Angel market.

VI. A LOOK TOWARD THE FUTURE: THE ROLE OF LABOUR SPONSORED VENTURE CAPITAL COMPANIES

The face of the Canadian venture capital industry has been dramatically altered over the

course of the past few years with the growing popularity of LSVCCs. These are now the dominant form of "hybrid" fund (i.e. a fund formed in response to government incentives). In 1989, hybrid funds managed a mere 17% of the total venture capital pool.[155] In 1993, hybrid funds managed 41% of the total pool of funds.[156] Of the approximately $1 billion flowing into the industry in 1994, 56% went to LSVCCs. The LSVCCs are also awash with cash. Only 15% of total funds available for investment were actually invested in 1994.[157]

While private funds are funded largely by institutional investors (public and private pension funds[158]), LSVCCs are funded by individuals. Individuals are willing to commit funds to high risk venture capital funds in order to capture the enormously generous tax credits offered by both federal and provincial governments (40% of the invested amount, to a maximum of $5000 per investor).

In the United States, by contrast, many states have formed government funds targeted at early stage investing. However, the industry is still dominated by the private funds, and their primary investors are pension funds.

The growing domination of the Canadian venture capital industry by LSVCCs raises some troubling questions. One relates to governance. The LSVCCs are funded by relatively unsophisticated individuals who are capable of supplying little useful monitoring of fund managers. This creates some question about the efficiency with which such funds will be managed.

The governance issue is exacerbated by the tremendous growth of the LSVCCs. This growth will undoubtedly result in the hiring of many inexperienced managers. If history is a guide, many of these managers will make questionable investment decisions.

There is some precedent for this. In 1958, the U.S. Small Business Administration offered tax incentives for the creation of Small Business Investment Companies (SBICs). Bygrave and Timmons comment that:

> The instant availability of cheap government money brought financial entrepreneurs out of the woodwork. Many should have stayed there. By 1962, 585 SBICs were licensed, and by the mid-1960S the nearly 700 organized dominated the U.S. supply of risk and venture capital. The very difficult, cash-consuming, hands-on challenges ... in working with smaller companies were greatly underestimated by these new entrants into the venture capital arena. The inevitable result was reminiscent of today's shake-outs in the savings and loan industry.

This experience was repeated in the early 1980s. As noted above, the U.S. venture capital industry went through a period of explosive growth in the early 1980s. The proximate result appears to have been a large number of poor investment decisions by inexperienced venture fund managers.[159] There is in fact some evidence that LSVCCs earn poorer returns than other types of funds, although this clearly demands further investigation.[160]

The enormous inflow of funds has left LSVCCs with much more capital than they can invest, perhaps even over a period of years. As a result, the private funds have been forced to compete for investments with cash-rich hybrid funds that, in some cases, are under statutory requirements to invest certain proportions of their committed capital by certain dates. This can only have the effect of diminishing the profits of private funds, and may even threaten the continued viability of such funds. Some private funds have already, in fact, reorganized as LSVCCs.[161]

While the collapse of the private fund industry does not seem to be imminent (a number of new private funds were formed in 1994[162]), some crowding out effect does seem likely.[163] While the LSVCCs and government funds are likely to hire managers with private fund experience, the governance and incentive structures of such funds are quite different from that of the private funds. This may result in a less efficiently managed industry.

This is of particular concern in that the private funds have tended to invest much more heavily in high technology firms than the hybrid funds.[164] Thus, if there is a crowding out effect, it may detrimentally affect the funding of high tech firms. The possibility that the shift to LSVCCs will result in a different mix of investee firms must be a concern at a time when the importance of funding "new economy" firms has never been greater.[165]

Yet another concern about the growing domination of the LSVCCs arises from the concentration of capital in a small number of funds. At the end of 1993, for example, venture capital funds had in total approximately $1.9 billion waiting to be invested.[166] Of this, hybrid funds accounted for over $1 billion,[167] with the lion's share of this $1 billion in the hands of three hybrid venture funds.[168] A breakdown in the governance of any of these three large funds would clearly have a major impact on the efficiency of venture capital investing as a whole.[169]

It should be stressed that this discussion is essentially an outline for future research. It is not known at this time whether the LSVCCs are run any less efficiently than private funds.

Indeed, some have argued that subsidization of small businesses, and especially small high technology businesses, may be justified on a variety of bases (such as job creation, or the divergence between public and private rates of return on high technology investments).[170] The generous tax incentives that have been responsible for the creation of the LSVCCs have resulted in recent inflows of capital into the venture capital industry that are far larger, on a per capita basis, than the new funds raised in the United States. If LSVCCs do not pursue profits with the same rigour as private fund managers, there is nonetheless a respectable argument that the resulting subsidization of small business will be beneficial.

However, it should be noted that the argument in favour of subsidization is weak outside of the context of high technology firms,[171] and LSVCCs do not invest in high tech businesses at nearly the rate of private funds. Moreover, for subsidization to be beneficial, monies must still be efficiently directed, and not merely wasted on worthless projects. Thus, efficient governance is no less a concern for a fund engaging in subsidization than for one that is not.

ENDNOTES

1. Paul A. Gompers, "The Rise and Fall of Venture Capital" (1994) 23:2 Business and Economic History 1, at 5.

2. William D. Bygrave and Jeffry A. Timmons, Venture Capital and the Crossroads (Boston: Harvard Business School Press, 1992).

3. Ibid. (U.S.); Macdonald & Associates, Venture Capital in Canada: A Guide and Sources (Toronto: Association of Canadian Venture Capital Companies, 1992) ("Venture Capital in Canada").

4. The increase in the U.S. appears to have been comparable. Lerner, for example, reports that "[t]he pool of venture capital under management [in the U.S.] increased sixfold from 1978 to 1990 (adjusted by the Gross Domestic Product deflator)." Joshua Lerner, "Venture Capitalists and the Decision to Go Public" (1994) 35 J. Fin. Econ. 293, at 295. Given that the U.S. figures are in constant dollars, the increases in Canada and the U.S. appear to be comparable.

5. Pavey notes that "whereas [U.S.] venture capital is a three-to-four-billion-dollar-a-year business today, private equity is a twenty-billion-dollar-a-year-business of which venture capital is maybe twenty percent." Robert D. Pavey, "Venture Capital and Private Equity: Financing Innovation in the Private Sector" (1995) 21 Can.- U.S. L.J. 203, at 203. Pavey also notes that in 1994, the U.S. merger and acquisition market was involved 270 billion dollars worth of transactions in 1994. Ibid.

6. See Jeffrey G. MacIntosh, Legal and Institutional Barriers to Financing Innovative Enterprise in Canada, monograph prepared for the Government and Competitiveness Project, School of Policy Studies, Queen's University, Discussion Paper 94-10 (Summer, 1994), at 3-6.

7. Ibid.

8. Ibid.

9. Bygrave and Timmons, supra, note 2, at 3.

10. R. Amit, L. Glosten, and E. Muller, "Entrepreneurial Ability, Venture Investments, and Risk Sharing," (1990) 36 Management Science 1232.

11. Christopher B. Barry, "New directions in research on venture capital finance" (1994) 23 Fin. Man. 3.

12. Ibid. at 8.

13. See e.g. J. Maier II and D. Walker, "The Role of Venture Capital in Financing Small Business" (1987) 2 Journal of Business Venturing 207 (53 percent of U.S. venture capitalists

fund less than 1 percent of the requests they receive). Sahlman also indicates that in the U.S., out of a few hundred investments screened, only a few will receive funding. See William A. Sahlman, "The structure and governance of venture-capital organizations" (1990) 27 J. Fin. Econ. 473, at 506. See also Barry, supra, note 11. Anecdotal evidence suggests that this is also true in Canada.

14. J. Lerner, "The Syndication of Venture Capital Investments," (1994) 23 Financial Management 16.

15. Sahlman, supra, note 13, at 506.

16. Bygrave and Timmons, supra, note 2 (re U.S. success stories).

17. MacIntosh, supra, note 6.

18. Ibid.

19. The various stages of a firm's development are defined infra, Part III. 5.

20. See generally MacIntosh, supra, note 6.

21. Ian C. MacMillan, Robin Siegel, and P.N. Subba Narashimha, "Criteria Used by Venture Capitalists to Evaluate New Venture Proposals" (1985) 1 J. Business Venturing 119.

22. Ibid. at 123.

23. Ibid.

24. Ibid.

25. Ibid. at 126.

26. Ibid. at 128.

27. Richard B. Carter and Howard E. Van Auken, "Venture Capital Firms' Preferences for Projects in Particular Stages of Development" (1994) 32:1 J. of Small Business Management 60. See also A.M. Kahn, "Assessing Venture Capital Investments with Non-Compensatory Behavioral Decision Models" (1987) 2 Journal of Business Venturing 193; A. Bruno and T. Tyebjee, "The Entrepreneur's Search for Capital" (1985) 1 Journal of Business Venturing 61.

28. Ibid. at 72.

29. See Bygrave and Timmons, supra, note 2.

30. Ibid. at 169.

31. Ibid.

32. On the value of liquidity to investors, see e.g. Yakov Amihud and Haim Mendelson, "Asset Pricing and the Bid-Ask Spread" (1986), 15 J. Fin. Econ. 223; Yakov Amihud and Haim Mendelson, "The Effects of Beta, Bid-Ask Spread, Residual Risk, and Size on Stock Returns" (1989), 44 J. Fin. 479.

33. A concise summary of the evidence may be found in Hanley and Ritter [Palgrave] and (with respect to Canadian evidence) Wendy Rotenberg, "Pricing Initial Public Equity Offerings: Who Wins, Who Loses And Why?" (1990) 3(1) Can. Invt. Rev. 17.

34. Hanley and Ritter, ibid.; Rotenberg, ibid.

35. Hanley and Ritter, ibid.; Rotenberg, ibid.

36. Hanley and Ritter, ibid.; Rotenberg, ibid. See also "Venture capital; Plenty to gain?" Economist, (Dec. 7, 1991) 100.

37. See J. Ritter, "The Long-Run Performance of Initial Public Offerings" (1991) 46 J. Fin. 3; Mario Levis, "The Long-run Performance of Initial Public Offerings: The UK Experience 1980-1988" (1993) 22 Fin. Man. 28; Tim Loughran and Jay Ritter, "The Timing and Subsequent Performance of IPOs: Implications for the Cost of Equity Capital", University of Illinois at Urbana-Champaign, April 27, 1993; Vijay Jog...

38. Loughran and Ritter, ibid.

39. Levis, supra, note 37.

40. Jog, supra, note 37.

41. Joshua Lerner, "Venture Capitalists and the Decision to Go Public", supra, note 4.

42. See MacIntosh, supra, note 6 (arguing that regulation is not likely to cure any allocative inefficiency caused by IPO overpricing).

43. Ibid.

44. See MacDonald & Associates, supra, note 3.

45. Bygrave and Timmons, supra, note 2, at 2-3, 16-17.

46. Sahlman, supra, note 13, at 489.

47. William L. Megginson and Kathleen A. Weiss, "Venture Capitalist Cerfication in Initial Public Offerings" (1991) 46 J. Fin. 879.

48. C.B. Barry, C.J. Muscarella, J.W. Peavy, III, and M.R. Vetsuypens, "The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going Public Process,"

(1990) 27 J. of Fin. Econs. 447.

49. Jog and MacIntosh are currently developing a data sample.

50. See "Top Brokers in Small-Cap IPO Market First-Half 1994" (Fall 1994) Profit 57 (indicating the largest players in the small cap underwriting market).

51. Intervention and Efficiency (Ottawa: Economic Council of Canada, 1982), at 29.

52. See generally MacIntosh, supra, note 6.

53. Competing in the New Global Economy, Report of the Premier's Council, Province of Ontario, 1988 ("Premier's Council"), vol.1, at 171.

54. Bygrave and Timmons, supra, note 2, at 23-25; Gompers, supra, note 1, at 10-13.

55. See Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity (Toronto: Macdonald & Associates, 1994), Appendix I, tables 1.2, 1.3.

56. Gompers, supra, note 1.

57. See Sahlman, supra, note 13.

58. Gompers, supra, note 1, at 22.

59. See Premier's Council, supra, note x, vol.1, at 145-147.

60. Peter Kastner, "Tax Credit Aspects: Tax Climate for R&D: A Canadian Perspective" (1995) 21 Can.- U.S. L.J. 289.

61. See Premier's Council, supra, note x, vol.3, at 186-87, 191-93.

62. See generally MacIntosh, supra, note 6.

63. Ibid.

64. MacIntosh, supra, note 6.

65. See e.g. Sahlman, supra, note 13; Bygrave and Timmons, supra, note 2.

66. Sahlman, supra, note 13.

67. See Sahlman, supra, note 13 (reporting that between 1965 and 1984, the median compound annual rate of return for venture funds was in excess of 26%); Bygrave and Timmons, supra, note 2; Gompers, supra, note 1.

68. See references in note 67.

69. See references in note 67. See also "Venture capital; Plenty to gain?" Economist, (Dec. 7, 1991) 100.

70. See Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, at 8-9.

71. Legal restraints on institutional investors have played an uncertain role in institutional purchases of small firm stocks.
Even restrictive 'legal for life' statutes have 'basket clauses' allowing for purchases of risky small firm shares, although recent federal adoption of "prudent person" investing standards may encourage more small firm investment. See generally Brian Z. Gelfand, Regulation of Financial Institutions (Toronto: Carswell, 1993); MacIntosh, supra, note 6.

72. In the Canadian study, the holding period in connection with an IPO is defined as the time from initial investment until the first sale of securities in connection with an IPO. By contrast, in the U.S. study, the holding period appears to be defined as the time from initial investment to the date of the IPO itself.

73. MacIntosh, supra, note 6.

74. See e.g. Bygrave and Timmons, supra, note 2, at 175. More generally, see H. Leland and D. Pyle, "Information Asymmetries, Financial Structure and Financial Intermediation" (1977) 32 J. Fin. 371.

75. VE, at 6.

76. The following categorization follows that in VE, Appendix A. The use of the term "stage" may be somewhat misleading, in that acquisition or turnaround financing may be supplied at a variety of different stages in a company's development.

77. This figure includes reverse takeovers (1%), which appear to be included in the IPO total from the U.S. sample.

78. VEC, at 11.

79. See Usha R. Mittoo, "Additional Evidence on Integration in the Canadian Stock Market" (1992) 47 J. Fin. 2035; P. Jorion and E. Schwartz, "Integration versus segmentation in the Canadian stock market" (1986) 41 J. Fin. 603.

80. VEC, at 11.

81. VEC, at 11.

82. VEC, at 10. Given that U.S. investments were one-quarter of the sample (see VEC, at , this means that repurchase was used at more than twice the rate for Canadian investments than for U.S. investments.

83. VEC, at 11.

84. VEC, at 6, 10.

85. The rapid influx of capital into the Canadian venture capital industry in the early 1980s is indicated by the ratio of new deals to exits in each year covered by the survey. This ratio jumped from 3.3 in 1980 to 25.8 in 1981. It fell to 8.9 in 1982 and to 3.7 in 1983. The only years (aside from 1981 and 1982) in which the ratio was above six were 1975 (7.0) and 1976 (6.7). Ibid. at 4. Thus, 1981 and 1982 were banner years for the venture capital industry in Canada.

86. See VEC, table 3, at 8.

87. The average IRR in 1975-80 was 25.8%. In the 1981-83 period, it was 22.8%. In 1984, it was 14.1%, and in 1985, it was 23.9%. See VEC, at 18. While the IRR in 1985 alone is no lower than that for 1975-83, combining 1984 and 1985 yields a lower IRR. Given that the average holding period for exits in 1984 and 1985 was 3.1 years and 4.1 years respectively, many of the exits made in 1984 and 1985 were from investments made in 1981 and 1982. Ibid.

88. VE, at 1.

89. VE, at 5.

90. A new fund need not have inexperienced managers; it may be operated by an experienced venture capital company, or hire experienced managers. However, the flow of new funds into the venture capital industry in the early 1980s was so great that it is inevitable that many of the newly formed funds employed managers lacking a great degree of experience. See Bygrave and Timmons, supra, note 2; Gompers, supra, note 1.

91. Bygrave and Timmons, ibid.; Gompers, ibid.

92. Bygrave and Timmons, ibid.; Gompers, ibid.

93. On the benefits of specialization, see Bygrave and Timmons, ibid.

94. VEC, at 4; VE, at 1.

95. Bygrave and Timmons, supra, note 2, at 13.

96. VEC comments that:

> It is important to note that writeoffs were expected to account for a high proportion of

the exits at the outset, given the nature of the sample. Many of the reporting funds have been formed in the past three to five years, and these funds can legitimately be expected to have taken writeoffs by now without having realized the gains on their more successful investments (which are still in their portfolio). If the sample included only those funds which have completed a full investment cycle, the proportion of writeoffs would, in all likelihood, have been significantly lower.

VEC, at 7.

97. VEC, at 8. One reverse takeover bid is included with the IPOs.

98. Ibid.

99. Ibid.

100. VEC, at 7.

101. VEC, at 5.

102. VEC, at 17.

103. VEC, at 6.

104. The IRR was calculated by treating the total amount invested by all venture capitalists as if it were a single investment, and calculating the IRR based on total exit price.

105. This was followed by turnaround financing (23%), expansion financing (22%), and seed/startup financing (16%). VEC, at 13.

106. VEC, at 10.

107. VEC, Table 11, at 17.

108. VE, at 15.

109. VE, at 10.

110. Ibid. at 3.

111. Indeed, Gompers has suggested that venture capitalists sometimes bring their portfolio firms to the public market too soon, in order to develop a track record of profitability and facilitate further fund raising. Gompers calls such behavior "grandstanding", and suggests that younger and less experienced venture capital managers are more likely to engage in grandstanding in order to compensate for the absence of a track record. See Gompers, supra, note 1; Paul A. Gompers, "Grandstanding in the Venture Capital Industry", Harvard University, unpublished draft, October 1995. Bygrave and Timmons make a similar argument. See Bygrave

and Timmons, supra, note 2. If correct, such behavior will clearly lower the returns realized from IPOs. This suggests that, absent the investor-venture capitalist agency cost, IPO returns would be even higher. It is likely, however, that "grandstanding" is not unique to IPO exits.

112. As VEC observed:

> The distribution of rates of return by exit mechanism [...] confirm one of the basic expectations of venture capital investing... a small number of highly profitable investments can produce a superior rate of return overall. Only 15% of the exits generated annual returns of more than 50%. These investments clearly played a critical role in producing an average annual return of 23% across the total sample.

VEC, at 17. With respect to U.S. data, see not only the VE study but Bygrave and Timmons, supra, note 2, at 167.

113. R.A. Shiller, "Initial Public Offerings: Investor Behavior and Underpricing" Cowles Foundation, Yale University, 1989.

114. See supra, note 37 and accompanying text.

115. Bygrave and Timmons, supra, note 2.

116. VEC, table 7, at 13.

117. VEC, at 18.

118. Sahlman, supra, note 13, table 6, at 511.

119. Bygrave and Timmons, supra, note 2, at 168.

120. VEC, table 12, at 18.

121. VEC, table 7, at 13.

122. VEC, table 2, at 6. The average investment was $999,000.

123. Ibid. The average investment was $453,000.

124. Ibid. The average size was $700,000.

125. Ibid. The average size was $613,000.

126. VEC, at 13. The average acquisition investment was $1,098,000, versus $545,000 for early stage investments, $707,000 for expansion stage investments, and $879,000 for turnaround investments. Ibid.

127. VE, table 3.4, at 19.

128. Ibid.

129. See also Venture Capital in Canada: Annual Statistical Review and Directory (Toronto: Association of Canadian Venture Capital Companies, 1994), Table IX.

130. Ibid. at 1; Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, at 4-5.

131. See also Mary Macdonald, "Financing Innovation in the Private Sector" (1995) 21 Can.-U.S. L.J. 195, at 200 ("in the mid-1980s, twenty-five percent of all the money invested went to technology companies. That figure is now sixty percent.").

132. For example, in the earlier period, there is no separate category for "industrial automation", or for "manufacturing".

133. While there clearly was a substantial increase in early and expansion stage financing, it should be noted that in the earlier survey, 23% of investments were identified as "other" or "unknown", while no investments were so identified in the later survey. Thus, early and expansion stage investments likely accounted for more than 63% in the earlier survey.

134. See Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, Appendix I, table 2.9.

135. Bygrave and Timmons report a movement towards later stage and acquisition investing on the part of U.S. venture capitalists. See Bygrave and Timmons, supra, note 2, ch.1; "Venture capital; Something gained" Economist (October 29, 1994) 91.

136. See Lerner, supra, note 4.

137. See e.g. "IPOs Provide the Best Exit ... As long as the market is there" (November 1995) Enterprise 1.

138. Mary Macdonald, "Financing Innovation in the Private Sector", supra, note 135, at 200.

139. See e.g. Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, at 16 (showing a substantial increase in the proportion of funds going to technology investments over the 1989-93 period), and various annual statistical reviews published by Macdonald & Associates for the Association of Canadian Venture Capital Companies.

140. Ibid. at 3. See also figure 1, on 2 (showing that the total capital under management was essentially unchanged between 1988 and 1992).

141. Ibid.

142. Gompers makes a similar argument. See Gompers, supra, note 1.

143. Gompers, ibid., at 13-15.

144. Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, figure 6, at 8, and Appendix A, table 1.6.

145. This would exclude 'corporate industrial' and 'corporate financial' funds, and include only 'private independent' funds. The classification comes from Mary Macdonald. See e.g. Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55.

146. With respect to U.S. data, see e.g. Office of the Chief Economist, Securities and Exchange Commission, "Institutional Ownership, Tender Offers, and Long-Term Investments", April 19, 1985. With respect to Canadian data, see Lewis D. Johnston and Bohumir Pazderka, "Firm Value and Investment in R&D" (1993) 14 Managerial and Decision Economics 15; Ronald M. Giammarino, "Patient Capital? R&D Investment in Canada", in Corporate Decision-Making in Canada, Ronald J. Daniels and Randall Morck, eds. (Calgary: Univ. of Calgary Press, 1995), at 575.

147. Paul Halpern,

148. By "privately run" I include a number of different types of funds, including "private independent" funds (traditional stand alone funds funded by institutional investors and wealthy individuals), "corporate industrial" funds (funds owned and managed by industrial corporations), and "corporate financial" funds (funds owned and managed by financial institutions). The classification comes from Mary Macdonald. See e.g. Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55.

149. See generally A. Riding, P. Dal Cin, L. Duxbury, G. Haines, R. Safrata, Informal Investors in Canada: The Identification of Salient Characteristics, A Report submitted to the Federal Department of Industry, Science and Technology Canada and to the Ministry of Economic Development and Trade of the Province of Ontario, May 23, 1993.

150. See Pavey, supra, note 5, at 206.

151. Riding et al. state that Angel investors are usually "bought out in a public offering or by a professional venture capital firm". See Riding et al., supra, note 149, at 29.

152. William E. Wetzel, "The Informal Venture Capital Market: Aspects of Scale and Efficiency" (1987) 2 J. Bus. Venturing 299.

153. Pavey, supra, note 5.

154. See Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, Appendix I, table 1.2.

155. Macdonald & Associates, ibid., Appendix I, table 1.3.

156. Ibid.

157. Ibid., figure 8, at 10.

158. Ibid., figure 6, at 8.

159. Bygrave and Timmons, supra, note 2; Gompers, supra, note 1.

160. Macdonald, supra, note 55, at 20.

161. Mary Macdonald, supra, note 135, at 199.

162. See "1994: An Active Year for the Industry" (1995) Enterprise 1.

163. It should be noted that the government funds may also have some tendency to crowd out the private funds. Government-run venture capital funds typically focus on early stage investing, and preliminary evidence suggests that they are not as profitable as private funds. Macdonald & Associates, supra, note 55, at 20.

164. Ibid., figure 16, at 18.

165. See generally MacIntosh, supra, note 6.

166. Macdonald & Associates, The Venture Capital Market in Canada: An Analysis of 1993 Venture Capital Activity, supra, note 55, Appendix I, table 1.7.

167. Ibid.

168. Ibid. at 9.

169. Macdonald also indicates that:

> Concentration of capital is also an issue with the private independent funds, although to a lesser extent. More than half of the estimated $566 million available from private funds is in the hands of 5 such funds.

Ibid. at 10.

170. Some of these arguments are summarized in MacIntosh, supra, note 6.

171. MacIntosh, supra, note 6.

FIGURE 1

DISTRIBUTION OF PORTFOLIO COMPANY
GAINS AND LOSSES BY EXIT METHOD

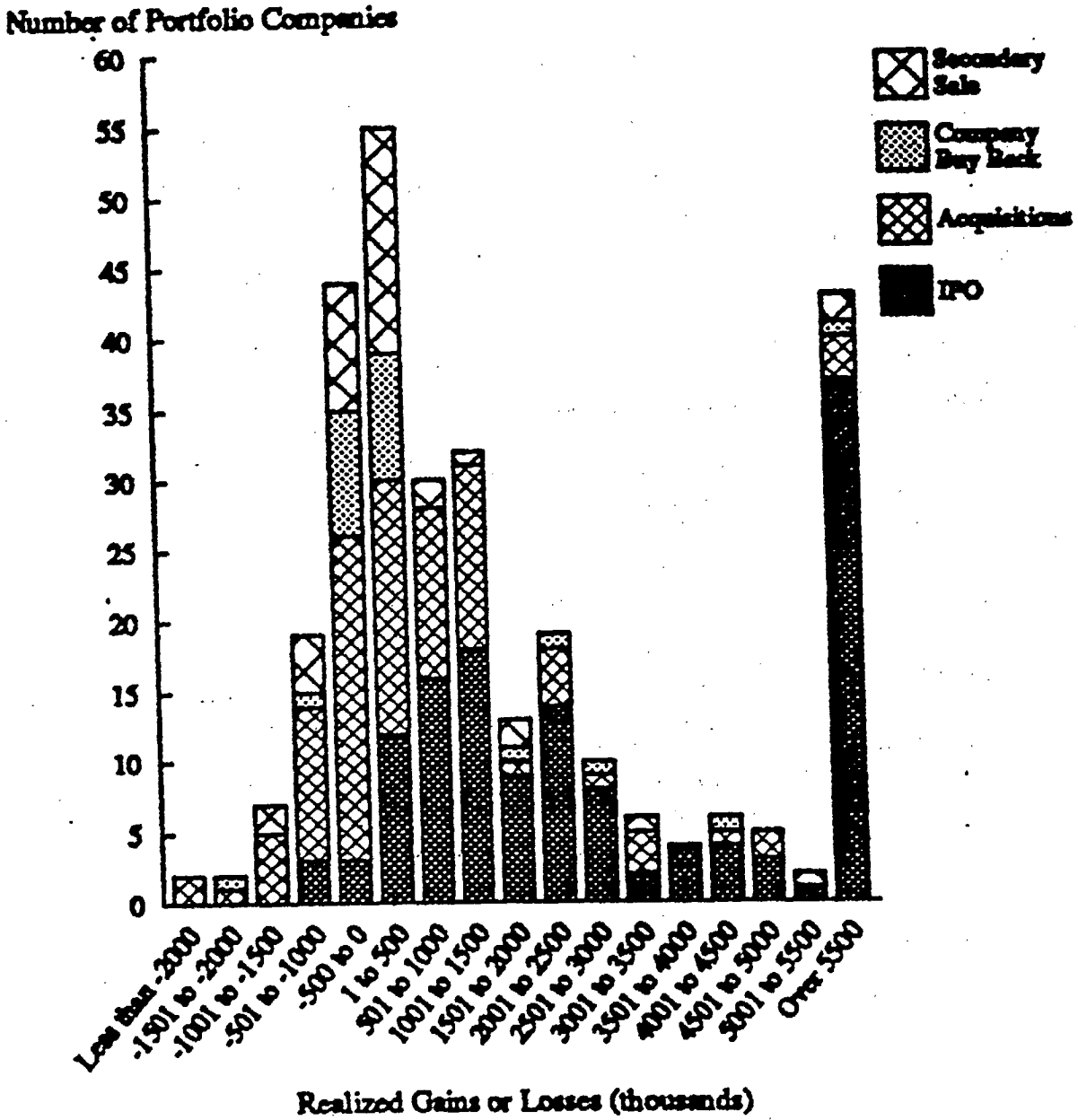

TABLE 1

DISTRIBUTION OF EXITS
CANADA (1975-1985) AND UNITED STATES (1970-1988)

	Canada			U.S.		
Exit Method	Number of Portfolio Companies	Percent	Average Investment ($000s)[5]	Number of Portfolio Companies	Percent	Average Investment ($000s)[6]
IPO[1]	27	16	999	193	35	814
Acquisition	29	17	700	118	22	988
Company Buy Back	37	22	453	33	6	595
Secondary Sale[2]	N/A	N/A	N/A	46	8	715
Liquidation[3]	N/A	N/A	N/A	32	6	1,030
Write-Off	53	32	613[4]	114	21	961
Unknown	4	2	N/A	-	-	-
Other	17	10	421	8	2	N/A
Total	167	99	3,186	544	100	5,103

1. In Canada, IPO includes 1 reverse takeover.
2. In Canada, secondary sales were not recorded separately. They may be reflected in the "other" category.
3. In Canada, liquidations were not recorded separately. They may be reflected in either the "acquisition" or "other" categories.
4. Excludes one extraordinary transaction which, if included, increases the average investment to $741,000.
5. Canadian dollars.
6. U.S. dollars.

Source: VEC, at 6: VE, at 7 and 10.

TABLE 2

DISTRIBUTION OF EXITS BY PORTFOLIO COMPANY INDUSTRY[1]

	Canada	U.S.
Communications	10%	14%
Computer Related	12%	41%
Other Electronic	5%	10%
Biotechnology	1%	2%
Medical/Health related	5%	9%
Energy Related	10%	4%
Consumer Related	16%	6%
Industrial Products	15%	5%
Other	23%	9%
Unknown	4%	-

1. Numbers may not sum to 100% due to rounding.

TABLE 3

DISTRIBUTION OF EXITS BY PORTFOLIO COMPANY STAGE

Portfolio Company Stage	Percent of Exits	
	Canada	U.S.
Early Stage	36%	48%
Expansion Stage	27%	45%
LBO	8%	7%
Turnaround	7%	0%

Source: VEC, at 13: VE, at 15.

TABLE 4

CROSS-DISTRIBUTION OF EXITS BY TIME AND METHOD IN CANADA

	1975-1977		1978-1980		1981-1983		1984		1985		Date Unknown		Total	
Exit Vehicle	#	%	#	%	#	%	#	%	#	%	#	%	#	%
IPO	0	0	3	9	6	19	5	19	11	19	1	10	26	16
Acquisition	0	0	5	15	8	25	5	19	9	16	2	20	29	17
Repurchase	3	43	10	30	4	13	4	15	15	26	1	10	37	22
Reverse	0	0	1	3	0	0	0	0	0	0	0	0	1	1
Write-Off	1	14	8	24	9	28	11	41	19	33	5	50	53	32
Other	3	43	6	18	5	16	2	7	4	7	1	10	21	13
Totals	7	100	33	100	32	100	27	100	58	100	10	100	167	100

Source: VEC, at 8.

TABLE 5

ANALYSIS OF EXITS BY BUSINESS ENVIRONMENTS IN THE UNITED STATES

	1/70-12/79	1/80-12/81	1/82-12/82	1/83-6/84	7/84-9/85	10/85-9/87	10/87-6/88
Exit Vehicles:	%	%	%	%	%	%	%
IPO	32	62	33	54	16	34	5
Acquisition	19	16	33	17	30	21	76
Company Buy-Back	7	2	8	8	4	7	3
Secondary Sale	23	11	8	6	11	5	13
Liquidation	-	2	-	6	7	8	10
Write-Off	19	7	17	9	32	25	43
Total	100	100	99	100	100	100	100
Total Number of Portfolio Companies:	31	45	24	125	88	182	39

Source: VE, at 23.

TABLE 6

PROFITABILITY AND HOLDING PERIODS FOR DIFFERENT EXIT TECHNIQUES

	Canada			U.S.	
Exit Method:	Average Holding Period: (years)	Average Internal Rate of Return: (%)		Average Holding Period: (years)	Average Gain (or Loss) per Year as a Multiple of Cost:
IPO	2.3	197		4.2	1.95
Acquisition	4.1	21		3.7	0.40
Company Buyback	5.7	44		4.7	0.37
Secondary Sale	N/A	N/A		3.6	0.41
Liquidation	N/A	N/A		4.1	(0.34)
Write-Off	3.4	N/A		3.7	(0.37)

Source: VEC, at 6: VE, at 10.

TABLE 7

DISTRIBUTION OF RATES OF RETURN BY EXIT VEHICLE USED, CANADA

	IPO		Repurchase		Acquisition	
IRR Range	#	%	#	%	#	%
>200%	2	8	-	-	-	-
126-200	2	8	-	-	-	-
76-125	4	15	1	3	-	-
51-76	1	4	-	-	4	14
26-50	2	8	6	16	2	7
16-25	4	15	6	16	2	7
0-15	3	12	11	30	10	35
<0	-	-	3	8	2	7
Incomplete Data	8	30	10	27	9	30
Total	26	100	37	100	29	100

Source: VEC, at 17.

TABLE 8

CROSS DISTRIBUTION OF EXITS BY STAGE OF INVESTMENT CYCLE AT TIME OF INITIAL INVESTMENT AND TYPE OF EXIT, CANADA

	Seed/ Startup		Expansion		Leveraged Buyout		Turnaround		Unknown		Totals	
Type of Exit	#	%	#	%	#	%	#	%	#	%	#	%
IPO	4	7	10	22	7	50	1	9	4	11	26	16
Acquisition	8	13	6	13	3	21	4	36	8	22	29	17
Repurchase	12	20	11	24	1	7	3	27	10	27	37	22
Reverse	1	2	0	0	0	0	0	0	0	0	1	1
Write-Off	30	50	11	24	1	7	3	27	8	22	53	32
Other	4	7	6	13	2	14	0	0	5	14	17	10
Unknown	1	2	1	2	0	0	0	0	2	5	4	2
Totals:	60	100	45	100	14	100	11	100	37	100	167	100

Source: VEC, at 14.

TABLE 9

DISTRIBUTION OF EXITS BY PORTFOLIO COMPANY STAGE, U.S.

Portfolio Company Stage	Percent of Number of Exits						
	Total Number of Exits:	IPO: (%)	Acquisition: (%)	Company Buy Back: (%)	Secondary Sale: (%)	Liquidation: (%)	Write-Off: (%)	Total:[1] (%)
Early Stage	261	30	22	3	7	5	31	98
Expansion Stage	244	43	23	5	9	7	12	100
LBO	36	28	17	30	19	-	6	99
All Stages	544	35	22	6	8	6	21	98

1. May not total 100% due to use of 'other' exit types.

Source: VE, at 15.

TABLE 10A

DISTRIBUTION OF EXITS OVER TIME,
1975-1985

	Exits		# of New Deals	Ratio of New Deals To Exits
Year	%	#		
1975	0	0	17	-
1976	4	2	28	7.0
1977	3	2	20	6.7
1978	12	7	18	1.5
1979	11	7	37	3.4
1980	10	6	33	3.3
1981	5	3	129	25.8
1982	8	5	71	8.9
1983	19	11	71	3.7
1984	27	16	74	2.7
1985	58	35	66	1.1
Unknown	10	6	-	-
Total:	167	100	564	-

Source: VEC, at 4.

TABLE 10B

DISTRIBUTION OF EXITS OVER TIME,
1992-1995

Year	Number of Exits	Number of New Deals	Ratio of New Deals To Exits
1992	20	161	8.05
1993	31	209	6.74
1994	34	232	6.82
1995	49	185	3.78

Source: Macdonald & Associates, at 2.

TABLE 11A

DISTRIBUTION OF EXITS BY VEHICLE USED, 1975-1985

Exit Vehicle	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
IPOs	26	16	999	2.3	197
Acquisitions	29	17	700	4.1	21
Repurchase	37	22	453	5.7	44
Reverse	1	1	-	-	-
Write-Offs	53	32	613[1]	3.4	-
Other	17	10	421	5.5	-
Unknown	4	2	-	-	-
Total	167	100	647	4.3	23

1. Excludes one extraordinary transaction which, if included, increases the average investment to $741,000.

Source: VEC, at 6.

TABLE 11B

DISTRIBUTION OF EXITS BY VEHICLE USED, 1992-1995

Exit Vehicle	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
IPOs	36	27	2,006	4.73	21
Acquisitions	16	12	2,643	5.89	12
Repurchase	41	31	997	5.28	8
Reverse	27	20	512	3.08	-
Write-Offs	12	9	662	1.98	38
Other	2	1	3,350	5.00	9
Total	134	100	1,372	4.53	16

Source: Macdonald & Associates, at 2.

TABLE 12A

CROSS-DISTRIBUTION OF EXITS BY TIME AND METHOD IN CANADA, 1975-1985

	1975-1977		1978-1980		1981-1983		1984		1985		Date Unknown		Total	
Exit Vehicle	#	%	#	%	#	%	#	%	#	%	#	%	#	%
IPO	0	0	3	9	6	19	5	19	11	19	1	10	26	16
Acquisition	0	0	5	15	8	25	5	19	9	16	2	20	29	17
Repurchase	3	43	10	30	4	13	4	15	15	26	1	10	37	22
Reverse	0	0	1	3	0	0	0	0	0	0	0	0	1	1
Write-Off	1	14	8	24	9	28	11	41	19	33	5	50	53	32
Other	3	43	6	18	5	16	2	7	4	7	1	10	21	13
Totals	7	100	33	100	32	100	27	100	58	100	10	100	167	100

Source: VEC, at 8.

TABLE 12B

CROSS-DISTRIBUTION OF EXITS BY TIME AND METHOD IN CANADA, 1992-1995

	1992		1993		1994		1995	
Exit Vehicle	#	%	#	%	#	%	#	%
IPO	5	25	6	19	9	26	16	33
Acquisition	4	20	5	16	2	6	5	10
Repurchase	8	40	10	32	9	26	14	29
Reverse	3	15	7	23	12	35	5	10
Write-Off	0	0	1	3	2	6	9	18
Other	0	0	2	6	0	0	0	0
Totals	20	100	31	100	34	100	49	100

Source: Macdonald & Associates, at 2.

TABLE 13A
CROSS DISTRIBUTION OF EXITS BY LOCATION OF PORTFOLIO COMPANY AND TYPE OF EXIT, 1975-1985

Exit Vehicle	British Columbia		Alberta		Ontario		Quebec		Atlantic Provinces		Other Canadian		Total Canadian	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
IPO	2	29	1	6	5	8	7	25	0	0	0	0	15	12
Acquisition	0	0	2	11	15	23	4	14	2	29	0	0	23	18
Repurchase	3	43	5	28	14	22	7	25	1	14	2	67	32	25
Reverse	0	0	1	6	0	0	0	0	0	0	0	0	1	1
Write-Off	1	14	2	11	24	37	8	29	3	43	1	33	39	30
Other	1	14	7	39	7	11	2	7	1	14	0	0	18	14
Totals	7	100	18	100	65	100	28	100	7	100	3	100	128	100

Exit Vehicle	U.S.		Other Countries		Unknown		Totals	
	#	%	#	%	#	%	#	%
IPO	9	32	0	0	2	33	26	16
Acquisition	4	14	0	0	2	33	29	17
Repurchase	3	11	1	20	1	17	37	22
Reverse	0	0	0	0	0	0	1	1
Write-Off	9	32	4	80	1	17	53	32
Other	3	11	0	0	0	0	21	13
Totals	28	100	5	100	6	100	167	100

Source: VEC, at 10.

TABLE 13B
CROSS DISTRIBUTION OF EXITS BY LOCATION OF PORTFOLIO COMPANY AND TYPE OF EXIT
1992-1995

	British Columbia		Prairie Provinces		Ontario		Quebec		U.S.		Other Countries	
Exit Vehicle	#	%	#	%	#	%	#	%	#	%	#	%
IPO	2	15	0	0	17	35	3	10	12	57	2	67
Acquisition	3	23	5	29	3	6	4	13	1	5	0	0
Company Buyback	4	31	11	65	12	24	9	30	4	19	1	33
Write-Off	2	15	1	6	10	20	12	40	1	5	0	0
Secondary Sales	1	8	0	0	7	14	1	3	3	14	0	0
Other	1	8	0	0	0	0	1	3	0	0	0	0
Totals	13	100	17	100	49	100	30	100	21	100	3	100

Source: Macdonald & Associates, at 3.

TABLE 14A

IPO'S BY LOCATION BY YEAR
(NUMBER OF IPO'S)

Location	1975-1980	1981-1983	1984-1985	Total
Quebec	-	-	7	7
Canada less Quebec	2	3	3	8
USA	1	4	6	11
Total	3	7	16	26

Source: VEC, at 11.

TABLE 14B

IPO'S BY LOCATION BY YEAR
(NUMBER OF IPO'S)

Location	1992	1993	1994	1995	Total
British Columbia	1	1	0	0	2
Ontario	4	2	4	7	17
Quebec	0	1	2	0	3
Canada	5	4	6	7	22
USA	0	2	2	8	12
Other Countries	0	0	1	1	2

Source: Macdonald & Associates, at 3.

TABLE 15A

LOCATION OF PORTFOLIO COMPANY
1975-1985

Location	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
Quebec	28	17	855	4.6	28
Canada less Quebec	100	60	588	3.9	23
Canada	128	77	684	4.0	24
USA	28	17	654	3.5	23
All Investments	167	100	647	4.3	23

Source: VEC, at 12.

TABLE 15B

LOCATION OF PORTFOLIO COMPANY
1992-1995

Location	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
British Columbia	13	10	1,561	5.99	8
Prairie Provinces	17	13	1,941	6.20	10
Ontario	49	37	1,361	4.29	20
Quebec	30	22	847	3.13	14
Atlantic Provinces	1	1	1,300	1.00	-
Canada	110	82	1,333	4.44	15
USA	21	16	1,590	4.37	15
Other Countries	3	2	1,258	6.22	28
All Exits	134	100	1,372	4.53	16

Source: Macdonald & Associates, at 4.

TABLE 16A

DISTRIBUTION OF EXITS AND RETURNS BY STAGE AT INITIAL INVESTMENT 1975-1985

Stage	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
Seed/Startup	60	36	545	4.5	16
Expansion	45	27	707	3.8	22
Leveraged Buyout	14	8	1,098	2.4	55
Turnaround	11	7	879	4.0	23
Other	1	1	N/A	-	N/A
Unknown	36	22	324	4.9	15
Total	167	100	647	4.3	23

Source: VEC, at 13.

TABLE 16B

DISTRIBUTION OF EXITS AND RETURNS BY STAGE AT INITIAL INVESTMENT 1992-1995

Stage	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
Early Stage	64	48	932	5.07	17
Expansion	61	46	1,830	3.76	11
Acquisition/ Buyout	3	2	426	7.61	30
Turnaround	6	4	1,875	3.81	28
All Stage	134	100	1,372	4.53	16

Source: Macdonald & Associates, at 4.

TABLE 17A

CROSS DISTRIBUTION OF EXITS BY STAGE OF INVESTMENT CYCLE AT TIME OF INITIAL INVESTMENT AND TYPE OF EXIT 1975-1985

	Seed/ Startup		Expansion		Leveraged		Turnaround Buyout		Unknown		Totals	
Type of Exit	#	%	#	%	#	%	#	%	#	%	#	%
IPO	4	7	10	22	7	50	1	9	4	11	26	16
Acquisition	8	13	6	13	3	21	4	36	8	22	29	17
Repurchase	12	20	11	24	1	7	3	27	10	27	37	22
Reverse	1	2	0	0	0	0	0	0	0	0	1	1
Write-Off	30	50	11	24	1	7	3	27	8	22	53	32
Other	4	7	6	13	2	14	0	0	5	14	17	10
Unknown	1	2	1	2	0	0	0	0	2	5	4	2
Totals:	60	100	45	100	14	100	11	100	37	100	167	100

Source: VEC, at 14.

TABLE 17B

CROSS DISTRIBUTION OF EXITS BY STAGE OF INVESTMENT CYCLE AT TIME OF INITIAL INVESTMENT AND TYPE OF EXIT 1992-1995

	Early Stage		Expansion		Acquisition/ Buyout		Turnaround		Total	
Type of Exit	#	%	#	%	#	%	#	%	#	%
IPO	19	30	15	25	0	0	2	33	36	27
Acquisition	5	8	10	16	1	33	0	0	16	12
Company Buyback	21	33	18	30	2	67	0	0	41	31
Write-Off	14	22	9	15	0	0	4	67	27	20
Secondary Sales	5	8	7	11	0	0	0	0	12	9
Other	0	0	2	3	0	0	0	0	2	1
Total	64	100	61	100	3	100	6	100	134	100

Source: Macdonald & Associates, at 5.

TABLE 18A
DISTRIBUTION OF EXITS BY INDUSTRY GROUP
1975-1985

Industry Group	Exits #	Exits %	Average IRR (%)
Communications	17	10	28
Computer Related	20	12	29
Other Electronic	8	5	29
Biotechnology	2	1	12
Medical/Health Related	8	5	12
Energy	16	10	17
Consumer Related	26	16	23
Industrial Products	25	15	26
Other	38	23	19
Unknown	7	4	-
Total	167	100	23

Source: VEC, at 15.

TABLE 18B
DISTRIBUTION OF EXITS BY INDUSTRY GROUP
1992-1995

Industry Group	Exits #	Exits %	Average Investment ($000s)	Average Holding Period (years)	Average IRR (%)
Biotechnology	4	3	1,190	3.41	12
Communications	11	8	1,149	3.42	23
Computer	17	13	1,688	4.91	21
Electronics	11	8	838	5.77	25
Energy/Environmental	2	1	2,450	3.00	-3
Industrial Automation	5	4	2,469	4.37	15
Medical/Health	23	17	1,286	3.73	6
Consumer	18	13	1,144	3.61	13
Manufacturing	22	16	1,214	4.87	8
Miscellaneous	21	16	1,639	5.48	8
All Stage	134	100	1,372	4.53	16

Source: Macdonald & Associates, at 4.

TABLE 19A

CROSS DISTRIBUTION OF EXITS
BY INDUSTRY OF PORTFOLIO COMPANY
AND TYPE OF EXIT
1975-1985

	Communications		Computer Related		Other Electronic		Biotechnology Genetic Eng.		Medical Related		Energy	
Type of Exit	#	%	#	%	#	%	#	%	#	%	#	%
IPO	3	18	3	15	2	25	1	50	1	13	1	6
Acquisition	3	18	5	25	1	13	0	0	1	13	1	6
Repurchase	2	12	2	10	4	50	0	0	2	25	5	31
Reverse	0	0	0	0	0	0	0	0	0	0	1	6
Write-Off	8	47	9	45	1	13	1	50	2	25	2	13
Other	0	0	1	5	0	0	0	0	2	25	5	31
Unknown	1	6	0	0	0	0	0	0	0	0	1	6
Totals	17	100	20	100	8	100	2	100	8	100	16	100

TABLE 19A (CONTINUED)

	Consumer Related		Industrial Products		Other		Unknown		Totals	
Type of Exit	#	%	#	%	#	%	#	%	#	%
IPO	2	8	4	16	8	21	1	14	26	16
Acquisition	4	15	5	20	7	18	2	29	29	17
Repurchase	7	27	7	28	7	18	1	14	37	22
Reverse	0	0	0	0	0	0	0	0	1	1
Write-Off	11	42	7	28	11	29	1	14	53	32
Other	2	8	2	8	4	11	1	14	17	10
Unknown	0	0	0	0	1	3	1	14	4	2
Totals	26	100	25	100	38	100	7	100	167	100

Source: VEC, at 16.

TABLE 19B

CROSS DISTRIBUTION OF EXITS
BY INDUSTRY OF PORTFOLIO COMPANY
AND TYPE OF EXIT
1992-1995

	Bio		Comm		Comp		Elec		Env		Ind	
Type of Exit	#	%	#	%	#	%	#	%	#	%	#	%
IPO	4	100	5	45	10	59	2	18	1	50	0	0
Acquisition	0	0	0	0	1	6	1	9	0	0	4	80
Company Buyback	0	0	3	27	1	6	2	18	0	0	0	0
Write-Off	0	0	2	18	1	6	3	27	1	50	1	20
Secondary Sales	0	0	1	9	4	24	3	27	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
	4	100	11	100	17	100	11	100	2	100	5	100

TABLE 19B (CONTINUED)

	Med		Con		Man		Mis		Total	
Type of Exit	#	%	#	%	#	%	#	%	#	%
IPO	11	48	1	6	1	5	1	5	36	27
Acquisition	1	4	3	17	3	14	3	14	16	12
Company Buyback	6	26	6	33	12	55	11	52	41	31
Write-Off	1	4	7	39	5	23	6	29	27	20
Secondary Sales	4	17	0	0	0	0	0	0	12	9
Other	0	0	1	6	1	5	0	0	2	1
	23	100	18	100	22	100	21	100	134	100

Source: Macdonald & Associates, at 5.

TABLE 20A

DISTRIBUTION OF RATES OF RETURN BY EXIT VEHICLE USED
1975-1985

	IPO		Repurchase		Acquisition	
IRR Range	#	%	#	%	#	%
>200%	2	8	-	-	-	-
126-200	2	8	-	-	-	-
76-125	4	15	1	3	-	-
51-76	1	4	-	-	4	14
26-50	2	8	6	16	2	7
16-25	4	15	6	16	2	7
0-15	3	12	11	30	10	35
<0	-	-	3	8	2	7
Incomplete Data	8	30	10	27	9	30
Total	26	100	37	100	29	100

Source: VEC, at 17.

TABLE 20B

DISTRIBUTION OF RATES OF RETURN BY EXIT VEHICLE USED
1992-1995

	IPO		Buyback		Acquisition		Secondary Sale	
IRR Range	#	%	#	%	#	%	#	%
>200%	1	3	0	0	1	6	1	8
126-200	1	3	0	0	0	0	2	17
76-125	4	11	1	2	0	0	0	0
51-76	4	11	0	0	2	13	2	17
26-50	10	28	2	5	2	13	2	17
16-25	3	8	8	20	1	6	0	0
0-15	10	28	20	49	9	56	3	25
<0	3	8	10	24	1	6	2	17
Total	36	100	41	100	16	100	12	100

Source: Macdonald & Associates, at 6.

TABLE 21A

$'S INVESTED/HOLDING PERIOD AND IRR
1975-1985

$'s Invested	Average Holding Period (years)	Average IRR (%)
<$200	4.9	16.7
$200-499	4.2	22.7
$500-999	3.1	21.2
>$1 million	4.0	36.3
Total	4.3	23.1

Source: VEC, at 18.

TABLE 21B

$'S INVESTED/HOLDING PERIOD AND IRR
1992-1995

$'s Invested	Average Holding Period (years)	Average IRR (%)
<$200	5.13	40
$200-499	4.40	3
$500-999	3.99	20
>$1 million	4.36	15
Total	4.53	16

Source: Macdonald & Associates, at 6.

TABLE 22A

DATE OF EXIT BY HOLDING PERIOD, AVERAGE INVESTMENT AND IRR 1975-1985

	Average Holding Period (years)	Average Investment ($000s)	Average IRR (%)
1975-1980	5.1	424	25.8
1981-1983	3.7	527	22.8
1984	3.1	556	14.1
1985	4.1	937	23.9
Total	4.3	647	23.1

Source: VEC, at 18.

TABLE 22B

DATE OF EXIT BY HOLDING PERIOD, AVERAGE INVESTMENT AND IRR 1992-1995

	Average Holding Period (years)	Average Investment ($000s)	Average IRR (%)
1992	4.60	1,423	10
1993	4.10	1,340	11
1994	3.97	1,279	12
1995	5.17	1,435	20
	4.53	1,372	16

Source: Macdonald & Associates, at 6.

TABLE 23

EXTENT DISPOSITION, 1992-1995

	#	Average Holding Period (years)	Average Investment ($000s)	Average IRR (%)
Partial	35	5.41	1,219[1]	21
Full	99	4.13	1,353	13
Total	134	4.53	1,372	16

1. Excludes one large transaction.

Source: Macdonald & Associates, at 6.

TABLE 24

REASONS FOR EXITS, 1992-1995

	#	Average Holding Period (years)	Average Investment ($000s)	Average IRR (%)
Pre-planned	35	6.2	2,262	16
Market Conditions	35	3.41	1,321	23
Unsolicited Offer	27	5.57	1,405	13
Others	37	3.78	555	-
Total	134	4.53	1,372	16

Source: Macdonald & Associates, at 6.

The Climate for Canadian Initial Public Offerings

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The Climate for Canadian Initial Public Offerings

Vijay Jog

Executive Summary

This paper provides empirical evidence on four issues related to the process of 'going public' in Canada. Issues considered are: underpricing of IPOs, long term stock market performance of IPOs, the financial performance of firms in the post-IPO period compared to their pre-IPO period, and the actual process of going public as seen from the view point of entrepreneurs.

Since the paper provides evidence on four related but separate areas, the methodologies followed in each area differ. For the work on underpricing, we use the standard definition of underpricing namely, the difference between the price of the shares on the first day of trading compared to the issue price. In evaluating the long-term performance, we calculate the wealth implications of investing in an IPO portfolio which represents the rates of return earned by an investor investing in our sample IPOs as they list on the stock exchange. We compare it with the bench mark portfolio. For the accounting-based performance, we investigate the financial statements of the sample firms and provide some distribution-based properties of standard financial performance measure. To get the evidence on the process of going public, we use a questionnaire-based methodology. Since most of our methodologies are now quite standard in the literature, we concentrate on the describing the results of our study.

First, the evidence reviewed here on underpricing of Canadian IPOs reveals that the degree of underpricing in Canada is much less than that reported in most other developed countries. Moreover, the degree of underpricing decreased in the 1980s compared to the 1970s. Thus, there is no reason to be concerned about the pricing mechanism for Canadian IPOs. It should be noted that the evidence is restricted to firms which qualified for listing on the Toronto Stock Exchange and may not be generalisable to other stock exchanges where listing requirements are less restrictive.

Second, with respect to the long term performance of IPOs in our sample, our conclusions are disappointing from an investor's viewpoint. Although, on an absolute basis, our sample IPOs generated positive returns to the investor in the first year and over a five year holding period, their relative performance was much worse. More specifically, in relation to the bench mark portfolio the cumulative abnormal residual for the Canadian sample by month 36 is -41.02 percent and the under-performance is evident for 4 years after the issue date.

Third, we present results on financial indicators of a sub-sample of fifty firms. Almost two-thirds of the sample firms show a deterioration in the standard financial performance measures. Since these fifty firms were chosen simply on the basis of data availability, there is no reason to believe that another set of fifty firms would display radically different performance characteristics. These results also correspond to the overall negative long term performance of the IPO firms in the stock market.

Lastly, we present results of a survey of questionnaire that was sent to entrepreneurs who were instrumental in taking their firms public. Its main purpose was to assess the issues that arise during the IPO process. We find that: the main reason for firms going public is that other sources of financing can no longer satisfy their financing needs. This, coupled with the state of the stock market and the owner's need to seek liquidity, may result in the firm's deciding to go public. The underwriter(s) who can get the IPO business will be those who have a good overall reputation, are known for their quality of service, can demonstrate their success in raising capital and can show their knowledge about institutional investors. The costs of raising external financing via an IPO is in the range of $300,000 to $400,000 plus another 6 to 7 percent in underwriting costs. In addition, underwriters are often allocated an over-allotment or a compensation option, bringing the total compensation of the underwriters to about 8 to 10 percent of the amount raised. There is a general recognition of the fact that underpricing of an IPO can be justified in the context of uncertainty about the future price of the IPO and in order to ensure that the required financing is raised. These results also indicate that, there are competing hypotheses for the underpricing, and that no one hypothesis can provide a complete explanation for the existence of underpricing in IPOs.

These overall results indicate that from the viewpoint of an entrepreneur, the Canadian IPO environment is an attractive one. The degree of underpricing is low; investors seem to buy all the IPOs offered despite below average returns and performance; there is no evidence of under-allotment; and the support by underwriters seems to be satisfactory. From an investor's viewpoint, the results are quite disappointing. Although, on an absolute basis, there is no great loss from an initial investment, a typical IPO provides large negative returns when adjusted for the underlying market movement. This less than attractive performance is also confirmed by the accounting-based analysis conducted for a small sample of recent IPO firms.

The overall evidence presented here indicates that the Canadian capital markets are doing a superior job in allocating risk capital to entrepreneurs, and that any concerns that Canadian entrepreneurs and policy makers may have in terms of the impact of IPO underpricing on the motivation of entrepreneurs to go public are not borne out by this evidence. Clearly, an improvement in underlying performance by IPO firms in post-IPO years would be welcome news if Canadian investors were expected to channel their savings into IPOs. However, the managers of these newly public firms seem to be unable to perform according to initial expectations. The post-IPO performance is poor both on the basis of stock market performance and on the basis of accounting-based performance measures although the latter is based on a somewhat non-random, small sample. As far as we know, no empirical evidence exists upon the post-IPO governance characteristics of these IPO firms. Neither is there any evidence on the adequacy of the management skills of these firms in their ability to manage in the new environment. The evidence presented here indicates that, if anything, these firms in their post-IPO period performed less than satisfactorily for their shareholders.

For an entrepreneurial firm, a public listing of its shares on a stock exchange is often considered a major event. This 'going public' through an initial public offering (IPO, hereafter) can be considered as the 'coming of age' for a firm.

The purpose of this paper is to provide empirical evidence on four issues related to the process of 'going public' based on Canadian IPOs during 1971-1992. More specifically, the paper provides evidence on: underpricing of IPOs, long term stock market performance of IPOs, the financial performance of firms in the post-IPO period compared to their pre-IPO period, and the actual process of going public as seen from the view point of individual firms. The evidence on the first three issues is based on secondary data available in the public domain; the evidence on the last issue comes from responses to questionnaires received from firms which went public during the late 1980s and early 1990s.[1]

The paper is organized as follows: in the next section, we provide some overall perspective on the importance of increasing our knowledge about the IPO environment in Canada. This perspective includes that of the government as well as that of the entrepreneur. It should be noted that the term 'entrepreneur' and 'firm' is used interchangeably throughout the rest of the paper. The next section provides a very brief overview of the Canadian IPO market and institutional environment. The following sections provide empirical evidence on the four main issues noted above. The paper ends with summary and conclusions.

IMPORTANCE OF THE IPO ENVIRONMENT

Access to equity capital for the Canadian entrepreneurial firm has generated considerable interest and debate, beginning with the Economic Council study in 1982, and continuing right up to the report produced recently by the Small Business Working Committee.[2] The basic notion behind all the analysis and concern with respect to the

IPO environment is that for a country like Canada to compete effectively, Canadian capital markets must be efficient and effective in providing equity capital to entrepreneurial firms.

If this access to equity capital is cost-effective, both from a transaction and a pricing and valuation viewpoint, then Canadian firms will be able to create and sustain new innovations, create jobs, generate corporate and personal tax revenues, and compete internationally. Thus, from an economic perspective, it is clear that Canada must have a vibrant capital market for IPOs.

There are some important additional reasons for having a vibrant IPO environment. First, entrepreneurs are provided with an additional impetus to start a business and nurture it if they have a reasonable expectation that, if and when necessary, capital markets will provide them with monetary rewards by purchasing their equity in the firm at a reasonable price. A second such reason is that a vibrant IPO market is able to provide 'exit' possibilities for investors who provide private capital to a firm prior to it being ready for an IPO. These informal investors and venture capitalists can, therefore, provide seed capital without being overly concerned about the potential 'locking in' of their investment for long periods of time.

A third and even more important reason for having a vibrant IPO market is the contemporary structural change in the global business environment. It is undeniable that to compete globally, Canada must change its focus from the " bricks and mortar" industrial base to the "knowledge based" economy, where efficient access to external equity capital is even more important. Traditional sources of debt financing can effectively finance the purchase of assets that have high collateral value. These lenders are comfortable with the knowledge that, in a worst case scenario, they can find buyers for the underlying assets of the firm. In the knowledge economy, no such collateral exists; and therefore, traditional sources of debt financing are not attracted to financing this sort of entrepreneurial firm.[3] Worse still, even if the lenders wanted to

lend against these 'soft' assets, the incentives necessary for a proper valuation of these firms may be absent in a lending environment where the up side returns are fixed, but the down side risk is not. Although there is no empirical evidence on this issue of the potential difficulty of raising funds for these knowledge-based firms, it is fair to say that a strong IPO environment may be another necessity for a country attempting a shift to a knowledge-based economy.

The benefits of a strong IPO environment to entrepreneurs and firms are easy to identify. Not only does the company receive equity financing at the time it goes public; but it also has easier access to equity capital in the post-IPO period. As it is evaluated more regularly by capital market participants, it can also be argued that 'going public' potentially reduces the cost of equity capital for the firm since these investors hold diversified portfolios and require a risk premium for only the undiversified portion of the firm risk. Some studies have indicated that a typical venture capital firm expects to earn at least 25 percent (in inflation-adjusted terms) on its investment, whereas typical required rates of return demanded by a capital market participant may be in the range of 15 to 19 percent.[4] Thirdly, the raising of equity capital also implies less reliance on debt financing, and consequently, a lower risk of bankruptcy. Additional intangible benefits may include increased credibility vis-a-vis lenders, suppliers and domestic and international buyers, increased ability to attract key personnel, and an improvement in a firm's operational and organizational structure due to increased scrutiny.[5]

Of course, along with the 'publicly traded' status come some impediments and costs. Initial costs include the legal and underwriting expenses associated with the IPO. Subsequent ongoing expenses include those for fulfilling filing requirements, information demands by investors and analysts, more stringent and formal legal and corporate governance requirements, exchange listing requirements and filing needs, disclosure rules, etc. Along with its 'public' status also comes the Board of directors which is now expected to act on behalf of external shareholders and monitor

management actions; this is also not without additional costs. Clearly, a strong and vibrant IPO market can exist only if the benefits far outweigh the costs of going (and staying) public.

HISTORICAL OVERVIEW AND INSTITUTIONAL CHARACTERISTICS

Given the importance of the IPO environment, it is scarcely surprising that both, the federal and provincial governments have taken a variety of initiatives to foster an easier and more cost-effective environment for accessing external equity capital by firms. It is not possible to provide a complete review of these initiatives here, What follows instead is a brief summary of these initiatives, which is intended to highlight some major initiatives and to note their similarities and dissimilarities. It should also be noted that not all of these initiatives directly impact the IPO environment; but they do need to be considered in the context of the life cycle of a firm's quest for growth. This begins with raising capital from 'love money', then moving on to informal capital, then to venture capital, and finally culminating in an IPO.[6] Each of these three early stages is important to a firm's growth and will influence the timing and decision of an IPO.

In Canada, the interest of various levels of governments in the issue of access to capital by entrepreneurial Canadian firms began mainly after the recession in the early 1980s. The changes at the beginning of this decade resulted in the reduced importance of traditional large firms and the emergence of a large number of small and medium sized firms.

This emergence of small firms led to the concern that access to various financing sources was extremely important if these firms were to grow and achieve some stability. Although these firms could rely on banks for traditional working capital and short-term financing, there was a need for access to other sources for both debt and equity capital. Consequently, many new initiatives were introduced by both the public

and private sectors to fulfil these financing needs.[7] The result was an emergence of provincially-backed venture capital firms, less stringent requirements for stock exchange listing, and increased access to various tax-based initiatives implemented by the various provinces, such as investment tax credits and higher depreciation for calculating provincial taxes. Although many of these initiatives were not directly targeted to IPOs, they did influence the growth of these firms, resulting potentially in a larger number of firms that could go public.

The most direct incentive affecting a firm's decision to go public was introduced in the Province of Quebec. The Quebec Stock Savings Plan (QSSP), introduced in 1979 and improved in the early 1980s, provided investors with tax assistance for their investment in newly-issued common equity by Quebec-based firms. At inception, this tax credit was available to all Quebec-based firms irrespective of size; however, later the program was (and is) primarily targeted to smaller firms. This plan had two objectives: first, to furnish the equity capital required by Quebec-based small and medium sized firms, and second, to encourage individuals to invest in the shares of these firms. By all standards, this program has been termed a success in achieving its objectives.[8]

Parallel to these tax-based developments, the country's leading stock exchange, the Toronto Stock Exchange, also introduced new initiatives to reduce the listing requirements and facilitate the 'going public' process for small firms.[9] These measures coupled with the robust equity markets of the mid 1980s, encouraged a large number of firms to go public.

Although not exhaustive, the discussion above indicates that access to equity financing for small firms has been a focus of continued interest in Canada. This focus has resulted in initiatives by both the public and private sector, to facilitate access to equity capital from a variety of sources. Many Canadian firms have taken advantage of these initiatives by raising equity capital through an IPO.

It is in this context that we provide empirical evidence on issues that arise in the IPO environment, beginning with the issue of underpricing of IPOs in Canada.

UNDERPRICING OF CANADIAN IPOS

One of the important aspects of a firm's decision to go public is that of receiving a 'proper' price for its common shares. Since the firm, by definition, is a private firm prior to going public, it must rely on investment bankers and underwriters to provide recommendations about the reasonable price at which it can sell its shares to investors. It can not judge the validity of these recommendations unless the shares are priced, sold to investors and begin to be traded on the stock exchange. Ideally, the firm would like the price at which shares begin trading on the stock market is very close to the price at which the shares were sold to investors - the issuing price.[10] If the trading price is much higher than the issuing price, that is the shares are underpriced significantly, then the firm will have received less financing than it could have. Moreover, if on average IPOs are underpriced significantly, many eligible firms would become reluctant to choose an IPO as a means of raising equity capital. On the other hand, if over-pricing is seen as a norm, investors will be unwilling to buy IPOs at issuance, preferring instead to wait a day or two and buy the same share at a lower price. Thus, the degree of under (or over) pricing may have a significant influence on the overall IPO environment.[11]

In this section, we review the evidence on the underpricing of Canadian IPOs during the last twenty years.[12] These results are from Jog and Srivastava (1994), who update the underpricing results provided by Jog and Riding (1987). Their results, based on the 1984-1992 period, show that the degree of underpricing for Canadian IPOs is decreasing almost continuously, and indicate that the degree of underpricing in Canada now stands significantly below every other country except France.[13] These results seem to indicate that any concerns about the impact of underpricing on the motivation of Canadian entrepreneurs to go public have lost their importance.

Earlier Results

In the earlier paper, Jog and Riding (1987) provided the first comprehensive evidence on underpricing in Canadian IPOs. Their results, based on a sample of 100 IPOs in the period 1971-1983, indicated that the average degree of underpricing ranged from 9.5 percent to 11.0 percent. However, the degree of underpricing varied significantly across issues, with approximately 40 percent being overpriced.[14]

In recent years, there has also been a growing interest about underpricing of IPOs in other countries. Table 1 summarizes the data for the G-7 countries given by, Loughran et.al. (1994) which provides a summary of international evidence on underpricing. Their summary table shows that the average underpricing for U.S. IPOs is 15.3 percent. Underpricing ranges from a low of 4.2 percent in France to highs of 78.5 percent in Brazil and 166.6 percent in Malaysia.[15] The average underpricing in Europe was 47.4 percent (11 countries, a total of 972 issues), 54.2 percent in South America (3 countries, 118 issues), and 66.6 percent in Asia including Australia and New Zealand (9 countries, 1,372 issues). Most of these results are based on evidence gathered during the 1970s and 1980s.

The Updated Results

The results below are based on the extension of the Jog and Riding study to IPOs from 1984 to 1992 by Jog and Srivastava (1994). The main source of their data is the IPO listing provided by the Toronto Stock Exchange (TSE).[16] A total of 254 common equity IPOs were identified over this period, 100 of which are from the Jog and Riding sample. The remaining 154 are based on updated data.[17] Data on stock returns data was obtained from the TSE-Western Stock Returns Database.

The IPOs covered in these listings include only those firms which raised equity financing through the TSE. As the TSE is the largest stock exchange in Canada, the

firms in our sample are also generally larger than those which have gone public on other exchanges. Consistent with the tradition in Canada, all of these IPOs were issued on a 'best efforts' basis. To ensure consistency with previous results, comparisons are also provided between the updated results and those of Jog and Riding (1987).[18]

Table 2 shows summary statistics for the entire sample, from 1971 to 1992. Two major conclusions can be drawn from this table. First, the degree of underpricing is markedly lower in the 1984-92 period than that reported by Jog and Riding for the earlier period. The average underpricing in the 1984-1992 period is 5.67 percent compared to the 9.96 percent earlier. Due to the very high dispersion in underpricing in the years 1971-1983, this difference of 4.29 percent in underpricing in the two periods is not statistically significant. However, the annual underpricing in the 1984-92 period has stayed below 7 percent, this upper limit being exceeded only marginally in two of the nine years. The average annual standard deviation is also significantly lower in the latter period, the difference being statistically significant at the 1 percent level of significance. These results clearly indicate that the degree of underpricing in Canada has been much lower in the 1980s than that reported for previous periods. Table 2 also indicates the nature of the overall market by showing the annual returns on the TSE300 Composite Index. Although not shown in the table, there is a positive relationship between the degree of underpricing and the state of the market.[19] Thus, there is some evidence that IPOs issued in bull markets are, on average, more underpriced than those issued in bear markets.

Figure 1 graphically shows the decline in the degree of underpricing as well as its extent during the last twenty years in Canada; and Figure 2 shows the annual variation in the percentage of underpriced IPOs. Consistent with the results of Figure 1, the percentage of IPOs underpriced each year is also decreasing in Canada. In the 1971-1983 period, the percentage of all IPOs which were underpriced was 62.0 percent. The corresponding number for the 1984-1992 period is 47.4 percent.[20]

Summary

The twenty-one year perspective presented in this section updates the evidence on the underpricing in Canada, its cross-sectional variation, and the percentage of IPOs which are underpriced each year. Based on the average degree of underpricing during the 1984-1992 period, Canada now ranks as the second best (after France) among the twenty five countries surveyed by Loughran et. al. (1994). These results indicate that the Canadian capital markets are doing a superior job in allocating risk capital to entrepreneurs, and that any concerns that Canadian entrepreneurs and policy makers may have in terms of the impact of IPO underpricing on the motivation of entrepreneurs to go public are not borne out by this evidence.

LONG-TERM PERFORMANCE OF CANADIAN IPOS

In addition to evaluating the underpricing of IPOs, a number of recent studies have recently examined the performance of initial public offerings (IPOs) in the United States and other countries.[21] These studies document the existence of positive average initial returns followed by strongly negative returns over an extended period following the IPO. In this section, we review the Canadian evidence on long-term IPO performance based on the stock market returns that would have been earned by an investor of an IPO stock. The evidence is based on the sample of Canadian IPOs over the 1971 to 1992 period based upon the subset of 254 equity IPOs used by Jog and Srivastava (1995).[22]

Methodology

Typically, the long term performance of a group of stocks is analyzed by investigating the returns earned by an investor whose investment strategy is to invest in each IPO as it lists on the Stock Exchange. However, since this performance may be affected simply by the overall performance of the stock market, it is also necessary to analyze

it on a relative basis by comparing it with widely-based stock market indices. Appendix 1 provides the details of the two methodologies for conducting this relative performance analysis. The first methodology provides an estimation of relative abnormal returns earned by IPOs over and above the benchmark portfolio.[23] The second methodology measures the wealth creation or depletion (called residual cumulative wealth from now on, and explained in the appendix) which would have resulted from investing in a portfolio of sample IPOs, relative to an investment in a benchmark portfolio. This residual cumulative wealth represents returns from an arbitrage strategy to an investor who invests in the sample IPO stocks and simultaneously holds a short position in the benchmark portfolio. A negative,return on such a strategy will imply that the investor would have done better by investing simply in the benchmark portfolio.

Since the measurement of long term performance may be sensitive to the choice of benchmark, as suggested by Ritter (1991), Jog and Srivastava use two benchmarks to evaluate abnormal performance for the sample stocks: the TSE 300 Composite Index and the Value-weighted Index of TSE Western Database stocks. The analysis is conducted over a 72 month period in the post-IPO period.

Long-term Performance Results

First, figure 3 shows matched cumulative (unadjusted) returns for an average stock in our portfolio relative to cumulative returns on the two benchmarks used in the study, viz., the TSE 300 Composite Index, and the Value-weighted TSE-Western Database index.[24] The latter two represent the returns that would have accrued to an investor who, instead of investing in IPOs, had invested in benchmark portfolios. As can be seen, over the 72-month period, returns on an average stock fall significantly below the cumulative return provided by either of the two benchmarks, the difference being of the order of 80 percent in month 47. From this point on, IPO returns seem to be exhibiting an upward trend. However, for the overall period, it is evident that the

portfolio of IPOs significantly under-performs the market for at least 72 months following the IPO listing.

Figure 4 provides evidence on relative performance with respect to TSE 300 Index whereas Table 3 provides a summary of results with respect to both the benchmarks. It is clear from these results that an average IPO, as measured by CAR, has under-performed the TSE Index by close to 50 percent over the first 49 months of trading, and this under performance is also highly statistically significant. From this point on, the under performance, as well as its significance, drops to the point that by the end of 60 months, the under-performance is not statistically significant in relation to the benchmark. For the sake of brevity, the results with respect to the value-weighted benchmark are not reported since they are very similar to the reported results relative to the TSE300 index.

This arbitrage strategy of going long in the portfolio of IPO stocks and short in the benchmark also seems to have resulted in substantially negative residual cumulative wealth. Based on Table 3 results, a zero initial investment in the arbitrage portfolio would have resulted in a loss to the investor of $35.15 by the end of 35 months in the post-IPO period with the benchmark being the TSE 300 Index, or $43.66 if the benchmark used is the value-weighted index. While the arbitrage portfolio strategy with the TSE Index shows a loss of only $6.19 by the end of 72 months, that with the value weighted index shows a much larger loss of $23.92. The upward trend in the CARs, as well as residual cumulative wealth with respect to either benchmark, may seem to be the result of a survivorship bias. Clearly, those IPOs which continue to be listed for a long period provide returns similar to other companies on the stock market.

Distribution of CARs and Sample Characteristics

Table 4 presents the distribution of CARs and residual cumulative wealth for the full sample of IPOs at intervals of 12 months using the TSE 300 Index as the benchmark.

All CARs and proportions are statistically significant at the 5 percent level unless marked with an asterisk. Not only the overall performance is statistically significant, the proportion of firms showing negative CARs in each of these intervals is statistically significantly greater (at the 5 percent level) than the number of IPOs with positive CARs. Clearly, an average IPO stock exhibits statistically and economically significant negative abnormal returns over as long a time period as 48 months. Similarly, the arbitrage strategy of taking a long position in the sample IPOs and a short one in the TSE 300 benchmark returns a significant loss over the 72 months. However, the relationship exhibits a U-shaped character perhaps indicating a survivorship bias.

Table 4 also presents the distribution of CARs for various sub-samples. While all sample partitions exhibit statistically significant under-performance in the post-IPO period of 72 months after the issue, there is evidence of a statistically significant differential performance across individual sub-sample partitions. Using 1992 dollars, an average IPO which was priced below $10 produced a CAR by Month 36 which was lower than that of an average IPO priced at or above $10 by almost 13 percent, the difference being statistically significant at 5 percent level. This trend seems to reverse itself beyond Month 36, although the CARs for low-priced IPOs are all statistically insignificant beyond Month 36. The difference in CARs between the two sub-sample partitions, however, continues to be statistically significant to Month 60 at the 5 percent level.

While both overpriced and underpriced stocks under-perform significantly in the after market, overpriced stocks perform significantly worse than underpriced stocks over the first 48 months. This is contrary to the existing non-Canadian evidence, which indicates that underpriced stocks show a more negative long term performance. Instead, in our sample of IPOs, stocks which are undervalued (that is, overpriced) by the market in relation to the underwriter's assessment at the time of issue under-perform even more in the after market.

Issues with gross proceeds of $10 million (using 1992 dollars) or more perform significantly better than those under $10 million. The difference by Month 48 is close to 30 percent; and difference is statistically significant at the 5 percent level. From there on, neither the CARs nor the differences in CARs across the two sample partitions are statistically significant.

In the sample segmented by whether the market was in the bull or bear phase, none of the CARs for IPOs made during a bull phase are statistically significantly different from zero. Those during a bear phase do show statistically significant under performance through to Month 48. From that point on, the under performance is statistically insignificant.

When the sample is segmented by sector, industrial IPOs exhibit statistically significant under-performance through to Month 48. Mining IPOs exhibit CARs which are not statistically significantly different from zero. Oil and Gas IPOs do exhibit statistically significant under-performance at Months 24 and 48. For the last two sample partitions, the sample size is too small to make any reasonable parametric statistical inferences. If the relative performance of these sample partitions is analyzed, industrial issues perform poorly relative to the mining issues over the first 24 months of market seasoning; but the trend reverses beyond that, with industrial issues performing better over the long haul. No such inference can be made with respect to Oil and Gas IPOs.

Overall, these results clearly indicate that the long term performance of IPOs in our sample has not been stellar. Although, on an absolute basis, these IPOs generated positive returns to the investor in the first year and then after holding them for over five years (see Figure 4), their relative performance was much worse. The decline in performance seems to start approximately ten months after the IPO and continues through to the end of the fourth year. The improvement in performance after the first four years may have more to do with survivorship bias and a reduced sample size

than with any fundamental changes to the underlying characteristics of the sample firms. The various sub-sample results show that the sample characteristics may have some influence on the degree of long term performance; however no firm conclusions can be reached using this univariate analysis.

Relationship between under-performance and issue-specific factors

In order to assess the relationship between CARs and issue-specific factors in a multi-variate context, six OLS regressions are performed over the 72-month period at 12-month intervals. The regression equation has the following form:

$$CAR^{i}_{1,s}=\alpha_0+\alpha_1 UP_i+\alpha_2 PROC_i+\alpha_3 PRICE_i+\alpha_4 MARKET_i+\alpha_5 INDUS_i+\epsilon_{is}$$

where s takes on a value of 12, 24, 36, 48, 60, and 72. UP_i is the underpricing in stock i. $PROC_i$ is the inflation-adjusted gross proceeds in 1992 dollars. $PRICE_i$ is the issue price for stock i. $MARKET_i$ is a dummy variable taking on a value of 1 if the market is in a bull phase and 0 otherwise at the time the IPO was issued. $INDUS_i$ captures the industrial classification of the IPO and takes on a value of 1 for Mining issues, 2 for Oil & Gas and 3 for Industrial issuers.

Table 5 presents results from these six regressions. The findings here essentially mirror those in the earlier section regarding the relationships of aggregated CARs to firm-specific variables. First, no obvious statistically significant relationship emerges which is stable over time. The cross-sectional regressions at Months 12, 24, and 36 show a statistically significant positive relationship between MARKET and the respective CARs. The conclusion is that IPOs issued in a bull market outperform those issued in a bear market in the first three years. In cross-sectional regressions at months 12 and 24, INDUS exhibits a statistically significant negative relationship with the dependent variable, showing that Industrial issues significantly under-perform others over the first 24 months. Cross-sectional regression at Month 36 confirms the

notion that larger issues perform significantly better than smaller issues, although regressions at other points in time do not show a significant relationship. Most importantly, in cross-sectional regression at Months 60 and 72, the degree of underpricing is shown to have a statistically significant positive relationship with cross-sectional CARs, implying that larger underpricing implies better performance over the long haul. On the other hand, it also implies that smaller underpricing or overpricing leads to long term under-performance in comparison with underpriced IPOs.

Summary

The magnitude of under-performance in the Canadian IPO market based upon a sample of 254 Canadian common equity IPOs issued between 1973 and 1992 as shown by Jog and Srivastava is found to be similar to the results reported for other countries. In particular, the cumulative abnormal residual for the Canadian sample by month 36 is -41.02 percent compared to -29.13 percent for Ritter's (1991) IPOs in the U.S. The sample IPOs in the Canadian study continue to show statistically significant under-performance for 4 years after the issue date.

An examination of the sample partitions of IPOs reveals some regularities. For example, irrespective of the type of sample segmentation, all sub-samples show high under-performance over 72 months of market seasoning. Other regularities which are observed are as follows: low priced stocks perform better than high priced stocks over the long run, but the relative performance is period-dependent; overpriced stocks perform significantly worse than underpriced stocks; larger issues perform significantly better than smaller issues through 48 months; and Industrial issues seem to perform better than either the Mining issues or Oil & Gas issues. However, the longitudinal analysis of CARs fails to uncover any systematic relationships with some firm-specific factors that are stable over time.

The evidence presented by Jog and Srivastava on long term under-performance

provides limited support for the signalling hypothesis of Allen & Faulhaber (1989) and Welch (1989), which contends that issuers use underpricing to signal quality of issue. As such, high quality issuers who can afford to offer higher underpricing than low quality issuers will do so. This hypothesis predicts better performance in the after market by issues that have been more underpriced. While both the underpriced and overpriced issues under-perform the market over 72 months of market seasoning, the underpriced IPOs perform statistically significantly better than the overpriced IPOs by as much as 23 percent through 48 months of market seasoning.

POST- IPO FINANCIAL PERFORMANCE

As noted above, the empirical evidence on the long-term performance of IPOs from the viewpoint of shareholders is not very attractive. It is possible that this disappointing performance is due to the high initial price paid by investors for the IPO and their subsequent disillusionment, leading to poor stock market performance. However, this need not necessarily imply a disappointing economic performance by firms which raised equity financing from external investors.

To shed further light on the subject of financial performance, we decided to collect accounting information on a sample of firms which raised financing though an IPO on the Toronto Stock Exchange during the 1985 - 1992 period. We also concentrated on non-resource firms, since the purpose of this part of the study was to analyze the financial performance of predominantly industrial and service sector companies. This required us to collect information on some relevant accounting variables from the prospectuses filed by these firms. Our main objective was to compare their performance in the pre-IPO years with the immediate post-IPO years.

Data

Since there is no readily available data base in Canada on IPOs, we decided to collect

the required data by searching the prospectuses of IPOs available in the Toronto Public Library, which is the main public source of such hard copy and inexpensive data in Canada. A total of 83 prospectuses were collected. Of these 83 prospectuses, we could find the relevant data for the two years preceding the IPO year and two years following the IPO year for a total of fifty-four firms. Of these, four firms were extremely large (Petro-Canada, Repap, Co-Steel, and Quebecor) and were eliminated from further analysis. The reason for the elimination was the fact that we are interested primarily in the performance of smaller firms, which raised equity financing from the stock market as a logical consequence of their growth. Thus, the remainder of our analysis in this section concentrates on a fifty firm sample.[25], It should be mentioned that this sample cannot be considered as a random ample; it can be termed as a 'convenience' sample. Our ability to increase the sample size is constrained by two forces: first, not all firms report the pre-IPO performance; and second, the available resources do not allow for contacting each firm and then coding the data manually. We hope that others may provide comparable results using a much larger data set.

Our sample of fifty firms come from a variety of industries. Table 6 shows the sectoral distribution of the sample firms. It should be noted that this sample does not necessarily represent the overall distribution of IPOs in that period; the sample is under-represented in the natural resource sector by design. As can be seen, sample firms span 28 industry groupings with some concentration in the technology sectors; there are twelve firms which represent the hardware, the software and the biotechnology sectors.

Results

Tables 7 and 8 provide the mean and median values for this sample of 50 firms for all the accounting variables collected from their prospectuses and their annual reports following the IPO year. These variables include the standard accounting variables

used in a typical corporate financial analysis, as well as some of the financial ratios that can provide indications of financial and operating performance. While more variables and details might be desirable, the necessary information is often unavailable in the prospectuses - which provide only the most aggregate information. These two tables provide aggregate information on eight income statement variables, five balance sheet variables, and five ratios constructed from these thirteen accounting variables. It should also be noted that no attempt is made to express these in inflation adjusted dollars since the analysis that follows provides a more detailed picture of performance.

Although these two tables do not provide a firm-by-firm perspective, some general conclusions can still be made. First, it is clear that the asset base of the firm increases after the IPO; since it now has a much higher level of equity capital. The results indicate that the primary result of an IPO is to increase the firm's working capital, since the net fixed assets seem to increase more slowly than the total assets. This is not surprising since many IPO firms raise equity financing to build inventories or finance accounts receivable. This increase in asset base also implies the ability of the firm to increase sales in cases where assets had been the constraining factor. As can be seen, there is indeed a corresponding increase in sales. For example, the mean and median value of sales show an increase of 25 percent in the year following the IPO (year 1). Thus, it is clear that the IPO allows the firm to increase assets and have the necessary capital base to support higher levels of sales. As a consequence of the IPO, this increase in sales and assets can now be financed without increasing the firm's debt load. As can be seen, there is no discernable trend in interest expense or the levels of short and long-term debt. The debt to asset ratio (second last row - D/A) actually declines. Thus, the IPO has achieved one of its main functions, a reduction in the reliance on debt by the firm. The increase in the number of external shareholders seems to have brought an increase in the dividends paid out to both common and preferred shareholders. Thus, part of the IPO financing seem to have been used by these firms to increase payout ratios.

Unfortunately, the mean and median values of performance indicators show that the growth in sales and assets comes at the expense of profitability and turnover. The sales to asset ratio (last row - S/A) declines significantly, indicating an inability of the sample firms to increase sales in proportion to the increase in assets. Also seen is a decline in the return-on-asset (ROA) and profit margin in the years following the IPO. Thus, these aggregate numbers imply that a typical IPO firm may actually display a deteriorating performance once it raises external equity capital.

These conclusions must be viewed with caution, because these are based on aggregate values and may be caused by a specific subset of the sample firms. To investigate this possibility, Tables 9 through 19 provide the distribution among firms of the various performance measures shown in Tables 7 and 8. This distribution-based analysis also allows us to make more precise conclusions about the sample firms.

Table 9 provides the distribution in terms of the percentage change in total assets. Column 1 compares the various post- and pre-IPO years for total assets. More specifically, row one compares the total assets in year 0 (that is, the year of the IPO) with year -2 (that is, two years prior to the IPO). It shows that in 5.1 percent of the sample firms, the total assets in year 0 declined by over 10 percent as compared to year -2. Similarly, in 87.2 % of the cases (the last column value in the first row), the total assets grew by at least 10 %. Similarly, the second row compares assets in year 0 with assets in year -1 and so forth, with the last row comparing assets in year 2 with assets in year 1. Thus, all years are expressed in relation to the year of the IPO which is designated as year 0. A similar format is followed in the rest of the tables. A variety of conclusions emerge from these tables.

There is an overall increase in assets (Table 9) and a corresponding increase in the number of firms reporting increases in depreciation expenses (Table 10). This is not surprising since there is a large infusion of additional capital into the firm, some of which is used to increase the firm's net fixed assets.

Table 11 shows the changes in the revenues of sample firms. Not surprisingly, a majority of sample firms experienced high growth rates in the pre-IPO years, given that it is likely that the external equity financing was being raised precisely to sustain growth. Similar high growth rates seem to continue in the post-IPO years, although at a declining rate

Although sample firms raise equity financing, their reliance on debt does not necessarily decrease: roughly as many firms show an increase in the debt/asset ratio as those showing a decrease (Table 12). This indicates that, in the case of over a third of the sample firms, asset growth forces them to continue to rely on higher levels of debt. This now may be more feasible due to their 'public' status.

In contrast to the aggregate results shown in Tables 7 and 8, Table 13 shows that there is no increase in common dividends in the post-IPO years; only one-fifth of the firms show an increase in dividends, and a majority of the firms show no increase. Similar conclusions can be drawn from Table 14, which shows most firms maintaining their payout ratios, but with almost one-fourth of the firms showing a decline.

Next, attention is focussed on performance measures. Tables 15 and 16 show the changes in the Earnings-Before-Interest and Taxes (EBIT) levels and the EBIT/sales ratio for the sample firms. Table 7 indicated that the level of EBIT had increased for all of the firms put together only in the years prior to the IPO (that is year -1 and year 0 compared to the preceding year). But we see from table 15 that the actual number of firms which show an increase in the level of EBIT in the post-IPO years is almost the same as the number of firms where the EBIT level has decreased. Moreover, the comparison of the EBIT/Sales ratio in Table 16 indicates a more disappointing picture. In all post-IPO years, almost two-thirds of the sample firms show a decline in this ratio, thereby indicating a worsening of operating margins. These results provide partial support to some recent work which contends that there may be a degree of 'earnings management' by firms immediately prior to the IPO. This earnings

management implies that one would expect to find a relative decline in reported earnings in the post-IPO years.[26]

Table 17 confirms this deterioration in performance, although the difference here is not as substantial as for the operating margins. Again, almost two-thirds of the sample firms show a decline in the profit margin. Table 18 analyzes the profitability performance using the return-on-asset measure, which shows the productivity of the asset base. Here again, performance is disappointing; over two-thirds of the sample firms show a decline in their performance.

Table 19 uses the changes in turnover ratio as another indicator of performance. This table indicates that the sample firms have been unable to generate an increasing level of sales per dollar of invested assets. More firms show a decline in this performance ratio than show an improvement.

Summary

Overall, these results indicate that the sample firms managed to increase their sales and assets and improve their working capital in the post-IPO years. They also managed to reduce their reliance on debt due to the infusion of the external equity capital. No major changes can be observed in their dividend payments or payout ratio, indicating that there was no additional withdrawal of funds by share holders.

However, the performance of these firms actually worsened. Almost two-thirds of the sample firms show a deterioration in the standard performance measures that are traditionally used in the corporate finance framework. Since the sample size is small and the distribution properties of the ratios are not known, there is little possibility that sophisticated statistical analysis can be conducted on this data. However, the distribution of firms is such that the overall deterioration in performance in the post-IPO years can not be explained away as a statistical artifact. It should also be

noted that even if the analysis is extended to a larger number of firms, there is little chance that these results will change significantly. Since these fifty firms were chosen simply on the basis of data availability, there is no reason to believe that another set of fifty firms would display radically different performance characteristics. These results also confirm the overall negative long term performance of the IPO firms in the stock market.

ENTREPRENEURS' VIEWS

In the sections above, the emphasis was placed on issues related to pricing, valuation and performance of IPOs in Canada. The analysis was based on data available in the public domain. The purpose of this section, however, is to assess the issues that arise during the IPO process. This analysis is based on the results of a survey questionnaire that was sent to entrepreneurs who were instrumental in taking their firms public.[27] The reason for this work was to obtain some direct evidence on the IPO process in Canada, rather than simply relying on secondary research on underpricing and stock market or accounting-based performance.

Five aspects of the IPO process were considered to be important: the decision to go public, contractual details of the IPO, IPO-specific aspects, the post-issuance process and finally, the entrepreneurs' views on the reasons for the underpricing of IPOs. The individual questions were intended to solicit the sort of detailed responses which are simply unavailable from secondary data sources.

Data

The questionnaires were sent to 140 potential respondents whose IPOs covered the years 1982 through 1993. Each questionnaire had a total of one hundred and five questions. Not surprisingly, the fifty-four responses came predominantly from recent IPOs, with twenty-nine from 1993, ten from 1988-1992 and fifteen from the pre-1988

years. In terms of dollars raised by our sample firms, the smallest amount raised was $2 million (in 1993 dollars) and the largest was $565 million.[28] Of the forty-seven respondents who indicated the amount raised, five can be considered as IPOs of very large established companies, which raised over $200 million each from the stock market.[29] Since the sample is small, no attempt is made to distinguish individual respondents representing large IPOs from that of small IPOs, except for some analysis of the sample based on value quintile. In most cases, little difference was found between the responses of the large and small IPO firms. The rest of this section provides the results of analysis based on these fifty-four respondents.

Results

The first set of questions referred to the issues surrounding the entrepreneur's (firm's) decision to go public. The questions were about the best time to go public, the reasons for going public, the usage of capital being raised, the importance of underwriters and the influence of venture capital financiers on the timing to go public. As can be seen from Table 20, the timing of IPOs seems to be related to the need for external equity financing coupled with inability to raise capital from other sources (e.g., private equity or debt), the state of the stock market (i.e. the bullishness sentiment), and the owners' need for liquidity. Correspondingly (although not shown here), capital raised though the IPO was used for financial restructuring (40 percent of the respondents), paying off the founding owners (25 percent) , financing acquisition of businesses (24 percent), and purchasing equipment (22 percent).[30] Other uses mentioned include: investing in research and development, retiring of debt, and general expansion of the business.

Table 21 shows that the choice of underwriter was dependent mainly on reputation, quality of service, previous success in raising capital, and institutional experience, rather than the location or size of the retail staff or even the history of under/over pricing. Not a single respondent mentioned the cost of service as the most important

consideration. Thus, it seems that hand-holding experience and the ability to raise capital through institutional investors seem to be key factors that can be emphasized by underwriters in the marketing of their services to potential IPO clients.

On the issue of venture capital influence on the IPO decision, only eleven IPOs had received financing from such firms; in just four cases, these venture capitalists were instrumental in the firm's decision to go public. In half the cases, venture capitalists continued to maintain the same level of ownership even one year after the IPO. Thus, the 'exit' requirements by venture capital financing was not a major aspect of the IPO decision. These results related to venture capitalists are not surprising given the much lower levels of involvement of venture capital in Canada overall than that found in the U.S.

The next section of the questionnaire focussed on the costs of IPO issuance and the contractual obligations of the firm with its underwriter. In thirty-one of the cases, the respondent firms claimed to have a firm agreement with the underwriter. In addition, many of these agreements also had either an over-allotment option or a compensation option.[31] Thirty-three firms had granted to their underwriters either an over-allotment option (twenty), or a compensation option (five) or both (eight). The over-allotment option was in the range of an additional 10 to 15 percent of the initial issue, whereas the compensation option was generally less than 10 percent of the initial issue. In both cases, the share price at which either of these options could be exercised was the IPO price. Since compensation option allows an underwriter to buy the shares during the subsequent twenty four months, the underwriters stand to benefit from this option in addition to the normal underwriting fees.

In the majority of cases, underwriters who were granted either or both of these options exercised them. The existence of these options was not restricted to small issuers only; but were equally present amongst all issuers. In at least fifty percent of the cases, another fifteen to twenty percent additional shares were issued to the

underwriting syndicate under these options. It is also interesting to note that of the thirty-six issuers whose shares were over-subscribed, only ten had neither of these options. Of the remaining fourteen where there was neither over nor under-subscription, nine had neither of the options. These observations indicate that over-subscription may be a norm rather than an exception; and that underwriters benefit further from these options if the over-subscription leads to higher prices in the immediate post-issuance period or if the stock price remains above the IPO price in the near term.[32]

Thus, these observations indicate that, in addition to fixed underwriting commissions, underwriting syndicate can also benefit from the receipt and the subsequent exercise of the over-allotment and compensation options. If the stock price increases over the IPO price in subsequent time periods, the underwriting syndicate can exercise either of the options and receive up to twenty percent additional shares at the IPO price. The evidence in the previous sections indicates that IPO stock prices, on average, increase by 10 to 15 percent in absolute terms in the two year subsequent to IPO issuance. This implies that the underwriters can earn an additional 1.5 to 2.5 percent of the IPO amount by exercising these options.[33]

Another issue investigated in this questionnaire is related to the out-of-pocket costs of the IPO issuance process. It is well known that there are some minimum fixed costs that are associated with the IPO process, which include not only the underwriting commission but also issuing and legal costs. Forty respondents provided information on these two categories of costs. Since our sample spans a ten-year period, we report these costs in 1993 dollars as well as in relation to the amount of financing raised through the IPO. In addition, due to the presence of a few large IPOs, we report the median results wherever appropriate and exclude the large IPOs when drawing generalisable conclusions. Expressed in 1993 dollars, the median (mean) levels of issuing expenses were $525,000 ($1 million) and $1.6 million ($2.8 million) for the underwriting commission for a median (mean) IPO financing of $26 million

($69.5 million) dollars. Table 22 expresses these expenses as a percentage of the total financing raised through the corresponding IPO.

Correspondingly, the issuing costs represent 2.3 percent, and the underwriting commission represents six percent of the IPO amount raised, bringing the total expense of a typical IPO to 8.3% of the amount raised. Obviously, these vary from issue to issue, and are partially dependent on the size of the IPO as there is a component of fixed and variable costs associated with an issue.[34] The following regression equations show the nature of the relationship between expenses and IPO value, both expressed in 1993 dollars for IPO issues of under $60 million.[35]

Issuing expense = 167,806 + 0.02 * IPO value (R-square = 0.31)

Underwriting commission = 171,048 + 0.05 * IPO Value (R-square = 0.81)

Total expenses = 338,854 + 0.069 * IPO Value (R-square = 0.80)

These results confirm the observations based on simple analysis: in a typical IPO issue, the fixed costs are about $300,000 to $400,000 in addition to the variable costs of 6 to 8 percent of the IPO value. A further 1.5 to 2.5 percent of the IPO value is also received by the underwriter through the exercise of the over-allotment and compensation options.

The next section of the questionnaire dealt with the process immediately surrounding the actual IPO issuance. In over seventy percent of the respondents, the finalization of the IPO price seems to take place two weeks prior to the offering date, with another 16 percent fixing the offering price in the four weeks prior to the date. The influence of institutional investors was also quite apparent from the responses. On average, sixty percent of the shares were bought by institutional investors; in twenty IPOs, the institutional investors purchased over 75 percent of the shares offered.

Moreover, the respondents also stated that not only were the institutional investors important in the initial purchase; but they continued to hold what they purchased; and in over 50 percent of the cases, they bought more shares in the month following the IPO. In contrast, in 35 percent of the cases, retail investors sold their shares soon after purchase; and in only 13 percent of the cases, was there any additional buying by these retail investors. These findings reinforce the importance IPO firms attach to the influence underwriters have with institutional investors

Given that one of the main functions of the underwriter is to provide service and support to the firm, it is interesting to note the respondents' opinions about the post-issuance support they received. Table 23 shows the responses to four key questions about post-issuance support. As can be seen, the degree of underwriter support is said in most cases to be 'above average' or 'excellent'. The perception is that underwriters do a better job in providing the support required by institutions than that required by retail investors. When asked specifically about support provided by the underwriter in assigning an analyst and in providing the coverage and analysis required after the IPO, over 90 percent of the respondents indicated that the lead underwriter had assigned an analyst, and sixty percent were satisfied with the subsequent coverage and analysis provided to the firm. It is also interesting to note that, of the eighteen respondents who have subsequently issued additional common shares, fourteen of them utilized the services of the same underwriter. This observation indicates that, despite the less than excellent ratings they give their underwriters, firms continue to deal with their original underwriters for subsequent issues. This finding is also important given the fact that only forty percent of the respondents show above average satisfaction about the price of their IPO and the current price of their common stock.

Another important purpose of the questionnaire was to elicit from the firms their response to the underpricing issue. As noted earlier, there is a large amount of literature which provides theoretical justification for the existence of underpricing.

However, there is little or no direct corroborative evidence on these competing theoretical hypotheses from the firms which actually raise the capital. Table 24 shows the responses to these competing hypotheses. The results partially corroborate all the theoretical hypotheses, with stronger corroboration for the discount based on future uncertainty as a major reason for underpricing. Given the generally low levels of litigation in Canada, it is not surprising to find only weak support for the legal argument for underpricing; a similar question may result in stronger agreement in the U.S. Moreover, although not reported here, none of these responses depend upon the size of the issue; there is virtually no difference between responses by small issuers and those of large issuers to these and the other questions in this section.

Summary

The results of this section can be summarized as follows: the main reason for firms going public is that other sources of financing can no longer satisfy their financing needs. This, coupled with the state of the stock market and the owner's need to seek liquidity, may result in the firm's deciding to go public. The underwriter(s) who can get the IPO business will be those who have a good overall reputation, are known for their quality of service, can demonstrate their success in raising capital and can show their knowledge about institutional investors. The costs of raising external financing via an IPO is in the range of $300,000 to $400,000 plus another 6 to 7 percent in underwriting costs. In addition, underwriters are often allocated an over-allotment or a compensation option, bringing the total compensation of the underwriters to about 8 to 10 percent of the amount raised. There is a general recognition of the fact that underpricing of an IPO can be justified in the context of uncertainty about the future price of the IPO and in order to ensure that the required financing is raised. These results also indicate that, there are competing hypotheses for the underpricing, and that no one hypothesis can provide a complete explanation for the existence of underpricing in IPOs.

OVERALL SUMMARY

This paper evaluated the environment for Canadian initial public offerings based on historical evidence. The empirical evidence was in four areas: underpricing, long term stock market performance, accounting-based performance in the post-IPO period, and the IPO process as viewed by firms which went public in the mid- to -late-1980s and early 1990s. The following major conclusions arise from this paper.

First, the evidence reviewed here on underpricing of Canadian IPOs reveals that the degree of underpricing in Canada is much less than that reported in most other developed countries. Moreover, the degree of underpricing decreased in the 1980s compared to the 1970s. Thus, there is no reason to be concerned about the pricing mechanism for Canadian IPOs. It should be noted that the evidence is restricted to firms which qualified for listing on the Toronto Stock Exchange and may not be generalisable to other stock exchanges where listing requirements are less restrictive.

In terms of long term performance of Canadian IPOs, the results are disappointing and are similar to those reported for the U.S. Although an investment in an average IPO provides positive absolute returns, the returns adjusted for the underlying stock market performance reveals a high degree of negative returns. On a market-adjusted basis, an average IPO shows a relative loss of 40 percent in four years. The performance is mostly negative beginning within a year of the IPO, continuing through to the end of the fourth year and turning somewhat positive in the fifth and sixth years. This apparent improvement must be viewed with caution due to the small sample size and obvious implication of the survivorship bias. IPOs which were overpriced perform even more negatively than those which were underpriced, an observation at odds with some U.S. results.

A smaller and more recent sample of IPOs reveals that the post-IPO performance as revealed by standard accounting-based performance measures can be considered

mediocre or worse. A majority of IPO firms show decreased turnover and profitability. These results are consistent with the long term performance results and further reinforce the view that IPOs, from an investor viewpoint, may show disappointing performance. There is no reason to believe that these results are specific to the sample studied. These results are also consistent with some U.S. studies which show evidence of active earnings management in the pre-IPO period.

In terms of some primary evidence about the IPO process as seen from the viewpoint of the firms, these show an overall degree of satisfaction about the support received from their underwriters and about the pricing of their IPOs. The costs of a typical IPO seem to be in the range of $300,000 to $400,000 plus 6 to 7 percent of the IPO value. Underwriters also receive further compensation (2% to 3%) due to compensation and over-allotment options. The sample firms seem to be perfectly willing to live with some underpricing as a compensation to investors for the underlying uncertainty involved. No expression of dissatisfaction about the process was reported.

These overall results indicate that from the viewpoint of an entrepreneur, the Canadian IPO environment is an attractive one. The degree of underpricing is low; investors seem to buy all the IPOs offered despite below average returns and performance; there is no evidence of under-allotment; and the support by underwriters seems to be satisfactory.

From an investor's viewpoint, the results are quite disappointing. Although, on an absolute basis, there is no great loss from an initial investment, a typical IPO provides large negative returns when adjusted for the underlying market movement. This less than attractive performance is also confirmed by the accounting-based analysis conducted for a small sample of recent IPO firms.

The overall evidence presented here indicates that the Canadian capital markets are doing a superior job in allocating risk capital to entrepreneurs, and that any concerns

that Canadian entrepreneurs and policy makers may have in terms of the impact of IPO underpricing on the motivation of entrepreneurs to go public are not borne out by this evidence. Clearly, an improvement in underlying performance by IPO firms in post-IPO years would be welcome news if Canadian investors were expected to channel their savings into IPOs. However, the managers of these newly public firms seem to be unable to perform according to initial expectations. The post-IPO performance is poor both on the basis of stock market performance and on the basis of accounting-based performance measures although the latter is based on a somewhat non-random, small sample. As far as we know, no empirical evidence exists upon the post-IPO governance characteristics of these IPO firms. Neither is there any evidence on the adequacy of the management skills of these firms in their ability to manage in the new environment. The evidence presented here indicates that, if anything, these firms in their post-IPO period performed less than satisfactorily for their shareholders.

Appendix 1: Methodology for Long-term Performance Analysis

The long-term performance of IPOs is determined by using two different methodologies. Ritter's (1991) methodology is used to evaluate how an average IPO stock performs over the 72 months following IPO.[36] The second methodology is used to measure the wealth creation or depletion (called residual cumulative wealth from now on, and explained below) which would have resulted from investing in a portfolio of sample IPOs, relative to an investment in a benchmark portfolio. This residual cumulative wealth represents returns from an arbitrage strategy to an investor who invests in the sample IPO stocks and simultaneously holds a short position in the benchmark portfolio. A negative return on such a strategy will imply that the investor would have done better by investing simply in the benchmark portfolio.

To ensure consistency with the Ritter results in using the first methodology, monthly returns are defined as the 21-trading day returns starting with the closing price on the twenty-first day of trading in the post-IPO period. Month 1, therefore, consists of days 22-43, followed by Month 2 including days 44-65, etc. Similarly, monthly residual returns are calculated as the monthly raw return on a stock less that on the benchmark for the corresponding 21-day period.

More specifically, the monthly abnormal return for stock i in month t with respect to the benchmark is defined as:

$$AR_{it}=R_{it}-R_{mt}$$

where R_{it} and R_{mt} are respectively the return on stock i in month t and the return on the benchmark in month t. The average benchmark-adjusted abnormal return for month t is the equally-weighted arithmetic average of the abnormal returns for individual stocks.

$$AR_t=\frac{1}{n_t}\sum_{i=1}^{n_t} AR_{it}$$

where n_t is the number of stocks in the portfolio in month t and the summation is over 1 to n_t.

The cumulative benchmark adjusted abnormal return in the after market from month q to month s is the summation of the average benchmark adjusted abnormal returns for individual stocks over this period.

where the summation is done from month q to month s. When a firm is de-listed from

$$CAR_{q,s}=\sum_{t=q}^{s} AR_t$$

the TSE-Western Database, the portfolio return for the next month is computed as an equally-weighted average return of the surviving firms in the portfolio. The computation of CAR, therefore, requires monthly re-balancing, with the proceeds of a de-listed firm equally allocated among the surviving members of the portfolio for each of the subsequent months.

For the second methodology, the residual cumulative wealth is computed as follows. Cumulative wealth from investing in stock i until month t , CW_{it}, is given as

$$CW_{it}=\prod_{t}(1+R_{it})$$

The residual cumulative wealth, RCW_{it}, for stock i until month t is given by

$$RCW_{it}=CW_{it}-CW_{mt}$$

where CW_{mt} is the cumulative wealth accumulated by investing in the benchmark until month t. Then, the average cumulative residual wealth, $ARCW_t$, until month t is computed as an equally-weighted average of the residual cumulative wealth for all stocks which form part of the portfolio in month t.[37]

$$ARCW_t=\frac{1}{n_t}\sum_{i=1}^{n_t} RCW_{it}$$

Since the measurement of long term performance may be sensitive to the choice of benchmark, as suggested by Ritter (1991), two benchmarks to evaluate abnormal performance for the sample stocks: the TSE 300 Composite Index and the Value-weighted Index of TSE Western Database stocks are used.[38]

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Endnotes

1. These four issues are, of course, not the only ones that are associated with the IPO environment. Various papers have covered other aspects of the IPO environment which we neither review nor discuss here. See, for example, Drake and Vetsuypens (1993), Garfinkel (1993), Krinsky and Rotenberg (1989).

2. Intervention and Efficiency, Economic Council of Canada, 1982. Breaking through the barriers: Forging Our Future, Small Business Working Committee, Report to Ministers, Industry Canada, 1994.

3. In these types of firms assets walk out at 5 p.m.; there is nothing to collateralize if they don't come back the next day.

4. See Jog, Riding and Lawson (1991)for the expected returns required by venture capitalists. The 15 to 19 percent range of required real returns for IPOs is an estimate based on the fact that historical average rates on a broad market index have been around 6 to 8 percent above the risk free rate. Since on can conjecture that IPOs may be viewed as relatively risky, investors may demand an additional 'risk premium' of 4 to 6 percent. If the real risk free rate is assumed to be 5 percent, then the cost of equity capital for an IPO can be estimated at between 17 and 22 percent.

5. See Desroches and Jog (1991).

6. 'Love money' refers to the initial injection of capital from parents, relatives, and friends of the entrepreneur. Informal investors include business associates or wealthy individuals who provide the next round of financing, followed by the more formal venture capital firms.

7. It is beyond the scope of this report to review all these developments and specific legislative changes. The purpose of this section is simply to provide an overall perspective on the environmental factors that have affected the financing of SMBs. For more details, see Jog (1996).

8. This is not to say that investors received an above normal return or that the entrepreneurs received a higher than equilibrium price for their shares due to the tax incentive. For an analysis of the valuation and pricing of QSSP stocks, see Jog and Riding (1990).

9. These initiatives include the Exchange Offering Prospectus (EOP) and the Canadian Over the Counters System (COATS).

10. It should be noted that the pricing of share issues does not necessarily relate to the proper valuation of IPO. One could argue that, in a risk-averse society, IPOs would be valued at a level lower than in a less risk-averse society. Whether this argument holds in the context of Canada and U.S. is anybody's guess.

11. A variety of explanations are available about the existence of underpricing; none of these are reviewed here. Interested readers can see Logue (1973), Smith (1986), Beatty and Ritter (1986), Rock (1986), among others. A complete review of this literature is beyond the scope of this paper.

12. This summary of results is directly based on Jog and Srivastava (1994); no claim of originality is made here.

13. Underpricing, in this paper as well as all others, is measured as the difference between the closing price on the first day of trading and the initial offering price expressed as a percentage of the initial offering price.

14. Another paper, Clarkson and Merkley (1993), based on IPOs of the years 1984-1987 shows a similar degree of underpricing.

15. The Malaysian results are based on a relatively small sample of 21 issues. The most exhaustive sample is from the U.S. - 10 626 issues. A casual glance at Table 1 from Loughran et. al. (1994) indicates that underpricing of over 20 percent can be found in fifteen of the twenty five countries reported.

16. Details of the Canadian capital markets in relation to IPOs and the history of IPO underpricing is available in Jog and Riding (1987), and is not repeated here. There has been relatively little change in the institutional framework since their discussion.

17. Closed-end funds, units issues, and issues involving both debt and equity were excluded from the sample. Some other Canadian studies seem to have included some of these IPOs in their samples, however.

18. This sample of 154 IPOs represent a total of Cdn. $5.7 billion financing, with consumer and industrial products IPOs accounting for approximately 33 percent of the total value and 40 percent in terms of numbers. This is in contrast with the 1971-1983 sample of Jog and Riding (1987). In their sample, resource sector industries were the dominant source of IPOs, representing well over 40 percent of the sample in value and numbers. This shift in the industrial composition of the sample corresponds to the shift in Canada from reliance ont eh

resource sector to reliance on non-resource sectors of the economy. In the 1983-1992 sample, the $10 - $20 price range dominate the sample. This is also quite different from that of Jog & Riding (1987) sample, where the $5 - $10 price range dominated the sample. This difference could simply be the result of inflation, or it could also represent the resource sector dominance in the earlier sample which typically favours low price IPO offerings.

19. A regression analysis between the average degree of underpricing and the TSE300 total returns (excluding the years 1974, 1975, and 1978, which had less than two IPOs each) shows that the slope coefficient is positive and the R-squared is 26 percent. No statistically meaningful relationship is found between the standard deviation and the TSE300 returns.

20. This percentage is not statistically different than 50 percent, implying that the degree of underpricing (or overpricing) is almost random.

21. See, for example, Ritter (1991) Levis (1993), Aggarwal et. al. (1993).

22. These results are directly based on our on going work in this area: Jog and Srivastava (1995).

23. Ideally, an equally-weighted index or a control portfolio of matching firms needs to be used. The former, although available in Canada, is suspect due to some abnormally high returns exhibited by the series; the latter is not feasible given existing resources.

24. These results are directly based on our on going work in this area: Jog and Srivastava (1995).

25. Over fifty percent of our IPO firms (twenty-six) raised funding in 1986, the year when the stock market rose significantly, followed by 1987 (eight), where prior to the October crash, the equity markets continued to be buoyant. Since we needed the post-IPO data for comparison purposes, we did not select firms which went public after 1992.

26. See, for example, Teoh et. al. (1994).

27. The questionnaires were sent to IPO firms in late 1993 and early 1994.

28. Unless otherwise stated, all dollar figures in this section are in 1993 dollars, using the consumer price index for adjustments.

29. These five companies are: Quebecor, Petro-Canada, West Fraser Timber, Potash Corporation, and Telemedia Inc.

30. The percentages add to more than 100 since multiple responses were allowed.

31. In an over-allotment option, the firm agrees to issue additional shares to the underwriter at a fixed price in case of over-subscription within 60 days of the IPO. Under a compensation option, the firm grants the underwriters a long-term (up to 24 months) option to buy additional shares of the company at a pre-determined exercise price.

32. Unfortunately, no data is available int he public domain on the actual number of over-subscribed shares. Neither the Ontario Securities Commission nor the Toronto Stock Exchange keeps such data. Our attempts to get this type of data through this questionnaire also failed, since of the thirty four issuers reporting over-subscriptions, only eleven reported the actual number of over-subscribed shares.

33. More specifically, this amount is estimated by multiplying the average increase in share rice by the average percentage of shares received under either of the two options.

34. The lowest (highest) issue expenses were reported as $30 000 ($14.5 million) and the lowest (highest) underwriting expenses were reported as $40 000 ($26.6 million).

35. All coefficients are statistically significant.

36. This 72 month period was chosen for convenience. It preserves the sample size and allows IPOs in the sample that were listed in the post-1986 period.

37. The two methods provide a complementary perspective on the long term performance of the sample IPOs. The first methodology is similar to an arithmetic average of abnormal returns whereas the second methodology corresponds to a geometric return.

38. Ideally, we would have also liked to use an equally-weighted index or a control portfolio of matching firms. The former, although available in Canada, is suspect due to some abnormally high returns exhibited by the series; the latter is not feasible given existing resources.

Table 1

Evidence on Underpricing in G-7 Countries

Country	Sample size	Time Period	Underpricing
Canada	100	1971-83	9.3%
France	187	1983-92	4.2%
Germany	172	1978-92	11.1%
Italy	75	1985-91	27.1%
Japan	472	1970-91	32.5%
United Kingdom	2,133	1959-90	12.0%
United States	10,626	1960-92	15.3%

Source: Loughran et. al. (1994)

FIGURE 1

CANADIAN IPO UNDERPRICING
1971 - 1992

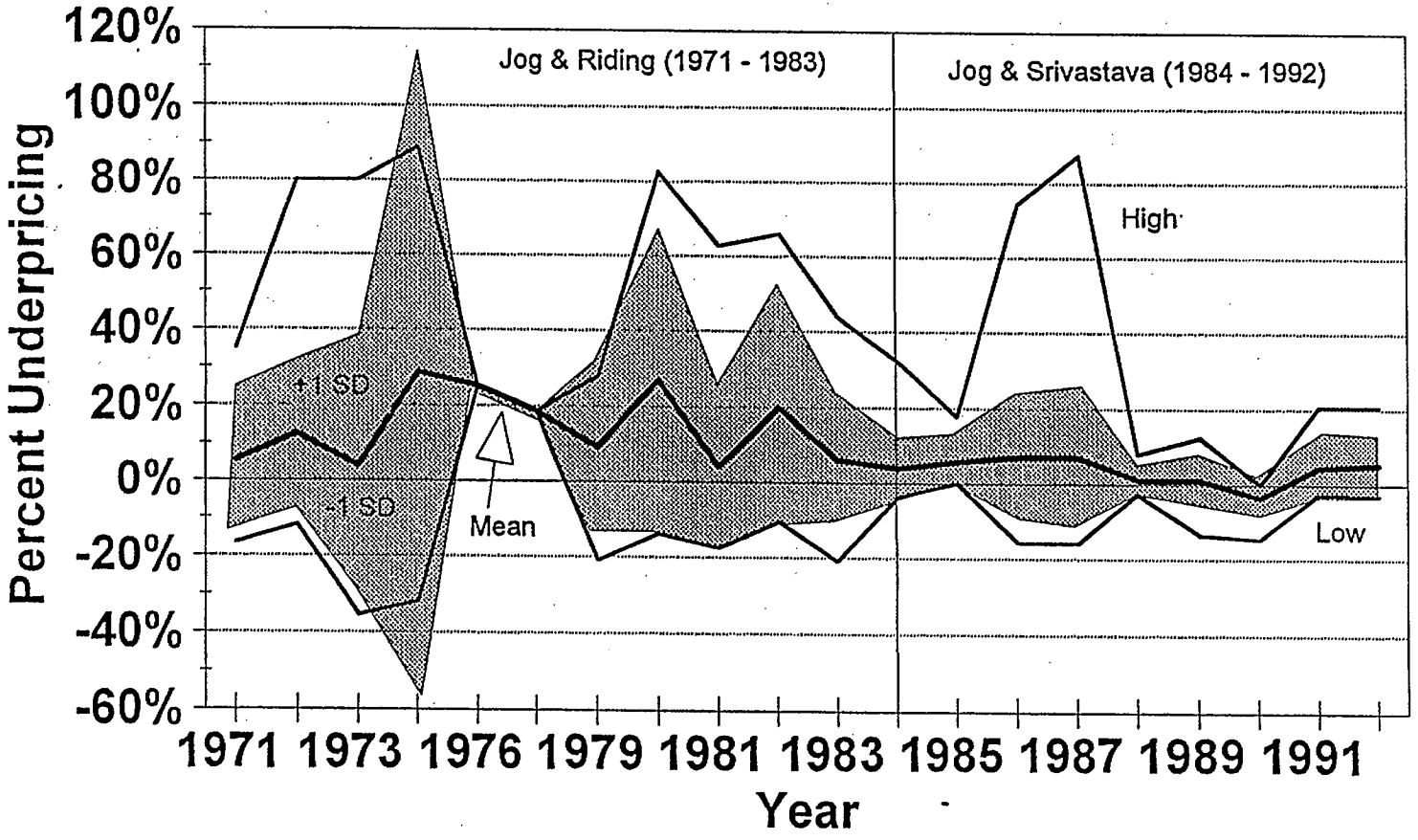

TABLE 2

Underpricing by Year

(1971-1992)

	Year	Average Underpricing	Standard Deviation of Underpricing	High	Low	#	TSE Total Returns
Jog & Riding (1971-83)	1971	5.31%	19.62%	34.88%	-16.67%	8	8.01%
	1972	12.36%	19.78%	80.00%	-11.82%	22	27.38%
	1973	3.87%	33.70%	80.00%	-35.42%	17	0.27%
	1974	28.54%	85.35%	88.89%	-31.82%	2	-25.93%
	1976	25.00%	0.00%	25.00%	25.00%	1	18.48%
	1978	18.48%	0.00%	18.48%	18.48%	1	29.72%
	1979	9.05%	21.65%	27.78%	-20.97%	4	44.77%
	1980	26.80%	39.87%	82.50%	-13.89%	8	30.13%
	1981	4.25%	20.77%	62.50%	-17.65%	17	-10.25%
	1982	19.82%	32.12%	65.79%	-10.71%	5	5.54%
	1983	6.21%	17.01%	43.85%	-21.05%	15	35.49%
	1971-83	9.96%	26.48%	88.89%	-35.42%	100	
Jog & Srivastava (1984-92)	1984	3.80%	9.46%	32.00%	-3.75%	14	-2.39%
	1985	5.87%	6.02%	17.65%	0.00%	6	25.07%
	1986	7.11%	16.53%	74.24%	-15.67%	70	8.95%
	1987	7.13%	18.58%	87.50%	-15.85%	30	5.88%
	1988	1.33%	4.07%	8.11%	-2.78%	4	11.08%
	1989	1.21%	7.02%	12.57%	-13.64%	10	21.37%
	1990	-3.80%	5.70%	0.00%	-14.74%	5	-14.80%
	1991	4.47%	8.40%	20.69%	-2.63%	5	12.02%
	1992	5.26%	8.02%	20.63%	-3.03%	10	-1.43%
	1984-92	5.67%	14.78%	87.50%	-15.85%	154	
	1971-92	7.36%	20.25%	88.89%	-35.42%	254	

Figure 2

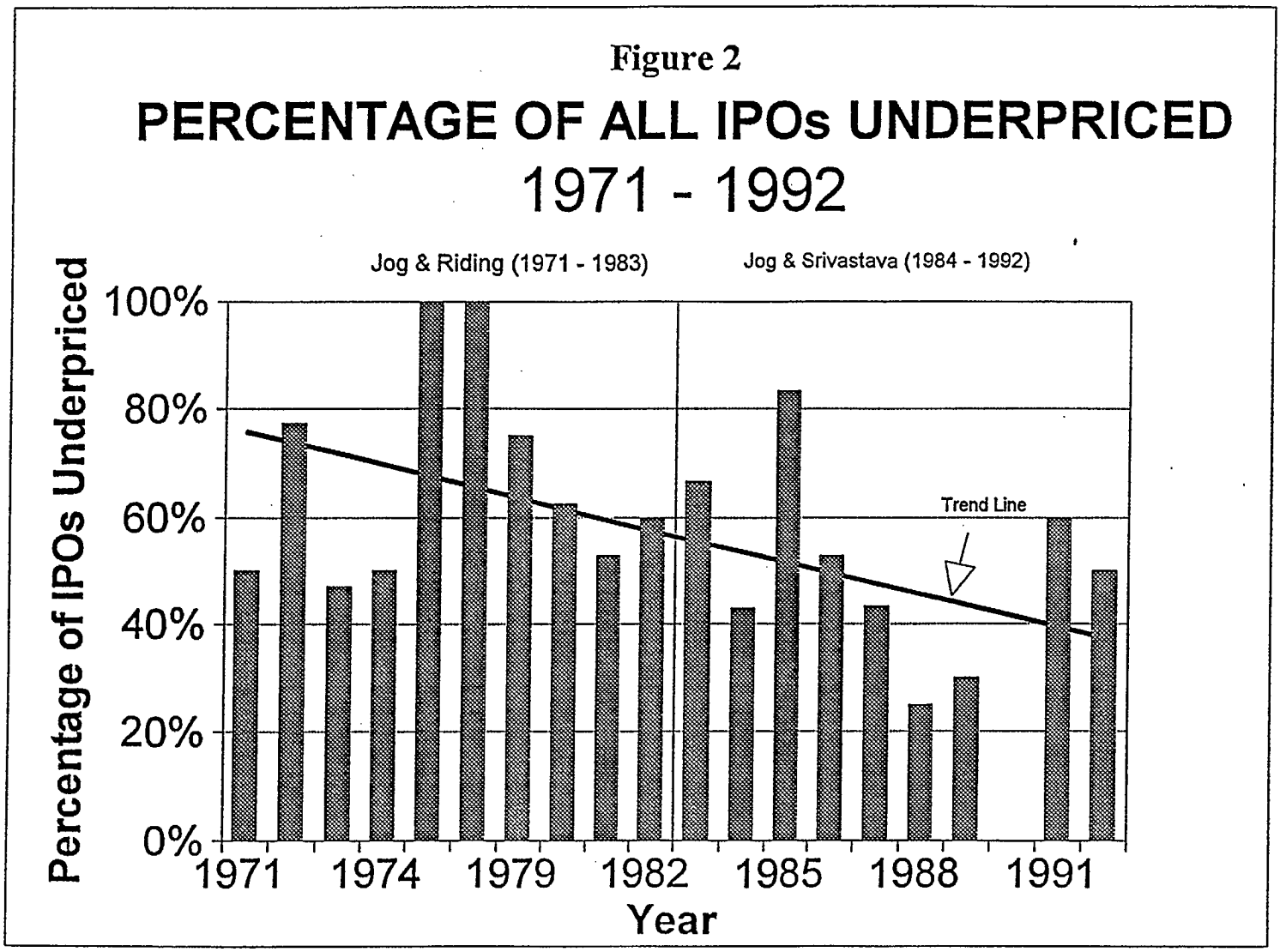
PERCENTAGE OF ALL IPOs UNDERPRICED
1971 - 1992
Jog & Riding (1971 - 1983)
Jog & Srivastava (1984 - 1992)
Percentage of IPOs Underpriced
100%
80%
60%
40%
20%
0%
Trend Line
1971
1974
1979
1982
1985
1988
1991
Year

Figure 3
Cumulative Raw Returns

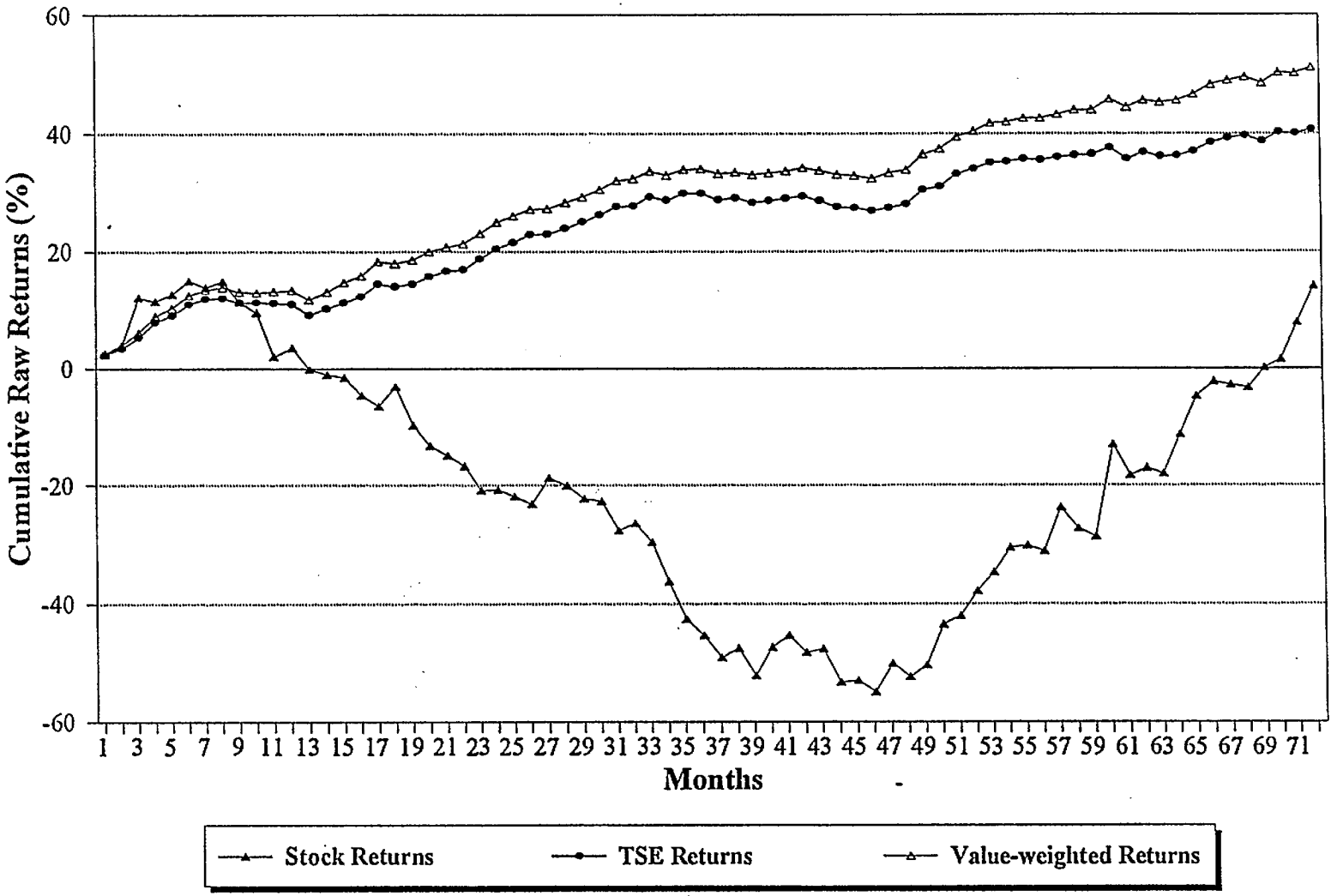

Table 3

Cumulative Abnormal Residuals (CAR), Residual Cumulative Wealth (RCW)

Month	Number of Firms	CAR wrt TSE 300 (%)	t-Statistic	RCW wrt TSE 300 ($)	RCW wrt VW Index ($)
1	149	-0.19	-0.13	-0.23	-0.54
12	148	-14.36	-2.22	-12.92	-15.76
24	150	-31.99	-3.49	-30.83	-37.28
36	130	-41.02	-3.39	-35.15	-43.66
48	117	-48.37	-3.28	-17.17	-28.32,
60	98	-35.28	-1.96	-15.26	-29.82
72	96	-24.72	-1.24	-6.19	-23.92

Figure 4
Residual Cumulative Wealth

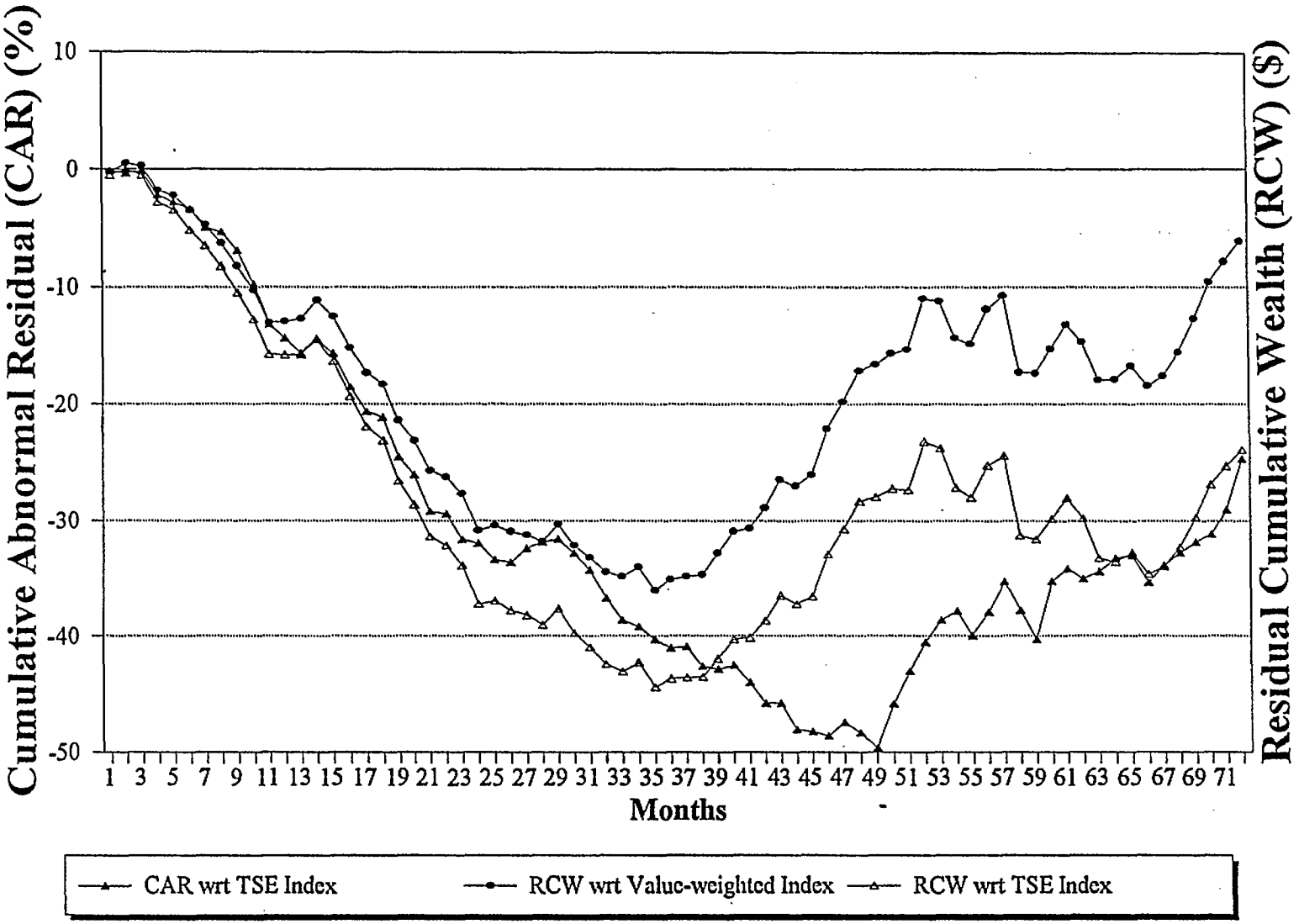

Table 4
Sub-sample Characteristrics and CARs

Sample	Month 12	Month 24	Month 36	Month 48	Month 60	Month 72
Full Sample CAR	-14.36% 148 (54:94)	-31.99% 150 (49:101)	-41.02% 130 (37:93)	-48.37% 117 (37:80)	-35.28% 98 (36:62)	-24.72%* 96 (45:51)&
Full Sample Cum. Wealth	-12.92 148	-30.83 150	-35.15 130	-17.17 117	-15.26 98	-6.19 96
Price < $10.00	-13.61*# 64 (24:40)	-36.92 66 (18:48)	-48.70 54 (12:42)	-43.49* 48 (14:34)	-22.49* 40 (14:26)	4.45* 38 (17:21)&
Price ≥ $10.00	-15.37 83 (29:54)	-28.92 83 (30:53)	-35.78 76 (25:51)	-51.48 69 (23:46)	-44.42 58 (22:36)	-44.97 58 (28:30)&
Overpriced	-19.97* 50 (13:37)	-43.13 51 (14:37)	-56.33 44 (13:31)	-64.32 37 (9:28)	-39.40*# 29 (9:20)	-41.20* 28 (10:18)&
Underpriced	-11.62* 97 (40:57)	-26.81 98 (34:64)	-33.60 86 (24:62)	-40.38 80 (28:52)	-32.89 69 (27:42)	-17.26* 68 (35:33)&
Proceeds > $10m	-18.41 72 (22:50)	-33.37 71 (22:49)	-35.13 61 (21:40)	-49.74 55 (16:39)	-33.24* 60 (15:30)	-15.10*# 45 (22:23)&
Proceeds ≤ $10m	-7.50 38 (15:23)&	-41.16 38 (9:29)	-75.12 32 (3:29)	-80.29 26 (3:23)	-50.67* 22 (6:16)	-26.53* 22 (8:14)&
Bull Market	23.55* 19 (12:7)&	10.00* 19 (11:8)&	-5.79* 18 (8:10)&	-24.17* 17 (8:9)&	-29.22*# 16 (7:9)&	-10.47* 15 (10:5)&
Bear Market	-19.59 129 (42:87)	-37.82 131 (38:93)	-45.78 112 (29:83)	-51.25 100 (29:71)	-35.19* 82 (29:53)	-26.05* 81 (35:46)&
Industrials	-17.21$ 122 (42:80)	-34.95$ 122 (36:86)	-43.39@ 107 (29:78)	-46.73$ 97 (28:69)	-30.70*$ 85 (34:51)	-21.50*@ 83 (40:43)&
Mines	14.31* 10 (5:5)&	0.39* 11 (7:4)&	-38.69* 9 (4:5)&	-71.05* 7 (3:4)&	-100.17* 5 (1:4)&	-3.41* 5 (3:2)&
Oil & Gas	-13.56* 15 (6:9)&	-32.82 16 (5:11)&	-26.21* 13 (4:9)&	-56.58 12 (5:7)&	-44.14* 7 (0:7)	-79.52* 7 (1:6)

Note Each cell (other than the ones with residual cumulative wealth) contains CAR%, number of sample (or, sub-sample) firms and the number of positive CARs versus negative CARs.

*not significant at the 5 percent level of significance
#not significantly different from the CAR of the other sample partition at the 5 percent level of significance
@not significantly different from the CAR of Mining IPOs at the 5 percent level of significance
$not significantly different from the CAR of Oil & Gas IPOs at the 5 percent level of significance
&the proportion of negative CARs is not statistically significantly greater than that of positive CARs at the 5 percent level of significance

Table 5

Relationship of Cumulative Abnormal Residual with Firm-specific Factors

Dependent Variable	Independent Variables						F-Statistics
	Constant	Underpricing	Proceeds	Price	Bull/Bear	Industry	
CAR(1,12)	122.874 (0.18)	0.007 (0.94)	-0.130 (0.39)	0.087 (0.57)	0.254 (0.01)	-0.222 (0.02)	3.089 (0.01)
CAR(1,24)	-112.265 (0.33)	0.043 (0.66)	0.172 (0.27)	0.004 (0.98)	0.193 (0.04)	-0.193 (0.05)	2.159 (0.06)
CAR(1,36)	-330.711 (0.03)	-0.019 (0.86)	0.297 (0.10)	-0.015 (0.93)	0.174 (0.10)	0.013 (0.90)	2.211 (0.06)
CAR(1,48)	-374.953 (0.09)	0.038 (0.75)	0.300 (0.14)	-0.051 (0.79)	0.129 (0.26)	-0.066 (0.58)	1.196 (0.32)
CAR(1,60)	-254.182 (0.22)	0.298 (0.03)	0.136 (0.53)	0.127 (0.54)	0.116 (0.38)	0.051 (0.72)	1.624 (0.17)
CAR(1,72)	-87.400 (0.72)	0.377 (0.00)	0.140 (0.51)	0.092 (0.65)	0.110 (0.39)	-0.216 (0.12)	2.288 (0.06)

Table 6: Industry Distribution of the Sample Firms

Industry	Number
Mining	1
Oil and Gas, mining and forest services	1
Paper and Forest Products	3
Building Materials	2
Autos and parts	1
Breweries and Beverages	2
Food processing	1
Household goods	5
Biotechnology/pharmaceutical	3
Hospitality	3
Specialty stores	2
Business Services	2
Chemicals and fertilisers	1
Electrical and electronic Products	1
Fabricating and Engineering	1
Speciality industries	1
Steel distributing and servicing	1
Technology - Hardware	6
Technology - software	3
Transportation and Environmental Services	2
Telephone utilities	1
Broadcasting	1
Publishing and Printing	1
Real Estate and construction	1
Leasing, financing, mortgages	1
Insurance	2
Conglomerates	1

Table 7: Mean value of each variable or ratio for any given year between -2 and +2

Year	-2	-1	0	1	2
Revenues	$44,411.29	$85,877.78	$100,598.12	$125,263.04	$127,828.70
Depreciation	$2,639.10	$3,976.19	$4,259.47	$5,770.82	$4,658.08
EBIT	$5,761.57	$16,783.80	$16,863.86	$14,108.47	$15,329.06
Interest	$2,186.68	$5,328.72	$4,130.39	$4,560.90	$4,450.28
Taxes	$963.31	$2,625.96	$2,937.04	$4,552.29	$4,697.56
Net Income	$1,314.27	$7,552.50	$9,337.18	$4,852.47	$7,493.72
Dividends-pref.	$22.94	$26.81	$119.00	$274.27	$469.76
Dividends-comm.	$294.39	$624.49	$2,969.92	$2,482.02	$3,798.46
S/T Debt	$2,319.16	$8,807.51	$9,303.92	$8,943.63	$8,374.90
L/T Debt	$19,566.69	$31,802.59	$42,411.02	$37,933.20	$51,666.80
Prefered Equity	$747.71	$1,442.67	$4,135.69	$4,943.10	$6,806.40
Net Fixed Assets	$43,119.57	$61,184.58	$73,395.57	$75,015.59	$93,368.72
Total Assets	$97,108.78	$152,954.74	$204,303.78	$203,164.29	$227,102.28
ROA	0.057	0.083	0.063	0.006	-0.040
Profit Margin	-0.006	0.052	0.073	-0.256	-0.131
Payout	0.264	0.114	0.160	0.355	0.104
D/A	0.282	0.262	0.196	0.188	0.230
S/A	1.527	1.356	1.081	0.991	0.886

Table 8: Median value of each variable or ratio for any given year between -2 and +2

Year	*-2*	-1	0	1	2
Revenues	$22,685.00	$23,348.00	$39,408.00	$48,009.00	$47,864.00
Depreciation	$752.00	$936.00	$1,287.00	$1,512.00	$1,095.00
EBIT	$2,575.00	$3,761.00	$6,497.00	$4,770.00	$2,190.50
Interest	$501.00	$532.50	$470.00	$446.00	$410.50
Taxes	$550.00	$1,083.00	$1,942.00	$1,824.00	$630.00
Net Income	$881.00	$1,491.00	$2,921.00	$2,217.00	$1,134.00
Dividends-pref.	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends-comm.	$0.00	$0.00	$0.00	$0.00	$0.00
S/T Debt	$899.50	$898.00	$629.00	$807.00	$1,520.00
L/T Debt	$3,806.00	$3,083.00	$3,113.00	$3,312.00	$2,089.00
Prefered Equity	$0.00	$0.00	$0.00	$0.00	$0.00
Net Fixed Assets	$3,779.00	$5,112.50	$9,062.00	$12,779.00	$8,851.00
Total Assets	$16,433.50	$19,664.00	$34,117.00	$45,285.00	$48,711.00
ROA	0.055	0.057	0.058	0.040	0.033
Profit Margin	0.045	0.056	0.063	0.046	0.026
Payout	0.000	0.000	0.000	0.000	0.000
D/A	0.274	0.276	0.158	0.146	0.206
S/A	1.402	1.210	0.954	1.038	0.882

Table 9: Distribution of IPO firms in terms of percentage change in total assets

Year	*x < -10%*	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	*5% <= x <10%*	>=10%
0_-2	5.1%	0.0%	5.1%	2.6%	87.2%
0_-1	5.8%	1.9%	5.8%	3.8%	82.7%
1_-2	2.6%	0.0%	2.6%	0.0%	94.9%
1_-1	5.8%	0.0%	1.9%	0.0%	92.3%
1_0	11.5%	0.0%	15.4%	11.5%	61.5%
2_-2	17.5%	0.0%	2.5%	0.0%	80.0%
2_-1	18.9%	1.9%	0.0%	0.0%	79.2%
2_0	24.5%	5.7%	1.9%	3.8%	64.2%
2_1	24.5%	5.7%	17.0%	11.3%	41.5%

Table 10: Distribution of IPO firms in terms of percentage change in Depreciation

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	*5% <= x <10%*	>=10%
0_-2	12.8%	0.0%	7.7%	2.6%	76.9%
0_-1	14.0%	4.0%	10.0%	6.0%	66.0%
1_-2	7.7%	0.0%	5.1%	0.0%	87.2%
1_-1	8.0%	0.0%	6.0%	4.0%	82.0%
1_0	2.0%	6.0%	8.0%	0.0%	84.0%
2_-2	27.5%	2.5%	5.0%	0.0%	65.0%
2_-1	21.6%	5.9%	2.0%	0.0%	70.6%
2_0	21.6%	2.0%	5.9%	3.9%	66.7%
2_1	22.0%	2.0%	14.0%	2.0%	60.0%

Table 11: Distribution of IPO firms in terms of percentage change in Revenue

	x < -10%	-10 % <= x < - 5%	- 5% <= x < 5%	5% <= x <10%	x >=10%
0_-2	4.4%	0.0%	2.2%	0.0%	93.3%
0_-1	13.2%	0.0%	7.5%	3.8%	75.5%
1_-2	2.2%	2.2%	2.2%	2.2%	91.1%
1_-1	7.5%	1.9%	1.9%	3.8%	84.9%
1_0	9.6%	3.8%	11.5%	1.9%	73.1%
2_-2	15.2%	2.2%	2.2%	0.0%	80.4%
2_-1	27.8%	1.9%	0.0%	1.9%	68.5%
2_0	24.5%	5.7%	3.8%	1.9%	64.2%
2_1	26.4%	1.9%	15.1%	11.3%	45.3%

Table 12: Distribution of IPO firms in terms of percentage change in Debt to Asset Ratio

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	*5% <= x <10%*	>=10%
0_-2	62.8%	2.3%	7.0%	27.9%	0.0%
0_-1	62.7%	3.9%	2.0%	0.0%	31.4%
1_-2	71.4%	4.8%	4.8%	2.4%	16.7%
1_-1	66.7%	2.0%	2.0%	5.9%	23.5%
1_0	47.9%	4.2%	8.3%	2.1%	37.5%
2_-2	53.5%	7.0%	2.3%	2.3%	34.9%
2_-1	48.1%	3.8%	5.8%	1.9%	40.4%
2_0	38.8%	2.0%	8.2%	2.0%	49.0%
2_1	31.9%	4.3%	14.9%	2.1%	46.8%

Table 13: Distribution of IPO firms in terms of percentage change in Common Dividend

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	*5% <= x <10%*	>=10%
0_-2	18.2%	0.0%	70.5%	0.0%	11.4%
0_-1	16.0%	0.0%	66.0%	0.0%	18.0%
1_-2	11.4%	0.0%	68.2%	0.0%	20.5%
1_-1	17.6%	3.9%	60.8%	0.0%	17.6%
1_0	17.6%	0.0%	58.8%	0.0%	23.5%
2_-2	13.3%	0.0%	68.9%	0.0%	17.8%
2_-1	21.6%	2.0%	58.8%	0.0%	17.6%
2_0	25.0%	0.0%	57.7%	0.0%	17.3%
2_1	12.2%	0.0%	73.5%	2.0%	12.2%

Table 14: Distribution of IPO firms in terms of percentage change in Payout Ratio

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	5% <= x <10%	>=10%
0_-2	25.0%	0.0%	68.2%	0.0%	6.8%
0_-1	24.0%	0.0%	64.0%	0.0%	12.0%
1_-2	22.7%	2.3%	68.2%	0.0%	6.8%
1_-1	25.5%	0.0%	60.8%	0.0%	13.7%
1_0	21.6%	0.0%	60.8%	2.0%	15.7%
2_-2	24.4%	0.0%	66.7%	0.0%	8.9%
2_-1	29.4%	0.0%	60.8%	0.0%	9.8%
2_0	28.8%	0.0%	59.6%	0.0%	11.5%
2_1	15.2%	0.0%	69.6%	0.0%	15.2%

Table 15: Distribution of IPO firms in terms of percentage change in EBIT

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	*5% <= x <10%*	>=10%
0_-2	24.4%	0.0%	4.4%	2.2%	68.9%
0_-1	22.6%	1.9%	7.5%	1.9%	66.0%
1_-2	28.9%	0.0%	4.4%	2.2%	64.4%
1_-1	39.6%	0.0%	5.7%	0.0%	54.7%
1_0	48.1%	0.0%	5.8%	3.8%	42.3%
2_-2	43.5%	0.0%	4.3%	0.0%	52.2%
2_-1	53.7%	0.0%	1.9%	3.7%	40.7%
2_0	56.6%	0.0%	0.0%	1.9%	43.4%
2_1	46.0%	2.0%	4.0%	2.0%	46.0%

Table 16: Distribution of IPO firms in terms of percentage change in EBIT to Sales Ratio

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	*5% <= x <10%*	>=10%
0_-2	42.2%	0.0%	6.7%	2.2%	48.9%
0_-1	28.3%	3.8%	15.1%	5.7%	47.2%
1_-2	51.1%	6.7%	15.6%	0.0%	26.7%
1_-1	56.6%	5.7%	11.3%	1.9%	24.5%
1_0	61.5%	3.8%	17.3%	1.9%	15.4%
2_-2	60.0%	0.0%	5.0%	0.0%	35.0%
2_-1	63.8%	4.3%	4.3%	2.1%	25.5%
2_0	63.0%	4.3%	10.9%	0.0%	21.7%
2_1	54.5%	4.5%	20.5%	0.0%	20.5%

Table 17: Distribution of IPO firms in terms of percentage change in Profit Margin

	x < -10%	-10 % <= x < - 5%	- 5% <= x <5%	5% <= x <10%	>=10%
0_-2	44.4%	0.0%	4.4%	2.2%	48.9%
0_-1	37.7%	1.9%	7.5%	3.8%	49.1%
1_-2	57.8%	4.4%	4.4%	0.0%	33.3%
1_-1	60.4%	1.9%	3.8%	0.0%	34.0%
1_0	61.5%	1.9%	3.8%	1.9%	30.8%
2_-2	60.9%	4.3%	0.0%	2.2%	32.6%
2_-1	63.0%	0.0%	1.9%	1.9%	33.3%
2_0	73.6%	0.0%	1.9%	3.8%	20.8%
2_1	61.5%	3.8%	5.8%	1.9%	26.9%

Table 18: Distribution of IPO firms in terms of percentage change in ROA

	x < -10%	-10 % <= x < - 5%	- 5% <= x < 5%	5% <= x <10%	x >=10%
0_-2	55.6%	0.0%	6.7%	2.2%	35.6%
0_-1	52.8%	0.0%	13.2%	3.8%	30.2%
1_-2	62.2%	2.2%	6.7%	2.2%	26.7%
1_-1	67.9%	0.0%	5.7%	0.0%	26.4%
1_0	57.7%	1.9%	5.8%	5.8%	28.8%
2_-2	71.7%	0.0%	0.0%	2.2%	26.1%
2_-1	70.4%	1.9%	1.9%	0.0%	25.9%
2_0	69.8%	3.8%	3.8%	0.0%	22.6%
2_1	63.5%	1.9%	7.7%	1.9%	25.0%

Table 19: Distribution of IPO firms in terms of percentage change in Sales to Assets Ratio

	x < -10%	*-10 % <= x < - 5%*	*- 5% <= x < 5%*	5% <= x <10%	x >=10%
0_-2	43.6%	5.1%	17.9%	5.1%	28.2%
0_-1	46.2%	7.7%	23.1%	1.9%	21.2%
1_-2	46.2%	15.4%	10.3%	7.7%	20.5%
1_-1	50.0%	1.9%	15.4%	11.5%	21.2%
1_0	30.8%	7.7%	15.4%	7.7%	38.5%
2_-2	65.0%	5.0%	5.0%	0.0%	25.0%
2_-1	58.5%	13.2%	7.5%	1.9%	18.9%
2_0	45.3%	7.5%	7.5%	3.8%	35.8%
2_1	39.2%	11.8%	13.7%	7.8%	27.5%

Table 20

DECISION THAT IT WAS BEST TIME TO GO PUBLIC

	Best Reason	Second Best	Third Best	Total
You felt ready	5	6	4	15
The business had an exceptionally good year	1	1	3	5
The business had a well-defined business plan to expand	11	11	4	26
The current sources of financing were starting to dry out	7	5	7	19
The business wished to enter new markets	2	8	2	12
The business was looking at diversifying	3	0	1	4
The stock market was favourable to high-priced issues	10	7	6	23
The owners wanted liquidity for their shares	1	8	11	20
The owners wanted to sell a part of their ownership	6	0	3	9
The owners wanted the respect a public firm enjoys	2	0	2	4
Others	5	2	5	12

Table 21

CHOOSING AN UNDERWRITER FOR IPO

	Very High	High	Average	Low	Very Low	most Important
A good reputation	27	23	3	0	0	11
The quality of service	21	26	4	1	0	10
The cost of service	2	13	29	7	1	0
Proximity of underwriter's office	0	3	14	16	19	1
Underwriter's success with previous issues	19	25	8	1	0	20
History of under/over pricing of issues	1	14	21	13	3	2
The size of the retail sales staff	5	11	17	13	6	1
Experience with large institutional clients	14	21	15	2	1	4
Market share	4	14	23	9	2	1

Table 22
Issuing and Underwriting Expenses as a percentage of Equity Capital raised
(Number of firms)

Percent range	Issuing Expenses	Underwriting Expenses	Total Expenses
0 - 1	8	2	1
1 - 2	8	2	1
2-3	7		
3-4	8	1	
4-5	3	4	1
5-6		7	3
6-7	1	15	6
7-8	1	2	6
8-9			4
9-10			6
10 and above		1	7

Table 23
Opinions about Underwriter Support immediately following IPO Issuance

	Poor	Below Average	Average	Above Average	Excellent
Overall support		3	19	17	11
Quality of service		1	15	21	14
Retail market support	2	8	23	15	3
Institutional support	2	4	13	24	7

Table 24
Underpricing Exists because

	Agree Strongly	Agree Moderately	Indifference	Disagree moderately	Disagree Strongly
Investors require a discount for future uncertainty	3	33	7	5	1
it reduces the possibility of underwriters losses due to under-subscription	7	22	12	5	2
IPOs are generally oversubscribed and demand exceeds supply	4	19	15	9	1
underwriters do not want a legal suit	1	13	16	13	5
underwriters can benefit their preferred customers	4	20	6	14	4
underwriters must leave 'something on the tables	6	20	12	8	2

CANADA - US MARKET SEGMENTATION AND THE COST OF EQUITY CAPITAL

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Executive Summary

Problem Researched

Barriers to international investments across countries can cause the financial markets to be segmented along the national boundaries. To the extent that the financial market of a country is isolated from those of other countries, the cost of capital in that country will depend on the demand and supply of capital within that country.

Many recent studies have found strong evidence that the Canadian equity market is segmented from the U.S. equity market, although there is a move toward integration of the two markets in the recent years. Segmentation is less severe for the Canadian stocks interlisted on the U.S. stock markets. An implication of these findings is that the cost of equity for Canadian firms is determined primarily in the Canadian equity market. Since Canadian economy is small and resource-based, many firm specific factors may be priced in the Canadian economy that may be diversified away in the large U.S. economy. Understanding of these factors is important to reduce the negative impact of these factors. The purpose of this study is to identify factors that are likely to influence the cost of equity for the Canadian firms and to provide empirical evidence on the significance of these factors.

I examine these issues using a sample of the seasoned equity issuances by the TSE 300 firms in the 1982-1993 period. I use an event study methodology and a two-step estimation procedure. In the first step, I measure the stock price effects to the announcements of the seasoned equity offerings. In the second step, I conduct a cross-sectional analysis to investigate the relationship between the stock price effects at the time of the announcements and the hypothesized factors suggested by the special characteristics of the Canadian equity market. I also study the differences in the price effects of the equity issues between the Canadian interlisted and non-interlisted firms.

Findings

The results reveal that the stock market reacts negatively to the announcements of the seasoned equity offerings. The issuing firms experience, on average, a drop of -1.75% in their share price in the two-day period surrounding the announcement date. The cross-sectional analysis indicates that larger firms experience a more pronounced negative reaction while interlisted firms have more favourable market reaction. The two-day share price drop for the interlisted firms is only -0.87 % compared to -2.33% for the non-interlisted firms. Also, the larger issues have a more negative reaction in the earlier period. There is no significant relationship between the stock price effect at the time of announcement and the industry, dividend yield, and ownership structure of the firm issuing equity.

Conclusions

The results of this study suggest that the main determinants of the equity capital are related to the smaller size of the Canadian equity market. The smaller size of the market implies that the equity issues by large firms cannot be easily absorbed by the market and the demand for such issues may be

downward sloping.

Overall, the findings of this study confirm the previous evidence that Canadian market is segmented from the U.S. equity market and segmentation is more severe for the non-interlisted stocks. The main barriers to integration appear to be related to the foreign investors' inhibitions to invest in Canadian securities. These barriers are reduced to a large extent by the interlisting of securities on the larger U.S. stock markets. Overall, the results suggest that the large Canadian non-interlisted firms are likely to face a higher cost of capital relative to their U.S. counterparts.

Policy Implications

Since a firm's ability to raise capital at a lower cost is a major competitive advantage in the increasingly globalized world economy, the government policy should be aimed at increasing the integration of the Canadian equity market with the U.S. market. In the last decade, the legal barriers to capital flows across borders have been eliminated or reduced considerably. However, the strong home-country bias in the institutional portfolios indicates that the indirect barriers to international investments still remain very strong. For example, only 10% of the value of the assets in the 500 largest institutional portfolios in the world is currently invested in foreign securities. The institutional portfolio managers prefer to invest in foreign stocks with high liquidity and information availability. The government policy should attempt to make the Canadian stocks attractive and easily accessible for the foreign investors. This can be achieved by encouraging Canadian firms to interlist on the U.S. stock exchanges and making the Canadian stock exchanges attractive sites for foreign investors.

Proximity to the larger U.S. market is big advantage for Canada and listing on the U.S. markets increases the visibility of the Canadian stocks for foreign investors who are more familiar with the U.S. stock markets. Interlisting of securities also creates incentives for the domestic stock exchanges to become more efficient by competing in the market place for orderflows of the interlisted Canadian stocks. The Canadian stock exchanges should develop strategies to attract foreign listings and investors to the Canadian stock market.

Future Directions

This study has focused on identifying the main determinants of the cost of equity for the Canadian firms. Future research should explore the determinants of the other components of the cost of capital, including the cost of debt and preferred shares.

ABSTRACT

This study examines the stock price effects of the seasoned equity offerings by the TSE 300 firms to identify the determinants of the cost of equity for Canadian firms. The results reveal that the issuing firms experience a significant drop in their share price around the announcement date. The cross-sectional analysis shows that larger firms experience a more pronounced negative reaction while interlisted firms have more favourable market reaction.The results suggest that the main determinants of the equity capital are related to the smaller size of the Canadian equity market. The findings of this study confirm the previous evidence that the Canadian market is segmented from the U.S. equity market and segmentation is more severe for the non-interlisted stocks.

I. Introduction

Barriers to international investments across countries can cause the financial markets to be segmented along the national boundaries. These barriers may include legal barriers such as the government restrictions on the flow of capital across countries as well as the indirect barriers that pertain to the investors' reluctance to invest in foreign securities due to difficulties in collecting information about or transacting in foreign stocks.

To the extent that the financial market of a country is isolated from those of other countries, the cost of capital in that country will depend on the demand and supply of capital within that country. In segmented capital markets, factors that determine the cost of capital may vary across countries depending on the characteristics of each economy. In a small economy, many factors may be priced that are diversified away in a large economy. Thus, firms with similar risk characteristics may have different cost of capital depending on the degree of segmentation and the special characteristics of the home country economy.

Many recent studies have investigated the integration of the Canadian and U.S. equity markets. Jorion and Schwartz (1986) find strong evidence using the Capital Asset Pricing Model (CAPM) that the Canadian stocks were priced in a segmented Canadian market rather than in an integrated market comprising of the Canadian and U.S. stock markets in the 1968-82 period. Mittoo (1992a) confirms their findings in the 1977-81 period using both the CAPM and the Arbitrage Pricing Theory (APT) but finds that there is a move toward integration in the recent 1982-86 period. Booth and Johnston (1984) conclude that the pricing of the Canadian stocks interlisted on the U.S. stock markets (interlisted stocks) and those listed only on the domestic stock exchanges (non-interlisted stocks) is done in different markets. Evidence by Mittoo (1992a) and Foerster and Karolyi (1993) supports these findings. In summary, two major conclusions can be drawn from the research on the

issue of the Canada - U.S. stock market integration:

(i) Until early 1980s the Canadian equity markets were segmented from the U.S. equity markets but there is a move toward integration of the two markets in the recent years.

(ii) Segmentation is more predominant for the Canadian non-interlisted stocks. Canadian stocks interlisted on the Canadian and U.S. stock markets are priced in a relatively integrated market compared to their domestic counterparts.

Segmentation of the Canadian and U.S. equity markets implies that the cost of equity capital for the Canadian firms depends largely on the demand and supply of the equity capital within Canada. Since Canadian economy is small and resource based many factors may be priced in the Canadian market that may be diversified away in the large U.S. economy. Consequently, the Canadian firms are likely to face a higher cost of capital relative to their U.S. counterparts. The purpose of this paper is to identify factors that are likely to influence the cost of equity capital for the Canadian firms and to provide empirical evidence on the significance of these factors. In addition, we also explore the differences between the interlisted and domestic listed securities. The rest of the paper is organized as follows. Secion II discusses the potential determinants of the cost of equity for Canadian firms. Section III describes the sample and test methodology. Section IV presents the empirical results and section V summarizes the findings and discusses the policy implications.

II. Determinants of the Canadian Cost of Equity

Standard Capital Asset Pricing Model (CAPM) specifies that systematic risk or beta is the only determinant of the risk relevant for pricing securities. This model is based on the strong assumptions of perfect and frictionless capital markets. In recentl years, many researchers have developed models by relaxing some of these assumptions. In these models, a broader measure of risk that also includes

institutional and firm specific factors is specified as relevant for asset pricing. For example, Merton (1987) develops a model of capital market equilibrium under the assumptions that investors generally know only about a subset of available securities and these subsets vary across investors depending on individual investors' degree of recognition of different securities. In their model, expected return increases with the systematic risk, firm specific risk and relative market value and decreases with the relative size of the firm's investor base. I draw upon this literature to identify factors that are likely to affect the demand or supply of the equity capital in the Canadian market. These factors are based on the special characteristics of the Canadian equity market and are discussed below.

A. *Industrial Structure*

King (1966) first identified the presence of an industry factor in addition to the market factor as a determinant of the U.S. stock returns. Lessard (1974, 1976) documented the importance of industry factor for the international stock returns. Roll (1992) showed that industry factor is an important determinant of the differences in the correlations and volatility among the country index returns. Canadian stock market is dominated by resource firms which are more volatile than the non-resource firms. Thus, industry is likely to be a significant factor in the Canadian market and the Canadian investors may demand a higher risk premium for holding the resource stocks relative to the non-resource stocks.

B. *Stock Liquidity*

Infrequent trading is a major problem in the Canadian stock market. Fowler, Rorkie and Jog (1980) report that out of the 1800 securities that were listed on the Toronto Stock Exchange for at least twelve month during the period January 1970 to December 1979, only 4.3 percent of the stocks

traded on the last day of each month, only 37.5 percent exhibited at least one trade every month and the remaining 58 percent had at least one month in which no trade was recorded. The high liquidity stocks are preferred by the large institutional investors who are the dominant investors in the Canadian stock market in the 1990s with more than 70% of the market share.[1] Thus, the demand for highly liquid Canadian stocks is likely to be greater than the supply of such stocks and investors may demand a higher risk premium for holding thinly traded stocks.

C. *Firm Size*

Many studies have documented a positive relationship between firm size and expected returns (Schwert (1983)). Berk (1993) argues that the relative firm size is actually a measure of risk. Canadian firms are much smaller, on average, compared to the U.S. firms. For example, only 9 Canadian companies were included in the Fortune's 1991 list of 500 largest industrial companies compared to 157 U.S. firms. Since Canada has a preponderance of small firms, investors may demand higher risk premium for holding the small stocks relative to the large firm stocks.

D. *Ownership Structure*

Ownership structure is a major difference between the Canadian and U.S. firms. Canadian firms, in general, are closely held and many domestically owned corporations have a control block of shareholders. Thain and Leighton (1991) find that 73 percent of the top 100 corporations in the U.S. are widely held compared to only 15 percent in Canada. Two opposite effects can be attributed to

[1] By 1990s, institutions such as mutual fund, pension funds, and insurance companies held 70% of the market's value. In 1991, they held about two-thirds of the trading value on the Toronto Stock Exchange. See, "Brokers chase small players again", *The Financial Post*, November 17, 1992.

the differences in the ownership structure. First, the agency costs that arise in the widely held firms because of the divergence between the interests of managers and shareholders are reduced in the closely held firms. On the other hand, the agency costs that stem from the conflict of interest between the majority and minority shareholders are likely to be higher in the closely held firms. Thus the net effect of ownership structure on the cost of equity depends on which factor dominates.

E. *Dividend Yield*

The impact of differential taxation on dividends and capital gains on equity value has been the subject of considerable debate in Canada. Booth (1987) argues that dividend tax credit induces segmentation in the Canadian market by encouraging Canadians to invest in the Canadian securities and provides evidence consistent with this hypothesis. McKenzie and Thompson (1995) also find that taxes affect stock prices and that changes in the domestic taxation of dividends have differential impact on high and low dividend yield securities. The effect of stock dividend yield, however, is likely to be minimal in recent years because of tax reforms that have reduced the tax differential between dividends and capital gains considerably.

F. *Interlisted Securities*

The number of interlisted Canadian securities has increased rapidly in recent years. At the end of 1992, 220 Canadian issues were interlisted on the U.S. stock exchanges. Companies seek U.S. listings primarily to access the larger U.S. capital markets and to increase the stock liquidity (Mittoo (1992b)). The interlisted securities form a significant portion of the Canadian market value and their traded value comprises more than 50% of the total dollar traded value on the Toronto Stock Exchange. Many interlisted securities are actively traded on the U.S. markets because the interlisted

securities are as convenient to trade for the U.S. investors as the domestic U.S. stocks. Since interlisting allows firms to dismantle some indirect barriers to international investments, Canadian investors may prefer the interlisted equity issues relative to the non-interlisted equity issues.

III. Data and Test Methodology

A. Sample and Data Description

The sample analyzed in this study consists of the seasoned equity issuances by the TSE 300 firms during the 1982-1993 period. The initial sample of equity offerings was identified from the *Compact Disclosure* and the search for the announcement dates of the offerings was done in the *Canadian Business and Current Affairs (CBCA).* To qualify for inclusion in the study, an equity issuance had to satisfy the following criteria:

1. The firm issuing the equity was included in the TSE 300 index as of December 1993.
2. The issue was a public seasoned offerings made by a non-financial firm. The initial public offerings (IPOs) were excluded.
3. The equity issue did not have any warrants or other sweetners attached.
4. The announcement date of the equity issue was available in the *Globe and Mail* or the *Financial Post* and there was no other major firm specific event on the announcement date.
5. The daily stock returns for the security were available on the *Canadian Financial Markets Research Centre (CFMRC)* database and sufficient stock returns data were available around the offerings announcement for empirical analysis.
6. The information on firm specific variables were available for the cross-sectional analysis. The data on firm specific variables were collected from the *Compustat, Compact Disclosure, Toronto Stock Exchange Reviews* and *the Financial Post Data base.*

These selection criteria resulted in a sample of 108 equity offerings.

B. Test Methodology

I employ the standard event study framework and follow a two-step estimation procedure to test the significance of the specified factors. In the first step, I estimate the abnormal returns to the announcements of the equity issuance by each firm. In an efficient market, the stock market reaction at the time of the announcement will capture the effects of the equity offering on the firm value. In the second step, I do a cross-sectional analysis of the relationship between the stock price effects and the determinants of the cost of equity.

Previous research has shown that stock market reacts negatively to the announcements of the new equity issuances. These studies have documented that seasoned equity offerings are accompanied by a drop in the issuer firm's price and larger equity issues have more pronounced negative reaction.[2] This is consistent with the theory that managers and investors have asymmetric information about a firm's prospect. Managers issue equity when the share price is too high relative to the managers' assessment of the share price based on the future cash flows to the firm and thus equity issue signals a bad news to the market. Jog and Schaller (1993) provide evidence in support of the asymmetric information hypothesis in the Canadian market. Thus the degree of asymmetric information needs to be controlled in the cross-sectional analysis.

B. 1. Estimation of Abnormal Stock Returns

The daily abnormal returns for any stock are defined as the difference between the observed returns and the expected returns predicted by single factor market model of expected returns. The market model is specified as:

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[2] See Jog and Schaller (1993) and Eckbo and Verma (1992) for Canadian evidence and Asquith and Mullins (1986), Lucas and McDonald (1990), Masulis and Korwar (1986), Mikkelson and Partch (1986) and Smith (1986) for the U.S. evidence.

$$R_{jt} = \alpha_j + \beta_j R_{Mt} + \epsilon_{jt} \quad (1)$$

where R_{jt} is the rate of return on secuirty j on day t, R_{Mt} is the rate of return on the value-weighted market portfolio provided by CFMRC on day t and ϵ_{jt} is the error term of security j on day t.

Abnormal return for the common stock of firm j on day t is defined as $AR_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{Mt})$, where $\hat{\alpha}_j$, $\hat{\beta}_j$ are ordinary least squares estimates of firm j's market model parameters. Event day 0 is defined as the day of the first announcement of the equity issue in a Canadian business newspaper. The parameters of the model are estimated from trading days -200 to -50 prior to the announcement day. For a sample of N firms, daily average abnormal return (AR) for each day t is obtained:

$$AR_t = (1/N)\sum_{j=1}^{N} AR_{jt} \quad (2)$$

The expected value of AR_t in the absence of any abnormal returns is zero and difference from zero captures the abnormal returns due to the market reaction to the announcement. To examine whether the average daily abnormal return is different from zero, the average standardized abnormal return (SAR_t) is calculated as

$$SAR_t = \frac{1}{N}\sum_{j=1}^{N} \frac{AR_{jt}}{S_{jt}} \quad (3)$$

where S_{jt} is the estimated residual standard deviation of firm j from the market model regression.

For calculating the significance of the abnormal returns, the following Z- statistic is calculated for a portfolio of N securities for each day t

$$Z_t = \sqrt{N}\, SAR_t \quad (4)$$

Assuming that the individual abnormal returns are normal and independent across securities, Z-statistic follows a unit-normal distribution and is used to test the hypothesis that the average standardized abnormal return equals zero.

Since there may be a leakage of information prior to the publication date, the cumulative abnormal returns (CAR) are calculated for a two-day period (-1, 0) which includes the event day and the trading day before the publication date.

B. 2. Cross-Sectional Regression

The following multiple regression model is estimated to examine the significance of the hypothesized factors:

$$SCAR_j = \alpha_0 + \beta_1 RESOURCE + \beta_2 TURNOVER + \beta_3 SIZE + \beta_4 OWNER + \beta_5 DIVYLD + \beta_6 ISSUESIZE + \beta_7 INTERLST + \epsilon_j$$

where $SCAR_j$ is the two day (-1, 0) standardized cumulative abnormal return and the independent variables are the hypothesized determinants of the equity capital. RESOURCE is a dummy variable which takes the value 1 if the equity issuance is by a resource firm and 0 otherwise. TURNOVER proxies the stock liquidity and is the ratio of the number of firms's shares traded to the average number of shares outstanding in one year prior to the equity issue. SIZE is the natural logarithm of the book value of the total assets of the firms in the year prior to the equity issue. OWNER is a dummy variable that takes the value 1 for firms that are closely held and 0 otherwise. A firm in which a single shareholder owns more than 20% of the voting shares outstanding is defined as a closely held firm. DIVYLD is the dividend yield of the stock in the year prior to the issue. ISSUESIZE is the ratio of the number of new shares offered to the number of shares outstanding at the end of the year prior to the issue and is a proxy for the degree of asymmetric information across firms. INTERLST is a dummy variable which takes the value 1 if the firm issuing equity was interlisted on the Canadian and

U.S. stock exchanges and 0 otherwise.

IV. Empirical Results

A. Sample Characteristics

Table I provides the frequency distribution of the sample offerings by the year of offering. The sample is concentrated in the 1991-93 period and about 60% of the sample equity offerings occur in this period. About 40% of the issues are by the interlisted Canadian firms and 60% by the non-interlisted Canadian firms. The equity issues by interlisted and non-interlisted firms follow a similar distribution over time.

B. Abnormal Returns

Table II provides the average daily abnormal returns (AR) for the period -10 to +10 days relative to the announcement day of the offerings. The results show that the stock market reacts significantly negatively to the announcement of the equity offerings, a finding that is consistent with the previous evidence in the U.S. and Canada. The abnormal return on day -1 is -1.51% of the issuer firm's equity value with a Z-statistic of -9.1 which is significant at less than 0.001 level. The abnormal return on the announcement day is -0.26% and the Z-statistic is significant at the 0.05 level. The average two-day cumulative abnormal return (CAR) is -1.75% and is statistically significant at less than 0.001 level. For most days prior to and after the event, there are no significant abnormal returns which is consistent with market efficiency.

There are significant differences in the abnormal returns between the interlisted and non-interlisted issues. The average two-day cumulative abnormal return (CAR) is -0.87% for the interlisted issues compared to -2.33% for the non-interlisted issues. The Z-statistic to test the difference between the two is 3.85 which is significant at the 0.01 level.

Table II also provides the percentage of positive and negative abnormal returns on each day.

The proportion of positive and negative abnormal returns are approximately the same for most days. However, 73% of the returns on day -1 and 59% of the returns on day 0 are negative. A binomial sign test is used to test the significance of the negative abnormal returns. The Z-value for the number of negative abnormal returns is -5.05 for day -1 and -1.95 for day 0.

C. Cross-Sectional Regression Analysis

Table III presents the correlations among the explanatory variables that proxy the hypothesized determinants of the equity capital. Most of the correlations are small. However, DIVYLD and SIZE are highly correlated with a correlation of 0.47 which may cause multicollinearity problem in the cross-sectional regression.

Table IV presents the results for the cross-sectional regressions of the standardized two-day cumulative abnormal returns (SCAR) on the potental determinants of the cost of equity for Canadian firms. Regression (1) is estimated with all the independent variables, including DIVYLD. Regression (2)-(5) exclude DIVYLD to deal with the potential multicollinearity problem beacuse of high correlation between DIVYLD and SIZE. Regressions (3) - (5) are estimated in three subperiods, 1982-87, 1988-93 and 1991-93. The explanatory power of the regression model varies from 0.14 to 0.34 in different regressions.

In regressions (1) and (2) that use the entire sample, the coefficients of SIZE and INTERLST are significant at the 0.05 and 0.01 levels respectively. The coefficient of SIZE has a negative sign which implies that larger firms have more pronounced negative reaction at the announcements of the equity issue. The coefficient of INTERLST is positive which suggests that the investors prefer equity issues of the interlisted firms relative to that of the non-interlisted firms. None of the other variables, RESOURCE, OWNER, DIVYLD and TURNOVER have significant coefficients at any conventional level.

The regression results in the subperiods show some differences. The explanatory power of the regression is much higher in each subperiod relative to the overall period which suggests that the determinants of the cost of equity may have changed over time. In the earlier 1982-87 subperiod, ISSUESIZE is the only significant variable and it has the predicted negative coefficient. Since ISSUESIZE proxies asymmetric information, these results support the findings of Jog and Schaller in the 1983-87 period. An alternative interpretation can be that segmentation of the Canadian equity market was more severe in the earlier period for both the interlisted and non-interlisted stocks. Larger issues which could not be easily absorbed in the smaller Canadian market experienced more negative market reaction. In the 1988-93 and 1991-93 subperiods, both SIZE and INTERLST are significant at the 0.05 or 0.01 level. In addition, TURNOVER is also significant at the 0.10 level in the 1991-93 period and has a positive coefficient suggesting that investors prefer highly liquid stock issues.

The differences in different subperiods can be interpreted as evidence of a move toward integration of the Canadian market over time. The significance of the INTERLST variable suggests that the foreign investors' inhibitions to invest in the Canadian stocks are the likely source of segmentation. Since interlisted Canadian securities are as easy to trade as the U.S. stocks, they are more appealing to the U.S. and other foreign investors. The higher trading volumes and broader shareholder ownership base of interlisted stocks also make these stocks attractive to the Canadian institutional investors who formed about 75% of the Canadian market in 1993, compared to about 50% in the early 1980s.

V. Summary, Conclusions, and Policy Implications

This study provides evidence on the determinants of the cost of equity for Canadian firms by conducting a cross-sectional analysis of the market reaction to the announcements of the seasoned equity issues by the TSE 300 firms in the 1982-93 period. Overall, the market reacts negatively to

the announcements of equity issuances, a finding which is consistent with the evidence in previous research. The issuing firms experience, on average, a drop of -1.75% in their share price in the two-day period surrounding the announcement date. The cross-sectional analysis indicates that larger firms experience a more pronounced negative reaction while interlisted firms have more favourable market reaction. The two-day share price drop for the interlisted firms is only -0.87 percent compared to -2.33 percent for the non-interlisted firms. Also, the larger issues have a more negative reaction in the earlier period. These results suggest that the main determinants of the equity capital are related to the smaller size of the Canadian equity market. Larger non-interlisted firms appear to face a downward sloping demand curve resulting in a larger drop in their share price at the time of new equity issuance.

The findings of this study confirm the previous evidence that Canadian market is segmented from the U.S. equity market and that the segmentation is more severe for the non-interlisted stocks. The main barriers to integration appear to be related to the investors' inhibitions to invest in Canadian securities. These barriers are reduced to a large extent by the interlisting of securities on the larger U.S. stock markets. Overall, the results suggest that the large Canadian non-interlisted firms are likely to face a higher cost of capital relative to their U.S. counterparts.

These findings have important policy implications since a firm's ability to raise capital at a lower cost is a major competitive advantage in the increasingly globalized capital markets. To reduce the potential difference in the cost of capital of Canadian firms relative to their U.S. counterparts, the government policy should be aimed at increasing the integration of the Canadian equity market with the U.S. market. In the last decade, the legal barriers to capital flows across borders have been eliminated or reduced considerably. However, the strong home-country bias in the institutional portfolios indicates that indirect barriers to international investments still remain very strong (Cooper

and Kaplanis (1994)). For example, only 10% of the value of the assets in the 500 largest institutional portfolios in the world is currently invested in foreign securities.[3] The institutional portfolio managers prefer to invest in foreign stocks with high liquidity and information availability. Kang and Stulz (1995) document that the foreign investors invest heavily in those Japanese firms that disclose more information.The government policy should attempt to make the Canadian stocks attractive and easily accessible for the foreign investors. This can be achieved by encouraging firms to interlist on the U.S. stock exchanges and making the Canadian stock exchanges attractive sites for foreign investors.

Proximity to the larger U.S. market is big advantage for Canada and listing on the U.S. exchanges enhances the visibility of Canadian stocks for foreign investors who are more familiar with the U.S. stock markets. The recent U.S.- Canada Multi-Jurisdictional Disclosure System has made U.S. interlisting less costly for Canadian firms. Evidence by Foerster and Koralyi (1993) and Mittoo (1995) shows that the listing in the U.S. also increases the total trading volume in the interlisted stocks. Interlisting of securities also creates incentives for the domestic stock exchanges to become more efficient by competing in the market place for orderflows of the interlisted Canadian stocks. The Canadian stock exchanges should develop strategies to attract foreign listings and investors to the Canadian stock market.

This study has focused on identifying the main determinants of the cost of equity for the Canadian firms. Future research should explore the determinants of the other components of the cost of capital, including the cost of debt and preferred shares.

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[3] "Global Capital Flows: Too little not too much", *The Economist*, June 24, 1995, 72-73.

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Table I

Frequency Distribution by Year of the Sample of Seasoned Equity Issues by the TSE 300 firms (1982-93).

Year	Frequency	Percentage
1982	3	2.78
1983	5	4.63
1984	3	2.78
1985	7	6.48
1986	6	5.56
1987	7	6.48
1988	1	0.93
1989	5	4.63
1990	4	3.70
1991	17	15.74
1992	24	22.22
1993	26	24.07
Total	108	100.0
Equity offerings by		
Interlisted firms	43	39.82
Non-interlisted firms	65	60.19

Table II

Daily Average Abnormal Returns (AR), T-statistics, Z-statistics and Proportion of Positive and Negative Abnormal Returns Around the Announcements of the Seasoned Equity Issues by the TSE 300 firms (1982-93).

Event Day	AR	T-statistic	Z-statistic	Proportion Positive: Negative
-10	0.003	1.42	1.37	58:42
-9	0.004	1.46	1.63	60:40
-8	-0.004	-1.82	-1.22	40:60
-7	0.001	0.39	1.13	53:47
-6	0.0002	0.09	0.35	45:55
-5	0.0013	1.41	1.83	50:50
-4	0.0011	0.42	1.31	46:54
-3	0.0007	0.29	0.59	49:51
-2	-0.0003	-0.13	-0.05	45:55
-1	-0.0151	-5.90**	-9.01**	27:73
0	-0.0026	-0.97	-2.30*	41:59
+1	0.003	2.09*	1.54	58:42
+2	0.0001	0.052	0.49	44:56
+3	0.0003	0.21	0.27	43:57
+4	-0.005	-2.63*	-1.95	36:64
+5	-0.004	-2.16*	-2.15*	36:64
+6	0.0012	0.68	-0.065	53:47
+7	-0.003	-1.55	-1.95	35:65
+8	-0.003	-1.18	-1.44	38:62
+9	-0.0002	-0.11	0.035	48:52
+10	0.0017	0.94	0.56	47:53

The average two-day (-1,0) cumulative abnormal return is -0.01749 with T-statistic = -5.0461, Z-statistic = -8.0197.

The Z-value for binomial sign test for the negative abnormal returns is -5.05 for day -1 and -1.95 for day 0.

The average two-day (-1,0) cumulative abnormal return for the interlisted equity issues is -0.00865 with Z-statistic = -2.07 and for the non-interlisted issues is -0.02334 with Z-statistic = -8.65. The Z-statistic for the difference between the average two-day (-1,0) cumulative abnormal returns for the interlisted and non-interlisted firms is 3.85 and is significant at the 0.01 level.

* Significant at the 0.05 level.
** Significant at the 0.01 level.

Table III
Correlations Among the Variables Measuring the Hypothesized Determinants of the Cost of Equity for Canadian Firms

	DIVYLD	SIZE	TURNOVER	ISSUESIZE	RESOURCE	INTERLST	OWNER
DIVYLD	1.0	0.472	-0.087	-0.179	-0.150	-0.061	-0.144
SIZE		1.00	-0.109	-0.182	0.077	0.004	-0.048
TURNOVER			1.00	-0.051	-0.075	0.096	-0.025
ISSUESIZE				1.00	-0.047	-0.097	0.067
RESOURCE					1.00	0.277	-0.255
INTERLST						1.00	-0.202
OWNER							1.00

RESOURCE is a dummy variable which takes the value 1 for the resource firms and 0 otherwise.
TURNOVER is the ratio of the number of firms's shares traded to the average number of shares outstanding in one year prior to the equity issue.
SIZE is the natural logarithm of the book value of the total assets of the firms in the year prior to the equity issue.
OWNER is a dummy variable that takes the value 1 for firms in which a single shareholder owns more than 20 % of the voting shares outstanding.
DIVYLD is the dividend yield in one year prior to the issue.
ISSUESIZE is the ratio of the number of new shares offered to the number of shares outstanding at the end of the year prior to the issue.
INTERLST is a dummy variable which takes the value 1 if the firm issuing equity was interlisted on the Canadian and U.S. stock exchanges and 0 otherwise

Table IV

Estimates of the Cross-Sectional Regressions of the two day Standardized Cumulative Abnormal Returns, SCAR (-1, 0), on the Hypothesized Determinants of the Cost of Equity for Canadian Firms (T-statistics are in parentheses).

Regression	(1)	(2)	(3)	(4)	(5)
Subperiod	1982-93	1982-93	1982-87	1988-93	1991-93
Sample size 108	108	31	77	67	
INTERCEPT	3.32	3.66	2.13	5.94*	4.47
	(1.64)	(1.89)	(0.80)	(2.40)	(1.81)
SIZE	-0.20*	-0.22*	-0.11	-0.37**	-0.287*
	(-1.998)	(-2.51)	(-0.94)	(-3.06)	(-2.38)
TURNOVER	0.118	0.13	0.064	1.009	1.14
	(0.54)	(0.58)	(0.37)	(1.63)	(1.70)
ISSUESIZE	-0.94	-0.88	-6.87**	0.88	-0.26
	(-0.80)	(-0.75)	(-2.77)	(0.66)	(-0.18)
RESOURCE	-0.107	-0.075	0.53	-0.07	-0.16
	(-0.38)	(-0.28)	(1.36)	(-0.21)	(-0.44)
INTERLST	0.73**	0.73**	0.051	0.73*	0.83*
	(2.85)	(2.74)	(0.12)	(2.17)	(2.40)
OWNER	-0.0092	-0.067	0.028	0.02	-0.117
	(-0.34)	(-0.25)	(0.08)	(0.06)	(-0.34)
DIVYLD	-0.032				
	(-0.46)				
R^2	0.14	0.14	0.34	0.24	0.27

RESOURCE is a dummy variable which takes the value 1 for the resource firms and 0 otherwise.
TURNOVER is the ratio of the number of firms's shares traded to the average number of shares outstanding in one year prior to the equity issue.
SIZE is the natural logarithm of the book value of the total assets of the firms in the year prior to the equity issue.
OWNER is a dummy variable that takes the value 1 for firms in which a single shareholder owns more than 20 % of the voting shares outstanding.

Table IV(Continued)

DIVYLD is the dividend yield in one year prior to the issue.

ISSUESIZE is the ratio of the number of new shares offered to the number of shares outstanding at the end of the year prior to the issue.

INTERLST is a dummy variable which takes the value 1 if the firm issuing equity was interlisted on the Canadian and U.S. stock exchanges and 0 otherwise

* Significant at the 0.05 level.

** Significant at the 0.01 level.

L'ÉVOLUTION DES STRUCTURES FINANCIÈRES DES GRANDES ENTREPRISES CANADIENNES

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Version préliminaire: les commentaires sont les bienvenus

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Evolution of the Financing Structures of Large Canadian Companies

Jean-Marc Suret and Jean-François L'Her

Executive Summary

This study deals with the evolution of the financing of large Canadian companies from 1960 to 1994. It consists of three parts: a discussion of changes in debt levels, an aggregate analysis of financing choices, and a study of explanatory econometric models for corporate financial choices.

Part I shows that there has been no significant increase in total corporate debt in Canada, as there has in the U.S. Total indebtedness increased between 1960 and 1982 and then declined; by 1994, it had fallen to 500 centesimal points above 1960 levels. On the other hand, if the market value of shares is taken into account, total debt was lower in 1994 than it was in 1960. The relative stability of total indebtedness is the result of rising long-term corporate debt and lower current liabilities. The fears expressed by some U.S. experts about the rapid increase in corporate debt in their country are therefore unjustified in the case of Canada. Only long-term debt has increased, but this trend has nothing in common with the U.S. trend.

Part II of the study deals with the relationship between financing choices on the one hand and economic and market conditions on the other. Financing choices are measured by the proportion of total cash requirements (including depreciation and dividends) covered by each source of financing. Over the entire period, internally generated funds covered an average 61.2% of the cash needs of growing companies, while 20% of needs were financed through long-term debt. Stock issues accounted for only 9.8% of cash requirements, and dividend payments considerably exceeded the amount of money raised from stock issues. Limited use of stock issues is also observed in other industrialized countries but, once again, the phenomenon is less notable here than in the U.S., where according to recent studies the net value of issues has become negative (due to redemptions). Recently, the proportion of financing obtained from stock issues has been on the rise in Canada (22.1% of cash requirements in 1993). The relative use of the various types of financing seems to be closely related to economic conditions. Debt assumption and stock issues are positively related to inflation and the stock market index respectively. On the other hand, no relationship between tax changes and aggregate corporate behaviour is observed. For example, tax changes which increased the advantages of corporate indebtedness have not resulted in increased borrowing. The assumption of long-term debt is negatively related to real interest rates, but interest rates do not seem to have an effect on total indebtedness. Debt assumption generally coincides with recessionary periods, probably due to weak cash flow. The financial choices of Canadian companies are thus strongly dependent on prevailing economic and financial conditions but do not appear to respond strongly to tax changes. There are however significant variations among individual companies; these are dealt with in the last part of the study.

Four models are used to explain the relative use of each type of financing by individual companies and a number of estimation methods are used for a sample containing 7,833 annual observations from 1963 to 1994. The findings are generally consistent with the behaviour described in the *Pecking Order Theory*. The main determinants of financing choices are corporate earnings and growth. Internal financing is attractive when earnings are high and growth is weak. The dividend policy has an inhibiting effect. In explanatory models for indebtedness, the variable for the relative importance of tax credits unrelated to debt displays a negative sign inverse to what is predicted by the theory. The most heavily indebted companies are also the ones which have tax credits unrelated to debt. This seems to confirm the importance of corporate earnings and guarantees in explaining debt. Debt assumption is positively related to company size. The addition of macro-economic variables to the models generally confirms the relationships observed at the aggregate level. However, contrary to expectations, there is a significant negative correlation between tax benefits associated with indebtedness and debt assumption. Changes in corporate ownership structures and the fact that some tax changes coincided with economic downturns are two possible explanations.

In conclusion, we do not observe any significant long-term change in the debt levels of Canadian companies. Their financing choices are essentially related to economic and market conditions. At the individual level, corporate growth and earnings are two basic explanatory factors for financial choices, and tax measures do not seem to significantly affect such choices.

L'évolution des structures de financement des grandes entreprises canadiennes.

Jean-Marc Suret et Jean-François L'Her

Sommaire

Cette étude porte sur l'évolution du financement des grandes entreprises canadiennes, de 1960 à 1994. Elle comporte trois parties, consacrées respectivement à l'évolution des niveaux d'endettement, à l'analyse agrégée des choix de financement et à l'étude de modèles économétriques d'explication des choix financiers des entreprises.

La première partie montre que l'on n'a pas observé, au Canada, d'augmentation importante de l'endettement total des entreprises, comme ce fut le cas aux États-Unis. L'endettement total mesuré selon la valeur comptable a augmenté de 1960 à 1982, puis il a diminué pour se situer, en 1994, à 500 points centésimaux au-dessus de son niveau de 1960. Par contre, si l'on tient compte de la valeur marchande des actions, l'endettement total est moins élevé en 1994 qu'en 1960. La relative stabilité de l'endettement total masque une croissance de la dette à long terme et une diminution du passif à court terme des entreprises. Les craintes qu'expriment certains auteurs américains face à l'augmentation rapide de l'endettement des entreprises de leur pays ne sont donc pas transposables au Canada. Seule la dette à long terme a augmenté, mais cette évolution est sans rapport avec celle observée aux États-Unis

La seconde partie de l'étude porte sur les relations entre les choix de financement et les conditions économiques et de marché. Ces choix sont mesurés par les proportions des besoins de fonds totaux (incluant l'amortissement et les dividendes) financés par chacune des sources de financement. En moyenne et pour l'ensemble de la période, les fonds autogénérés ont permis de combler 61,2% des besoins de fonds des entreprises en croissance, alors que la dette à long terme a financé 20% des besoins. Les émissions d'actions ne constituent que 9,8% des fonds requis et les montants versés sous forme de dividendes dépassent largement ceux qui ont été levés lors des émissions d'actions. Ce faible recours aux émissions d'actions est aussi perceptible dans les autres pays industrialisés mais, ici encore, le phénomène est moins marqué qu'aux États-Unis, où les émissions nettes sont devenues négatives (en raison des rachats) suivant différents travaux publiés récemment. On note d'ailleurs, au Canada, une augmentation récente de la proportion du financement obtenue lors d'émissions d'actions (22,1 % des fonds requis en 1993). L'importance relative des divers modes de financement semble fortement liée aux conditions économiques. L'inflation et les niveaux du marché boursier ont des relations positives avec, respectivement, le recours à la dette et les émissions d'actions. En revanche, nous n'observons aucune relation entre les changements de la fiscalité et les comportements agrégés des entreprises. Par exemple, les changements fiscaux qui ont accru l'avantage à l'endettement des entreprises ne se sont pas traduits par une augmentation du

recours à l'endettement. Le taux réel d'intérêt est lié négativement au recours à l'endettement à long terme, mais ne semble pas influencer l'endettement total. Finalement, les périodes de récession coïncident généralement avec le recours à l'endettement, vraisemblablement en raison de la faiblesse des fonds autogénérés. Les choix financiers des entreprises canadiennes dépendent donc largement des conditions économiques et financières qui prévalent, mais semblent peu sensibles aux changements dans la fiscalité. Il existe cependant des variations importantes dans les comportements individuels des entreprises qui font l'objet de la dernière partie de l'étude.

Quatre modèles sont utilisés pour expliquer le recours relatif à chacun des modes de financement au niveau des entreprises et plusieurs méthodes d'estimation sont employées pour un échantillon comportant 7833 observations annuelles, de 1963 à 1994. Les résultats sont généralement cohérents avec le comportement décrit dans la *Pecking Order Theory*. Les déterminants principaux des choix de financement sont la rentabilité et la croissance. L'autofinancement est d'autant plus important que la rentabilité est élevée et la croissance faible. La politique de dividende est perçue comme contraignante. Dans les modèles explicatifs de l'endettement, la variable liée à l'importance relative des crédits d'impôt non liés à l'endettement est affectée d'un signe négatif inverse à celui prévu par la théorie. Les entreprises les plus endettées sont également celles qui disposent des crédits d'impôt non liés à l'endettement. Ceci semble confirmer le rôle important joué par la rentabilité et par les garanties dans l'explication de l'endettement. Finalement, la taille est positivement associée au recours à l'endettement. L'introduction des variables macro-économiques dans les modèles permet généralement de confirmer les relations observées au niveau agrégé. Toutefois, la mesure de gain fiscal associé à l'endettement est associée négativement et de façon significative au recours à la dette, ce qui est contraire aux prévisions. Pour expliquer ce phénomène, il est possible d'invoquer la coïncidence de certains des changements fiscaux avec des périodes de ralentissement économique et les changements dans la structure de propriété des entreprises.

En conclusion, nous n'observons pas de modification importante à long terme au niveau de l'endettement des entreprises canadiennes. Leurs choix de financement sont essentiellement liés aux conditions économiques et aux marchés. Au niveau individuel, la croissance et la rentabilité sont les deux éléments d'explication fondamentaux des choix financiers et la fiscalité ne paraît pas modifier de façon significative les choix de financement.

1 INTRODUCTION

Aux États-Unis, l'augmentation rapide des niveaux d'endettement des entreprises au cours des années 1980 a soulevé l'inquiétude de plusieurs chercheurs (Bernanke et Campbell, 1988; Friedman, 1986; Taggart, 1986) et le président de la Réserve Fédérale a cité cet endettement élevé comme l'un des facteurs expliquant la lenteur de la reprise économique après la récession de 1990-91 (Gertler et Hubbard, 1993). Par contre, d'autres chercheurs voient dans les hauts niveaux d'endettement un facteur positif, susceptible de réduire l'amplitude et la fréquence des comportements sous-optimaux des dirigeants (Jensen, 1986). L'analyse et l'explication des changements de structure de financement à moyen et long terme sont donc devenus des sujets d'étude importants. Au Canada, toutefois, les travaux de ce type sont à peu près inexistants. Quelques données comparatives tendent à montrer que l'endettement des entreprises canadiennes serait supérieur à celui observé aux États-Unis en 1991 et que cet endettement aurait peu augmenté entre 1982 et 1991 (Rajan et Zingales, 1995, tableaux II et III). Selon Grant *et al.* (1990), l'endettement aurait diminué au cours des années 1980, contrairement à ce que l'on observe aux États-Unis. Finalement, Filion (1992, p.5) rapporte une évolution irrégulière et volatile de l'endettement total, mesuré de 1964 à 1990 en utilisant la valeur marchande des fonds propres. Une étude rigoureuse de l'évolution de l'endettement au Canada s'impose donc. Elle constitue la première partie de cette recherche et son objectif est de répondre à la question suivante: *quelle a été l'évolution de la structure de financement des entreprises canadiennes, de 1960 à 1994?*

L'évolution de l'endettement mise en évidence dans cette section initiale permet de réfuter l'hypothèse d'une évolution de l'endettement similaire à celle des États-Unis, tout autant que celle de l'invariance des structures financières. La croissance, puis la réduction de l'endettement montrent que les proportions dans lesquelles les entreprises ont financé leur croissance au cours de la période d'étude ont été variables et différentes de celles qui peuvent être estimées à partir des niveaux moyens d'endettement. La question se pose donc de savoir: *quels sont les facteurs qui, globalement, peuvent expliquer les choix de financement des entreprises canadiennes ?*. La seconde partie de l'étude traite de cette question en abordant les relations entre les choix de financement et les conditions économiques et financières. Des modèles de flux sont alors employés. Les variables expliquées sont les proportions des fonds requis par la croissance, obtenues de l'une ou l'autre des sources de financement. Ce travail se distingue donc nettement des recherches classiques portant sur le financement des entreprises qui, tant au Canada qu'aux États-Unis, ont employé des modèles en coupe transversale, dont les

variables expliquées étaient des *niveaux* d'endettement observés à un moment donné[2].

Par ailleurs, dans des conditions économiques données, les choix des entreprises semblent répondre à des facteurs particuliers, vraisemblablement spécifiques aux firmes. Dans la dernière partie de l'étude, les choix de financement sont donc expliqués, au niveau de chacune des entreprises, simultanément par des facteurs propres aux entreprises et par les conditions des marchés. Nous tentons alors de répondre à la question suivante: *peut-on expliquer les choix individuels de financement des entreprises canadiennes par des caractéristiques spécifiques et en tenant compte de la situation économique globale?*

2 ÉVOLUTION À LONG TERME DE L'ENDETTEMENT

2.1 Les travaux antérieurs

Aux États-Unis, l'évolution de l'endettement a été analysée depuis 1926 (Taggart, 1985, 1986). Lorsque le ratio de la dette totale est rapporté à l'actif, il passe de 30% en 1945-1946 à 55% en 1979 (Taggart, 1986, tableau 1.1). Lorsque les ratios sont ajustés pour tenir compte des valeurs marchandes du capital-actions ou du coût de remplacement des immobilisations, l'augmentation de l'endettement est cependant moins importante et apparaît surtout au cours des années 1970. Elle s'accélère cependant au cours des années 1980, ce qui a attiré l'attention de nombreux chercheurs, qui rapportent généralement des résultats similaires (Bernanke et Campbell, 1988; Friedman, 1986; Taggart, 1986; Rajan et Zingales, 1995). Entre 1982 et 1992, le ratio moyen de la dette aux fonds propres, pour un échantillon constant d'entreprises, est passé de 0,32 à 0,46 aux États-Unis (Rajan et Zingales, Tableau III). Cette augmentation rapide de l'endettement ne semble cependant pas généralisée à l'ensemble des pays industrialisés.

Il n'existe pas, à notre connaissance, d'études canadiennes récentes de l'évolution des structures de financement des entreprises portant sur de longues périodes. Seul Filion (1992), dans une analyse des coûts de financement, rapporte des données agrégées pour la période qui va de 1963 à 1990 (p. 58). Le ratio d'endettement, mesuré à la quasi-valeur marchande, passe de 0,37 en 1963 à un maximum de 0,56 en 1982 pour

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[2] Ces modèles sont qualifiés de modèles de stocks, par opposition aux modèles de flux. L'analyse des décisions de financement par des modèles d'explication des *niveaux* d'endettement repose implicitement sur l'hypothèse que les entreprises se situent à leur niveau cible d'endettement (MacKie-Mason, 1990b, p. 92). La variabilité des niveaux d'endettement rend cette approche difficile à justifier au Canada.

diminuer ensuite et se situer à 0,44 en 1990. Rajan et Zingales (1995)[3] fournissent des données qui permettent de comparer l'évolution des modes de financement au Canada avec celle observée dans les autres pays du G7. Les entreprises canadiennes, américaines, françaises et japonaises ne semblent pas différer de façon significative sur la base des niveaux d'endettement, lorsque les ajustements sont faits pour tenir compte des différences de systèmes comptables. Seuls l'Allemagne et le Royaume-Uni montrent des niveaux d'endettement inférieurs. Le ratio moyen de la dette à l'avoir des entreprises canadiennes serait passé de 0,42 en 1982 à 0,40 en 1991. Grant *et al.* (1990) rapportent une diminution importante de l'endettement des entreprises canadiennes entre 1983 et 1989 et opposent cette évolution à l'augmentation observée aux États-Unis. Ross *et al.* (1995, p. 469) avancent la fiscalité comme élément susceptible d'expliquer cette différence entre les deux pays. La période étudiée par Grant *et al.* est cependant trop courte pour que l'on puisse en tirer des conclusions solides, alors que l'étude de Gagnon et Papillon (1984) menée à l'aide de données de statistique Canada, porte sur des données antérieures à 1980.

Il existe par ailleurs quelques études canadiennes menées en coupes transversales. Davis (1994) teste l'hypothèse de substitution fiscale de DeAngelo-Masulis (1980). Gagnon *et al.* (1987) observent une relation inverse et significative entre l'endettement et la rentabilité, mais n'observent aucun effet fiscal significatif. En revanche, Bartholdy et al (1989) montrent que les taux d'impôt des entreprises ont un effet significatif et important sur les niveaux d'endettement des entreprises canadiennes. Aucune de ces études ne porte sur une longue période. Seule l'étude de Mandron (1993) fait exception puisqu'elle utilise des données de 1967 à 1987. Toutefois, elle recourt à des moyennes d'observations pour chaque firme et période ou sous-période. Elles reposent toutes sur l'analyse des niveaux d'endettement et non des flux. Finalement, aucune n'utilise de données postérieures à 1982. La connaissance limitée du comportement financier des entreprises canadiennes, l'absence d'analyse de l'évolution de l'endettement de ces entreprises et d'études liant cette évolution au contexte économique et financier justifient l'étude présentée ici.

2.2 L'évolution de l'endettement au Canada

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[3] Cette étude utilise les données d'entreprises tirées de *Global Vantage* qui sont comparées à celles que l'on peut tirer des statistiques agrégées de l'OCDE. Les auteurs observent peu de différences entre les deux sources de données, mais ils mettent en évidence l'importance de prendre en compte les particularités des systèmes comptables pour mesurer correctement l'endettement. Toutefois, Singh (1995) observe d'importantes différences suivant que l'on étudie le financement à partir des données de type *flow of funds* de l'OCDE ou de données comptables d'entreprises. La présente étude repose sur des données d'entreprises. Mayer (1990) présente les avantages et problèmes que pose chacun de ces types de données pour l'étude des choix de financement.

Les données utilisées dans l'étude proviennent de la version 1991 de la base de données du *Financial Post,* qui couvre 30 années (1960-1990). Elles ont été complétées par celles tirées de *Compustat,* en raison de changements importants apportés par *Financial Post* à la structure de la base et à la nature des postes.[4] Cette dernière base propose de l'information relative à près de 1000 titres. Cependant, la longueur de la période d'étude fait en sorte que les données ne sont disponibles, pour chacune des années, que pour un sous-ensemble d'environ 400 entreprises. L'élimination des entreprises du secteur financier ramène la taille de l'échantillon à environ 350 titres. Il n'est donc pas possible, à partir de cette base de données, de constituer un échantillon composé des mêmes entreprises suivies année après année, et les résultats rapportés ici concernent l'ensemble des entreprises non financières.

À partir de l'ensemble des observations disponibles pour chacune des années, nous avons calculé, de 1963 à 1990, le niveau d'endettement comptable (c'est-à-dire mesuré uniquement à partir des données de bilan) total, à court terme et à long terme. La dette à court terme utilisée est celle présentée normalement au bilan, tandis que la dette à long terme ne comprend ni les impôts reportés ni les intérêts minoritaires[5]. La partie de la dette à long terme venant à échéance dans l'année a été considérée comme faisant partie de la dette à long terme. L'endettement total à la valeur marchande est également estimé, en divisant la valeur comptable de la dette par la quasi-valeur marchande de l'actif, obtenue en additionnant la valeur comptable de la dette à la valeur marchande des fonds propres. Celle-ci est calculée en multipliant le nombre d'actions ordinaires émises par leur prix de fermeture à la fin de l'exercice financier. Lorsque la structure financière comprend des actions privilégiées, leur valeur est mesurée de la même façon. Cette mesure ne tient donc pas compte des variations possibles de la valeur marchande de la dette, qui ne peut être estimée faute de transactions.

La figure 1 illustre l'évolution de diverses mesures de l'endettement des grandes entreprises canadiennes, de 1960 à 1994. Les valeurs numériques moyennes sont rapportées au tableau 1. L'endettement à long terme, en hausse très légère de 1960 à 1979, augmente rapidement au cours des années 1980 à 1982, pour atteindre 25,1% et décroître ensuite légèrement. L'endettement total, mesuré par rapport à la valeur comptable de l'actif, augmente de 1960 à 1981, où il atteint un niveau maximal de 47,8%. Il décroît ensuite lentement, pour se situer,

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[4] Avant de fusionner les deux bases de données, nous avons vérifié la similitude des montants rapportés par les deux bases, pour des années, observations et postes correspondants.

[5] Les impôts reportés ont été intégrés aux fonds propres. Les intérêts minoritaires sont déduits des fonds propres mais, afin de préserver l'équilibre du bilan, nous réduisons de façon proportionnelle tous les postes du côté gauche du bilan. Les valeurs calculées de cette façon sont celles qui seraient obtenues si la consolidation se faisait en proportion des actions effectivement détenues et si les structures de bilan des filiales différaient peu de celle de la compagnie mère.

en 1994, à 43%[6]. La répartition de l'endettement entre la dette à court et à long terme a changé au cours de la période étudiée. Le recours à la dette à court terme (mesuré par l'écart entre le ratio de dette totale et celui de la dette à long terme) s'est sensiblement accru de 1960 (18,24%) à 1979 (25,6%) pour revenir ensuite au niveau de 19% en 1994. Au cours de la période 1960-1980, l'augmentation de l'endettement total provenait essentiellement de l'augmentation de la dette à court terme. La tendance s'est ensuite inversée. Lorsque la valeur des fonds propres est mesurée suivant la valeur au marché des actions, la mesure de l'endettement total devient plus volatile, ce qui traduit les fluctuations de la valeur des titres. En moyenne, l'endettement mesuré à l'aide de la valeur comptable est du même ordre que celui mesuré à l'aide de la valeur marchande des fonds propres jusqu'en 1980, ce qu'illustre la moyenne mobile (à 6 périodes) de cette série. Après 1980, l'endettement semble inférieur lorsqu'il est mesuré suivant la valeur au marché des titres. Ce phénomène peut être lié à l'inflation qui a prévalu au cours des années 1980 et à la hausse relativement continue des indices boursiers depuis 1982. Finalement, une mesure de l'endettement corrigé pour tenir compte des liquidités est également présentée à la figure 1. L'endettement total ajusté est mesuré en rapportant la dette nette des liquidités (encaisse et placements à court terme) à la valeur comptable de l'actif. Cette mesure de l'endettement montre une évolution parallèle à celle évoquée plus haut, mais la diminution de l'endettement depuis 1982 est plus importante, en raison de l'augmentation des liquidités des entreprises. En 1994, l'endettement total ajusté est de 31,8% contre 29,7% en 1960.

Insérer ici la figure 1 et le tableau 1

Quelle que soit la mesure utilisée, l'endettement des entreprises au Canada ne semble pas avoir connu d'augmentation importante, contrairement aux États-Unis. Si l'endettement à court et à long terme a augmenté jusqu'au début des années 1980, les ratios de dette totale présentent une diminution sensible depuis cette période alors que l'endettement à long terme s'est accru de façon importante au début des années 1980 pour demeurer à peu près inchangé ensuite. Si l'encaisse et les placements à court terme sont déduits de la dette, le ratio de la dette totale à l'actif est à peu près le même en 1994 qu'en 1960, après être passé par un maximum au début des années 1980. Il semble également impossible de détecter une tendance à la hausse de l'endettement mesuré à la valeur marchande. Il passe de 41% à 37% environ de 1960 à 1994. Ces observations ont plusieurs implications. En premier lieu, les entreprises canadiennes présentent un comportement différent de celui des entreprises américaines. Cependant, l'explication de ces différences dépasse les objectifs de cette étude, en dépit de son

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[6] L'évolution observée entre 1983 et 1989 correspond parfaitement à celle rapportée par Grant *et al.* (1990).

intérêt évident. Il est vraisemblable que la structure de la propriété des entreprises dans les deux pays ainsi que le type de croissance, notamment le recours important à l'endettement pour financer les acquisitions puissent être à l'origine de ces divergences de comportement. En second lieu, les structures de financement des entreprises canadiennes ne peuvent être considérées comme stationnaires au cours de la période étudiée. Les modèles classiques d'explication des structures en coupe transversale, qui reposent sur l'hypothèse implicite que les entreprises ont atteint et conservé un niveau cible optimal, ne sont donc pas adaptées à la situation canadienne. Les entreprises ont en effet financé leur croissance dans des proportions différentes de celles qui prévalaient au cours des périodes antérieures. De plus, ces proportions ont varié au cours de la période étudiée. Dans un tel contexte, il devient important de s'intéresser aux *choix* de financement, révélés par les variations annuelles des postes de passif et de l'avoir des actionnaires. Ces choix devraient dépendre à la fois des conditions générales de l'économie et des caractéristiques particulières des entreprises. La suite de ce travail propose donc l'analyse des choix agrégés de l'ensemble des entreprises, puis une étude au niveau des entreprises elles-mêmes.

3 LES CHOIX FINANCIERS AGRÉGÉS AU CANADA: PRÉSENTATION ET EXPLICATIONS

3.1 Travaux antérieurs

La quasi-totalité des études portant sur les structures financières a recours à un modèle d'explication des niveaux d'endettement à un moment donné [7]ou encore à un regroupement de coupes transversales qui permet, dans une certaine mesure, de prendre en compte l'aspect dynamique du processus (Homaifar *et al*, 1994). Leur objectif est généralement d'expliquer le niveau de la dette, par rapport à l'actif ou aux fonds propres. Contrairement à cette approche classique, nous nous intéressons ici à la façon dont les entreprises financent leur croissance, ce qui implique l'étude des flux de financement et exige que l'on distingue les flux internes de ceux qui proviennent de l'extérieur, qu'il s'agisse de dette ou de fonds propres.

L'étude se situe donc dans la lignée des quelques travaux américains qui rapportent des résultats convergents pour ce qui est des choix de financement des entreprises non financières, depuis la seconde guerre mondiale (MacKie-Mason, 1990b; Mayer, 1990; Taggart, 1985, 1986; Crabbe *et al.*, 1990). Les résultats de ces divers travaux peuvent se résumer comme suit: l'autofinancement a prévalu, de façon systématique, de 1946 à 1987, les bénéfices avant distribution des dividendes représentant 97% des sources totales de fonds. Les émissions d'actions, qui finançaient environ 5% des besoins totaux jusqu'au milieu des années 1970, affichent un solde négatif depuis cette période. Entre 1984 et 1987, les rachats d'actions ont représenté environ 16 % des

[7] Voir Harris et Raviv (1991) pour une revue des travaux antérieurs, ainsi que Titman et Wessels (1988) ou Rajan et Zingales (1995) pour des études-types.

besoins de fonds (MacKie-Mason). Les ratios de dividendes ont légèrement diminué, mais ils sont toujours supérieurs à 20%. Le financement public par émission d'obligations comble environ 10% des besoins de financement. Selon Lintner (1985), *the agreement among all series in showing a massive increase in the relative use of debt over the last fifteen or twenty years is simply the most dramatic and best known of the instances of common broad movements.* Cependant, les données agrégées (*Federal Reserve Flow of Funds Accounts*) présentées par Taggart diffèrent très fortement de celles rapportés par MacKie-Mason, qui utilise les mêmes sources. Par exemple, les fonds autogénérés représentent 52% du financement entre 1970 et 1979 pour Taggart et 75% environ pour Mackie-Mason. Ces différences peuvent découler des modes de calcul employés par les auteurs.

Au Canada, les résultats relatifs à l'évolution à long terme de l'endettement proviennent généralement d'études comparatives. Mayer (1990) compare les modes de financement des entreprises dans 8 pays, de 1970 à 1985 à l'aide de données agrégées de l'OCDE. Il observe que la rétention des bénéfices est, de loin, la principale source de financement. Elle représente 76,4% du financement au Canada, 85,9% aux États-Unis et 102,4% au Royaume-Uni. Au cours de cette période, les émissions d'actions n'ont comblé que 2,5% des besoins de fonds au Canada, contre 1,1% aux États-Unis. Rajan et Zingales (1995) observent également que le financement externe des entreprises canadiennes et américaines est principalement composé de dette, que ce soit aux États-Unis depuis le début des années 1980 ou au Canada depuis le milieu de cette décennie. Toutefois, les entreprises canadiennes auraient émis des proportions importantes de leur financement externe sous forme d'actions au début des années 1980. Patry et Poitevin (1995) rapportent les données agrégées tirées des statistiques de l'OCDE, pour la période 1969-1992. Toutefois, seule la distinction entre fonds internes et externes est rapportée et ces données ne prennent pas en compte les flux entre les entreprises. La situation canadienne est examinée en détail dans la suite de cette section.

3.2 Données

La compréhension des décisions financières des entreprises et de leurs déterminants passe par l'étude des choix financiers. Ceux-ci s'expriment sous la forme de pourcentages, par rapport aux besoins de fonds totaux. Comme les besoins de fonds peuvent être positifs ou négatifs (dans le cas de sociétés dont l'actif décroît), il convient de séparer l'échantillon sur cette base afin de faciliter l'interprétation. La suite de l'analyse sera

d'ailleurs exclusivement basée sur les observations comportant une croissance de l'actif brut.[8] Le tableau 2 rapporte, pour chacune des années et pour chaque catégorie d'entreprises, les fonds requis par la croissance, exprimés en proportion de l'actif brut de début de période. Ces valeurs sont donc une estimation du taux de croissance de l'actif brut des entreprises dont les données sont disponibles pour deux années consécutives. Le taux d'inflation est également rapporté, afin de permettre d'évaluer le taux de croissance réel. En moyenne, les besoins de fonds ont représenté annuellement 15,7% des actifs bruts, pour une croissance moyenne réelle de l'ordre de 10,5%. Les entreprises en croissance ont affiché un taux moyen de 17,4% alors que celles dont la taille a décliné l'on fait au taux de 11,9%. La proportion d'entreprises dont l'actif a diminué était de 6,8%, en moyenne, de 1960 à 1981. Cette proportion a fortement augmenté ensuite pour se situer, en moyenne, à 19,38%. Cette différence importante, de même que les taux de diminution plus élevés observés depuis 1980, semblent indiquer un changement de comportement des entreprises canadiennes. La croissance ne semble plus systématique et près d'une entreprise sur 5 voit son actif diminuer annuellement.

Insérer ici le tableau 2

3.3 Mesure des choix de financement

L'étude des choix de financement demande que l'on mesure comment, à chacune des périodes, les entreprises décident de financer leurs besoins de fonds. En principe, les données provenant de l'état de l'évolution de la situation financière devraient servir à faire cette estimation, puisque son objectif est de permettre à l'utilisateur des états financiers de savoir à quels instruments financiers l'entreprise a eu recours. Toutefois, cet état n'est requis que depuis 1985 et n'apparaît, dans les bases de données et pour l'ensemble des entreprises, que depuis 1988. Ces bases de données ne permettent pas de disposer de données comparables antérieures. Il est par ailleurs impossible de déduire les postes figurant dans cet état de l'évolution pour les années antérieures à partir des postes de bilan et de l'état des résultats, principalement en raison des consolidations.[9]

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[8] D'autres travaux éliminent simplement les cas de diminution de l'actif (Mackie-Mason, 1990b). Ces cas ont été conservés dans cette première partie de l'étude parce qu'ils représentent une proportion non négligeable des observations, principalement après 1980, et parce que le comportement de ces entreprises présente des caractéristiques intéressantes.

[9] Lorsqu'une entreprise acquiert une filiale et procède à une consolidation, l'investissement rapporté à l'état de l'évolution correspond à une augmentation de l'ensemble des postes de l'actif et pas seulement à l'accroissement des immobilisations. À la limite, lors de l'acquisition d'une filiale du secteur des services, on pourrait observer un accroissement des postes de stocks et de comptes à recevoir de la compagnie-mère, alors que l'actif immobilisé resterait inchangé, si la filiale comporte peu d'actif immobilisé. Le changement de méthode de comptabilisation

Pour les fins de cette étude, nous considérons qu'une entreprise doit, à chaque période, disposer d'un montant de financement égal à la croissance brute (i.e. avant amortissement) de son actif total[10], auquel s'ajoutent les dividendes. Dans ce cas, les besoins de fonds de l'entreprise à l'année t sont donnés par:

$$BT_t = (A_t - PM_t) - (A_{t-1} - PM_{t-1}) + Dep_t + D_t - (Enc_t - Enc_{t-1}) \quad (1)$$

où

BT_t = Besoins de fonds totaux de l'année t
A_t = Actif total
PM_t = Participations minoritaires (provenant du bilan)
Dep_t = Amortissement (provenant de l'état des résultats)
D_t = Dividendes ordinaires et privilégiés
Enc_t = Encaisse

Les ajustements apportés à la variation de l'actif net découlent des considérations suivantes: les participations minoritaires sont soustraites de l'actif, qui est donc mesuré comme si on ne consolidait que la partie des filiales effectivement détenues. L'amortissement est ajouté à la variation de l'actif net afin de retrouver la variation de l'actif brut[11]. Les dividendes sont ajoutés aux besoins de fonds, comme dans l'analyse de Modigliani-

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des placements peut également modifier le montant des immobilisations, sans qu'il y ait investissement. La reconstitution, à partir des bilans et états des résultats, des postes de l'état de l'évolution de la situation financière, lorsqu'ils étaient disponibles, a fait apparaître des écarts pouvant atteindre 100%.

[10] Nous ne considérons pas, comme le fait Mayer (1990. p. 329), les flux nets de financement. Un investissement en actif réel est donc traité de la même façon qu'un investissement en actif financier. Établir une distinction revient à tenir compte d'un investissement dans une filiale qui est consolidée (avec, par exemple, 51% des actions) et à ne pas considérer le même investissement s'il ne conduit pas à une consolidation (49% des actions, par exemple). Il est vrai que la prise en compte des investissements financiers à long terme augmente la mesure de l'investissement, alors que l'utilisation des flux nets permet d'éliminer les cas où l'investissement financier ne traduit pas l'augmentation du capital physique. Mais, dans cette étude, nous nous intéressons ultimement au comportement individuel des entreprises et considérons donc de la même façon un investissement en actif réel, l'acquisition et la consolidation d'une filiale et l'achat d'une participation dans une autre entreprise, qui constituent diverses formes de croissance.

[11] Considérer la variation de l'amortissement accumulé comme un besoin de fonds et l'amortissement de l'année comme une source de financement a des impacts importants sur les mesures des choix financiers, qui expliquent vraisemblablement les différences importantes entre les études utilisant ce type de données. L'exemple suivant illustre ces effets. Suivant la méthode des flux bruts, les fonds requis

	Année 1	Année 2	Variation
Actif à court terme	200	200	0
Immobilisations brutes	200	400	200
Immobilisations nettes	100	250	150
Actif (valeur nette)	300	450	150
Actif (valeur brute)	400	600	200
Passif à court terme	100	100	0

Miller (1977). L'actif net est calculé hors encaisse, puisque l'augmentation de l'encaisse ne constitue pas un besoin de fonds réel.

Ces besoins de fonds totaux (ou fonds requis) sont comblés par l'accroissement de la dette totale (*Δ DT*), les augmentations de capital-actions (*Δ CAPA*) et les fonds autogénérés (*FAG*). Ces derniers peuvent être décomposés en trois parties. La première comprend les fonds réinvestis (*Δ BNR*), la seconde correspond au versement de dividendes et la troisième est l'amortissement qui est incorporé aux fonds autogénérés puisque les variables expliquées sont calculées sur une base brute. Les variables qui décrivent le financement sont donc les suivantes:

Δ DT = Variation de la dette totale, incluant le passif à court terme. Il est légitime de considérer l'augmentation du passif à court terme comme une source de financement, puisque l'ensemble des besoins de fonds est pris en compte, incluant ceux liés à l'accroissement des postes d'actif à court terme.

Δ DLT = Variation de la dette à long terme, incluant la portion de la dette à long terme échéant dans l'année. La différence entre *Δ DT* et *Δ DLT* donne la partie du financement provenant de l'accroissement du passif à court terme (*Δ PCT*).

Δ CAPA= Variation nette du capital-actions émis. Dans la section descriptive, les actions ordinaires sont séparées des actions privilégiées; dans les modèles économétriques, les actions ordinaires sont associées aux actions privilégiées.

Δ BNR = Variation dans les bénéfices non répartis (incluant les impôts reportés).

FAG = Fonds autogénérés. Ils incluent la variation dans les bénéfices non répartis, les dividendes et l'amortissement.

Pour chacune des entreprises et chacune des années, les variables *Δ PCT, Δ DLT, Δ CAPA* et *FAG* ont été calculées. Le total ainsi obtenu a été divisé par les besoins de fonds totaux de chaque entreprise. Les ratios moyens ainsi obtenus sont illustrés à la figure 2 puis présentés aux tableaux 3,4 et 5.

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sont de 200. Ils sont comblés par une émission d'actions de 100 et par les fonds autogénérés (réinvestissement de 50 et amortissement de la période de 50). Le ratio d'autofinancement est alors de 50%. Suivant la méthode des flux nets, les fonds requis sont de 150, ce qui correspond à la variation de l'actif comptable. L'autofinancement (BNR / Fonds requis) est alors de 33%.

3.4 Résultats

La figure 2 illustre les résultats obtenus pour les entreprises en croissance. Elle met en évidence la part très importante de l'autofinancement dans la croissance des entreprises canadiennes. En moyenne, ces fonds représentent 64,7% (49,1% + 15,6%, tableau 3) des fonds requis tels que définis à l'équation 1. L'importance de cette source de financement est cependant variable, les valeurs les moins élevées étant observées en 1981-82 et 1988-89, ce qui correspond approximativement aux périodes de récession. Le tableau 3 présente, pour chacune des années, la proportion du financement provenant des principales sources de fonds, pour l'ensemble des observations. Les tableaux 4 et 5 présentent des renseignements identiques, lorsque les entreprises sont classées suivant que leur actif augmente ou diminue.[12] Pour les entreprises en croissance, en moyenne, au cours des 34 années étudiées, le réinvestissement des bénéfices a comblé 47% des besoins de fonds bruts, alors que la portion versée en dividendes correspondait à 14,2% des fonds requis. La dette à long terme a compté pour 20 % des fonds contre 9% pour la dette à court terme. Les émissions d'actions ordinaires ont représenté 8,2% des besoins contre 1,6% pour les actions privilégiées. Les valeurs rapportées au tableau 4, pour l'ensemble des observations, diffèrent peu, en moyenne, de celle rapportées pour l'ensemble des observations. Cependant, l'examen du tableau 5, consacré aux entreprises en décroissance, révèle des caractéristiques surprenantes[13]. En premier lieu, les dividendes représentent 15,6% de la réduction de l'actif brut. Les entreprises en décroissance doivent donc cette situation, en partie, au versement de dividendes. Les fonds autogénérés ont été positifs, et ceux qui ont été réinvestis représentent 31,6% de la diminution. Ces entreprises ont réduit leur actif par la réduction du passif à court terme et de la dette à long terme. Elles ont même émis des actions, qui représentent 4% de la diminution totale. Ces entreprises en décroissance, qui représentent désormais une proportion importante des entreprises canadiennes, mériteraient donc une analyse approfondie, qui a cependant été reportée à des travaux ultérieurs.

Insérer ici la figure 2 et les tableaux 3, 4 et 5

En moyenne, les entreprises canadiennes en croissance se comportent donc à peu près comme celles des

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[12] Cette distinction est importante en raison du mode de calcul des variables. Une entreprise qui réduit son actif en raison d'une perte se voit en effet attribuer 100% dans la colonne réinvestissement des bénéfices, tout comme celle qui a financé sa croissance entièrement par ses bénéfices. Des études similaires éliminent généralement les entreprises en décroissance. Elles ont été étudiées ici en raison de leur importance relative.

[13] Compte tenu du fait que le dénominateur est affecté d'un signe négatif, un ratio négatif indique une variation de même sens, c'est-à-dire une diminution.

autres grands pays industrialisés et, en particulier, comme celles des États-Unis. L'autofinancement est prépondérant et le recours aux émissions de capital-actions est rare. Toutefois, des variations temporelles importantes peuvent être observées: par exemple, les émissions d'actions représentent 19,3% des besoins de fonds en 1983 et 22,1% en 1993. La dette à long terme a permis de financer environ 35% des besoins de fonds de 1987 à 1991. Plusieurs auteurs suggèrent que ces variations sont liées à des fluctuations des cycles économiques et aux conditions des marchés financiers. La section suivante présente une analyse sommaire de ces hypothèses, qui font l'objet de vérifications économétriques dans la dernière partie.

3.5 Choix financiers et conditions économiques

Comme le notent Nakamura et Nakamura (1982, note 31), il est probable que l'augmentation temporelle de l'endettement aux États-Unis soit largement imputable à des facteurs macroéconomiques. Parmi les facteurs invoqués pour expliquer globalement l'évolution des choix de financement, les plus importants semblent être la fiscalité, l'inflation, et des coûts relatifs de financement, tels que perçus par les dirigeants.

La fiscalité

Dans le cadre développé par Miller (1977), il n'existe pas de niveau optimal d'endettement au niveau des entreprises, mais il existe un niveau optimal d'endettement dans l'économie. L'économie d'impôt due à l'endettement est donnée par la quantité G[14]:

$$G=[1-\frac{(1-t_{ps})\ (1-t_c)}{(1-t_p)}]\ D \qquad (2)$$

où t_{ps} est le taux d'impôt payé par les individus sur leurs revenus d'actions, t_c est le taux d'impôt des entreprises, et t_p représente le taux d'impôt des particuliers, alors que D est le montant de la dette. Au niveau de l'entreprise, G peut être négatif, positif ou nul suivant le statut fiscal des actionnaires, ce qui peut provoquer un effet de clientèle. Au niveau de l'économie toutefois, les changements fiscaux qui accroissent ou diminuent G devraient avoir un impact sur les politiques de financement, si les entreprises choisissent leur mode de financement en fonction de la fiscalité. Par ailleurs, DeAngelo et Masulis (1980) ont introduit la notion de crédits d'impôt non

[14] Grier et Strebel (1983) utilisent exactement la même mesure de ce qu'ils appellent *Net Debt Incentive Ratio*, pour évaluer la sensibilité des entreprises américaines aux changements des paramètres fiscaux, au cours de la période 1964-1976. Ils obtiennent des résultats ambigus qui ne confirment que partiellement l'hypothèse de Miller.

liés à l'endettement (*Non Debt Tax Shield* ou *NDTS*), qui seraient un substitut aux économies d'impôt que procure l'endettement. Aux États-Unis, Mackie-Mason (1990a) et Givoly *et al* (1992), qui ont examiné l'impact de la réforme fiscale de 1986, ont mis en évidence une sensibilité faible des entreprises aux changements fiscaux.[15] Nous avons donc calculé, pour chacune des périodes, les différents taux d'impôt et estimé G. L'annexe 1, qui rapporte le détail des calculs, montre que la valeur de G a fortement varié au cours de la période d'analyse, notamment lors de la réforme fiscale de 1972. Plusieurs ajustements ont également été apportés, au fil des ans, aux *NDTS* mais leur effet sur l'ensemble des entreprises est difficile à évaluer et l'importance de ces crédits est spécifique à chacune des entreprises (Givoly *et al*). Ces crédits sont donc introduits lors de l'analyse menée au niveau des entreprises. La figure 3 illustre l'évolution de G, sous l'hypothèse que l'investisseur marginal est un particulier. Le taux maximal applicable aux entreprises est également illustré, de même que la proportion du financement composé de dette à court et à long terme. Il semble exister peu de relation entre la valeur du gain lié à l'endettement et la proportion du financement tirée de l'endettement à long terme. Le coefficient de corrélation entre les deux variables est de -0,032. Cependant, il existe une relation plus forte entre le recours à l'endettement total et la valeur G. Le coefficient de corrélation est alors de 0,335. Toutefois, l'année 1972, qui voit un accroissement très important du gain lié à l'endettement pour les entreprises, est l'une de celle où le recours à la dette est le moins élevé et un phénomène similaire est observé en 1982, autre année d'augmentation de la valeur G. L'association entre la fiscalité et les choix financiers des entreprises sera approfondie dans la section consacrée aux choix financiers des entreprises individuelles.

Insérer ici la figure 3

L'inflation

Plusieurs travaux conceptuels ont lié positivement le recours à l'endettement à l'inflation (Modigliani,1982; Modigliani et Cohn 1979; Prezas, 1991; Taggart, 1986), mais ce lien passe généralement par la fiscalité et par les coûts d'agence. Taggart (1985) propose une analyse complète de l'interaction entre ces déterminants potentiels de l'endettement et montre qu'en présence de coûts d'agence, une augmentation de l'inflation anticipée provoque le remplacement de fonds propres par de la dette et augmente le taux d'endettement d'équilibre. La figure 4, qui illustre l'évolution de l'inflation et des proportions des fonds requis tirées de la dette totale et de la

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[15] La réforme américaine réduisait l'importance des crédits d'impôt non liés à l'endettement, ce qui rendait la déduction des intérêts plus attrayante, mais modifiait simultanément l'imposition des sociétés et des particuliers. Au niveau agrégé, le changement dans l'endettement des entreprises a été infime (0.007 d'après Givoly *et al*) mais les ajustements observés au niveau des entreprises confirment l'effet simultané de l'impôt des particuliers et des entreprises sur les choix de financement.

dette à long terme, montre quelques éléments susceptibles d'appuyer cette hypothèse. Le coefficient de corrélation entre le recours à l'endettement à long terme et le taux d'inflation est de 0,2376. Il est de 0,3312 lorsque l'on prend en compte le recours à l'endettement sous toutes ses formes.

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Choix de financement et coûts perçus de financement

Le niveau général du marché boursier n'est généralement pas considéré comme un facteur déterminant des choix financiers des entreprises. Pourtant, lorsque l'on demande directement aux gestionnaires quels sont les facteurs qu'ils prennent en compte lors des décisions de financement, *capital markets is firms' primary concern, rather than clientele or certain market segments* (Norton, 1991, p.438). Au Canada également, les dirigeants interrogés citent les conditions générales de marché comme principal facteur influençant les décisions de financement (Cheung *et al*, 1989). Pour les chercheurs qui étudient le phénomène des émissions initiales, il va de soi qu'il existe des périodes favorables, nommées *Hot Issues Markets* (Ritter, 1991), au cours desquelles se produisent la majorité des émissions et durant lesquelles les émetteurs reçoivent, en moyenne, des montants supérieurs pour des titres comparables.

Quelques travaux ont cependant lié les coûts et les choix de financement. Viswanath (1993) propose une version modifiée de la *Pecking Order Theory* (*POT*) et établit un lien entre les taux d'intérêt futurs anticipés et les émissions d'actions. Si la structure à terme des taux d'intérêt est décroissante, situation plus vraisemblable lors des sommets des cycles économiques, les émissions d'actions seraient plus importantes. Ce phénomène a été mis en évidence par Choe *et al.* (1989). Finalement, diverses études des choix de financement mettent en évidence le rôle significatif de variables telles que le ratio *de la valeur comptable à la valeur marchande du titre (book to market ratio*, Rajan et Zingales,1995; Homaifar *et al*, 1994) ou le ratio cours/bénéfice (Chung, 1993). Ces deux ratios, qui sont considérés comme des estimateurs de l'importance relative des opportunités de croissance future, sont liés négativement à l'endettement. Cependant, ces variables sont également des estimateurs classiques du coût de financement (McCauley et Zimmer,1989) et il est possible de défendre que le recours aux émissions de capital-actions externes est d'autant plus fréquent que ces indicateurs sont élevés et indiquent un faible coût du financement par actions. C'est ce que propose Singh (1995). Il explique que les entreprises des marchés émergents se financent largement par émissions d'actions en raison du coût relativement faible de ce type de financement, lié à la hausse rapide des indices boursiers de ces marchés au cours des années 1980. Les ratios cours/bénéfice élevés, observés dans de nombreux pays émergents, auraient incité les

entreprises à procéder à de nombreuses émissions. Nakamura et Nakamura (1982) observent que les ratios d'endettement à long terme sont liés positivement au coût des fonds propres et négativement au coût de la dette. Il existerait donc une association entre le niveau relatif des indices boursiers et les choix de financement, ce que confirme la figure 5. Elle montre l'évolution du ratio cours/bénéfice moyen des entreprises de l'échantillon, qui correspond approximativement à celui du TSE, ainsi que la proportion des fonds requis obtenus par émissions d'actions. Il existe une relation forte entre les deux séries, la corrélation atteignant 56,5%. Il semble donc que le niveau général des cours boursiers influence les choix financiers des entreprises.

Insérer ici la figure 5

De la même façon, si les dirigeants tiennent compte du coût réel du financement par dette, on peut anticiper une baisse relative du financement par dette lorsque les taux réels d'intérêt se situent à un niveau élevé[16]. La figure 6 permet de constater l'absence de relation entre le recours au financement total par dette et le taux réel. La corrélation entre les deux séries est de -0,0347. Par contre, le taux réel des obligations à long terme est négativement associé avec le recours à l'endettement à long terme. Dans ce cas, la corrélation est de -0,274.

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Financement et cycle économique

Quelques travaux lient les choix financiers des entreprises au cycle économique (Seth, 1992). Pour Taggart (1986, p.37), la relation entre les choix financiers et les cycles économiques est évidente puisqu'il existe une relation inverse entre le recours à l'endettement et la disponibilité des fonds internes. Ce recours à l'endettement serait particulièrement important à la fin des périodes d'expansion et au début des périodes de récession, alors que de fortes dépenses d'investissement coïncident avec une baisse des fonds générés. La figure 7 ne met pas en évidence de relations très fortes entre le recours à la dette à long terme et le taux de croissance de la production industrielle, utilisé ici comme indicateur de croissance économique. Le coefficient de corrélation est d'ailleurs de 0,12. Il est positif, ce qui est contraire aux attentes, et non significatif. Le recours à la dette totale est cependant lié négativement à l'indice de croissance de la production. Une forte proportion des fonds requis est

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[16] Brick et Palmon (1992) lient l'endettement et la variabilité des taux d'intérêt, à l'aide de la notion de *Tax-Timing option*, qui favoriserait l'émission de dette en période de volatilité des taux. Cette variable n'a pas été retenue.

venue de l'endettement lors des récessions de 1980-82 de même qu'en 1986. Le coefficient de corrélation entre les deux séries est de -0,378.

Insérer ici la figure 7

Il semble donc exister des relations fortes entre les choix financiers des entreprises, d'une part, et les conditions de l'économie et des marchés, d'autre part. Cette observation correspond à la fois au bon sens et aux énoncés des dirigeants d'entreprises eux-mêmes. L'étude descriptive menée ici est cependant superficielle et ne tient pas compte des différences de comportement au niveau des entreprises. De plus, l'impact des variables a été analysé de façon indépendante. La suite de l'étude est dévolue à l'élaboration et aux tests de modèles d'explication des choix de financement où interviennent simultanément les conditions économiques et les caractéristiques des entreprises.

4 EXPLICATION DES CHOIX FINANCIERS DES ENTREPRISES

4.1 Modèles et données

Les analyses des sections précédentes ont mis en évidence des variations temporelles importantes dans l'utilisation des diverses sources de fonds par les entreprises. Ces variations qui semblent partiellement liées aux variations économiques. L'analyse en coupe transversale des choix de financement montre également une variabilité importante des choix financiers, pour une même période, suivant les entreprises. Dans cette dernière partie de l'étude, nous tentons de déterminer si ces variations sont aléatoires ou si elles peuvent être liées à des caractéristiques des entreprises. Dans une seconde étape, les conditions des marchés et de l'économie sont prises en compte[17].

L'objectif des modèles économétriques utilisés ici est de déterminer s'il est possible d'expliquer les *choix* de financement des entreprises. L'étude se distingue donc des nombreux travaux qui ont tenté d'expliquer les *niveaux* d'endettement (Titman et Wessels, 1988). L'étude la plus proche de celle proposée ici a été menée par MacKie-Mason (1990b) aux États-Unis. Cet auteur utilise un *modèle de choix séquentiel (nested probit*

[17] Les effets d'interaction entre les conditions économiques et les caractéristiques des entreprises n'ont pas été abordées dans cette première version de l'étude.

model) dont les variables expliquées sont binaires[18] suivant une logique basée sur la POT et sur une distinction entre le financement interne (réinvestissement et emprunt) et externe (émissions publiques de dette et fonds propres).[19] Pour Mackie-Mason, les déterminants du recours à l'endettement sont liés à la fiscalité, aux coûts réels de faillite et aux coûts d'agence. Il observe que les entreprises qui versent peu de dividendes, ont des bénéfices volatils, des pertes reportées et un déclin du prix de leur action, et se financent à l'interne. Il reconnaît toutefois que le principal problème de son modèle vient de l'agrégation de deux types de financement internes très différents, soit le réinvestissement et l'emprunt bancaire. Cette méthode n'a donc pas été retenue. Il est également possible d'analyser les déterminants des choix financiers des entreprises à l'aide de modèles de choix discrets, où la variable binaire expliquée dépend de la décision d'émettre des obligations ou des actions (Marsh, 1982; Bayless et Diltz, 1994). Cette méthode n'a pas été retenue ici, pour plusieurs raisons. En premier lieu, elle ne tient compte que du financement externe, qui ne représente qu'une part relativement minime du financement total. En second lieu, les emprunts bancaires et les émissions privées d'obligations se trouvent exclues de l'analyse. Finalement, ramener le choix de financement à une variable binaire présente une perte d'information, puisque des émissions importantes se trouvent traitées de la même façon que celles de petite taille, alors que les années où coïncident les deux types d'émissions sont éliminées. Les méthodologies de type binaire, si elles permettent de tenir compte simultanément de deux modes de financement, ne permettent pas de prendre en compte l'ensemble des opérations de financement à un moment donné. Nous avons donc opté pour une série de modèles expliquant chacun l'une des caractéristiques du financement. Dans cette première étape, ces modèles sont traités de façon consécutive et non simultanée, pour éviter les problèmes de spécification.[20]

Ce travail n'a pas l'ambition de tester l'une ou l'autre des théories qui prétendent expliquer le comportement des entreprises puisque, comme le souligne Myers (1994), il n'existe toujours pas de théorie cohérente permettant d'expliquer ces comportements. Nous proposerons donc un modèle d'explication des choix de financement qui repose, comme celui de Rajan et Zingales (1995) sur une synthèse des principales études antérieures afin de définir les variables explicatives des choix financiers. Comme ces auteurs, nous considérons

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[18] Un code *New shares* est attribué si la firme émet des actions, quels que soient les autres modes de financement, le code *Bonds* caractérise l'entreprise qui émet des obligations, *Private debt* si elle emprunte et *Retained earnings* dans tous les autres cas.

[19] Cette étude assimile donc les émissions d'obligations à un financement externe public. Or, Crabbe & al. (1990) observent que le montant des placements privés d'obligations dépasse, en 1988 et 1989, celui des placements publics. Ces placements privés sont réalisés directement auprès d'investisseurs institutionnels.

[20] Voir Jensen *et al.*(1992) pour un modèle d'explication partiel des structures financières utilisant un système d'équations simultanées. Leur objectif est toutefois différent de celui poursuivi ici. Jalilvand et Harris (1984) emploient également un système d'équations pour expliquer les choix de financement.

que, *according to Harris and Raviv (1991). the consensus is that leverage increases with fixed asset, non-debt tax shields, growth opportunities and firm size and decreases with volatility, advertising expenditure, bankruptcy probability and uniqueness of the product.* Rajan et Zingales retiennent 4 variables susceptibles d'expliquer l'endettement, soit un indicateur du caractère tangible de l'actif *(tangibility: fixed to total assets)*, une mesure des anticipations de croissance (*market to book ratio*), la taille et la rentabilité (*operating cash-flow /book value of assets*). Les variables utilisées ici seront cependant légèrement différentes, puisque l'objectif est d'expliquer le recours aux divers types d'endettement et non leur divers niveaux. Par ailleurs, après avoir décrit et analysé l'effet des variables spécifiques aux entreprises, nous introduirons dans les modèles les principaux indicateurs macroéconomiques dont il a été question plus haut.

4.1.1 Explication du pourcentage d'autofinancement

Dans le cadre de la POT, le recours à l'autofinancement sera d'autant plus important que la rentabilité est élevée et que la croissance est faible. La croissance de l'actif (*CROIS*) et la rentabilité (*RENT*) sont donc les deux principales variables explicatives de la proportion des fonds requis comblée par le réinvestissement des bénéfices. La politique de dividende est ici considérée comme une variable explicative, comme dans le modèle de Jensen *et al.*(1992) Elle est mesurée par *DIST*, qui est le rapport des dividendes versés aux bénéfices disponibles aux actionnaires au cours des trois derniers exercices financiers. Si la politique de dividendes est contraignante, ce que semblent indiquer divers travaux antérieurs, la variable *DIST* devrait être affectée d'un coefficient significatif et négatif lorsqu'il s'agit d'expliquer la proportion d'autofinancement. Finalement, il semble impossible de considérer de la même façon les entreprises qui ont subi des pertes et celles qui ont dégagé des bénéfices au cours des exercices précédents. Les premières n'ont pas de choix réels de financement, et les relations observées peuvent traduire un simple effet d'arithmétique comptable.[21] Une variable BP (pour variable Binaire de Perte) a donc été introduite dans le modèle. La proportion d'actif immobilisé financée à l'année t, exprimée par rapport aux fonds requis (*AI*) est introduite dans le modèle[22]. Comme l'actif immobilisé sert à garantir la dette, il tend à réduire les coûts d'agence potentiels des créanciers et permet de recourir davantage à l'endettement[23]. La proportion d'autofinancement devrait être négativement liée à cette variable.

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[21] Voir Allen (1993) pour une discussion de ces problèmes. Comme lui, nous les esquivons en expliquant les choix financiers de la période t par les variables mesurées antérieurement.

[22] Comme nous utilisons ici un modèle d'explication des variations, c'est le changement de la valeur brute de l'actif immobilisé qui est rapportée à l'augmentation totale de l'actif à l'année t.

[23] Il est également possible de défendre que l'importance de l'actif immobilisé est positivement liée au risque d'opération qui devrait être inversement lié au risque financier, donc à l'endettement. Il est également évident que l'actif immobilisé est générateur de crédits d'impôt non liés à l'endettement. Par ce raisonnement, on associe

Comme Jalilvand et Harris (1984) et Homaifar *et al.*(1984), et à la suite des résultats agrégés observés dans les sections précédentes, nous considérons que les conditions de marché boursier influencent les choix financiers. Toutefois, le taux de rendement boursier ne semble pas être un bon indicateur de ces conditions, puisqu'il peut être particulièrement élevé en début de cycle haussier, à un moment où les dirigeants considèrent que leurs titres sont encore sous-évalués par le marché. Le ratio bénéfice/cours relatif (*EPRR*) est utilisé ici comme indicateur du prix relatif des titres. Afin de prendre en compte les fluctuations de cet indicateur aussi bien dans le temps que d'une entreprise à l'autre, les ratios sont doublement normalisés. La première normalisation se fait par rapport au marché et la seconde par rapport à l'historique du ratio normalisé. La quantité ainsi obtenue est couramment employée par les analystes financiers pour déterminer si un titre est ou non sous-évalué. (Melkinof, 1988). Une valeur élevée de cet indicateur indique que le titre est peu valorisé par le marché. Dans cette situation, l'entreprise devrait avoir davantage recours à l'autofinancement (et à l'endettement) et ne pas émettre d'actions. Le modèle aurait donc la forme suivante:

$$\Delta AUTO_{it} = \alpha_0 + \alpha_1 CROIS_{it} + \alpha_2 RENT_{it} + \alpha_3 DIST_{it} + \alpha_4 BP_{it} + \alpha_5 AI_{it} + \alpha_6 EPRR_{it} + e_{1it} \qquad \text{(M1)}$$

où

$\Delta AUTO_{it}$ = Partie des fonds requis autofinancée par l'entreprise i à l'année t. Il s'agit de la somme de l'accroissement des bénéfices non répartis et de l'amortissement, rapportée aux fonds requis calculés suivant l'équation 1, en incorporant les dividendes et l'amortissement.

$CROIS_{it}$ = Taux de croissance géométrique annuel moyen de l'actif brut (valeur comptable de l'actif + amortissement accumulé) au cours des trois derniers exercices financiers, pour l'entreprise i au temps t

$$CROIS_t = (ACTIF_t \,/\, ACTIF_{t-3})^{1/3} - 1 \qquad (4)$$

$RENT_{it}$ = Taux de rendement moyen de l'actif, avant intérêts et impôt, pour l'entreprise i au temps t. Il s'agit d'une moyenne calculée au cours des trois derniers exercices financiers.

$$ROA_t = \sum_{s=t-2}^{t} BAII_s \,/\, \sum_{s=t-2}^{t} ACTIF_s \qquad (5)$$

$DIST_{it}$ = Indicateur de politique de dividendes. Il s'agit du ratio du dividende versé au bénéfice disponible aux actionnaires, au cours des trois exercices financiers se terminant à la date de l'analyse. Lorsque

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à nouveau négativement l'importance de l'actif immobilisé à l'endettement. Voir Balakrishnan et Fox (1993) pour une discussion de ce problème. L'une des solutions est probablement de mesurer le caractère plus ou moins spécifique des actifs (Balakrishnan et Fox; Malitz *et al*, 1989), ce qui n'est pas possible à partir des données disponibles.

des dividendes ont été versés en dépit de pertes, la valeur limite de 1 est attribuée. On considère alors que la totalité des bénéfices a été distribuée.

$$DIST_{it} = \frac{\sum_{s=t-2}^{t} dividendes_s}{\sum_{s=t-2}^{t} bénéfices\ nets_s} \quad ou\ 1\ si \sum_{s=t-2}^{t} bénéfices < 0 \tag{6}$$

BP_{it} = Variable binaire qui prend la valeur 1 lorsque le bénéfice total des trois derniers exercices est négatif.

$$BP_{it} = 1 si \sum_{s=t-2}^{t} bénéfices > 0\ ou\ 0\ autrement \tag{7}$$

AI_{it} = Augmentation de la valeur brute de l'actif immobilisé, en proportion de l'augmentation totale de l'actif brut (les fonds requis).

$EPRR_{it}$ = Ratio bénéfice/cours relatif exprimé par rapport à sa moyenne historique. Dans un premier temps, le ratio bénéfice/cours est normalisé par la moyenne de la distribution de ce ratio pour l'année t. Le résultat obtenu est le ratio relatif à la moyenne, noté EPM_{it}. Cette première étape est nécessaire pour prendre en compte les fluctuations intertemporelles de ce ratio.

$$EPM_{it} = EP_{it}/EP_{mt} \tag{8}$$

La moyenne historique de ce ratio est ensuite calculée pour les trois exercice t, t-1 et t-2. La quantité $EPMH_{it}$ indique la position habituelle du ratio du titre par rapport à celui du marché, ce qui permet de tenir compte d'éventuels effets de secteur ou de taille.

$$EPMH_{it} = \frac{1}{3} \sum_{s=t-2}^{t} EPM_{is} \tag{9}$$

Le ratio bénéfice/cours relatif est donné par l'équation (10). Elle indique dans quelle mesure le ratio bénéfice/cours du titre se situe au-dessus ou au-dessous de sa moyenne historique corrigée. Il s'agit là d'un indicateur couramment employé par les analystes financiers pour déterminer si un titre est sur ou sous évalué.

$$EPRR_{it} = EPM_{it}/EPMH_{it} \tag{10}$$

Les variables macroéconomiques associées à ce modèle sont le taux de croissance de l'activité économique (*CIPI*), l'indice agrégé de valeur relative du marché (bénéfices/cours du marché), le taux d'inflation (*INF*) et le taux d'intérêt à long terme (*OBLIG*)

4.1.2 Explication du pourcentage des besoins de fonds financé par la dette totale

La dette étant un complément à l'autofinancement lorsque celui-ci ne suffit plus (dans le cadre de la *POT*), les variables explicatives du modèle M1 sont incorporées aux modèles explicatifs du recours à l'endettement total (M2a) et à la dette à long terme (M2b). Cependant, les travaux antérieurs ont révélé le rôle de deux autres variables dans la détermination des niveaux d'endettement. Ces variables jouent donc vraisemblablement un rôle dans l'explication des choix annuels des modes de financement. Il s'agit de la fiscalité et de la taille. La fiscalité intervient ici par l'intermédiaire des crédits d'impôt non liés à l'endettement, les *NDTS*. Le gain fiscal *à la Miller* n'intervient pas au niveau individuel, puisque les entreprises, à un moment donné, sont affectées du même taux d'impôt, à moins qu'elles n'aient accumulé d'importantes pertes. En l'absence de données complètes relatives à la propriété des titres, il faut également considérer que les actionnaires sont imposés au même taux, ce qui implique que le gain relatif à l'endettement varie dans le temps, mais pas d'une entreprise à l'autre. La variable *RDF* (Ratio des Déductions Fiscales) représente le rapport des *NDTS* disponibles à l'année t au cash-flow moyen des trois derniers exercices. Le calcul s'inspire largement de celui utilisé par Davis (1994) et l'on s'attend à observer une relation inverse entre le recours à l'endettement et la variable *RDF*.[24]

Finalement, la taille relative est incorporée au modèle. Dans les travaux antérieurs, elle est généralement associée positivement à l'endettement (Harris et Raviv, 1991; Rajan et Zingales, 1995) sans qu'il n'existe d'explications très satisfaisantes à cette observation. Les deux hypothèses les plus fréquemment mentionnées sont une relation négative entre la taille et les coûts de faillite ainsi que l'accès plus facile des grandes firmes aux marchés obligataires monétaires.

Les modèles d'explication de la partie du financement tirée de l'endettement total (M2a) et de l'endettement à long terme (M2b) s'écrivent donc comme suit:

$$\Delta DT_{it} = \beta_0 + \beta_1 CROIS_{it} + \beta_2 RENT_{it} + \beta_3 DIST_{it} + \beta_4 BP_{it} + \beta_5 AI_{it} + \beta_6 EPRR_{it} + \beta_7 RDF_{it} + \beta_8 Taille + e_{2it} \quad \text{(M2a)}$$

$$\Delta DLT_{it} = \beta_0 + \beta_1 CROIS_{it} + \beta_2 RENT_{it} + \beta_3 DIST_{it} + \beta_4 BP_{it} + \beta_5 AI_{it} + \beta_6 EPRR_{it} + \beta_7 RDF_{it} + \beta_8 Taille + e_{2i} \quad \text{(M2b)}$$

[24] La normalisation des *NDTS* par le cash-flow s'impose en raison des différences de taille des entreprises et de la longueur de la période étudiée.

où, en plus des variables déjà définies, on trouve:

ΔDT_{it} = partie des fonds requis composée de l'augmentation de l'endettement, sous toutes ses formes (passif à court terme + dette à long terme)

ΔDLT_{it} = partie des fonds requis composée de l'augmentation d'endettement à long terme.

RDF = ratio des déductions fiscales non liées à l'endettement. Il s'agit du rapport des déductions non liées à l'endettement (*NDTS*) estimées pour l'année t au cash-flow moyen des trois dernières années (*CFM*). Cette expression des crédits d'impôt relatifs s'inspire de celle développée par Davis (1994), dans le cadre fiscal canadien. Elle est cependant adaptée pour tenir compte des limites qu'impose la liste des postes disponibles dans la base de données. Le calcul en est détaillé à l'annexe 1.

$$RDF = NDTS_{it} / CFM \tag{13}$$

$Taille_{it}$ = capitalisation boursière totale, rapportée à la moyenne de cette quantité pour l'ensemble des observations disponibles à l'année t. La normalisation est nécessaire en raison de la longueur de la période d'étude.

Les variables macroéconomiques associées à ce modèle sont le taux d'inflation (*INF*), le taux d'intérêt promis à long terme (*OBLIG*) ainsi que la valeur de l'avantage fiscal à l'endettement des entreprises (le *G* de Miller).

4.1.3 Explication du pourcentage de l'investissement financé par émission d'actions

Les variables invoquées précédemment pour expliquer le recours à l'endettement peuvent également expliquer le recours aux émissions externes de capital-actions, avec des signes inverses, à l'exception de la taille et des crédits d'impôt non liés à l'endettement, que l'on n'associe généralement pas au recours au capital-actions. Le modèle M3 a donc la forme suivante:

$$\Delta CAPA_{it} = \gamma_0 + \gamma_1\ CROIS_{it} + \gamma_2 RENT_{it} + \gamma_3 DIST_{it} + \gamma_4 BP_{it} + \gamma_5\ EPRR_{it} + e_{3it} \tag{M3}$$

où

$\Delta\ CAPAit$ = proportion des fonds requis financée par des émissions de capital-actions

Les variables marcroéconomiques qui seront associées à ce modèle sont l'indice de variation dans l'activité économique (*CIPI*), l'inflation (*INF*) et les taux d'intérêt à long terme (*OBLIG*). La première variable est un estimateur du coût relatif du financement par capital-actions. Les deux variables suivantes sont des déterminants potentiels du recours à l'endettement. Un niveau élevé des taux à long terme devrait inciter les entreprises, toutes

choses égales par ailleurs[25], à émettre des actions.

4.1.4 Récapitulation

Les différents modèles évoqués ainsi que les signes attendus sont récapitulés de la façon suivante:

	Modèles	M1	M2a	M2b	M3
	Variables expliquées	*AUTO*	*Δ DT*	*Δ DLT*	*ΔCAPA*
Code		Signes attendus			
	Variables explicatives spécifiques aux entreprises				
CROIS	Taux de croissance moyen	-	+	+	+
RENT	Rentabilité moyenne	+	-	-	-
DIST	Ratio de distribution	-	+	+	+
BP	Variable binaire associées aux pertes	-	+	+	+
RDF	Ratio des déductions fiscales non liées à l'endettement		-	-	
AI	Changement dans l'actif immobilisé en proportion de la croissance totale	-	+	+	
EPRR	Ratio bénéfice/cours relatif à la valeur historique du ratio relatif au marché	+	+	+	-
TailleR	Taille mesurée par la capitalisation boursière, exprimée relativement à la taille moyenne des entreprises de l'échantillon		+	+	
Variables macroéconomiques					
CIPI	Taux de changement dans la production industrielle	-	+	+	+
INF	Taux d'inflation	-	+	+	-
OBLIG	Taux promis sur les obligations à long terme	+	-	-	+
G	Gain fiscal à l'endettement des entreprises (G de Miller)		+	+	
EPM	Ratio bénéfices/cours moyen du marché	+			-

4.2 DESCRIPTION DES VARIABLES

Le tableau 7 récapitule les principales caractéristiques des distributions des variables utilisées dans les différents modèles. Afin de limiter le poids des données extrêmes dans les estimations, les valeurs inférieures au premier centile ou supérieures au dernier centile ont été ramenées à la valeur de ces centiles. Pour ce qui est des modes

[25] Ce "toutes choses égales par ailleurs" implique, entre autres, que les taux requis sur le marché boursier ne se soient pas ajustés à ces taux d'intérêt élevés, en provoquant une chute des prix des titres. Idéalement, c'est une mesure de la différence entre les coûts de financement à long terme, dans l'esprit de ce que propose Filion (1992), qui devrait être utilisée. Des travaux en ce sens sont actuellement en cours.

de financement, les données moyennes et médianes diffèrent légèrement des moyennes globales rapportées dans la première partie de l'étude. En effet, l'analyse par entreprise conduit à calculer des moyennes de ratios, alors que l'analyse agrégée conduit au calcul de ratios moyens.

- Variables expliquées

L'autofinancement a constitué en moyenne près de 74,3% des sources de fonds des entreprises canadiennes durant les 32 dernières années. Toutefois, cette distribution est fortement asymétrique à droite et la médiane se situe à 52% de sorte que pour une entreprise sur deux l'autofinancement représente moins de 52% des sources de financement. Cette médiane est proche de la valeur agrégée calculée précédemment (47%). L'existence de valeurs positives extrêmes mérite une explication. Il s'agit de situations où les fonds autogénérés dépassent les besoins de fonds. Cette situation prévaut lorsque des entreprises en croissance faible dégagent des flux monétaires importants qu'ils utilisent pour rembourser des dettes. Cette situation a surtout été observée au cours des années plus récentes. L'écart-type de la distribution est élevé, ce qui indique des différences importantes entre les entreprises ou dans le temps.

La part du financement tiré de la dette, sous toutes ses formes, est en moyenne négative (-3,9%), mais la médiane est positive et proche de la quantité mesurée de façon agrégée (26,6% contre 29% pour les entreprises en croissance, au tableau 4). La forte asymétrie est provoquée par environ 1 centième des observations, dont la valeur a été bornée à -12,88. Ici encore, il s'agit de situations particulières, généralement provoquées par des entreprises dont les besoins de fonds sont peu importants et qui utilisent une émission d'actions ou des bénéfices importants pour réduire leur endettement. La dette à long terme représente en moyenne 5,31% des fonds requis, ce qui correspond à la moyenne agrégée. Cependant, dans près de 3800 observations, la variation de la dette à long terme est nulle. Le plus souvent, cette situation découle simplement de l'absence de ce mode de financement dans la structure. Cette situation explique que la médiane de la distribution soit proche de 0.

Nous avons également évalué les dividendes versés, par rapport aux fonds totaux requis. Ils ont représenté en moyenne, durant cette période 17.3% des besoins de fonds totaux des entreprises, proportion à peu près équivalente à celle observée au niveau agrégé. Ce résultat confirme que les entreprises ont davantage distribué aux gestionnaires qu'elles n'ont recueilli des fonds lors des émissions.

-Variables explicatives

Les entreprises de l'échantillon ont connu en moyenne une croissance de 16.2%. Cependant, la médiane se situe à 11.6%, ce qui traduit l'influence d'un sous-ensemble d'observations à très forte croissance. La situation est à peu près la même en ce qui concerne le taux de rendement. La distribution de la croissance est asymétrique à droite (médiane de 11.6%). La rentabilité de l'actif a été en moyenne de 13.4% alors que la médiane a été de 10,8%.

Le ratio de distribution de dividendes a été en moyenne sur l'échantillon de 28.6%.[26] On observe que, 3.5% des entreprises ont continué à verser des dividendes même si elles ont subi des pertes (en moyenne) au cours des 3 derniers exercices financiers, ce qui confirme le caractère contraignant de la politique de dividendes.

Le ratio bénéfice/cours relatif est, on pouvait le prévoir, comme très proche de l'unité. La moyenne se situe à 1.031 et la médiane est de 0.99. 7.4% des entreprises ont connu des pertes de sorte que nous avons distingué ce sous-groupe et avons considéré une variable dichotomique EPN. En moyenne, la croissance de l'actif immobilisé n'a représenté que 27,3% des fonds requis. Cette proportion relativement faible découle à la fois du mode de calcul des fonds requis et de la croissance par acquisition qui a prévalu dans de nombreux cas.

4.3 Méthodologie et résultats

Dans un premier temps, les modèles d'explication des choix de financement sont estimés en 2 étapes. Pour cela, 32 régressions en coupe transversale sont estimées, pour chacune des années de 1963 à 1994.[27] Les coefficients moyens sont ensuite calculés,[28] de même que leur dispersion ce qui permet d'estimer les valeurs t. Cette

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[26] Ce ratio est exprimé par rapport aux bénéfices disponibles, alors que la variable DIV est calculée par rapport aux fonds requis, ce qui explique la différence de niveau moyen de ces deux indicateurs de la politique de dividendes.

[27] La perte des premières années de la période d'étude découle du calcul de certaines variables, comme le taux de rendement, au cours de périodes de trois ans. L'année 1968 a également été omise de l'estimation en deux étapes, puisque la variable binaire de perte ne présentait, cette année-là, qu'une seule valeur différente de 0. Le coefficient de cette variable était alors affecté d'une valeur extrême. Les observations de cette année apparaissent cependant dans les estimations en *pooling*.

[28] Les coefficients moyens sont estimés comme suit:

$$\bar{\alpha}_k = \frac{1}{32} \sum_{t=1}^{32} \hat{\alpha}_{kt} \quad \text{idem pour } \beta \text{ et } \gamma$$

technique, qui a été employée par Fama et French (1992), autorise la variation annuelle des paramètres estimés. Cependant, si elle permet d'observer l'instabilité temporelle des coefficients estimés, cette méthode ne permet pas d'expliquer l'origine de ces variations. Dans une seconde section, les modèles (M1) à (M3) sont donc estimés en une seule étape, suivant la méthode de regroupement (*pooling*). Cette estimation offre plus de degrés de liberté, réduit la collinéarité entre les variables explicatives et conduit donc à des estimés plus efficaces. Elle permet également d'obtenir des tests plus puissants. Elle permet en outre d'introduire dans les modèles des variables macroéconomiques pouvant conditionner les choix de financement des entreprises. L'introduction de ces variables permet de corriger partiellement l'hypothèse implicite de ce type d'estimation, qui est que l'ordonnée à l'origine et les pentes associées aux différentes variables sont temporellement stables.[29] Chacun des modèles est donc estimé suivant trois méthodes: en deux étapes, en *pooling* incorporant seulement les variables spécifiques aux entreprises et en *pooling* en incorporant les variables macro-économiques. L'ensemble des paramètres estimés par chacune des trois méthodes et pour chacun des modèles est présenté aux tableaux 8 (modèles liés aux fonds propres) et 9 (modèles liés à la dette).

Modèle M1: part de l'autofinancement dans le total des fonds requis

Les coefficients moyens et leurs niveaux de signification associés, pour chacune des méthodes d'estimation, sont rapportées aux trois premières colonnes du tableau 8. L'analyse des résultats des régressions annuelles montre que les coefficients sont affectés du signe attendu pour pratiquement chacune des années étudiées. L'ordonnée à l'origine est positive et très significative reflétant le fait qu'en moyenne l'autofinancement est une source de fonds privilégiée par les entreprises. Les coefficients moyens sont également statistiquement différents de 0 et sont affectés du signe prévu. Le recours à l'autofinancement est inversement lié à la croissance (le coefficient est de -0,884 et positivement lié à la rentabilité, le coefficient moyen s'établissant à 1,222. Ces résultats sont conformes à un schéma d'ordre hiérarchique dans le choix des modes de financement. Tel qu'anticipé, le coefficient associé à la variable *DIST* qui représente le taux de distribution est négatif et significatif (-0.493). En effet, plus le taux de distribution des dividendes est élevé, plus l'entreprise a de la difficulté à s'autofinancer, à rentabilité et croissance égale. Ce résultat semble indiquer que le versement des dividendes est perçu comme contraignant par les entreprises. L'examen des données montre d'ailleurs que de nombreuses entreprises procèdent simultanément à un versement de dividendes et à des émissions d'actions. Le coefficient moyen associé à la variable binaire BP est négatif et significatif (-0.850). Ce résultat, attendu, traduit le fait que l'entreprise qui

[29] Notons que les modèles présentés ici ne permettent pas de prendre en compte la variabilité des pentes, mais simplement celle des ordonnées à l'origine.

connaît des pertes dispose d'une capacité d'autofinancement réduite.

La variable EPRR, qui indique le niveau plus ou moins favorable du prix du titre, est affectée d'un signe positif. Des niveaux élevés des prix correspondent à des périodes de réinvestissement élevé. Ce résultat est contraire à celui qui l'on pouvait anticiper. En effet, il aurait été logique d'observer des émissions plus nombreuses et un réinvestissement moindre lors des périodes où le cours de l'action est élevé. Il semble que ce ne soit pas le cas; la relation observée peut être expliquée si l'on observe que les périodes durant lesquelles les valeurs de EPRR sont élevées sont également celles où les bénéfices sont importants, ce qui permet aux entreprises de s'autofinancer plus largement.

Le coefficient de la variable AI est négatif et statistiquement significatif, ce qui indique que le recours à l'autofinancement est d'autant plus important que la croissance ne découle pas de l'acquisition d'actifs tangibles.

L'estimation en pooling met en évidence des résultats très proches de ceux observés lors de l'analyse en deux étapes. Les pentes associées aux variables expliquant la part de chacun des modes de financement de la croissance des entreprises semblent donc relativement stable durant la période d'analyse. Le coefficient de détermination du modèle M1 est de 22%.

La dernière estimation fait intervenir quatre variables macroéconomiques dont on peut anticiper qu'elles influencent la proportion d'autofinancement. Il s'agit de l'activité économique, mesurée par la variation dans l'indice de production industrielle (*CIPI*), du taux d'inflation de l'année (*INF*) tel que rapporté par Statistique Canada, et d'un indicateur agrégé du niveau du marché boursier, calculé en effectuant la moyenne arithmétique des ratios bénéfice/cours des entreprises de l'échantillon (*EPM*), du taux de rendement à long terme des obligations industrielles, mesuré par la moyenne arithmétique des taux mensuels promis (*OBL*). A l'exclusion de l'indicateur du niveau du marché boursier, tous ces indicateurs jouent un rôle significatif dans l'explication de la proportion d'autofinancement. L'autofinancement se réduit en période de croissance économique. Le coefficient est de -0,008, et il est statistiquement significatif. L'inflation est également négativement liée au recours à l'autofinancement, ce qui peut être expliqué par l'attrait plus important de l'endettement en période inflationniste. Finalement, les variations dans les niveaux d'autofinancement ne semblent pas liées au niveau du ratio bénéfice/cours pour l'ensemble du marché.

Les conditions économiques semblent donc liées au choix d'un financement, mais l'augmentation très faible du coefficient de détermination indique que l'ajout des variables macroéconomiques n'améliore que très peu le

modèle économétrique.

Modèle M3: part des émissions d'actions

La partie droite du tableau 8 rapporte les coefficients et tests associés au modèle M3. Lors de l'estimation en deux étapes, les coefficients associés à la variable *CROIS* sont positifs pour 30 des 31 estimations. Ceux qui sont associés à la variable *RENT* sont négatifs durant 28 des 32 années. En moyenne (tableau 8) ces coefficients sont statistiquement significatifs. Le recours au financement par émission de capital-actions est donc d'autant plus important que la croissance est rapide et que la rentabilité est faible. La variable liée à la politique moyenne de distribution ne joue aucun rôle, quelle que soit la méthode d'estimation utilisée. Cependant, la variable binaire associée aux pertes est affectée d'un coefficient positif et statistiquement significatif. Les entreprises qui financent une grande partie de leur croissance par des émissions d'actions sont donc celles qui n'ont pas dégagé de bénéfices au cours des exercices précédents (la variable binaire est affectée de la valeur 1 en cas de perte). Il n'est donc pas surprenant d'observer l'absence de relation entre l'indicateur du prix relatif des titres et l'importance relative des émissions d'actions. Le coefficient lié à la variable EPRR est en effet négatif, mais n'est pas significatif.

L'estimation en regroupement conduit à des résultats similaires à ceux obtenus par la méthode en deux étapes. Le seul changement notable est lié au niveau de signification de la variable RENT. Aucune des variables macroéconomiques ne semble jouer un rôle explicatif à l'exception de l'indicateur de niveau de marché. Celui-ci est lié négativement et significativement à la proportion financée par actions. Les émissions sont donc d'autant plus importantes que le rapport du bénéfice au prix est faible, en moyenne. Ceci traduit une relation positive entre la proportion financée par actions et le ratio cours/bénéfices.

Quelle que soit leur forme, les modèles d'explication des proportions financées par capital-actions ont un pouvoir explicatif relativement faible. Leur coefficient de détermination est au maximum de 3,9 %.

Modèles M2a et M2b: part de la dette totale et de la dette à long terme

Les résultats des modèles relatifs au financement par dette sont rapportés au tableau 9. Les résultats diffèrent assez peu suivant que l'on explique la dette totale ou à long terme et seules les principales différences seront discutées.

CROIS: conformément aux attentes, le coefficient moyen associé à la variable *CROIS* est positif et significatif (0,486). Ce coefficient est positif pour chacune des estimations annuelles. Tel qu'anticipé, le coefficient moyen associé à la variable *RENT* est négatif et significatif (-0,539). Le coefficient de la variable *DIST* est positif (0,131) et statistiquement significatif. Ceci indique que les entreprises à politique de dividende généreuse ont, en moyenne, recours de façon plus intense au financement par dette. La politique de dividende semble donc contraignante. La variable binaire qui indique les situations de perte est également associée à un coefficient positif et significatif. Comme la valeur 1 est associée aux situations de pertes, la relation positive indique que les entreprises à très faible rentabilité se financent par émission de dette à long terme.

L'indicateur de valeur relative des crédits d'impôt non liés à l'endettement (*RDF*) ne joue aucun rôle explicatif dans le cas de cette dette à long terme et il est lié de façon positive et significative à la proportion financée par la dette totale. Ce résultat est contraire à ce que permet d'anticiper la théorie.

La variable *EPRR* est liée négativement, de façon significative à la proportion financée par dette, qu'elle soit à long terme ou totale. Ceci indique que le financement par dette en d'autant plus grand que le prix du titre et élevé par rapport à son bénéfice (après normalisation). Ce résultat est contraire à l'intuition, puisque des valeurs élevées des titres devraient provoquer des recours plus nombreux aux émissions d'actions. Il est possible que cet effet soit imputable à la rentabilité. Des bénéfices élevés, en permettant un recours plus large à l'autofinancement, réduirait le besoin de recourir à l'endettement.

Comme anticipé, le recours à l'endettement est associé au financement plus important d'immobilisations (*AI*). La taille est positivement associée à la proportion financée par la dette à long terme, mais on ne décèle pas de relations dans le cas de la dette totale. Le résultat est cohérent avec un accès plus facile des entreprises de grande taille au financement obligataire (*TAILLE*).

Les résultats changent peu suivant la méthode d'estimation et l'introduction des variables macroéconomiques n'améliore que très faiblement le pouvoir explicatif des modèles. L'inflation est positivement liée au recours à l'endettement, mais les entreprises semblent assez peu sensibles au niveau des taux à long terme. Dans le cas de la dette totale, le coefficient est cependant négatif et son niveau de signification est de l'ordre de 12%. La croissance économique est positivement associée avec la croissance de l'endettement total, ce qui peut traduire l'effet de l'augmentation des postes de passif à court terme en période d'expansion. En revanche, l'association avec la dette à long terme est négative, mais non significative au seuil de 5%.

Finalement, la valeur G, qui traduit le gain lié à l'endettement des sociétés, est liée négativement au recours à l'endettement des sociétés. La constance des résultats significatifs inverses aux énoncés théoriques est sans doute l'une des conclusions les plus nettes de l'exercice mené ici. Il en est également l'un des aspects les plus troublants.

5 CONCLUSIONS

Cette étude de l'évolution du financement des grandes entreprises canadiennes de 1960 à 1994 comporte trois parties, consacrées respectivement à l'évolution des niveaux d'endettement, à l'analyse agrégée des choix de financement et à l'étude de modèles économétriques d'explication des choix financiers des entreprises.

La première partie montre que l'on n'a pas observé, au Canada, d'augmentation importante de l'endettement total des entreprises, comme ce fut le cas aux États-Unis. L'endettement total a augmenté de 1960 à 1982, puis il a diminué pour se situer, en 1994, à 500 points centésimaux au-dessus de son niveau de 1960. Par contre, si l'on tient compte de la valeur marchande des actions, l'endettement total est moins élevé en 1994 qu'en 1960. La relative stabilité de l'endettement total est le résultat d'une croissance de la dette à long terme et d'une diminution du passif à court terme des entreprises. Les craintes qu'expriment certains auteurs américains face à l'augmentation rapide de l'endettement des entreprises de leur pays ne sont donc pas justifiées au Canada. Seule la dette à long terme a augmenté, mais cette évolution est sans rapport avec celle observée aux États-Unis

La seconde partie de l'étude porte sur les relations entre les choix de financement et les conditions économiques et de marché. Ces choix sont mesurés par les proportions des besoins de fonds totaux (incluant l'amortissement et les dividendes) financés par chacune des sources de financement. En moyenne et pour l'ensemble de la période, les fonds autogénérés ont permis de combler 61,2% des besoins de fonds des entreprises en croissance, alors que la dette à long terme a financé 20% des besoins. Les émissions d'actions ne constituent que 9,8% des fonds requis et les montants versés sous forme de dividendes dépassent largement ceux qui ont été prélevés lors des émissions d'actions. Ce faible recours aux émissions d'actions est aussi perceptible dans les autres pays industrialisés mais, ici encore, le phénomène est moins marqué qu'aux États-Unis, où les émissions nettes sont devenues négatives (en raison des rachats) suivant différents travaux publiés récemment. On note d'ailleurs, au Canada, une augmentation récente de la proportion du financement obtenue lors d'émissions d'actions (22,1 % des fonds requis en 1993). L'importance relative des divers modes de financement semble fortement liée aux conditions économiques. L'inflation et les niveaux du marché boursier ont des relations positives avec, respectivement, le recours à la dette et les émissions d'actions. En revanche, nous n'observons aucune relation entre les changements de la fiscalité et les comportements agrégés des entreprises. Par exemple, les changements fiscaux qui ont accru l'avantage à l'endettement des entreprises ne se sont pas traduits par une augmentation du recours à l'endettement. Le taux réel d'intérêt est lié négativement au recours à l'endettement à long terme, mais ne semble pas influencer l'endettement total. Finalement, les périodes de récession coïncident généralement avec le recours à l'endettement, vraisemblablement en raison de la faiblesse des fonds autogénérés. Les choix

financiers des entreprises canadiennes dépendent donc largement des conditions économiques et financières qui prévalent, mais semblent peu sensibles aux changements dans la fiscalité. Il existe cependant des variations importantes entre les comportements individuels des entreprises, qui font l'objet de la dernière partie de l'étude.

Quatre modèles sont utilisés pour expliquer le recours relatif à chacun des modes de financement au niveau des entreprises et plusieurs méthodes d'estimation sont employées pour un échantillon comportant 7833 observations annuelles, de 1963 à 1994. Les résultats sont généralement cohérents avec le comportement décrit dans la *Pecking Order Theory*. Les déterminants principaux des choix de financement sont la rentabilité et la croissance. L'autofinancement est d'autant plus important que la rentabilité est élevée et la croissance faible. La politique de dividende est perçue comme contraignante. Dans les modèles explicatifs de l'endettement, la variable liée à l'importance relative des crédits d'impôt non liés à l'endettement est affectée d'un signe négatif inverse à celui prévu par la théorie. Les entreprises les plus endettées sont également celles qui disposent des crédits d'impôt non liés à l'endettement. Ceci semble confirmer le rôle important joué par la rentabilité et par les garanties dans l'explication de l'endettement. Finalement, la taille est positivement associée au recours à l'endettement L'introduction des variables macro-économiques dans les modèles permet généralement de confirmer les relations observées au niveau agrégé. Toutefois, la mesure de gain fiscal associé à l'endettement est associée négativement et de façon significative au recours à la dette, ce qui est contraire aux prévisions. Pour expliquer ce phénomène, il est possible d'invoquer la coïncidence de certains des changements fiscaux avec des périodes de ralentissement économique et les changements dans la structure de propriété des entreprises.

En conclusion, nous n'observons pas de modification importante à long terme au niveau d'endettement des entreprises canadiennes. Leurs choix de financement sont essentiellement liés aux conditions économiques et aux marchés. Au niveau individuel, la croissance et la rentabilité sont les deux éléments d'explication fondamentaux des choix financiers et la fiscalité ne paraît pas modifier de façon significative les choix de financement. Ce travail présente cependant plusieurs limites, qui constituent autant de possibilités de recherche futures. La principale est sans doute l'absence de toute prise en considération de la structure de propriété des entreprises. Le type d'actionnaire semble influencer les choix financiers (Israel, 1992; Grier et Zychowitz, 1994) et le statut fiscal de ces actionnaires modifie l'avantage fiscal à l'endettement (Gagnon et al., 1987). Même si la détermination exacte de la structure de propriété est difficile lorsque les périodes d'analyse dépassent 30 ans, il conviendrait d'intégrer cette dimension aux divers modèles explicatifs. En second lieu, diverses caractéristiques sectorielles paraissent jouer un rôle dans la détermination des choix financiers. En particulier, la nature des éléments d'actif semble influencer les choix financiers (Balakrishnan et Fox, 1993; Chung, 1993; Williamson, 1988). Les données disponibles au Canada ne permettent cependant pas de mesurer de façon correcte le caractère

plus ou moins spécifique de ces éléments d'actif en raison surtout de l'absence de données relatives aux activités de recherche et développement. En raison de la longue période d'étude, des difficultés d'accès à des données valables et des changements relativement importants qui sont survenus dans la structure de propriété des entreprises canadiennes au cours des trois décennies étudiées, ce travail a été laissé pour des études antérieures. Le risque d'opération a également été négligé, puisqu'il pose d'importants problèmes de mesure (Chung, 1993).

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Figure 1: Évolution de l'endettement des grandes entreprises canadiennes, de 1960 à 1994. Il s'agit des moyennes des distributions (pour un échantillon de composition variable, tiré des bases du *Financial Post* et *Compustat*) des ratios suivants: Endettement à long terme = Dette à long terme (incluant la portion échéant dans l'année) rapportée à la valeur comptable de l'actif; Endettement total = Passif à court terme + Dette à long terme rapportée à la valeur comptable de l'actif; Endettement total à la valeur marchande = Passif à court terme + Dette à long terme rapportée à la valeur de l'actif - valeur comptable des fonds propres + valeur au marché des fonds propres; Endettement corrigé: ratio de la dette totale diminuée des liquidités et des placements à court terme rapportée à la valeur comptable de l'actif. La moyenne mobile est calculée à l'aide des 6 derniers termes de la série des ratios moyens d'endettement total à la valeur marchande.

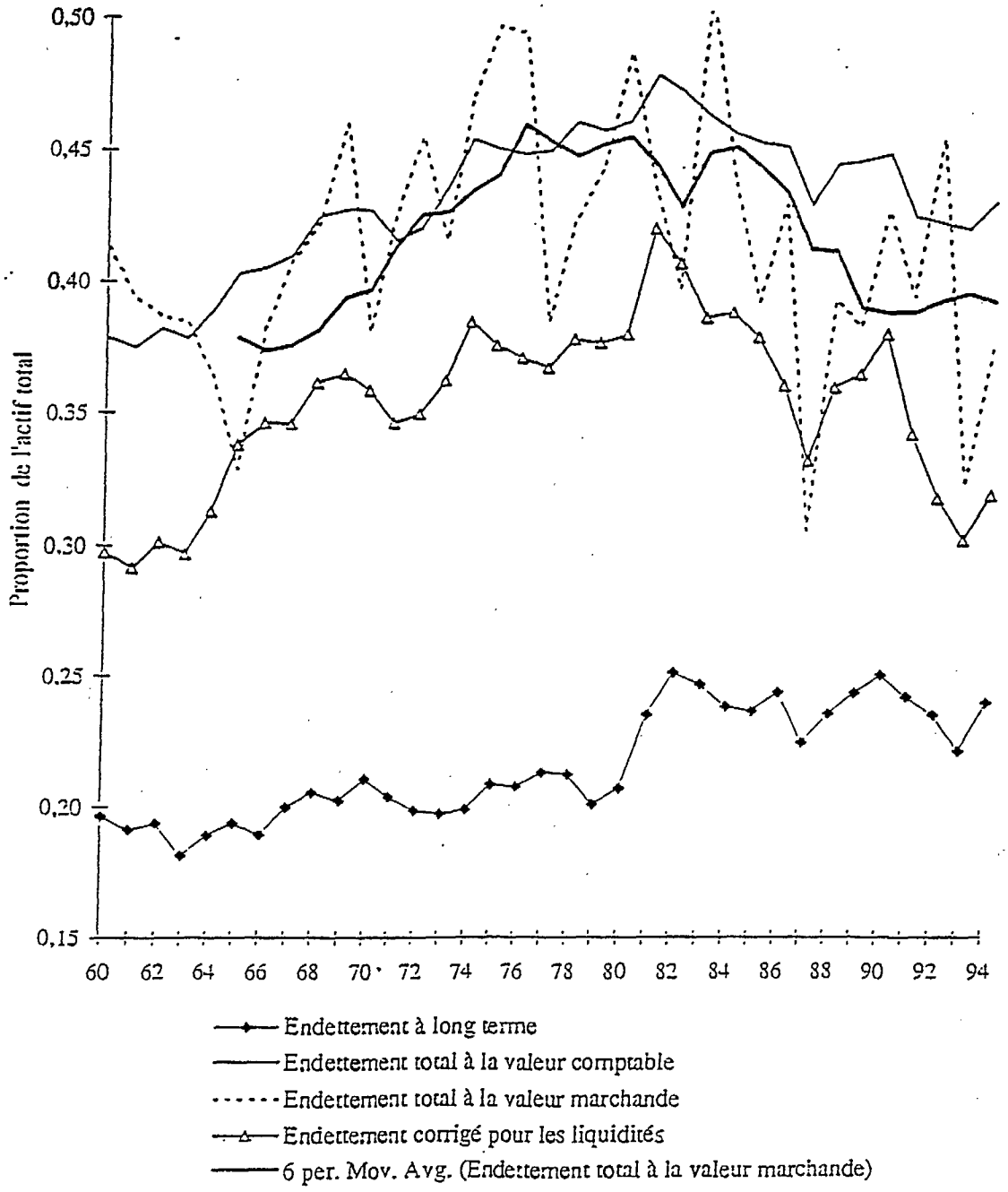

Tableau 1: Ratios d'endettement moyens, par année, pour l'ensemble des grandes entreprises canadiennes de l'échantillon. L'échantillon est composé va de 222 observations en 1960à 465 observations en 1994.

Année	Dette à long terme à l'actif évalué suivant la valeur comptable	Dette totale à l'actif évalué suivant la valeur comptable	Dette totale à l'actif évalué suivant la quasi-valeur marchande	Dette totale ajustée pour les liquidités à l'actif évalué suivant la valeur comptable
1960	0,1965	0,3789	0,4125	0,2975
1961	0,1913	0,3749	0,3941	0,2915
1962	0,1939	0,3824	0,3872	0,3013
1963	0,1821	0,3785	0,3849	0,2968
1964	0,1894	0,3892	0,3641	0,3126
1965	0,1941	0,4028	0,3288	0,3378
1966	0,1897	0,4051	0,3828	0,3460
1967	0,1998	0,4095	0,4077	0,3457
1968	0,2053	0,4240	0,4212	0,3612
1969	0,2022	0,4269	0,4594	0,3648
1970	0,2104	0,4263	0,3808	0,3582
1971	0,2037	0,4150	0,4251	0,3459
1972	0,1987	0,4197	0,4542	0,3494
1973	0,1975	0,4351	0,4150	0,3621
1974	0,1992	0,4537	0,4701	0,3847
1975	0,2086	0,4500	0,4965	0,3755
1976	0,2075	0,4480	0,4941	0,3706
1977	0,2129	0,4493	0,3847	0,3667
1978	0,2122	0,4601	0,4231	0,3778
1979	0,2009	0,4569	0,4417	0,3764
1980	0,2069	0,4602	0,4861	0,3796
1981	0,2351	0,4780	0,4338	0,4195
1982	0,2512	0,4717	0,3970	0,4066
1983	0,2467	0,4626	0,5093	0,3863
1984	0,2383	0,4559	0,4374	0,3882
1985	0,2367	0,4523	0,3927	0,3786
1986	0,2438	0,4506	0,4280	0,3600
1987	0,2244	0,4284	0,3057	0,3316
1988	0,2356	0,4439	0,3926	0,3595
1989	0,2435	0,4452	0,3828	0,3644
1990	0,2502	0,4479	0,4259	0,3798
1991	0,2418	0,4238	0,3940	0,3415
1992	0,2350	0,4214	0,4537	0,3172
1993	0,2209	0,4191	0,3217	0,3016
1994	0,2395	0,4294	0,3738	0,3183

Tableau 2: Inflation et fonds requis pour leur croissance par les grandes entreprises canadiennes, de 1960 à 1994. Les fonds requis sont l'augmentation de la valeur brute de l'actif plus les dividendes versés, pour les entreprises pour lesquelles les données sont disponibles au cours de deux années consécutives. Ils sont exprimés en pourcentage de l'actif brut de début de période. L'actif brut est égal à l'actif présenté aux états financiers augmenté de l'amortissement accumulé

		Ensemble des observations		Entreprises en croissance		Entreprises en décroissance	
Année	Taux d'inflation	Obs	Taux de croissance	Obs	Taux de croissance	Obs.	Taux de croissance
1960	1,02	222	na	197	na	25	na
1961	1,01	238	13,4	229	13,7	9	-6,1
1962	1,00	245	14,1	231	14,5	14	-5,0
1963	1,98	270	14,8	258	15,3	22	-5,0
1964	1,94	288	15,2	271	15,6	17	-5,2
1965	2,38	300	16,8	293	17,0	7	-2,6
1966	3,72	309	17,5	299	17,8	10	-8,7
1967	3,58	319	16,3	292	17,0	27	-5,3
1968	3,89	336	15,7	316	16,4	20	-8,2
1969	4,58	344	16,3	321	16,7	23	-7,3
1970	3,18	351	16,3	312	17,1	39	-7,7
1971	3,09	403	15,5	360	16,2	43	-5,7
1972	4,87	408	14,6	385	15,0	23	-3,7
1973	7,50	419	18,4	402	18,6	17	-7,3
1974	10,96	415	17,5	388	22,1	27	-4,1
1975	10,77	414	17,2	366	17,8	48	-6,6
1976	7,29	419	14,9	379	15,6	40	-14,3
1977	8,06	410	19,0	374	19,8	36	-6,8
1978	8,85	397	20,9	375	21,7	22	-11,9
1979	9,20	392	21,9	379	22,2	13	-21,2
1980	10,19	388	24,1	367	24,4	21	-13,4
1981	12,45	385	24,2	356	26,5	29	-22,2
1982	10,75	387	12,7	287	16,1	100	-9,1
1983	5,86	385	10,9	314	14,2	71	-15,8
1984	4,32	384	15,7	340	17,6	44	-19,8
1985	4,01	375	16,4	316	18,5	59	-9,5
1986	4,10	362	10,8	274	16,7	88	-12,1
1987	4,42	335	17,5	289	19,9	46	-11,2
1988	4,00	318	17,1	273	19,4	45	-12,4
1989	5,06	303	16,8	250	20,9	53	-14,3
1990	4,71	281	11,3	216	13,8	65	-13,2
1991	5,60	429	8,0	302	11,4	127	-9,4
1992	1,51	450	8,3	349	11,3	101	-9,8
1993	1,86	465	6,3	373	14,1	92	-16,1
1994	0,18	232	15,8	211	16,9	21	-73,0
Moyenne	5,2		15,7		17,4		-11,9

Figure 2: Choix agrégés de financement des grandes entreprises canadiennes, de 1960 à 1994. Pour chacune des années, le montant total obtenu de chacune des sources de fonds a été rapporté au total des besoins de fonds à court et long terme, incluant les dividendes versés. L'échantillon est composé de l'ensemble des observations disponibles sur les bases *Financial Post et Compustat*.

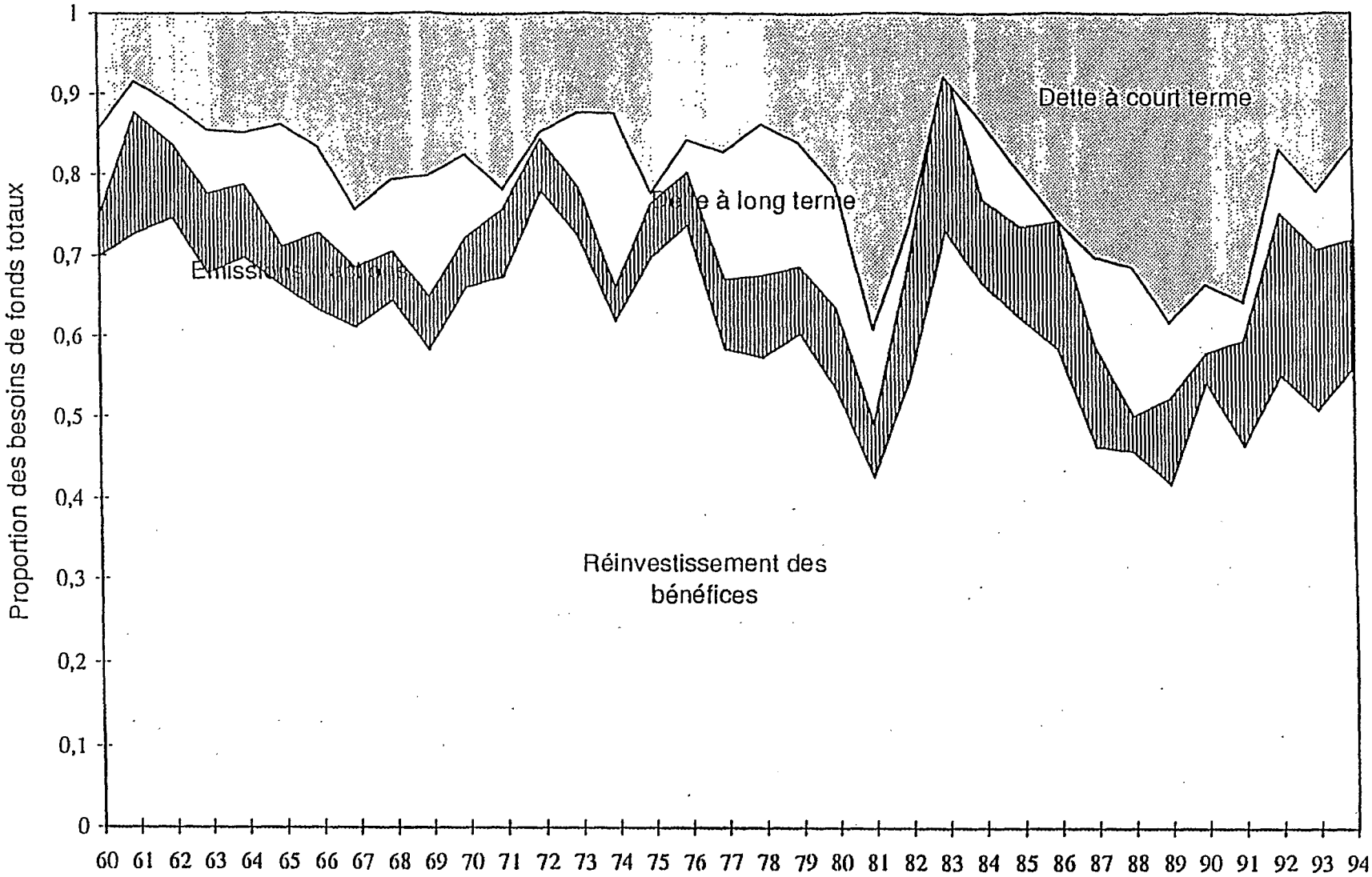

Tableau 3: Proportion des fonds requis par la croissance financée par chacun des modes de financement, pour l'ensemble des entreprises canadiennes de l'échantillon, de 1960 à 1994.

Année	Proportion des besoins de fonds totaux comblée par						Total	Nombre d'observations
	Dette à court terme	Dette à long terme	Fonds autogénérés		Émissions d'actions ordinaires	Émissions d'actions privilégiées		
			Réinvestis	Distribués				
1960	0,100	0,136	0,513	0,204	0,036	0,011	1	222
1961	0,029	0,087	0,526	0,207	0,140	0,010	1	238
1962	0,041	0,109	0,555	0,201	0,082	0,012	1	245
1963	0,067	0,115	0,527	0,192	0,078	0,021	1	270
1964	0,048	0,147	0,523	0,192	0,091	-0,002	1	288
1965	0,150	0,136	0,484	0,181	0,035	0,014	1	300
1966	0,105	0,163	0,465	0,171	0,073	0,022	1	309
1967	0,056	0,247	0,443	0,179	0,047	0,028	1	319
1968	0,082	0,196	0,491	0,168	0,047	0,016	1	336
1969	0,140	0,202	0,442	0,154	0,051	0,011	1	344
1970	0,092	0,173	0,491	0,181	0,043	0,020	1	351
1971	0,010	0,221	0,514	0,172	0,060	0,023	1	403
1972	0,005	0,142	0,614	0,172	0,052	0,015	1	408
1973	0,088	0,121	0,596	0,136	0,057	0,002	1	419
1974	0,258	0,053	0,551	0,154	-0,019	0,003	1	415
1975	-0,009	0,226	0,564	0,154	0,051	0,014	1	414
1976	0,029	0,155	0,580	0,171	0,036	0,029	1	419
1977	0,145	0,171	0,460	0,136	0,032	0,055	1	410
1978	0,179	0,132	0,460	0,124	0,062	0,043	1	397
1979	0,148	0,159	0,488	0,122	0,061	0,023	1	392
1980	0,147	0,214	0,436	0,101	0,056	0,046	1	388
1981	0,094	0,415	0,334	0,090	0,047	0,020	1	385
1982	0,019	0,250	0,408	0,157	0,112	0,053	1	387
1983	-0,073	0,033	0,605	0,180	0,231	0,024	1	385
1984	0,092	0,061	0,590	0,136	0,095	0,026	1	384
1985	0,055	0,166	0,525	0,131	0,096	0,027	1	375
1986	-0,128	0,230	0,505	0,197	0,154	0,042	1	362
1987	0,096	0,277	0,418	0,083	0,144	-0,019	1	335
1988	0,172	0,288	0,369	0,126	0,074	-0,029	1	318
1989	0,068	0,420	0,340	0,092	0,067	0,012	1	303
1990	0,058	0,334	0,433	0,135	0,049	-0,009	1	281
1991	-0,123	0,470	0,282	0,194	0,194	-0,018	1	410
1992	0,094	0,103	0,416	0,158	0,248	-0,019	1	431
1993	-0,072	-0,247	0,712	0,230	0,431	-0,054	1	448
1994	0,077	0,159	0,508	0,088	0,169	-0,001	1	226
Moyenne	0,067	0,179	0,491	0,156	0,094	0,013	1	352

Tableau 4: Proportion des fonds requis par la croissance financée par chacun des modes de financement, pour l'ensemble des entreprises canadiennes en croissance, de 1960 à 1994.

Année	Proportion des besoins de fonds totaux comblée par						Total	Nombre d'observations
	Dette à court terme	Dette à long terme	Fonds autogénérés		Émissions d'actions ordinaires	Émissions d'actions privilégiées		
			Réinvestis	Distribués				
1960	0,109	0,144	0,502	0,198	0,036	0,011	1	197
1961	0,039	0,084	0,523	0,205	0,139	0,010	1	229
1962	0,049	0,112	0,547	0,199	0,081	0,012	1	231
1963	0,081	0,144	0,491	0,187	0,076	0,021	1	249
1964	0,066	0,147	0,512	0,187	0,090	-0,002	1	271
1965	0,152	0,138	0,482	0,181	0,034	0,014	1	293
1966	0,107	0,165	0,465	0,168	0,073	0,022	1	299
1967	0,069	0,245	0,438	0,174	0,046	0,028	1	292
1968	0,088	0,207	0,482	0,163	0,044	0,016	1	316
1969	0,150	0,202	0,431	0,153	0,054	0,011	1	321
1970	0,103	0,174	0,484	0,176	0,043	0,019	1	312
1971	0,026	0,218	0,506	0,168	0,058	0,023	1	360
1972	0,009	0,147	0,608	0,170	0,051	0,015	1	385
1973	0,094	0,124	0,589	0,135	0,056	0,003	1	402
1974	0,216	0,124	0,498	0,121	0,024	0,017	1	388
1975	0,013	0,224	0,549	0,150	0,050	0,014	1	366
1976	0,042	0,157	0,572	0,165	0,036	0,028	1	379
1977	0,158	0,172	0,450	0,134	0,030	0,056	1	374
1978	0,187	0,138	0,451	0,122	0,060	0,042	1	375
1979	0,153	0,160	0,482	0,121	0,061	0,022	1	379
1980	0,151	0,214	0,433	0,100	0,055	0,046	1	367
1981	0,119	0,392	0,341	0,085	0,044	0,020	1	356
1982	0,042	0,264	0,413	0,135	0,101	0,046	1	287
1983	-0,020	0,079	0,580	0,151	0,193	0,017	1	314
1984	0,098	0,134	0,539	0,126	0,079	0,024	1	340
1985	0,067	0,199	0,502	0,120	0,086	0,026	1	316
1986	0,001	0,259	0,439	0,144	0,131	0,027	1	274
1987	0,112	0,302	0,386	0,077	0,138	-0,015	1	289
1988	0,186	0,314	0,341	0,116	0,068	-0,025	1	273
1989	0,095	0,383	0,338	0,079	0,088	0,017	1	250
1990	0,086	0,337	0,430	0,112	0,043	-0,007	1	216
1991	0,049	0,358	0,323	0,141	0,128	0,001	1	289
1992	0,080	0,168	0,429	0,122	0,194	0,006	1	335
1993	0,070	0,223	0,406	0,102	0,221	-0,021	1	366
1994	0,116	0,165	0,478	0,084	0,160	-0,001	1	206
Moyenne	0,090	0,200	0,470	0,142	0,082	0,016	1	311

Tableau 5: Proportion de la diminution des fonds supportée par chacun des modes de financement, pour l'ensemble des entreprises canadiennes en décroissance, de 1960 à 1994.

Année	Proportion des besoins de fonds totaux comblée par						Total	Nombre d'observations
	Dette à court terme	Dette à long terme	Fonds autogénérés		Émissions d'actions ordinaires	Émissions d'actions privilégiées		
			Réinvestis	Distribués				
1960	1,715	1,626	-1,447	-0,929	-0,007	0,042	1	25
1961	1,133	-0,356	0,237	-0,056	0,038	0,004	1	9
1962	1,124	0,686	-0,723	-0,053	-0,006	-0,028	1	14
1963	1,578	3,245	-3,321	-0,322	-0,188	0,007	1	21
1964	2,568	0,111	-1,067	-0,603	-0,012	0,002	1	17
1965	0,948	1,218	-1,006	-0,098	-0,063	0,001	1	7
1966	0,395	0,415	0,417	-0,272	-0,001	0,046	1	10
1967	1,475	0,021	-0,046	-0,373	-0,113	0,036	1	27
1968	0,477	0,919	-0,101	-0,169	-0,151	0,025	1	20
1969	1,503	0,200	-1,078	-0,083	0,391	0,067	1	23
1970	0,841	0,234	-0,016	-0,129	0,058	0,012	1	39
1971	1,234	0,043	-0,110	-0,096	-0,079	0,009	1	43
1972	0,646	1,119	-0,539	-0,214	-0,015	0,003	1	23
1973	1,831	0,883	-1,562	-0,126	-0,384	0,358	1	17
1974	0,050	0,405	0,286	-0,008	0,196	0,070	1	27
1975	2,498	-0,023	-1,111	-0,344	-0,033	0,012	1	48
1976	0,596	0,246	0,170	-0,079	0,070	-0,004	1	40
1977	1,396	0,246	-0,483	-0,115	-0,177	0,133	1	36
1978	0,765	0,518	-0,202	-0,015	-0,055	-0,012	1	22
1979	1,073	0,462	-0,467	-0,049	0,032	-0,052	1	13
1980	1,368	0,316	-0,465	-0,173	-0,048	0,002	1	21
1981	0,681	-0,139	0,502	-0,044	-0,023	0,024	1	29
1982	0,271	0,402	0,465	-0,091	-0,020	-0,027	1	100
1983	0,309	0,361	0,424	-0,030	-0,039	-0,025	1	71
1984	0,180	1,238	-0,224	-0,031	-0,158	-0,005	1	44
1985	0,330	0,929	-0,001	-0,131	-0,124	-0,003	1	59
1986	0,558	0,381	0,155	-0,086	0,030	-0,039	1	88
1987	0,425	0,807	-0,250	-0,051	0,010	0,058	1	46
1988	0,465	0,820	-0,209	-0,070	-0,052	0,046	1	45
1989	0,365	0,004	0,318	-0,052	0,297	0,068	1	53
1990	0,343	0,360	0,403	-0,104	-0,013	0,012	1	65
1991	0,958	-0,234	0,540	-0,141	-0,223	0,101	1	121
1992	-0,012	0,611	0,520	-0,123	-0,173	0,176	1	96
1993	0,276	0,907	-0,039	-0,085	-0,085	0,025	1	82
1994	1,958	0,477	-1,016	-0,132	-0,276	-0,008	1	20
Moyenne	0,923	0,556	-0,316	-0,156	-0,040	0,032	1	41

Figure 3: Évolution des paramètres fiscaux et du recours au financement par dette des entreprises canadiennes en croissance, de 1960 à 1994. Le calcul de la valeur G de Miller est exposé à l'annexe 1. Le taux d'impôt corporatif est celui applicable à une société ontarienne. La proportion des fonds requis financée par dette totale est donnée par le rapport de l'augmentation annuelle du passif à court terme et de la dette à long terme, pour l'ensemble des entreprises, à l'accroissement brut de l'actif augmenté des dividendes pour l'année correspondante. Le calcul est le même pour la dette à long terme, mais la variation de la dette à long terme apparaît seule au numérateur.

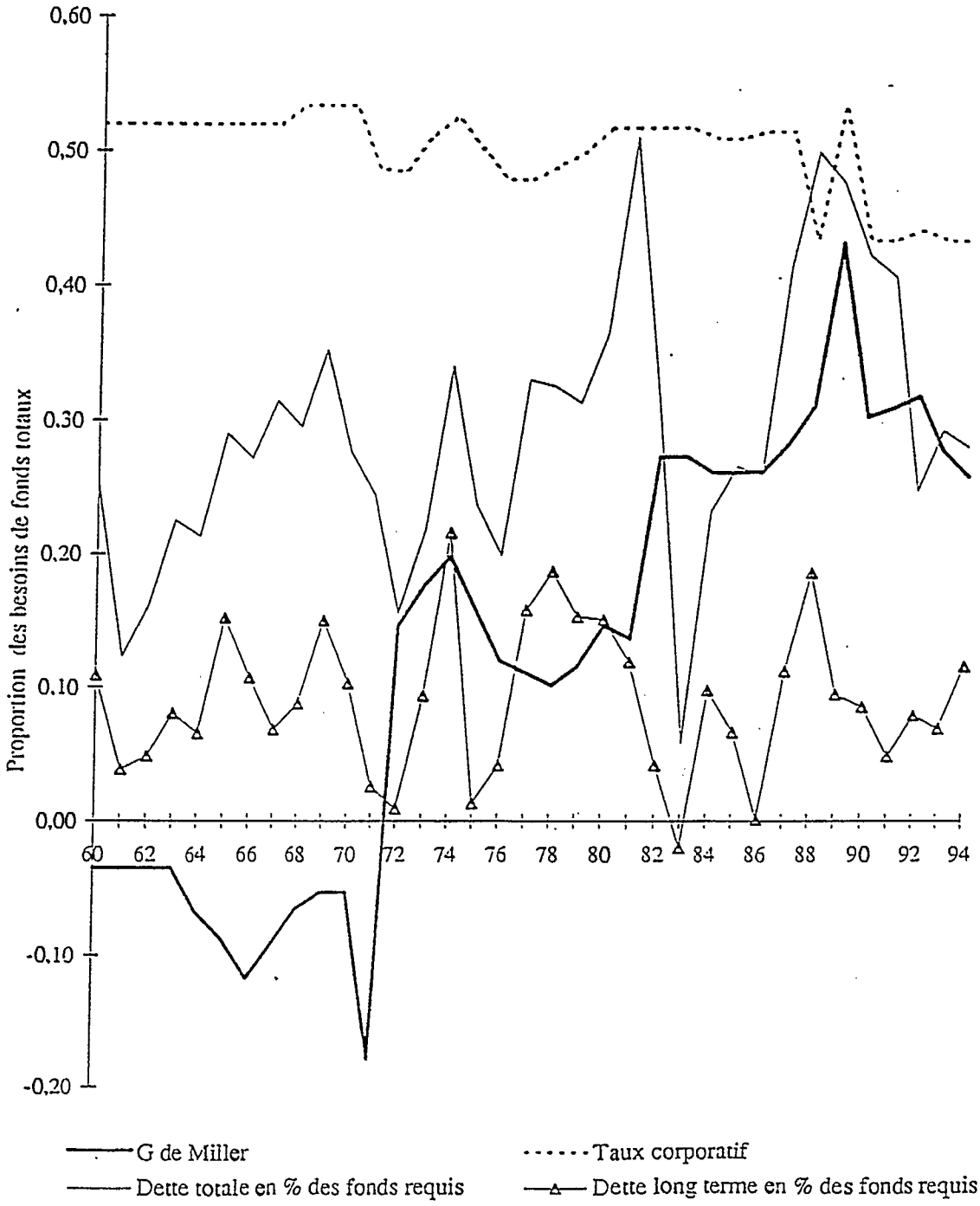

Figure 4: Évolution de l'inflation et du recours au financement par dette des entreprises canadiennes en croissance, de 1960 à 1994. Le taux annuel d'inflation est tiré de la Revue de la Banque du Canada.

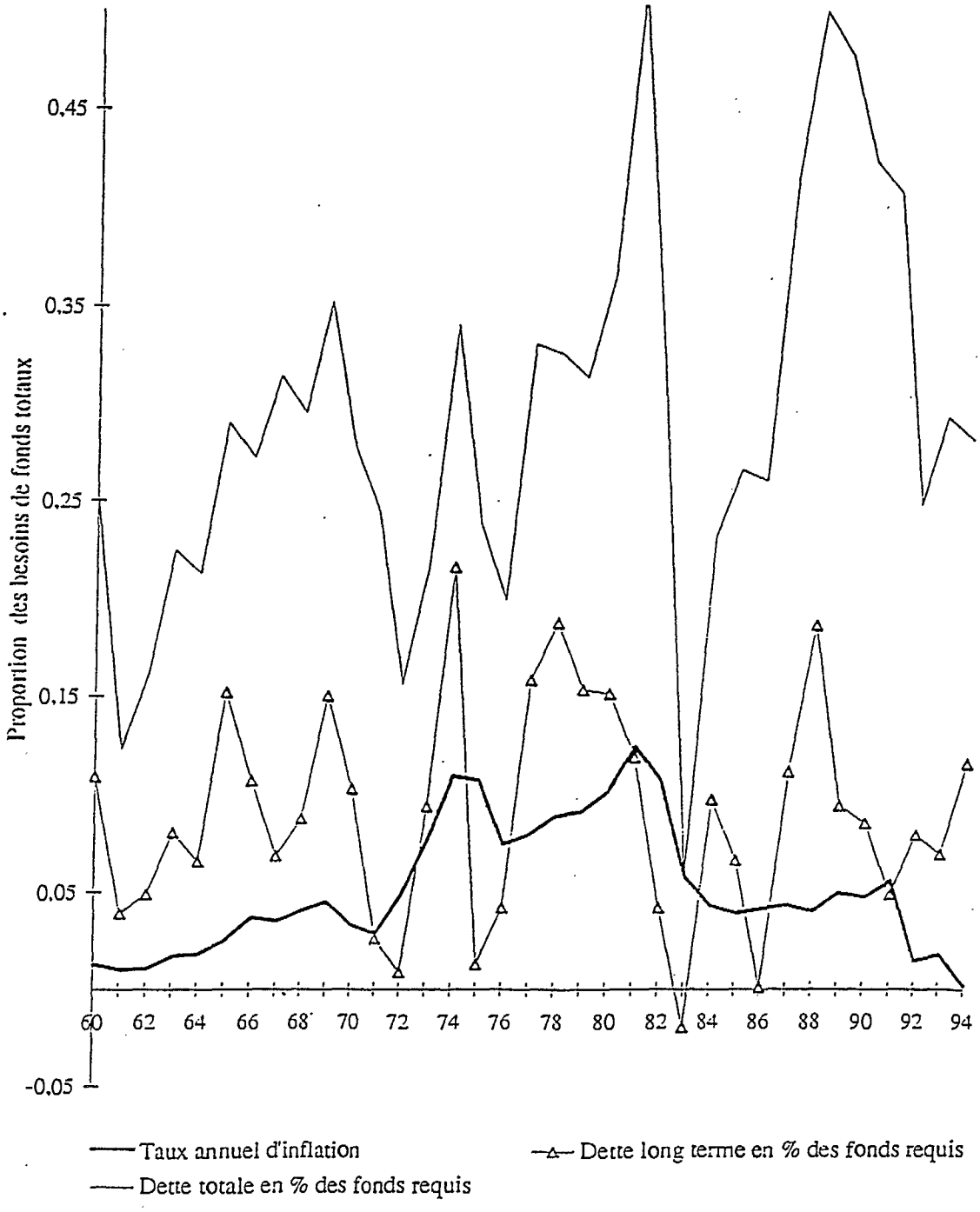

Figure 5: Évolution du ratio cours/bénéfice moyen et du recours au financement par émissions d'actions des entreprises canadiennes en croissance, de 1960 à 1994. Le ratio cours/bénéfice moyen est la moyenne arithmétique des ratios des entreprises de l'échantillon, calculés à partir des bénéfices annuels et des prix de fin d'exercice. La proportion des fonds requis financée par émission d'actions est donnée par le rapport de l'augmentation annuelle du capital-actions ordinaire et privilégié, pour l'ensemble des entreprises, à l'accroissement brut de l'actif augmenté des dividendes pour l'année correspondante.

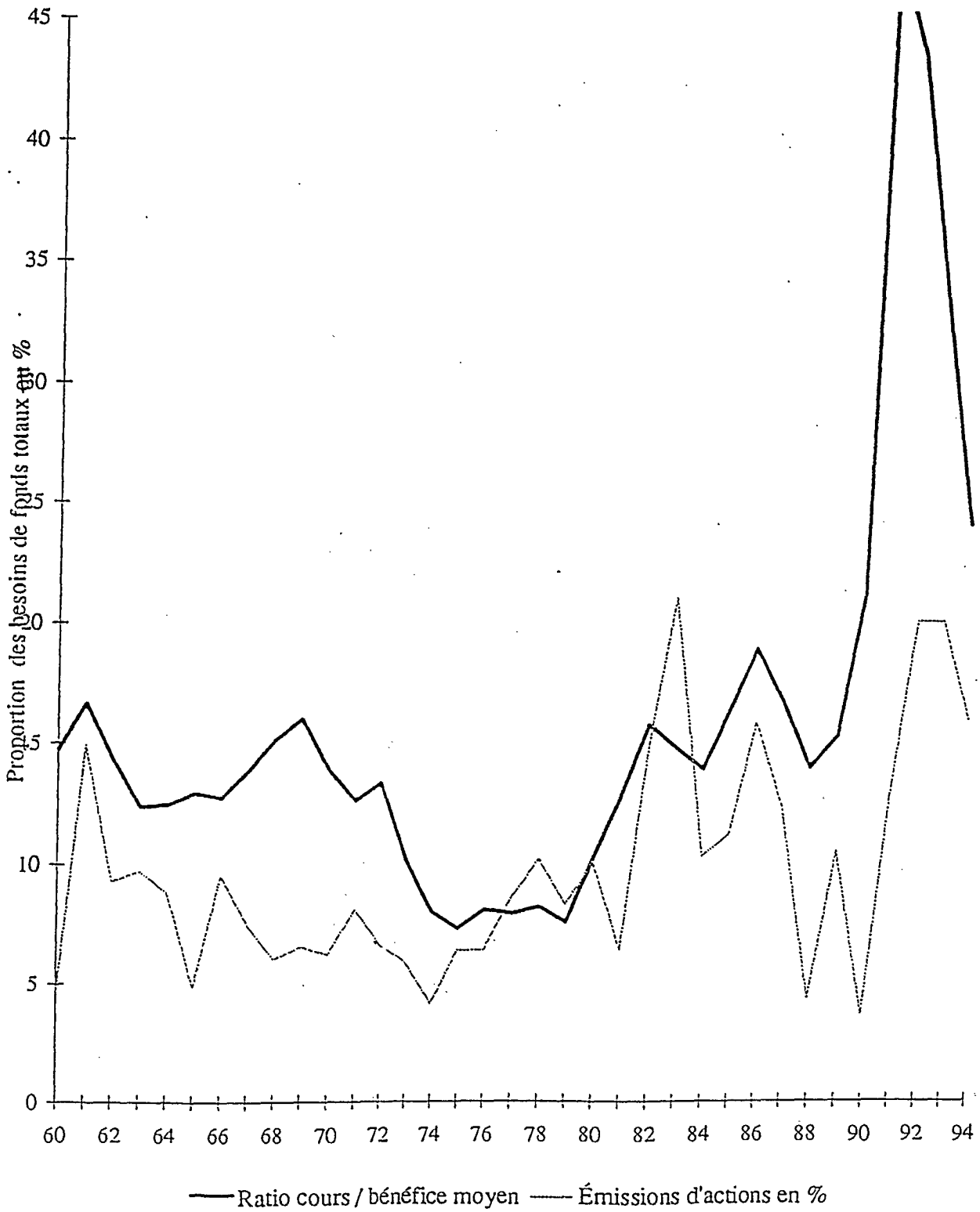

Figure 6: Évolution du taux d'intérêt réel à long terme et du recours au financement par dette totale et par dette à long terme des entreprises canadiennes en croissance, de 1960 à 1994. Le taux d'intérêt réel est donné par: $r = ((1 + r_o) / (1 + i) - 1)$ où r_o est le taux promis sur les obligations à long terme et i le taux d'inflation de l'année. Le taux promis pour une année donnée est la moyenne des taux promis à la fin de chacun des mois, rapportés par *Scotia-McLeod* pour les obligations industrielles. La proportion des fonds requis financée par dette totale est donnée par le rapport de l'augmentation annuelle du passif à court terme et de la dette à long terme, pour l'ensemble des entreprises, à l'acroissement brut de l'actif augmenté des dividendes pour l'année correspondante. Le calcul est le même pour la dette à long terme, mais la variation de la dette à long terme apparaît seule au numérateur.

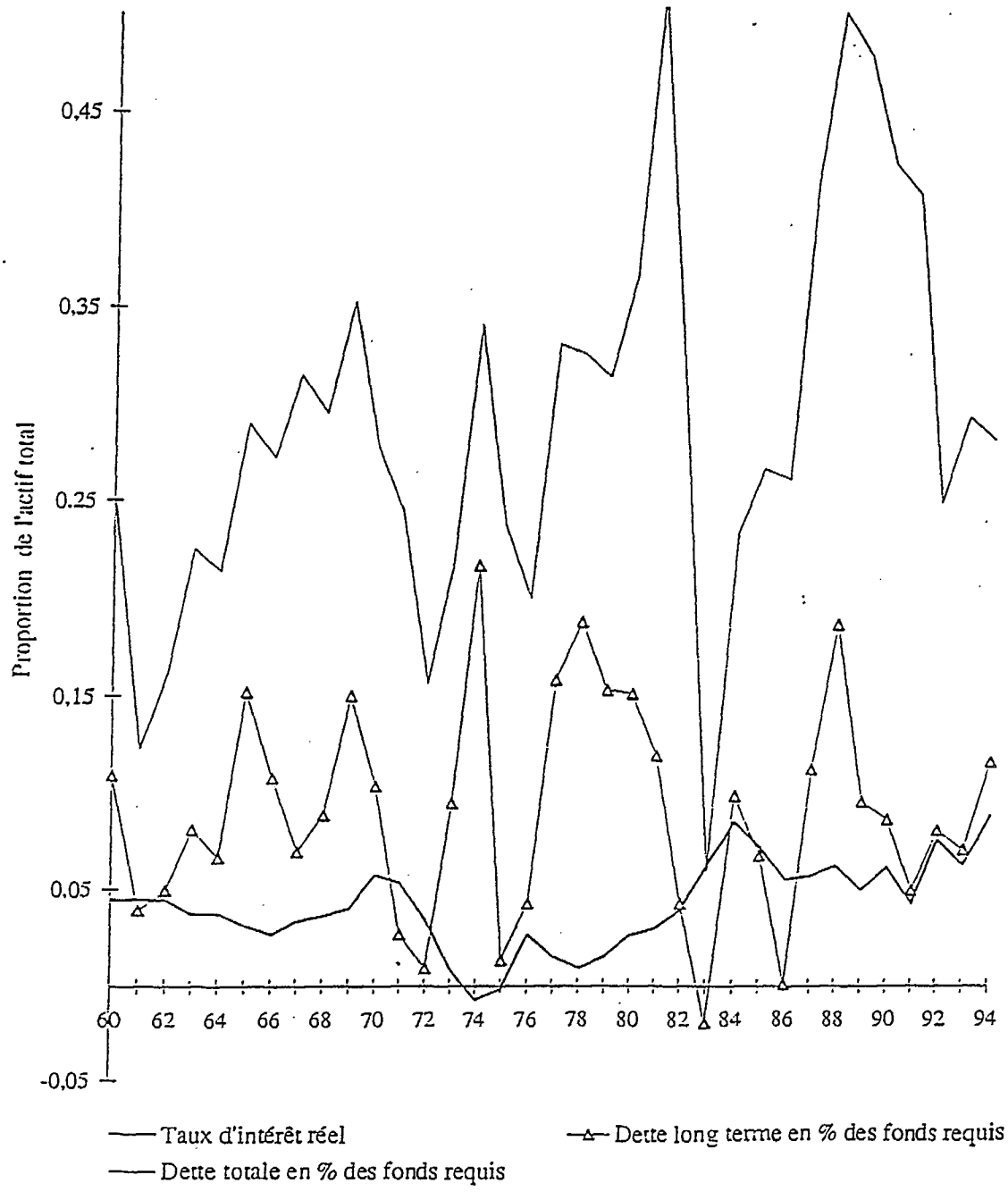

Figure 7: Évolution du taux de croissance de la production industrielle et du recours au financement par dette totale et par dette à long terme des entreprises canadiennes en croissance, de 1960 à 1994. Le taux de croissance est calculé à partir des valeurs successives de l'indice de production, sans ajustement pour l'inflation.La proportion des fonds requis financée par dette totale est donnée par le rapport de l'augmentation annuelle du passif à court terme et de la dette à long terme, pour l'ensemble des entreprises, à l'accroissement brut de l'actif augmenté des dividendes pour l'année correspondante. Le calcul est le même pour la dette à long terme, mais la variation de la dette à long terme apparaît seule au numérateur.

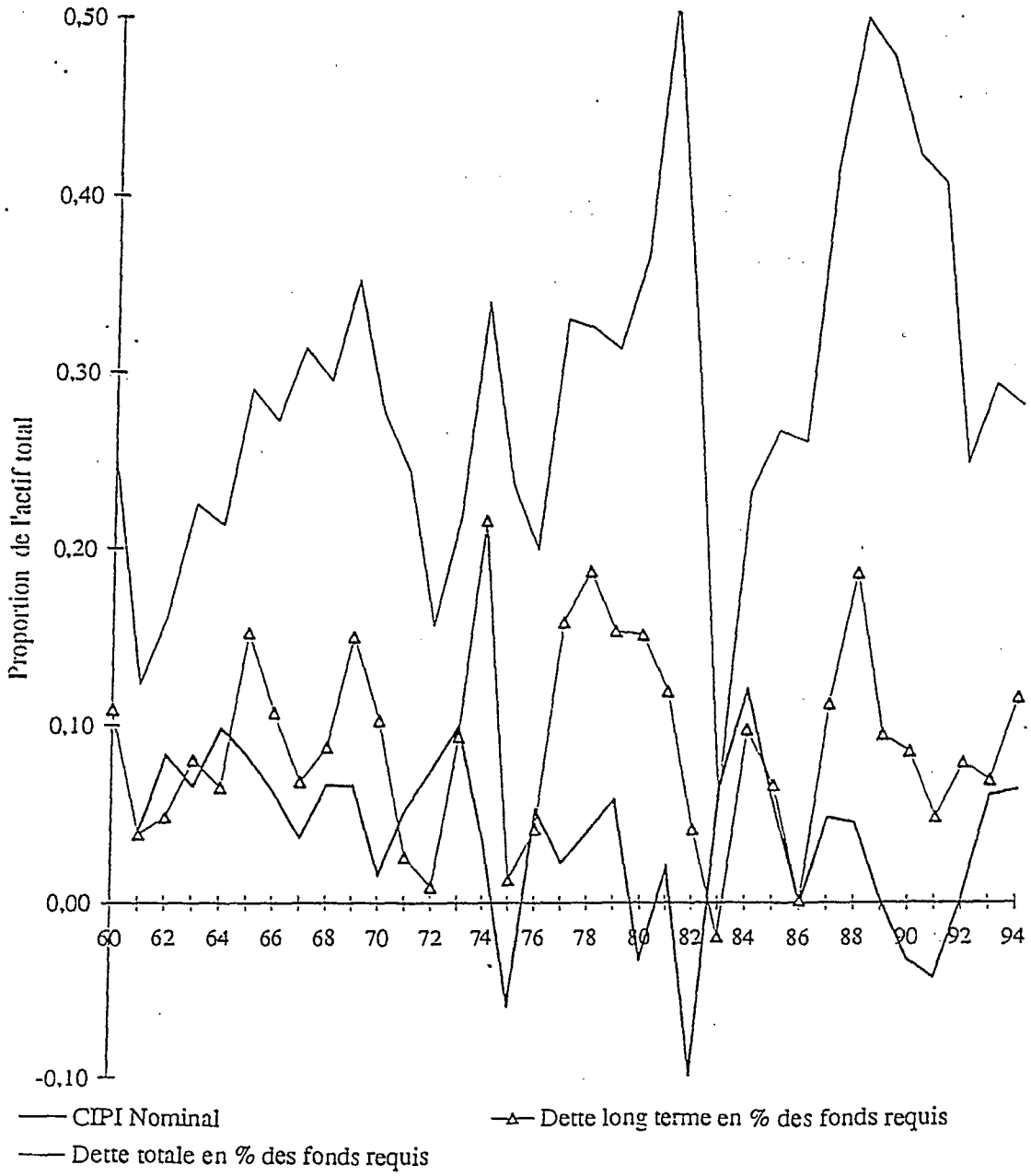

Tableau 7: Principales caractéristiques des distributions des variables qui apparaissent dans les modèles explicatifs des choix de financement. L'échantillon comporte 7833 observations annuelles de 1963 à 1994.

Variables expliquées	Moyenne	Écart-type	Max.	Min.	Médiane
Autofinancement en % des besoins de fonds totaux (*Δ AUTO*)	0,743	1,056	7,610	-2,37	0,520
Financement par dette totale, en % des fonds requis (*Δ DTOT*)	-0,039	1,356	2,450	-12,88	0,266
Financement par dette à long terme, en % des fonds requis (*Δ DTOT*)	0,053	0,623	3,57	-4,30	0,001
Financement par émission d'actions en % des fonds requis (*ΔCAPA*)	0,109	0,521	10,734	-8,583	0,000
Ratio de distribution (DIV)	0,173	0,270	1,790	0,000	0,093
Variables explicatives					
Taux de rendement moyen de l'actif (*RENT*)	0,134	0,388	19,200	-0,290	0,108
Taux de croissance moyen de l'actif brut (*CROIS*)	0,162	0,193	2,267	-0,445	0,116
Distribution des dividendes, en % des fonds requis (*DIST*)	0,286	0,426	4,200	0,000	0,185
Capitalisation boursière relative à celle du marché (*TAILLER*)	1,102	2,001	26,548	0,005	0,354
Ratio Bénéfice/cours relatif au marché et à sa valeur historique (*EPRR*)	1,031	0,566	3,000	0,000	0,990
Proportion des fonds requis pour les immobilisations (AI)	0,273	0,581	1,450	-5,610	0,331

Tableau 8 Coefficients et tests statistiques des estimations en deux étapes et en *pooling* des différents modèles explicatifs des choix de financement par les fonds propres.

	M1: Autofinancement			M3: Emission d'actions		
	2 étapes	*Pooling*	*Pooling macro*	*2étapes*	*Pooling*	*Pooling macro*
Variables spécifiques						
Ordon.	0.730	0.696	0.624	0.112	0.112	0.186
	(13.52)*	(24.20)*	(7.53)*	(4.07)*	(7.15)*	(4.10)*
CROIS	-0.884	-0.831	-0.837	0.392	0.395	0.383
	(-8.89)*	(-12.94)*	(-12.96)*	(7.33)*	(11.56)*	(11.17)*
RENT	1.122	1.285	1.344	-0.325	-0.578	-0.469
	(5.23)*	(9.71)*	(9.93)*	(-1.32)	(-7.95)*	(-6.33)*
DIST	-0.493	-0.472	-0.476	-0.001	0.002	-0.007
	(-13.59)*	(-17.79)*	(-17.77)*	(-0.09)	(0.14)	(-0.53)
BP	-0.850	-0.803	-0.811	0.248	0.298	0.292
	(-12.08)*	(-13.44)*	(-13.56)*	(3.41)*	(9.09)*	(8.19)*
EPRR	0.323	0.345	0.343	-0.012	-0.005	-0.008
	(11.45)*	(18.50)*	(18.38)*	(-0.83)	(-0.58)	(-0.83)
AI	-0.627	-0.629	-0.630			
	(-9.51)*	(-33.34)*	(-33.36)*			
Variables macroéconomiques						
CIPI			-0.008			-0.002
			(-3.22)*			(-1.77)
INF			-0.027			-0.008
			(-3.32)*			(-1.76)
OBL			0.020			0.007
			(2.64)*			(1.68)
EPM			0.848			-1.067
			(1.27)			(-2.92)*
R2		0.220	0.222		0.031	0.039
F		369.519	224.68		51.586	36.64

Tableau 9 Coefficients et tests statistiques des estimations en deux étapes et en *pooling* des différents modèles explicatifs des choix de financement liés à l'endettement.

	M2a: Dette à long terme			M2b: Dette totale		
	2 étapes	*Pooling*	*Pooling macro*	*2 étapes*	*Pooling*	*Pooling macro*
Variables spécifiques						
Ordon.	-0.0011	0.0353	0.009	-0.046	-0.058	-0.176
	(-0.02)	(1.67)	(0.24)	(-0.54)	(-1.28)	(-2.02)*
CROIS	0.486	0.436	0.430	0.693	0.548	0.566
	(8.34)*	(11.18)*	(11.01)*	(4.44)*	(6.48)*	(6.70)*
RENT	-0.532	-0.595	-0.653	-1.410	-1.195	-1.385
	(-4.15)*	(-7.11)*	(-7.73)*	(-4.87)*	(-6.59)*	(-7.57)*
DIST	0.131	0.112	0.11	0.309	0.288	0.301
	(5.92)*	(7.00)*	(7.21)*	(9.68)*	(8.29)*	(8.64)*
BP	0.235	0.214	0.22	0.507	0.392	0.413
	(3.67)*	(5.94)*	(6.11)*	(5.46)*	(5.02)*	(5.29)*
RDF	-0.006	-0.006	0.000	0.114	0.137	0.167
	(-0.24)	(-0.35)	(0.02)	(2.58)*	(3.49)*	(4.25)*
EPRR	-0.114	-0.132	-0.12	-0.301	-0.323	-0.314
	(-8.13)*	(-11.60)*	(-11.18)*	(-8.96)*	(-13.1)*	(-12.74)*
AI	0.404	0.408	0.404	0.853	0.925	0.921
	(18.05)*	(35.95)*	(35.71)*	(9.92)*	(37.56)*	(37.55)*
TAILLE	0.009	0.008	0.008	0.005	0.006	0.009
	(3.05)*	(2.57)*	(2.79)*	(1.06)	(0.93)	(1.37)
Variables macroéconomiques						
CIPI			-0.002			0.015
			(-1.72)			(4.50)*
INF			0.008			0.041
			(2.80)*			(6.73)*
OBL			0.000			-0.015
			(0.12)			(-1.72)
G			-0.149			-0.327
			(-2.79)*			(-2.82)*
R2		0.196	0.198		0.199	0.206
F		240.186	163		244.403	170.94

Annexe 1: Origine et mesure des paramètres fiscaux

Deux ensembles de paramètres fiscaux sont calculés. Les premiers concernent les gains liés à l'endettement, suivant la proposition de Miller (1977). Ils conduisent à l'estimation de variables valables pour l'ensemble des entreprises, dont la valeur fluctue au gré des changements fiscaux. Le second ensemble de paramètres renvoie à la notion de crédits non liés à l'endettement. (NDTS). Il s'agit de quantités spécifiques aux entreprises.

1) les crédits liés à l'endettement

En raison de la complexité du système fiscal canadien et des différences interprovinciales, plusieurs hypothèses simplificatrices ont été posées[1]. Le contribuable ontarien a été utilisé comme investisseur représentatif et les paramètres fiscaux ontariens ont été également appliqués aux entreprises.[2]

Les taux d'impôt sur le revenu des particuliers

Les taux d'impôt combiné (fédéral et provincial) est celui d'un résident de l'Ontario, imposé au taux le plus élevé, suivant Revenu Canada (statistiques fiscales, diverses années). Le calcul est compliqué par l'ajout des surtaxes, qui sont applicables par palier. Nous avons utilisé l'expression suivante:

$$t_p = (t_{pf} \times (1 + t_{pp})) \times (1 + s).$$

où tp, tpf, tpp et s sont respectivement le taux combiné du contribuable ontarien, le taux provincial exprimé en proportion du taux fédéral, le taux marginal maximal applicable au niveau fédéral et la surtaxe maximale. Avant 1971, les taux maximaux atteignaient 80% pour des contribuables dont les revenus imposables dépassaient 400 000$. Afin de ne pas introduire de distorsions, nous avons ajusté pour l'inflation, avant et après 1971, le revenu d'un contribuable dont le revenu imposable était de 100 000$ cette année là. Les taux d'impôt employés sont ceux qui auraient été applicables, au fil des ans, à ce revenu imposable après indexation.

L'imposition des dividendes

Notons

α = Facteur de crédit pour dividende, exprimé en % du dividende reçu (pour des fins de calcul)[3]

γ = Facteur de majoration, exprimé en % du dividende reçu

t_{pf} = Taux personnel fédéral

t_{pp} = Taux personnel provincial, exprimé en % du taux fédéral, pour le contribuable ontarien

t_p = Taux personnel combiné

t_{pd} = Taux personnel combiné sur les dividendes

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[1] L'analyse fine de la fiscalité et de ses impacts sur le comportement financier des entreprises canadiennes dépasse largement le cadre de l'étude présentée ici. Des études plus approfondies incluant diverses imperfections de marché ont été réalisées par Bartholdy et al. (1986). Voir également Davis (1994), Gagnon et Suret (1988), et Suret et Gagnon (1989) pour la relation entre la fiscalité et les politiques de dividendes.

[2] Davis (1994).

[3] Généralement, ce facteur est exprimé par rapport au dividende reçu. Pour l'exprimer par rapport à la majoration, il suffit de diviser ce facteur par (γ-1), où γ est le facteur de majoration.

Dn: = Dividende net
D = Dividende brut
le dividende net est donné par:

$$Dn = D-[\gamma Dt_{pf}-\alpha_f D]-t_{pp}[\gamma Dt_{pf}-\alpha_f D]$$

$$Dn = D\,[1-(\gamma t_{pf}+\alpha_f)\,(1+t_{pp})]$$

et le taux d'impôt sur les dividendes est donné par:

$$T_{pd} = (\gamma t_{pf}+\alpha_f)\,(1+t_{pp})$$

Par exemple, pour un dividende de 1000$, si le facteur de majoration est 1.25 et le facteur de crédit donné par la Loi fédérale de l'impôt de 2/3 de la majoration (soit .167 du dividende reçu), alors Tpp= 0.5. [4]

L'imposition des gains en capital
Le taux d'impôt sur les gains en capital est donné par le taux d'impôt combiné fédéral et provincial, multiplié par la proportion des gains en capital imposables.

L'imposition des revenus de placement
Comme les revenus de placements n'ont généralement pas été imposés au même taux durant la période d'étude, il est nécessaire de prendre en compte la politique de distribution des entreprises. Le *pay-out* moyen, pour chacune des années, a été estimé en rapportant les dividendes versés par l'ensemble des entreprises aux bénéfices disponibles aux actionnaires. Le taux applicable aux revenus d'actions (t_{ps}) est la moyenne pondérée des taux applicables aux dividendes et aux gains en capital, le ratio de *pay-out* étant employé comme facteur de pondération. Le calcul repose donc sur l'hypothèse implicite que le contribuable marginal est un particulier et ne tient pas compte des différences entre les structures de propriété.

Le taux d'impôt des corporations
Il s'agit du taux maximal applicable aux revenus hors fabrication; l'idée de classer les entreprises suivant qu'elles pouvaient ou non profiter du taux moindre applicable aux revenus de fabrication a été abandonnée devant la constatation que la pluspart des entreprises ne peuvent être rangées totalement dans l'une ou l'autre des catégories en raison de la multiplicité des sources de revenus.

Le tableau A1 récapitule les valeurs des principaux paramètres fiscaux estimés et employés dans l'étude, de 1960 à 1994.

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[4] Cette situation particulière est illustrée par Thornton (1993, p.106).

Tableau A1: Principaux paramètres fiscaux utilisés dans la détermination du gain dû à l'endettement. Il s'agit des taux combinés (provincial et fédéral) pour un contribuable ontarien dont le revenu réel, qui était de 100 000$ en 1970, est demeuré inchangé au cours de l'ensemble de la période.[5]

	Taux d'impôt sur les dividendes	Taux d'impôt sur les gains en capital	Taux personnel	Taux des corporations	Pay-out moyen	Taux sur les revenus de placement	G de Miller
1960	0,520	0,000	0,650	0,520	0,4720	0,245	-0,0348
1961	0,520	0,000	0,650	0,520	0,4720	0,245	-0,0348
1962	0,520	0,000	0,650	0,520	0,4720	0,245	-0,0348
1963	0,520	0,000	0,650	0,520	0,4720	0,245	-0,0348
1964	0,520	0,000	0,650	0,520	0,4252	0,221	-0,0682
1965	0,520	0,000	0,650	0,520	0,3975	0,207	-0,0880
1966	0,520	0,000	0,650	0,520	0,3565	0,185	-0,1172
1967	0,520	0,000	0,650	0,520	0,3919	0,204	-0,0920
1968	0,520	0,000	0,650	0,534	0,3833	0,199	-0,0658
1969	0,520	0,000	0,650	0,534	0,4014	0,209	-0,0533
1970	0,520	0,000	0,650	0,534	0,4014	0,209	-0,0533
1971	0,517	0,000	0,647	0,487	0,3631	0,188	-0,1792
1972	0,470	0,307	0,613	0,485	0,3174	0,358	0,1461
1973	0,470	0,307	0,613	0,510	0,2690	0,351	0,1770
1974	0,470	0,307	0,613	0,526	0,2419	0,346	0,1984
1975	0,470	0,307	0,613	0,502	0,2468	0,347	0,1589
1976	0,470	0,307	0,613	0,480	0,2380	0,345	0,1198
1977	0,466	0,310	0,619	0,480	0,2509	0,349	0,1107
1989	0,389	0,310	0,619	0,490	0,2463	0,329	0,1015
1979	0,389	0,310	0,619	0,500	0,2121	0,326	0,1155
1980	0,389	0,310	0,619	0,518	0,2019	0,326	0,1464
1981	0,394	0,314	0,628	0,518	0,2396	0,333	0,1364
1982	0,252	0,252	0,503	0,518	0,2348	0,252	0,2739
1983	0,252	0,252	0,503	0,518	0,2335	0,252	0,2739
1984	0,252	0,252	0,503	0,510	0,2352	0,252	0,2618
1985	0,252	0,252	0,503	0,510	0,2175	0,252	0,2618
1986	0,255	0,255	0,510	0,515	0,2624	0,255	0,2626
1987	0,347	0,255	0,510	0,515	0,2277	0,276	0,2833
1988	0,312	0,338	0,451	0,435	0,2915	0,331	0,3109
1989	0,314	0,341	0,454	0,535	0,2611	0,334	0,4324
1990	0,320	0,347	0,463	0,435	0,3454	0,338	0,3033
1991	0,316	0,343	0,457	0,435	0,2152	0,337	0,3101
1992	0,316	0,343	0,457	0,443	0,2805	0,335	0,3185
1993	0,374	0,390	0,521	0,435	0,1856	0,387	0,2780
1994	0,395	0,413	0,550	0,435	0,1391	0,410	0,2592

[5]Les principales sources utilisées sont *Canadian Tax Foundation*, The National Finance, diverses années, C.C.H. Canadian Limited et le *Canadian Income Tax Guide*, Don Mills, Ontario, diverses années.

2) les crédits non liés à l'endettement

Les crédits non liés à l'endettement sont exprimés sous la forme de déductions totales rapportées au bénéfice moyen avant déductions. L'estimation est compliquée par le fait que les états financiers font état soit de crédits, soit de déductions. Nous utilisons l'expression suivante:

$$RDF_{it} = \frac{NDTS_{it}}{CFM} = [AMORT_{it} + \frac{IR_{it}}{\tau} + \frac{APR_{it}}{\tau} + \frac{CNR_{it}}{\tau}]/CFM \qquad (4)$$

où

RDF = Ratio des déductions fiscales non liés à l'endettement

NDTS = Crédits d'impôt non liés à l'endettement; il s'agit en fait de déductions.

CFM = Cash-flow moyen des trois derniers exercices; le cash-flow est obtenu en ajoutant l'impôt payé, l'amortissement et les intérêts au bénéfice net (CF = BNET + Impôt payé + Intérêts + Amortissement). Le cash-flow moyen est calculé pour les trois exercices t, t-1 et t-2.

AMORT= Amortissement comptable relevé à l'état des résultats.

IR = Impôt reporté, principalement imputable à la différence entre l'amortissement aux fins fiscale et comptable. La quantité *(AMORT + IT / τ)* est donc un estimateur de l'amortissement réclamé aux fins fiscales.

APR = Ajustement de l'impôt à payer en raison du report de pertes. La division de cette quantité par le taux d'impôt indique le montant déduit au titre du report de pertes pour l'année considérée.

CNR = Crédits non rapportés à l'état des résultats, qui figurent dans les notes aux états financiers. Leur division par le taux d'impôt permet d'estimer le montant réclamé.

La quantité *RDF* traduit donc le rapport entre les déductions réclamées à l'année t et le cash flow moyen des trois années qui se terminent à la date d'estimation. Un *RDF* égal ou supérieur à l'unité correspond à une situation où l'entreprise est en mesure d'effacer totalement son bénéfice fiscal. Cette mesure est imparfaite. Il serait préférable de disposer des montants accumulés, par exemple pour ce qui est des pertes reportées. Ce n'est cependant pas possible compte tenu des données disponibles dans les bases de données utilisées ici.

LE RÉGIME D'ÉPARGNE-ACTIONS DU QUÉBEC: VUE D'ENSEMBLE ET ÉVALUATION[1]

Jean-Marc Suret, CIRANO et
Elise Cormier, Université Laval

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Version préliminaire: les commentaires sont les bienvenus

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The Quebec Stock Savings Plan: Overview and Evaluation

Jean-Marc Suret and Élise Cormier

Executive Summary

This in-depth analysis of the Quebec Stock Savings Plan (QSSP) proposes to evaluate the Plan dealing with its different sections and offering interpretations of its objectives. At the outset, the Plan was designed to lower the income tax rate of high-income earners and increase the proportion of savings invested in stocks. The QSSP has since been changed several times in order to steer more money towards small companies. The study includes an itemized account of all the information on each issue made by companies with assets under $1 billion. The performance of securities and issuers is analyzed up to 1994. The study's main conclusions are summarized below.

Small companies

The Plan had the short-term effect of generating a stream of primary issues from small companies. The relaxation of requirements for listing securities on the Stock Exchange also contributed to this result. Comparison with Ontario issues over the same period shows that while Ontario issues were initially under-valued, the same was not true of QSSP issues, suggesting that the issue price of eligible securities was adjusted upward. These issues have generally performed very weakly. The number of issues in this category has dropped sharply since 1987 and has declined to about the same level as before the Plan's introduction, although the Plan is still in effect. A large proportion of the small companies that floated primary public issues under the Plan have now disappeared as a result of bankruptcy or sale. Investors who put money into this section of the Plan have suffered keen disappointment and their opportunity losses total hundreds of millions of dollars.

The impact on the capitalization of small companies was short-lived. On average, these companies' debt levels returned to pre-issue levels within one or two years. A number of companies showed higher debt levels due to relatively mediocre performance. On average, issuers recorded significantly weaker earnings after the issue than before.

The analysis indicates that listing securities on the Stock Exchange via tax incentives has been a very ineffective stimulant in the case of small companies. Moreover, the Plan has probably had a perverse effect, driving many disappointed investors out of this market forever.

Medium-sized companies

Medium-sized companies have made extensive use of the QSSP. Some of them have floated a number of issues under the Plan. Some of these companies have experienced significant growth. It is, however, difficult to link this growth to the Plan for a number of reasons: 1) many of the companies in question received large subsidies at the same time; 2) most of these companies had sufficient cash flow to finance their growth; 3) many of the companies paid

out dividends equal to a substantial proportion of the funds they raised under the Plan during the period under study. It was therefore not essential to issue new shares. Securities issued by companies in this category did, however, provide a higher, though unexceptional, average yield than those issued by small companies, comparable to the yield of Ontario primary issues during the same period.

It is possible that the QSSP has spurred the growth of some companies. However, it is difficult to demonstrate that the Plan was an essential factor in their growth, which a number of indicators suggest could have been achieved without the tax expenditure.

Large companies

Initially, the QSSP allowed investors to buy large company shares without restriction. The deduction for this type of investment was subsequently reduced and the authorized amount lowered. The amounts issued and the credits granted for these companies' issues have been considerable, but the effect on the capitalization of these companies, which generally have generous dividend policies, has been negligible. These very large companies are strongly capitalized. Tax assistance for their stock issues is therefore difficult to justify in economic terms. We believe that the goal of this section of the Plan was to lower the tax rate of individuals and encourage investment in stocks. The first objective could have been achieved more simply by lowering the tax rate. The economic importance of the second objective remains to be demonstrated.

The hundreds of millions of dollars in tax expenditures poured into the Quebec Stock Savings Plan do not seem to have achieved the desired effect in terms of financing small companies. It is possible that the QSSP has helped some medium-sized companies, but the Plan cannot be said to have had a major impact. Finally, the only perceptible effect of the section of the Plan for large companies has been to reduce the tax paid by the taxpayers who participated in the Plan.

Le Régime d'épargne-actions du Québec: vue d'ensemble et évaluation

Jean-Marc Suret et Élise Cormier

Sommaire

Cette analyse approfondie du Régime d'épargne-actions du Québec propose l'évaluation du programme sous diverses dimensions qui représentent autant d'interprétations des objectifs visés. Conçu au départ pour réduire le taux d'impôt des contribuables à revenu élevé et accroître la proportion de l'épargne détenue sous forme de capital-actions, le RÉAQ a ensuite été modifié à plusieurs reprises pour orienter davantage de fonds vers les entreprises de petite taille. L'étude a comporté un relevé détaillé de l'ensemble de l'information pour chacune des émissions effectuées par des entreprises dont l'actif était inférieur au milliard de $. L'évolution des titres et des entreprises émettrices a été analysée jusqu'en 1994. Les principales conclusions de l'étude sont résumées ci-dessous.

Les entreprises de petite taille

Le programme a créé, à court terme, une offre importante d'émissions initiales provenant d'entreprises de petite taille, d'autant plus que les normes d'inscription en Bourse ont été assouplies. Une comparaison avec les émissions ontariennes de la même période montre que la sous-évaluation initiale qui prévalait en Ontario n'existe pas pour les émissions RÉAQ, ce qui laisse croire que les prix d'émission des titres admissibles auraient été ajustés à la hausse. De façon générale, la performance de ces émissions a été très faible. Depuis 1987, le nombre d'émissions appartenant à cette catégorie a très fortement diminué et est retombé à un niveau à peu près équivalent à celui qui prévalait avant la mise en place du programme, bien que celui-ci demeure toujours en vigueur. Une importante proportion des entreprises de petite taille qui ont réalisé un premier appel public à l'épargne dans le cadre de ce programme a aujourd'hui disparu, à la suite de faillite ou d'acquisition. La déception des investisseurs qui ont participé à cette dimension du programme est importante et leur perte d'opportunité s'élève à plusieurs centaines de millions de $.

L'impact sur la capitalisation des entreprises de petite taille a été de courte durée. En moyenne, ces entreprises ont retrouvé, après un ou deux ans, le niveau d'endettement qui prévalait avant l'émission. Plusieurs ont montré un endettement supérieur qui peut s'expliquer par des performances relativement médiocres. La rentabilité des entreprises émettrices est en effet significativement plus faible après l'émission qu'avant, en moyenne.

L'analyse montre que la stimulation de l'entrée en Bourse par le biais d'incitatifs fiscaux a été, dans ce cas, extrêmement peu efficace. De plus, le programme a vraisemblablement eu des effets pervers, en éloignant définitivement de ce marché de nombreux investisseurs déçus par leurs placements.

Les entreprises de taille moyenne

Les entreprises de taille moyenne ont largement eu recours au RÉAQ. Certaines ont d'ailleurs procédé à de multiples appels à l'épargne dans le cadre du programme. Plusieurs de ces entreprises ont connu une croissance importante. Il est toutefois difficile de lier cette croissance au programme, pour plusieurs raisons: 1) ces entreprises ont souvent reçu simultanément d'importantes subventions, 2) les fonds autogénérés étaient généralement largement suffisants pour couvrir les besoins de la croissance et 3) pour plusieurs entreprises, les dividendes versés au cours de la période représentent une part importante des fonds prélevés dans le cadre du programme. L'émission de nouvelles actions n'était donc pas essentiel. En moyenne, le taux de rendement des titres des entreprises de cette catégorie a cependant été meilleur que celui des petites entreprises, sans être exceptionnel. Il se compare au taux de rendement des émissions initiales ontariennes de la même période.

Il est possible que le RÉAQ ait permis à quelques entreprises une croissance plus rapide. Toutefois, il est difficile de montrer que le RÉAQ ait été un déterminant essentiel de cette croissance et plusieurs indices laissent croire que celle-ci aurait pu avoir lieu sans cette dépense fiscale.

Les entreprises de grande taille

Initialement, le RÉAQ permettait d'acquérir sans restriction des titres de grandes entreprises. La déduction liée à ce type d'investissement a ensuite été réduite et le montant autorisé diminué. Les montants émis et les crédits accordés pour les émissions de ces entreprises sont considérables mais l'effet sur la capitalisation de ces entreprises, d'ailleurs généralement généreuses au niveau de leur politique de dividendes, a été négligeable. Ces entreprises de très grande taille sont largement capitalisées. Il est donc difficile de justifier économiquement une aide fiscale à l'émission de leurs actions. Nous considérons que, dans ce cas, l'objectif du programme était la réduction du taux d'impôt des particuliers et l'accroissement de la détention d'actions. Le premier objectif aurait pu être atteint plus simplement en réduisant le taux d'impôt. Quant au second objectif, il reste à démontrer son importance économique.

Les centaines de millions de $ de dépenses fiscales consacrées au Régime d'épargne-actions du Québec ne semblent pas avoir eu les résultats prévus, en ce qui concerne le financement des entreprises de petite taille. Il est possible que le RÉAQ ait aidé quelques entreprises de taille moyenne, mais l'effet du programme ne peut être qualifié de majeur. Finalement, le volet consacré aux grandes entreprises n'a eu comme effet perceptible que de réduire l'impôt payé par les contribuables qui ont participé au régime.

Le Régime d'épargne-actions du Québec: vue d'ensemble et évaluation

En 1979, le gouvernement du Québec créait le Régime d'épargne-actions du Québec, ou RÉAQ, avec un triple objectif. Il visait à réduire le fardeau fiscal des contribuables à revenu élevé, à stimuler la détention des titres boursiers par les investisseurs du Québec et, enfin, à faciliter l'accroissement du capital permanent des entreprises. Au cours des premières années, le programme a presque exclusivement profité aux très grandes sociétés. Par la suite, le gouvernement a modifié ses règles de fonctionnement afin d'orienter une part importante des fonds vers des titres émis par des sociétés dites intermédiaires, puis vers les titres de faible capitalisation. Le RÉAQ est alors partiellement devenu un programme d'aide à la capitalisation.

L'importance des sommes accordées à titre de crédits d'impôt, la disparition quasi-totale du programme après plusieurs années d'euphorie et les très nombreuses déceptions qu'ont connues les investisseurs justifient la production d'un bilan de ce programme. C'est le principal objectif de cette étude, qui complète et met à jour les analyses menées par SECOR (1986), Lussier et Hawkins (1991) et Suret (1990, 1993). Elle comporte trois sections principales. La première rappelle les conditions de la création et de l'évolution du programme. Elle permet de récapituler les montants émis par catégorie ainsi que les coûts totaux du programme. Cette première section présente également un classement des entreprises qui sera utilisé dans les sections suivantes.

La seconde section adopte le point de vue de l'investisseur. Une première partie illustre l'augmentation de la proportion des épargnes des ménages québécois détenue sous forme de capital-actions. La seconde analyse l'évolution des émissions, qui sont réparties en catégories sur la base de la taille des entreprises lors de l'émission, puis en fonction de leur performance relative à celle du marché, jusqu'au 31 décembre 1994. Les émissions initiales sont distinguées des appels subséquents à l'épargne, et les gains et pertes d'opportunité sont évalués pour chaque sous-groupe d'entreprises.

Dans la catégorie des petites entreprises, la valeur des émissions a diminué de plus de 42 p. cent. Les crédits d'impôt ont partiellement permis de compenser cette importante perte de valeur mais les investisseurs ont subi une grande perte d'opportunité. Peu d'émissions de cette catégorie ont permis la réalisation de gains et plus de 43 p. cent des titres émis ne sont plus négociés ou s'échangent à des prix dérisoires. Dans la catégorie des entreprises de taille moyenne, les émissions ont perdu environ 25 p. cent de leur valeur. Les crédits d'impôt ont néanmoins permis aux investisseurs de réaliser un faible gain d'opportunité. Dans l'ensemble, les émissions RÉAQ ont offert une performance décevante. Celles effectuées par de petites entreprises ont réalisé un rendement bien inférieur à celui de leurs homologues ontariennes alors que les émissions des entreprises de taille

moyenne se sont comportées approximativement comme les émissions initiales effectuées à Toronto.

La troisième section est dévolue à l'étude de l'impact du programme sur les entreprises. Les effets globaux du programme, soit l'augmentation nette, mais temporaire, du nombre des premières émissions, ainsi que la réduction du coût des appels initiaux à l'épargne, y sont d'abord mis en évidence. L'étude de l'impact sur la structure de financement, objectif central du programme dès sa réorientation de 1983, fait ensuite l'objet d'études menées globalement pour l'ensemble des entreprises de petite taille (actif inférieur à 25 millions de $ lors de l'émission) et de taille moyenne (de 25 à 250 millions de $ d'actif). L'analyse met en évidence le caractère temporaire de la réduction de l'endettement et la diminution forte et durable de la rentabilité des entreprises émettrices. L'analyse détaillée des entreprises qui ont eu recours au régime à plus de trois occasions permet ensuite de montrer que, dans la plupart des cas, il est difficile de défendre que le programme ait eu un impact important sur la croissance des entreprises.

1 LE PROGRAMME ET LES ÉMISSIONS

1.1 Le programme

Créé en 1979, le RÉAQ a subi, à de nombreuses reprises, de telles transformations au niveau de ses objectifs ou de ses modalités d'application qu'il est difficile de le considérer comme un seul programme. Ses caractéristiques « permanentes » sont de permettre à un particulier résidant au Québec de réclamer une déduction dans le calcul de son revenu imposable égale à une partie du coût d'acquisition « d'actions admissibles » de « corporations admissibles ». Pour être admissible, une corporation doit employer au moins cinq personnes à plein temps au cours de l'année précédant l'émission et doit avoir sa direction générale au Québec, ou y verser plus de la moitié de ses salaires. Les placements de portefeuille ne peuvent représenter plus de 50 p. cent de l'actif d'une corporation admissible. De plus, celle-ci doit effectuer une offre publique d'actions comportant au moins un droit de vote. Les actions subalternes sont autorisées, mais généralement soumises à des pourcentages de déduction inférieurs à ceux des actions ordinaires. Pour bénéficier de la déduction, l'investisseur doit détenir les titres durant deux années civiles complètes, mais ceux-ci peuvent être remplacés par d'autres actions admissibles.

L'ensemble des paramètres d'application, qu'il s'agisse des catégories d'entreprises admissibles, des taux de déduction ou des limites de déduction, ont fait l'objet de plusieurs ajustements qu'il serait fastidieux d'énumérer

ici.[2] Quatre périodes principales peuvent être distinguées: le démarrage (1979-1982), l'expansion (1983-1986), la réorientation (1987-1988) et les tentatives de relance (1989-1994).

Le démarrage

Au moment de sa création, le RÉAQ accordait à tous les titres admissibles une déduction identique, quelle que soit la taille de l'entreprise émettrice. Par conséquent, de 1979 à 1982, les investisseurs ont surtout acquis des actions de grandes entreprises, qui ont mis en place des plans de réinvestissement des dividendes et de souscriptions. Ces derniers ont d'ailleurs été à l'origine de la plus grande partie des crédits accordés au cours de cette période (tableau 1).

L'expansion

Dans son discours sur le budget du 10 mai 1983, le Ministre des Finances reconnaissait la situation décrite précédemment et écrivait: « (...) Le Régime d'épargne-actions ne s'est pas révélé aussi utile qu'il aurait pu l'être pour les entreprises, par opposition aux particuliers. Une dizaine de grandes entreprises qui, au fond, n'ont pas besoin du Régime d'épargne-actions pour placer leurs titres, ont mobilisé la majeure partie des émissions, alors que les petites et moyennes entreprises en ont profité moins (...). Or, les problèmes de sous-capitalisation s'appliquent bien plus à elles qu'à de grandes banques ou à des holdings comme Canadian Pacific Enterprises ».[3] Afin d'orienter davantage de fonds vers les entreprises de petite taille, des catégories de sociétés ont alors été définies en fonction de leur actif ou de leurs fonds propres. Le pourcentage du coût d'acquisition pouvant être déduit était modulé suivant ces catégories et la nature des titres pour atteindre 150 p. cent dans le cas des sociétés en voie de développement.[4] De plus, la déduction accordée pour les titres de sociétés importantes, dont l'actif dépasse le milliard de $, a été limitée à 1000 $ par contribuable. Ces diverses modifications au programme ont permis d'orienter les investissements vers les actions des entreprises de plus petite taille.

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[2] Voir Lacroix (1987a) pour une analyse détaillée du fonctionnement de ce programme en 1986 et les différents rapports Martin pour une description des ajustements apportés au fil des ans. L'annexe 1 présente un résumé des principales modifications.

[3] Québec, Ministère des Finances, Discours sur le Budget, 10 mai 1983.

[4] Il existait dès lors quatre catégories de sociétés: importantes, intermédiaires, en voie de développement et autres ainsi que deux types de titres: ordinaires et subalternes.

Le RÉAQ connaît alors une expansion rapide, comme l'illustre le tableau 1. Les émissions admissibles placées au Québec atteignent 1,27 milliard de $ en 1985 et 1,75 milliard de $ l'année suivante. Les plans de réinvestissement des grandes sociétés sont encore, durant cette période, à l'origine d'une très large part des déductions réclamées. Le tableau 2 montre que le coût fiscal du programme dépasse 193 millions de $ pour la seule année 1995.

La réorientation

Au cours de l'année 1986, plusieurs modifications majeures sont apportées au programme. Ces changements découlent vraisemblablement de l'explosion de ses coûts, mais également de la constatation de plusieurs problèmes de fonctionnement. En premier lieu, en dépit de taux de déduction moins généreux, les grandes entreprises ont continué, au cours de la période 1982-1986, à drainer une part importante des fonds recueillis dans le cadre du programme. En second lieu, quinze sociétés ont dû annuler leur émission et plusieurs autres ont dû réduire leur prix d'émission ou rendre les investissements plus attrayants en y ajoutant un bon de souscription. En troisième lieu, de nombreuses entreprises ont émis des titres subalternes. En 1986, trente-six placements, représentant 45 p. cent de la valeur placée au Québec, étaient composés d'actions subalternes (Martin, 1987). Finalement, il semble que plusieurs entreprises aient utilisé des montants reçus lors d'émissions RÉAQ pour procéder au rachat de titres déjà émis.

À la fin de 1986, deux déclarations ministérielles viennent donc modifier de façon importante le fonctionnement du programme. Le principal changement apporté est une réduction de la limite de taille qui séparait les entreprises intermédiaires des grandes entreprises. Cette modification réduit le taux de déduction pour les titres émis par les entreprises dont l'actif est compris entre 250 millions et 1 milliard de $ et, surtout, limite la déduction obtenue à l'aide de ces actions à 1000 $ par année.[5] À partir de 1987, le programme est donc nettement orienté vers les actions d'entreprises dont l'actif ne dépasse pas 250 millions de $. C'est dans ce contexte que survient la débâcle boursière d'octobre 1987, qui voit la valeur des titres RÉAQ se déprécier de façon très importante, ce qui conduira à la désaffection des investisseurs et à des tentatives de relance du programme.

Les tentatives de relance

Comme l'indique le tableau 2, les déductions réclamées en 1986 s'élèvent à 487,36 millions de $ alors que les

[5] Voir l'annexe 1 pour un sommaire des autres modifications apportées à cette occasion.

recouvrements de déduction se chiffrent à 14,14 millions de $.[6] 169 360 contribuables ont participé au programme. En 1987, les déductions ne sont que de 181,65 millions de $ et les recouvrements atteignent 60,02 millions de $. 29 800 contribuables ont en effet décidé de ne pas détenir les titres RÉAQ pendant la période requise. En 1988, le déclin se poursuit, les déductions nettes des recouvrements s'établissant à moins de 90 millions de $. Le nombre d'émissions réalisées dans le cadre du programme diminue de façon brutale.

Pour contrer cette désaffection, plusieurs modifications sont apportées au régime dans le but d'assouplir les conditions posées aux investisseurs et aux entreprises émettrices. En 1988, le montant maximum déductible de 5 500 $ imposé aux investisseurs est aboli et seule demeure la limite de 10 p. cent du revenu total. Les investisseurs obtiennent également le droit, à des fins de couverture, d'acheter des titres des sociétés en voie de développement sur le marché secondaire, pour remplacer des titres acquis au cours des deux années d'imposition précédentes, sans incidence sur la déduction fiscale accordée. À partir de 1989, les actions de sociétés en voie de développement et intermédiaires obtenues par conversion d'autres titres deviennent admissibles au régime au taux de déduction prévu pour ces actions. En 1990, les règles régissant les Fonds d'investissement RÉAQ sont assouplies: si ceux-ci placent au moins 50 p. cent de leurs produits d'émission dans des sociétés en voie de développement, ils bénéficient désormais d'un sursis de douze mois pour placer le solde de leurs produits d'émission. En 1991, le taux de déduction accordé aux titres des corporations de taille moyenne est haussé à 75 p. cent. En outre, la limite du montant déductible de 1 000 $ est retirée pour ces corporations, alors qu'elle est augmentée à 2 500 $ pour les grandes corporations. Enfin, on accorde désormais une déduction temporaire sur les titres convertibles en titres admissibles au RÉAQ (50 p. cent sur les titres de sociétés en voie de développement et 25 p. cent sur les titres de sociétés intermédiaires).

Ces mesures semblent avoir partiellement relancé le programme, puisque l'année 1994 voit des entreprises considérées en voie de développement émettre pour près de 400 millions d'actions admissibles. Toutefois, cette somme est imputable à quelques entreprises, qui n'appartiennent à cette catégorie qu'en raison de l'élargissement des critères d'actif maximal (de 25 à 250 millions) et qui ont effectué des émissions impliquant chacune des montants de l'ordre de 30 à 40 millions de $. On n'assiste donc pas à une relance réelle du programme, qui demeure essentiellement utilisé par des entreprises de grande taille.

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[6] Les recouvrements sont imposés aux contribuables qui ne détiennent pas les titres durant deux années civiles après leur acquisition.

1.2 Les émissions: vue d'ensemble

Le tableau 1 récapitule les montants émis ainsi que les pourcentages de déduction accordés pour chacune des années de 1979 à 1994, suivant les diverses catégories d'entreprises. Pour l'ensemble de la période, les émissions admissibles placées au Québec sont évaluées à 8,7 milliards de $. Les grandes entreprises sont responsables de la majeure partie de ces montants avec 5 milliards de $. Les émissions des entreprises intermédiaires représentent environ 2 milliards de $ alors que les entreprises en voie de développement et autres sont à l'origine d'émissions totalisant 1,72 milliard de $. Ces titres n'ont pas toujours commandé le même niveau de déduction. La multiplication des montants émis par le pourcentage de déduction permet d'évaluer plus correctement les bénéfices tirés du programme pour chaque catégorie d'entreprise. Les déductions liées à chacune des catégories sont alors de 3,17, 1,68 et 1,9 milliards de $, pour un montant total de 6,75 milliards de $. La multiplication de ce montant de déduction par un taux marginal d'impôt moyen de 25 p. cent dépasse largement le montant des crédits accordés, qui avoisine le milliard de $. Cette situation est liée au fait que certains investisseurs institutionnels ont acquis des titres admissibles mais n'ont pu réclamer les déductions. D'autres investisseurs n'ont pas détenu les titres durant les deux années requises et ont dû rembourser une partie des crédits obtenus. Il n'en demeure pas moins que les investisseurs des grandes entreprises ont été les principaux bénéficiaires du régime, même si les ajustements apportés ont pu modifier la répartition des crédits entre les catégories. Le tableau 1 met également en évidence l'effet de ces ajustements successifs ainsi que l'impact de la crise boursière de 1987.

De 1979 à 1983, les investisseurs ont essentiellement fait l'acquisition d'actions de grandes entreprises, le crédit d'impôt attaché à ces titres étant égal à celui accordé pour l'achat de titres de petites entreprises, et les émissions d'entreprises de petite taille étant à peu près inexistantes. Les entreprises importantes sont d'ailleurs à l'origine de 64 p. cent des déductions au cours de cette période initiale[7]. Au cours de la seconde période définie dans l'étude (1983-1985), le pourcentage du coût d'acquisition pouvant être déduit est modulé suivant les catégories

[7] Comme le tableau 2, le tableau 1 repose en grande partie sur des estimations. Depuis l'arrêt des publications de la Commission de valeurs mobilières du Québec en 1988, il n'existe plus de source officielle rapportant des données relativement à ce programme. Depuis 1989, les statistiques fiscales ne présentent plus de statistiques concernant les déductions réclamées. Il est donc impossible de connaître avec précision l'envergure et le coût du programme. En particulier, les estimations de la proportion des crédits attribuables à chacune des classes d'entreprises repose sur l'hypothèse, non vérifiable, que le rapport entre les placements et les déductions est le même pour toutes les catégories d'entreprises. La proportion des déductions attachée à chaque catégorie a été estimée en ajustant le total annuel des émissions par le taux de déduction pertinent.

et la nature des titres.[8] De plus, la déduction accordée pour les titres de sociétés importantes est limitée à 1000 $ par contribuable. Ces diverses modifications du programme devaient orienter les investissements vers les actions des entreprises de plus petite taille. Toutefois, au cours de cette période d'expansion, la majeure partie des émissions sont encore effectuées par les grandes entreprises. En effet, les montants admissibles émis par les entreprises importantes représentent 41,5 p. cent du total, contre 30,5 p. cent pour les entreprises intermédiaires et 28 p. cent pour les entreprises en voie de développement. La période de réorientation (1987-1988) voit la proportion émise par les entreprises importantes augmenter à nouveau (46 p. cent), en dépit du fait que les titres émis par ces entreprises ne commandent plus qu'une déduction de 50 p. cent. L'année 1986 a nettement marqué un sommet dans le montant des émissions, avec 1,7 milliard de $. En 1989, le montant total des émissions admissibles placées au Québec n'est plus que de 113 millions de $.

Les émissions ont culminé en 1986, avec un total de plus de 1,7 milliards de $. Au cours de cette année, les entreprises en voie de développement ont émis des montants supérieurs à ceux des grandes sociétés. Les émissions ont diminué très rapidement au cours des années suivantes. Après 1989, le RÉAQ semble à nouveau en croissance; il faut cependant noter que cette croissance est surtout imputable aux grandes sociétés. En effet, les entreprises en voie de développement n'ont recueilli que 113,7 millions de $ entre 1989 et 1992, ce qui ne représente que 6.58 p. cent du montant total des émissions, qui a dépassé 1,576 milliard de $. Le RÉAQ est donc redevenu un programme axé vers les titres de moyenne et de grande capitalisation.

Le tableau 2 rapporte les crédits effectivement accordés de 1979 à 1986, puis une estimation de ces mêmes crédits pour les années suivantes. Au total, le RÉAQ aurait coûté 986,67 millions de $ au fisc québécois. Sur la base des estimations qui apparaissent au tableau 1 et en tenant compte des différences entre les taux de déduction, il est possible d'évaluer à 47 p. cent la proportion de ces crédits attribuable aux actions de très grandes entreprises.

Insérer ici les tableaux 1 et 2

[8] La description des limites des catégories ainsi que des pourcentages de déduction applicables en fonction des années, des catégories de sociétés et des types d'actions est présentée à l'annexe 1.

1.3 Classement des émissions

Dans la suite de l'étude, les émissions admissibles sont regroupées en quatre catégories. La classification établie dans le cadre du programme n'a pas été utilisée pour plusieurs raisons. Premièrement, les limites séparant les catégories ont été plusieurs fois déplacées. Ainsi, une société dont l'actif s'établit à 200 millions de $ est considérée comme intermédiaire jusqu'en 1988 et comme entreprise en voie de développement ensuite. Deuxièmement, il semble exister de nombreux cas d'exception à ces règles basées sur la taille et l'avoir, sans que l'on puisse déterminer l'origine de ces dérogations.[9] Finalement, il est difficile de définir des catégories de taille fixes au cours d'une période longue durant laquelle le taux d'inflation a été relativement élevé. Le classement employé dans cette étude est donc le suivant. Les petites entreprises ont un actif inférieur à 25 millions, exprimés en $ de 1986, lors de l'émission. L'actif des entreprises moyennes est compris entre 25 et 250 millions de $ de 1986. Enfin, les grandes entreprises ont un actif compris entre 250 millions et 1 milliard de $ de 1986 alors que celui des très grandes entreprises dépasse cette limite. L'indice des prix à la consommation a été employé pour ajuster annuellement les limites des classes.

Le tableau 3 présente la distribution des émissions suivant l'actif total des entreprises émettrices, pour chacun des groupes définis ci-dessus.

Insérer ici le tableau 3

2 Le RÉAQ et les investisseurs

Le RÉAQ visait, en tout premier lieu, deux objectifs. Il s'agissait de la réduction de l'impôt payé par les contribuables à haut revenu et de l'augmentation de la proportion de capital-actions dans les portefeuilles des ménages québécois. Il est possible d'analyser globalement l'atteinte de ces objectifs. Celui lié à la fiscalité nécessite peu de discussions: le fardeau fiscal des contribuables a été réduit de près d'un milliard de $. La façon dont cette réduction peut être ventilée entre les diverses catégories de contribuable est présentée dans les

[9] Par exemple, IAF Biochem est classée dans la catégorie des entreprises intermédiaires avec un actif de 1,9 millions de $, au moment où la limite inférieure impliquant l'inclusion dans cette catégorie était établie à 25 millions de $. Il existe six autres cas d'inclusion d'entreprises de petite taille dans la catégorie des entreprises intermédiaires. Il est possible que certaines dispositions anti-évitement ainsi que des spécifications relatives aux mesures de l'actif et de l'avoir aient été appliquées pour justifier ces classements, mais les prospectus ne permettent pas de les expliquer.

différents rapports Martin et n'est donc pas reprise ici. Par contre, l'évolution du taux de détention des titres boursiers est étudiée dans la section consacrée aux impacts globaux du programme. Cependant, le programme n'a pu changer de façon durable le comportement des ménages québécois que si le déplacement de leur épargne des titres à revenu fixe vers les actions a été bénéfique. Il convient donc de s'intéresser aux gains et pertes réalisés par ces investisseurs[10]. C'est l'objet des sections suivantes, consacrées respectivement aux titres de petite taille puis de taille moyenne.

2.1 Impacts globaux

Le tableau 4 montre que la part des actions dans l'actif total des ménages québécois est passée de 0,8 p. cent à 2,3 p. cent entre 1977 et 1984. Cette proportion est dès lors comparable à celle observée pour l'ensemble du Canada. Au cours de la même période, cette proportion est demeurée relativement stable en Ontario (2,6 à 2,7). Il est donc possible de lier l'augmentation rapide de la proportion d'actions détenues au RÉAQ. L'examen des proportions d'actions dans l'actif financier montre une évolution similaire. Cette proportion passe de 3,8 p. cent à 9,2 p. cent au Québec, alors qu'elle décroît en Ontario. Il faut cependant noter que l'augmentation de la proportion des fonds détenus sous forme d'actions a été plus prononcée en Colombie Britannique qu'au Québec, alors que cette première province ne disposait pas de programme comparable. Les données présentées dans ces tableaux proviennent de sondages ponctuels effectués par Statistique Canada. Il n'existe pas de données comparables pour les périodes plus récentes et il est impossible de déterminer dans quelle mesure l'accroissement de la part des actions dans l'épargne a été permanent.

Le tableau 5 illustre l'évolution du taux d'actionnariat au Québec, en Ontario, au Canada et aux États-Unis. 4,4 p. cent des québécois détenaient des actions en 1977, alors que cette proportion atteignait 11,4 p. cent en Ontario. En 1986-87, le taux d'actionnariat atteint 16 p. cent au Québec, alors qu'il est passé à 20 p. cent en Ontario et à 18 p. cent pour l'ensemble du Canada. La période d'activité du RÉAQ a donc correspondu à un accroissement rapide du taux d'actionnariat au Québec, qui s'approche de celui du Canada. On observe toutefois une légère diminution de ce taux au Québec entre 1986 et 1988; il est possible que ce mouvement se soit poursuivi en raison de la désaffection des investisseurs vis-à-vis du régime, mais les données ne permettent pas de vérifier cette

[10] Les notions de gains et pertes ont été utilisées dans cette étude en raison de l'absence de données boursières fiables qui limitent les possibilités de calcul des taux de rendement mais aussi en raison de la diversité de la période de détention des titres.

hypothèse. Sur le plan de la détention d'actions, le régime semble effectivement avoir atteint les effets visés.[11]

Insérer ici les tableaux 4 et 5

2.2 Les investisseurs et les entreprises RÉAQ de petite taille[12]

Les entreprises dont l'actif lors de l'émission était inférieur à 25 millions de $, exprimés en $ de 1986, composent cette catégorie. Elle regroupe majoritairement des entreprises classées, pour les fins du régime, dans la catégorie «en voie de développement» Un certain nombre d'entreprises, trop petites pour satisfaire au critère de taille

[11] Nous ne pouvons évidemment juger de la validité de l'objectif lui-même, qui repose sur l'hypothèse voulant que la détention d'actions par de nombreux investisseurs stimule la croissance économique et améliore le bien-être. Il est possible de prétendre, au contraire, que la détention, par de nombreux investisseurs, de titres risqués de qualité médiocre peut réduire à la fois la valeur de leur épargne et leur incitation à participer, dans le futur, au financement direct des entreprises.

[12] L'analyse détaillée qui est rapportée dans la suite de l'étude a nécessité un relevé minutieux des données suivantes: 1) caractéristiques des émissions et des entreprises, à partir des prospectus obtenus de la CVMQ, 2) caractéristiques des entreprises après l'émission, à partir des états financiers obtenus des entreprises, de la CVMQ et, dans quelques cas récents, de la base de données CANCORP, 3) pourcentage des actions effectivement acquises au Québec: Rapport Martin et Rapport de la Caisse de dépôts, 4) prix des titres émis, à la fin de chacune des années depuis l'émission et facteurs de fractionnement, à l'aide du tableau des titres, publication mensuelle de la Bourse de Montréal, 5) évolution et situation de l'entreprise de l'émission à la fin de 1994: Nouvelles Quotidiennes Officielles de la Bourse de Montréal, Financial Post Datagroup: *Survey of Predecessor and Defunct Companies*, Bulletin de Statistiques de la Commission des Valeurs Mobilières du Québec et Manuel des Statistiques de la Bourse de Montréal ainsi que *Mergers and Acquisitions in Canada* (publié par Venture Economics Canada Limited) et le Fichier central des entreprises du Ministère des Institutions financières et des corporations du Québec.

L'emploi de sources multiples découle du fait qu'il n'existe pas, au Québec, de relevé uniforme des principales données portant sur les émissions. Les récapitulations des émissions RÉAQ, effectuées jusqu'en 1987 par Martin (CVMQ), ne sont plus produites depuis cette date. Les données comptables et financières des entreprises listées à Montréal ne sont pas accessibles directement et ne peuvent être consultées qu'aux archives de la CVMQ; il a également été impossible d'obtenir de la Bourse de Montréal des données boursières antérieures à 1989.

Ce relevé a été effectué pour 400 émissions. Nous avons observé de nombreux cas de discordances entre les sources, ainsi qu'entre les données rapportées dans les travaux antérieurs. L'une des différences principales porte sur les écarts entre le produit de l'émission rapporté au prospectus, le montant effectivement souscrit (qui peut être inférieur ou supérieur au précédent) et le montant effectivement placé au Québec. Le relevé qui a été effectué comporte encore, vraisemblablement, quelques inexactitudes. En particulier, il a été absolument impossible de déterminer ce que sont devenues plusieurs émissions. Cependant, il est le résultat d'un recoupage systématique de toutes les observations publiées jusqu'à maintenant à propos des entreprises RÉAQ.

minimale situé à 2 millions de $, ont également émis des titres dans le cadre du programme, dans la catégorie des corporations « autres ». Elles sont également prises en compte ici. Les actions de ce groupe d'entreprises permettent, à partir de 1984, un pourcentage de déduction plus élevé que celui des grandes entreprises. Il était de 100 à 150 p. cent, alors que le prix des titres des grandes entreprises ne réduisait le revenu imposable que de 75 p. cent en 1984 et 50 p. cent par la suite. Ce volet du programme avait clairement pour objectif d'améliorer la capitalisation des entreprises de petite taille. Il a coïncidé avec la mise en place du Programme d'aide à la capitalisation des entreprises (le PAC) qui couvrait, à l'aide de subventions, une partie (et parfois la totalité) des coûts du premier appel public à l'épargne.

Dans la majorité des cas, ces entreprises ont procédé à un premier appel public à l'épargne dans le cadre du programme. Les émissions dont il est question dans cette section se répartissent de la façon suivante:

Émissions initiales suivies d'entrées en Bourse	154
Émissions subséquentes suivant une émission initiale RÉAQ:	23
Émissions subséquentes:	11
Total des observations pour lesquelles l'information est disponible:[13]	183

2.2.1 Les émissions: état et évolution

Au total, les émissions suivies d'inscriptions en Bourse, placées au Québec[14] par les entreprises de cette catégorie ont amassé 1252,03 millions de $, alors que les sociétés qui sont demeurées fermées ont recueilli approximativement 24,75 millions, un montant qui sera négligé dans l'analyse (tableau 6). La taille moyenne des émissions était de l'ordre de 6,84 millions de $. La petite taille des émissions est liée à celle des entreprises. En moyenne, l'actif total au moment de l'émission est de 12,74 millions de $, mais cette valeur est fortement influencée par quelques émissions. Le RÉAQ a donc amené des corporations de très petite taille à procéder à des émissions publiques. Par ailleurs, plus de la moitié des émissions proviennent du secteur tertiaire. Il s'agit donc d'une situation particulière. En effet, la présence de titres peu capitalisés peut être observée ailleurs. C'est

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[13] Un certain nombre d'émissions qui n'ont pas été suivies d'entrées en Bourse ou dont l'information est incomplète n'ont pu être traitées dans l'étude. Généralement, ces entreprises étaient de très petite taille.

[14] Les montants prennent en considération la proportion des titres effectivement placée au Québec et admissibles au RÉAQ (dans la mesure où ils sont acquis par des particuliers). Ne pas prendre en compte cette proportion revient à donner un poids beaucoup plus important aux émissions des entreprises de grande taille. Alors que les entreprises dont l'actif est inférieur à 25 millions de $ écoulaient 99,4 p. cent (1984) et 91,6 p. cent (1985) de leurs actions admissibles au RÉAQ, ces proportions étaient de 84,4 p. cent et 82,5 p. cent, respectivement pour les entreprises dont l'actif est compris entre 250 millions et un milliard et de 61,9 p. cent et 65,5 p. cent, respectivement pour les très grandes entreprises.

le cas par exemple de nombreux titres miniers négociés à la Bourse de Vancouver. Cependant, l'inscription massive de titres de faible capitalisation appartenant à des secteurs qui, en règle générale, ne produisent pas de rendements très élevés semble originale.

Insérer ici le tableau 6

De 1979 à 1994 inclusivement, 217 émissions ont été relevées dans les catégories des petites entreprises pour un total de 1276,78 millions de $. Seulement 183 de ces émissions ont donné lieu à des inscriptions en Bourse et ont pu être évaluées. Le produit brut, le prix d'émission et la déduction accordée au titre proviennent des listes de la CVMQ (rapports Martin) et de la Bourse de Montréal. Le bulletin quotidien de la Bourse de Montréal a permis de tenir compte des fusions, faillites, rachats et changements de nom, puis de relever les prix de clôture au 31 décembre 1994.

Pour faciliter l'évaluation de la valeur marchande de l'augmentation des fonds propres, divers groupes d'émissions, décrits au tableau 6, ont été composés. Un premier groupe comporte 35 émissions d'entreprises qui sont en faillite ou dont les transactions en bourse ont été suspendues à la suite de difficultés financières. Ces émissions ont provoqué une perte d'opportunité de 186,87 millions de $ qui représente la valeur des émissions, accumulée au taux de rendement de l'indice des titres de faible capitalisation (*Small Caps*).

Pour les entreprises rachetées et celles qui sont toujours transigées, une classification arbitraire a été établie. Elle repose sur le calcul du prix d'émission ajusté (P_{ea}) pour les variations de l'indice des titres de petite capitalisation. Le P_{ea} est donné par l'expression suivante lorsque le titre est toujours transigé au 31 décembre 1994:

$$P_{ea} = PE \frac{\textit{Indice S.C. à la date du rachat}}{\textit{Indice au jour d'émission}}$$

Le P_{ea} est donc la valeur, au 31 décembre 1994, d'un montant égal au prix d'émission brut, accumulé au taux de rendement de l'indice *Small Caps*. L'indice de rendement total a été utilisé ici, après avoir constaté l'absence de dividendes versés par les entreprises de cette catégorie.

Dans le cas où un titre est toujours transigé, une simple comparaison entre le prix de fermeture au marché et le P_{ea} du titre correspondant permet d'évaluer la performance relative à celle de l'indice. Lorsque le titre a fait l'objet d'un rachat au cours de la période d'analyse, le montant reçu par les actionnaires au moment de la transaction

est accumulé au taux de rendement de l'indice sous l'hypothèse que les actionnaires réinvestissent le produit du rachat au taux du marché pertinent pour la classe de risque. On obtient ainsi le MRA (montant reçu par les actionnaires, ajusté).

L'émission est considérée comme un succès si elle se transige à un cours supérieur au P_{ea} ou si le MRA est supérieur au P_{ea}. Elle est considérée comme un échec si son prix de fermeture en décembre 1994 (ou le MRA) est inférieur à 20 p. cent du P_{ea}.

Un total de 34 émissions ont été rachetées, fusionnées ou échangées. Dans 11 cas, le montant reçu par les actionnaires a été supérieur au P_{ea}: les actionnaires ont réalisé un gain d'opportunité de 69,74 millions de $. Dans tous les autres cas, le rachat a provoqué une perte d'opportunité évaluée à 54,28 millions de $.

Les 114 émissions toujours transigées en décembre 1994 comprennent 27 cas de « succès » qui ont provoqué un gain d'opportunité de 415,36 millions de $. Cependant, ce montant est très fortement influencé par quelques observations. Breuvage Cott (68,4 millions de $), IAF Biochem (76,4 millions de $) ainsi que Mux Lab (44,5 millions de $) sont responsables de 189,30 millions de $ de gains pour les investisseurs, soit 45,50 p. cent du total des gains mesurés. Dans le cas des rachats, Aligro représente à elle seule 22,3 des 69,74 millions de $ de gain.

Les émissions qui peuvent être considérées comme des succès parce que leur rendement a été supérieur à celui de l'indice ne représentent que 20,7 p. cent des émissions. 21,9 p. cent des émissions se transigeaient au 31 décembre 1994 à un prix inférieur à 20 p. cent du prix d'émission. Ensemble, les émissions de cette catégorie ont donc provoqué des pertes d'opportunité estimées à 217,66 millions de $. A la date de l'évaluation, 45 émissions se transigent (ou ont été rachetées) à des prix inférieurs à 20 p. cent du P_{ea}.

L'analyse présentée ici donne une idée fausse de la performance réelle des titres émis, en raison de la présence du crédit d'impôt. Si on ne tient pas compte de ces crédits, la perte d'opportunité s'élève à 745,79 millions de $ pour l'ensemble des émissions de la catégorie, puisque la valeur accumulée des produits bruts est de 1894,44 millions de $ au 31 décembre 1994. Ces émissions se transigent donc, après un intervalle de temps variant de 4 à 12 ans, à 57,48 p.cent de leur valeur initiale.

L'observation, au cours des trois à cinq premières années, d'un rendement relativement faible des émissions initiales n'est pas spécifique aux actions émises dans le cadre du RÉAQ. Dans divers pays, incluant les États-Unis, les portefeuilles composés d'émissions initiales ont, en moyenne, réalisé des rendements significativement moindres que ceux de titres équivalents (Laughram et Ritter,1995). Jog et Srivastava (1995) montrent que cette

situation prévaut également au Canada. Le rendement des émissions initiales effectuées à la Bourse de Toronto, de 1984 à 1992, aurait été de -52,24 p. cent après les quatre premières années, alors que l'indice TSE 300 progressait de 28,05 p. cent. Après 72 mois, le rendement cumulé des émissions initiales était de 14,18 p. cent et celui de l'indice de 40,71 p. cent. Le rendement excédentaire cumulé est de l'ordre de -24,72 p. cent après 72 mois. Les émissions REAQ semblent donc montrer une performance plus médiocre que celle observée en Ontario. Cependant, pour rendre les valeurs comparables, il convient d'isoler les émissions initiales.

2.2.2 Les émissions initiales des entreprises de petite taille

Les émissions initiales ont impliqué des montants moyens de 6,28 millions de $[15]. Il s'agit d'émissions de très petite taille par rapport aux standards nord-américains. En effet, aux États-Unis, les 1 798 émissions initiales réalisées entre 1983 et 1985 ont rapporté, en moyenne, 13,94 millions de $ américains (Young et Zaima, 1988). En Ontario, la taille moyenne des 154 émissions initiales de la période 1984-1992, employées par Riding et Srivastava (1995) est de 36,9 millions de $.

Le résultat de l'analyse des émissions initiales apparaît au Volet B du tableau 6. Il est surprenant de constater qu'en moyenne, les émissions initiales affichent une performance supérieure à celle des émissions secondaires de taille comparable. En effet, les 154 émissions initiales ont provoqué, ensemble, une perte d'opportunité de 11,96 millions de $, en tenant compte du crédit d'impôt. Toutefois, lorsque ce crédit est négligé, la perte d'opportunité s'établit à 416,21 millions de $, ce qui correspond à 43 p.cent du produit brut. Le rendement excédentaire cumulé sur l'ensemble de la période est donc de l'ordre de -43 p.cent. Même si les indices et les périodes de calcul des rendements employés dans les deux études ne correspondent pas parfaitement, il semble que les rendements des nouvelles émissions RÉAQ aient été largement inférieurs à ceux des émissions ontariennes réalisées au cours de la même période. Le crédit d'impôt a partiellement compensé cette faible performance mais les investisseurs ont cependant subi une importante perte d'opportunité.

2.3 Les investisseurs et les entreprises de taille moyenne

L'exercice de classement mené pour les entreprises de petite taille a été reproduit pour ce groupe d'entreprises. Les résultats apparaissent au volet A du tableau 7. Sur la base du critère suivant lequel le titre est acheté ou négocié à un prix supérieur au cours d'émission ajusté pour la variation de l'indice, 30 des 93 observations (soit

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[15] En réalité, les montants totaux peuvent être légèrement supérieurs, puisque seuls sont pris en compte les montants placés au Québec. Toutefois, dans le cas des entreprises de petite taille, le pourcentage des fonds placés au Québec atteint généralement 100 p. cent.

32 p. cent) peuvent être considérées comme des succès. Le groupe des compagnies dont les titres se transigent à un prix supérieur au P_{ea} a généré des gains de 380,98 millions de $. Ces gains sont dus seulement à quelques entreprises: Vidéotron (59,3 millions de $), Québécor (102,86 millions de $), Mémotec Data (36,2 millions de $) et Télé-Capitale (33,7 millions de $). À elles quatre, ces entreprises accaparent 232,06 millions de $ des gains totaux. Cette situation est identique à celle qui prévaut dans la catégorie des petites entreprises. Elle requiert des précautions lors de l'emploi et de l'interprétation des valeurs moyennes. Si l'ensemble des émissions de cette catégorie a généré un gain évalué à 116,49 millions de $, il n'en demeure pas moins que les deux tiers des investisseurs qui se sont intéressés à cette catégorie d'actions ont subi des pertes d'opportunité.

Il faut par ailleurs souligner que le gain qui apparaît ici est entièrement imputable aux crédits d'impôt. En effet, quand la perte d'opportunité des investisseurs est évaluée sans tenir compte du crédit, elle s'élève à 358,61 millions de $; le montant brut des émissions, accumulé au taux de l'indice *Small Caps*, est de 2131,50 millions de $ alors que la valeur des émissions au 31 décembre 1994 n'atteint que 1755,81 millions de $. Le rendement excédentaire cumulé de ce groupe d'émissions est de l'ordre de -25 p. cent, ce qui correspond approximativement au rendement de -24,72 p. cent mesuré par Jog et Srivastava (1995).

Ici encore, l'échantillon est composé d'émissions initiales et d'appels subséquents à l'épargne. Le volet B du tableau 7 présente donc les mêmes informations en ne conservant que les émissions initiales appartenant à ce groupe de taille. Les 46 émissions initiales impliquaient des montants moyens (placés au Québec) de 15,02 millions de $. Elles ont globalement procuré un gain d'opportunité de 91,69 millions de $ lorsque le crédit d'impôt est pris en compte. Comme dans le groupe des petites entreprises, les émissions initiales ont réalisé, en moyenne, une performance supérieure à celles des émissions subséquentes. Cependant, lorsque le crédit est omis afin d'évaluer la performance réelle des titres, la perte d'opportunité s'établit à 141,74 millions de $, ce qui représente 20,51 p. cent des montants initialement émis. Ce groupe d'émissions initiales aurait donc réalisé une performance légèrement supérieure à celle observée en Ontario.

Insérer ici le tableau 7

2.4 Conclusion

Dans l'ensemble, les titres émis dans le cadre du RÉAQ semblent être de mauvaise qualité. Si les crédits reçus par les investisseurs ne sont pas pris en compte, la perte de valeur des émissions réalisées par les entreprises de petite taille s'établit à 578,48 p. cent des montants initialement émis, alors que la perte est de 25 p.cent pour les émissions effectuées par les entreprises dont l'actif se situait entre 25 et 250 millions de $. Le crédit accordé n'a que partiellement compensé ce faible rendement dans le cas des petites entreprises et a permis un gain minime

dans le groupe des entreprises de taille moyenne. Toutefois, la majeure partie des gains provient d'un sous-ensemble fort restreint d'entreprises et il est probable que la très grande majorité des investisseurs attirés par le RÉAQ et incapables de diversifier largement leur portefeuille en raison des limites imposées a subi des pertes importantes. Ces pertes expliquent vraisemblablement la désaffection des contribuables qui se traduit à la fois par la baisse des déductions réclamées et par celle des émissions admissibles.

3 Le RÉAQ et les entreprises

Sans être clairement mentionné dès le lancement du programme, l'objectif de la capitalisation des entreprises est apparu de plus en plus nettement au fil des discours et des modifications apportées au programme. Il existe plusieurs façons d'étudier dans quelle mesure le programme a, sur ce plan, atteint ses objectifs. Il est possible d'analyser la réduction du coût des émissions initiales pour les entreprises et l'augmentation du nombre et de l'importance des premiers appels publics à l'épargne. C'est l'objectif de la première section. Il est également possible de mesurer directement l'impact du programme sur la structure financière des entreprises. La deuxième section est consacrée à cette question. Enfin, on peut procéder, par étude de cas, au rapprochement des montants recueillis dans le cadre du programme et de l'évolution des entreprises. Cette dernière méthode est utilisée pour terminer dans la troisième et dernière section.

3.1 Vue d'ensemble

La réduction des coûts d'émission

L'une des raisons invoquées lors de la mise en place du programme était le coût élevé des premiers appels publics à l'épargne. Ce coût a trois composantes, soit la rémunération du courtier, les frais divers (analyse, prospectus) et la sous-évaluation initiale (SEI) du prix des titres. Cette sous-évaluation, mise en évidence dans la plupart des pays, décrit l'ajustement à la hausse des cours lors des premiers jours de transaction. Elle est considérée comme un coût pour l'émetteur, puisque celui-ci ne reçoit pas la totalité de la valeur qu'attribue le marché à ses titres. Le tableau 8 permet de comparer ces diverses composantes des coûts d'émission, pour des échantillons d'émissions initiales réalisées entre 1979 et 1985 en Ontario et dans le cadre du RÉAQ. Les coûts moyens apparaissent par catégorie de taille, puisque celle-ci est un déterminant important des coûts d'émission[16].

[16] Voir Suret & al. (1990) pour une étude complète de l'impact du RÉAQ sur les coûts d'émission. Une étude récente de Jog et Srivastava (1995) montre cependant que la sous-évaluation initiale a diminué, en Ontario, tout au long de la périodé 1984-1992. L'impact réel du RÉAQ sur ce phénomène demanderait donc une analyse plus complète.

Le tableau 8 montre que le RÉAQ n'a pas eu d'effet sensible sur la rémunération des courtiers ni sur les autres frais, qui restent similaires au Québec et en Ontario. Cependant, la sous-évaluation initiale a totalement disparu pour les émissions québécoises d'un montant supérieur à 5 millions de $. Lors des émissions les plus importantes, les titres semblent émis avec une prime de l'ordre de 4 à 6 p. cent. En Ontario au contraire, la sous-évaluation persiste. L'écart entre les deux provinces est particulièrement net dans le cas des émissions comprises entre 1 et 2 millions de $ qui, en Ontario, subissent une sous-évaluation moyenne de 30 p. cent qui n'existe pas dans le cadre du RÉAQ. En moyenne, la sous-évaluation a disparu au Québec alors qu'elle est de l'ordre de 12,66 p. cent en Ontario. Cette situation a vraisemblablement contribué à augmenter le nombre des appels initiaux à l'épargne.

Insérer ici le tableau 8

L'augmentation du nombre des émissions initiales

Le RÉAQ semble avoir provoqué un accroissement temporaire, mais réel, des émissions initiales et inscriptions en Bourse tel qu'illustré au tableau 9. Le nombre de nouvelles sociétés inscrites en Bourse a été de 40 entre 1979 et 1982 à Montréal; il a été de 175 au cours de la même période à Toronto. Le rapport entre ces deux quantités est de 23 p. cent. Entre 1983 et 1987, période d'expansion du régime, le rapport entre le nombre d'inscriptions nouvelles (Montréal/TSE) passe à 76 p. cent; il retombe cependant à 33 p. cent après 1987. Une évolution parallèle est observée en ce qui concerne les émissions initiales. Leur nombre est en effet passé de 1 à 2 par année, entre 1979 et 1982, à 83 pour la seule année 1986. Les nouvelles émissions ont été deux fois plus nombreuses au Québec qu'en Ontario en 1985. Cette stimulation des nouvelles émissions a cependant été temporaire. En effet, on n'observe que 32 premiers appels publics à l'épargne réalisés dans le cadre du régime de 1989 à 1992. L'une de ces émissions est due à Air Canada et l'autre à un fonds RÉAQ. Pour ce qui est du financement par capital-actions des entreprises de petite taille, le RÉAQ n'a donc eu qu'un effet temporaire. La performance médiocre de très nombreux titres de la catégorie des entreprises en voie de développement explique vraisemblablement la rareté actuelle des nouvelles émissions[17].

[17] La dispersion des gains et pertes d'opportunité est importante, et il est intéressant de relier l'évolution des cours, qui conditionne des montants, aux caractéristiques des émissions ainsi qu'à leur contexte économique et financier. Ces travaux sont en cours par ailleurs, et les résultats n'ont pas été rapportés en détail afin de conserver à ce document une dimension acceptable. Il semble acquis que la taille des émissions et des entreprises, le secteur d'activité ainsi que l'âge des entreprises émettrices permettent, dans une certaine mesure, d'expliquer les différences entre les évolutions des titres sur le marché secondaire. Cependant, il semble exister des effets d'interaction importants entre ces variables, qui rendent l'analyse complexe en raison de la taille réduite des

Insérer ici le tableau 9

3.2 L'utilisation des fonds

L'objectif principal du programme, vis-à-vis des petites et moyennes entreprises, était clairement l'amélioration du capital permanent. L'atteinte de cet objectif peut être évalué de deux façons. Il est possible d'étudier l'utilisation du produit net, qui apparaît au prospectus. Il est également possible d'analyser les caractéristiques des entreprises, avant et après l'émission. Ces deux méthodes ont été employées.

L'utilisation du produit de l'émission

Les fonds prélevés dans le cadre du RÉAQ ont été partiellement capturés par les intermédiaires financiers. Une étude antérieure (Suret et al, 1990) a montré que les frais et la rémunération des courtiers avaient absorbé environ 10,64 p. cent du produit brut des émissions.

L'utilisation moyenne du produit net, prévue par les émetteurs, apparaît ci-dessous[18]. Plus du tiers des fonds a été consacré au remboursement de dettes. L'effet immédiat a donc été, vraisemblablement, l'amélioration de la capitalisation.[19] Seulement 35,2 p. cent des fonds ont été investis directement, et cette proportion passe à 42,9 p. cent si l'on incorpore les dépenses de R&D. La proportion des fonds consacrée au rachat d'actions existantes est minime. Cela est en partie imputable au fait que le gouvernement a sévèrement limité cette possibilité à partir de 1987.

échantillons.

[18] Les tests qui ont été effectués ne mettent pas en évidence d'écart systématique entre l'utilisation prévue et l'emploi réel des fonds. L'utilisation prévue est présentée ici parce que les données peuvent être plus facilement obtenues que dans les cas des emplois réels.

[19] Les intermédiaires financiers sont donc vraisemblablement les premiers bénéficiaires du programme. Il a en effet permis le remboursement de dettes, donc la consolidation de la position des prêteurs pour les emprunts subsistants.

Répartition, en pourcentage, des fonds recueillis par les entreprises de petite taille dans le cadre du RÉAQ

Investissement	35.24
R&D	7.65
Remboursement	34.38
Rachat	2.48
Fonds de roulement	20.45

A priori, les émissions RÉAQ aurait donc dû améliorer sensiblement la capitalisation des petites entreprises émettrices. Il reste cependant à déterminer dans quelle mesure cet accroissement a été durable.

3.3 L'amélioration de la capitalisation des entreprises

Une recherche antérieure (St-Pierre et Beaudoin, 1996) a étudié la variation de l'endettement des entreprises québécoises lors des appels initiaux à l'épargne. Cette étude montre que le ratio d'endettement a retrouvé, après deux ans, le niveau qui prévalait avant l'émission. Le passif à court terme diminue également lors de l'émission et s'accroît ensuite, sans retrouver toutefois son niveau antérieur. Au total, l'effet des émissions initiales sur l'endettement serait donc peu important. Par ailleurs, cette étude met en évidence une réduction importante des ratios moyens et médians de rentabilité après l'émission. L'analyse menée ici diffère de l'étude de St-Pierre et Beaudoin sous plusieurs aspects. En premier lieu, nous nous intéressons ici à l'ensemble des émissions RÉAQ, qu'il s'agisse ou non d'émissions initiales. Lorsqu'une entreprise procède à plusieurs émissions, elle se trouve donc incluse dans l'échantillon à plusieurs reprises[20]. En second lieu, le nombre d'observations a été tenu constant afin d'éviter tout biais de survivance.[21] Troisièmement, l'analyse de la situation post-émission a été

[20] Le cas particulier des émissions multiples, qui concerne surtout les entreprises de taille moyenne, est analysé séparément dans la section consacrée à ces entreprises. Une analyse approfondie de ces entreprises est disponible par ailleurs (Suret et Cormier, 1996b).

[21] L'étude de St-Pierre et Beaudoin porte sur 106 émissions, mais il ne subsiste plus que 77 observations 2 ans après l'émission. Il est vraisemblable que les observations ainsi perdues correspondent aux titres délistés, le plus souvent en raison de difficultés financières. Éliminer ces observations revient à sous-évaluer le ratio d'endettement moyen suivant l'émission, les entreprises omises étant vraisemblablement les plus endettées. Pour éviter ce problème, les règles de décision suivantes ont été appliqués. Lorsque l'entreprise a été délistée en raison de difficultés financières importantes ou a été liquidée, le ratio d'endettement est évalué à 100 p. cent et les taux de rendement sont nuls. Lorsque la situation précise de l'entreprise émettrice n'a pu être déterminée avec précision ou lorsque les titres ont été rachetés, l'observation est omise de l'échantillon.

allongée à quatre années afin d'évaluer les effets à moyen terme. Finalement, nous avons procédé à des tests statistiques non paramétriques pour comparer les distributions de fréquence des principales variables avant et après l'émission.

Les principales données comptables ont été relevées, pour chacune des émissions, dans les prospectus, les états financiers et, pour quelques entreprises, dans les bases de données *CANCORP* et *Stock Guide*[22]. Les principaux postes du bilan et de l'état des résultats ont été relevés et standardisés. Quatre ratios sont analysés ici. Il s'agit du ratio de la dette à long terme à l'actif total (ratio de dette long terme), du ratio de la dette totale à l'actif (ratio de dette totale), du taux de rendement de l'avoir des actionnaires (ROE) et du taux de rendement de l'actif (ROA). Ces ratios ont été évalués pour les exercices financiers -1 à +4, l'exercice 1 étant celui au cours duquel les montants des émissions sont incorporés au bilan. Le temps 0 correspond donc au dernier exercice financier précédant l'émission. Le nombre d'observations disponibles diminue avec les années, pour plusieurs raisons. Plusieurs entreprises ont été retirées de la Bourse, en raison de problèmes financiers, alors que d'autres sont redevenues privées à la suite du rachat de leurs propres titres ou ont été acquises. Finalement, il est impossible d'analyser l'évolution à moyen terme des émissions les plus récentes. Le relevé a été effectué pour 268 émissions, dont seulement 192 peuvent faire l'objet d'analyses au cours de 4 exercices financiers consécutifs. 173 émissions peuvent être étudiées jusqu'à l'année +3 alors que l'échantillon qui permet l'étude jusqu'à l'exercice financier +4 ne comporte que 147observations. L'essentiel de l'analyse est basé sur cet échantillon, mais des résultats comparables sont présentés pour les deux autres échantillons. Il est en effet important d'analyser l'effet sur les résultats des entreprises qui disparaissent de la Bourse peu de temps après l'émission.

L'endettement

Le tableau 10 rapporte les principales caractéristiques des distributions des quatre ratios calculés, pour chacune des années relatives à l'émission et pour chacun des échantillons. Le volet A regroupe les résultats obtenus à l'aide de l'échantillon le plus nombreux, qui limite cependant la période d'observation à une seule année après celle où l'émission est incorporée. Les émissions ont évidemment pour effet de réduire l'endettement des entreprises, dont la médiane passe de 0,63 à 0,49 p.cent. Le ratio de la dette à long terme est également réduit de 0,17 à 0,14 p.cent. Cependant, ces deux ratios recommencent à s'accroître dès l'année +2. Le ratio de la dette totale à l'actif passe à 0,53 p.cent et celui de la dette à long terme dépasse, dès l'année 2, son niveau antérieur

[22] *CANCORP* est élaborée par *Disclosure Inc.* Bethesda, MD 20816, USA et diffusée au Canada par la Société Nationale d'information (Montréal). *Stock Guide* est élaborée et diffusée par Stock Guide Publications Inc, Williamston, Ont, KOC 2J0.

à l'émission.

Le volet B, qui regroupe les observations tirées de l'échantillon de 173 observations suivies durant cinq exercices, confirme la croissance de l'endettement après les émissions, qui est du même ordre que celle observée pour les seuls apeels initiaux à l'épargne par St-Pierre et Beaudoin (1996). Le changement d'échantillon n'affecte pas les ratios médians ni les moyennes. L'exclusion des entreprises délistées ne semble donc pas avoir d'impact important sur les résultats.

Finalement, les ratios présentés au volet C confirment la remontée lente mais constante de l'endettement moyen et médian des entreprises émettrices. L'endettement à long terme est, en particulier, sensiblement plus élevé après l'émission qu'avant: sa médiane s'établit à 21 p.cent contre 17p.cent avant l'émission. Les valeurs moyennes sont respectivement de 34 p.cent et 17 p.cent. Elles sont cependant affectées par quelques valeurs extrêmes.

L'existence de telles valeurs requiert l'analyse des distributions, présentée au tableau 11. On y observe l'évolution de la distribution de fréquence des ratios de la dette totale à l'actif pour les six exercices financiers entourant l'émission. L'année 0 est l'occasion d'un déplacement de l'ensemble de la distribution vers les valeurs les moins élevées. Ensuite, l'augmentation de l'endettement se traduit par un glissement de la distribution vers son niveau antérieur à l'émisssion. Toutefois, il semble exister encore une différence entre les distributions à l'année 4 et à l'année 0. Le test de la différence de ces deux distributions (après regroupement des classes à faible effectif) donne une valeur du chi carré de 14,17 avec 9 degrés de liberté. L'hypothèse de similitude des deux distributions ne peut donc être rejetée au seuil habituel de 5 p.cent; elle ne peut l'être qu'au seuil de 10 p.cent environ.

L'examen des distributions à l'année 5, qui n'ont pas été rapportées en raison de la baisse importante du nombre d'observations, montre que toute différence statistique entre les distributions des ratios de la dette totale à l'actif avant et après l'émission a disparu. L'effet des émissions RÉAQ sur la capitalisation des entreprises de taille petite et moyenne (moins de 250 millions d'actif) a donc été réel, mais temporaire. Trois ans après l'émission, il n'existe plus de différence statistique significative (au seuil conventionnel de 5%) entre les distributions des ratios d'endettement des 147 observations disponibles.[23] La lente augmentation de l'endettement est

[23] L'échantillon analysé ici comporte 12 cas d'entreprises qui ont procédé à des émissions multiples au cours de la période d'analyse. Il est donc possible que l'évolution de l'endettement soit affectée, après la première émission, par les montants recueillis lors des émissions subséquentes. Pour vérifier l'ampleur du phénomène, l'ensemble des calculs a été reproduit en éliminant les émissions suivies d'un second appel à l'épargne au cours

vraisemblablement liée à la faible rentabilité des enteprises, analysée dans la section suivante. En effet, il existe au Canada une relation inverse significative entre la rentabilité et le recours à l'endettement (Suret et L'Her, 1996). Si elle a été surtout mise en évidence à l'aide d'échantillons de grandes entreprises, cette relation peut vraisemblablement être vérifiée au niveau des entreprises de plus petite taille. Cette hypothèse conduit donc naturellement à l'analyse de la rentabilité des entreprises émettrices.

Insérer ici les tableaux 10 et 11

La rentabilité

L'effet le plus net des émissions RÉAQ sur les entreprises est sans doute la réduction importante et durable des taux de rendement de l'avoir et de l'actif. Un retour à la partie droite du tableau 10 (volet C) montre que le ROE médian passe de 25 p.cent au temps 0 à 12 p.cent lors de l'incorporation de l'émission. Il ne s'agit pas du simple effet arithmétique lié à l'augmentation des fonds propres. En effet, le ROE médian continue de décroître, pour se situer à 9 p. cent à l'exercice 4. Des évolutions similaires apparaissent aux volets A et B; la réduction de la rentabilité des entreprises émettrices ne peut donc être attribuée à des effets d'échantillon. Il faut en effet souligner que les entreprises les moins rentables ont déjà généralement disparu 3 ans après l'émission. L'évolution de la rentabilité de l'actif est également fort claire. La médiane de la distribution de ce ratio passe de 7 p.cent avant l'émission à 2 p.cent à l'année 4.[24]

Le volet B du tableau 11 illustre l'évolution de la distribution du taux de rendement de l'avoir des actionnaires. Avant l'émission, moins de 10 p. cent des entreprises rapportaient des taux de rendement négatifs, synonymes de pertes. La proportion est 28,57 p.cent à l'année 4. À l'autre extrémité de la distribution, la proportion d'entreprises qui rapportaient des ROE supérieurs à 30 p.cent est passée de 40,8 p.cent avant l'émission à 5,4

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de la période d'étude. Les résultats obtenus en omettant les 15 émissions concernées ne diffèrent pas de façon importante de ceux présentés et n'ont donc pas été rapportés. Par exemple, pour l'échantillon de 147 observations, la médiane de la distribution du ratio d'endettement à l'année +4 passe de 0,55 à 0,577 alors que la moyenne passe de 0,68 à 0,698.

[24] Il s'agit du taux de rendement net, c'est-à-dire calculé sur la base du bénéfice net, avant postes extraordinaires. Compte tenu du changement de structure de financement, un taux de rendement avant intérêt et impôts aurait été préférable. Une proportion importante des entreprises qui composent l'échantillon ne rapportant pas les intérêts, le calcul du bénéfice avant intérêts et impôts est impossible. On peut cependant supposer que la réduction des taux de rendement bruts a été encore plus marquée que celle des taux de rendement nets, en raison de la réduction des charges financières dues à l'endettement.

p.cent à l'année 4. Après regroupement des classes des distributions, la valeur du chi carré de 90,89 (avec 9 degrés de liberté) permet de rejeter l'hypothèse d'égalité des distributions aux temps -1 et +4 au seuil de 1 pour 1000. Il est clair que la distribution des taux de rendement ne montre aucun signe de redressement qui pourrait faire croire à un déséquilibre temporaire imputable aux émissions. La réduction de l'effet de levier peut en partie expliquer ce déclin, mais il faut trouver ailleurs l'explication de ce phénomène. En effet, la réduction de l'endettement a été temporaire, relativement peu importante à moyen terme et ne pourrait expliquer la réduction du ROA. L'explication la plus plausible de la réduction significative et durable du taux de rendement de l'avoir est que les entreprises émettrices ne disposaient pas, au moment de l'émission, de projets dont le taux de rendement était supérieur au coût de capital. Elles ne faisaient donc pas face, en moyenne, à un réel problème de financement, défini comme étant l'impossibilité de financer des projets rentables. Ce résultat paraît important. En effet, il tendrait à démontrer que le RÉAQ n'a pas contribué à diriger des fonds vers des applications rentables mais, au contraire, vers des projets dont le taux de rendement était si faible qu'ils n'auraient pas dû être financés.

3.4 Quelques cas particuliers

L'analyse de la section précédente porte exclusivement sur les entreprises dont l'actif est inférieur à 250 millions de $. Si elle permet une vue d'ensemble des émissions, elle cache d'importantes disparités. Elle est en outre limitée par le fait que plusieurs entreprises ont, au cours de la période étudiée, dépassé les limites de taille qui séparent, arbitrairement, les catégories. Finalement, il devient difficile d'analyser de façon indépendante des séries de trois, quatre ou cinq émissions effectuées par la même entreprise. Ces diverses raisons ont conduit à procéder à l'étude cas par cas des entreprises de taille moyenne et grande qui ont eu recours le plus souvent au programme. Il s'agit de dix entreprises dont l'actif total est passé, au cours de la période, de 1,7 a 25,1 milliard de $. Leur liste apparaît au tableau 12. Ces entreprises québécoises ont émis des actions dans le cadre du RÉAQ à au moins trois reprises, ce qui a justifié leur sélection dans cet échantillon. Le total des émissions dépasse 1,22 milliard de $, mais le montant effectivement placé au Québec est de 752 millions de $. Il reste à déterminer si les fonds ainsi souscrits ont eu un effet important sur la croissance de ces entreprises.

Pour chacune des entreprises, les principales données comptables ont été relevées à l'aide des prospectus et des rapports annuels. Le tableau 12, qui récapitule ces données, rapporte l'actif et les fonds propres au début et à la fin de la période d'analyse, la variation dans les fonds propres et les dividendes ordinaires versés. Le rapport des fonds obtenus des émissions RÉAQ à la variation des fonds propres a été calculé, de même que le rapport entre les dividences versés et les fonds prélevés dans le cadre du régime.

Le tableau 12 illustre la grande variété des situations des entreprises, qui peuvent être divisées en deux groupes.

Dans le premier se trouvent des entreprises qui, au cours de la période d'étude, ont versé sous forme de dividendes des montants approchant, ou dépassant, celui obtenu des émissions RÉAQ. Il s'agit de Donohue, dont les dividendes représentent 194,38 p.cent des fonds RÉAQ placés au Québec, Bombardier (126,21 p.cent), UAP (121,11%), Québécor (78,76 p.cent), Mémotec Data-Téléglobe (55,72 p. cent) et Gaz Métropolitain, pour lequel nous n'avons pu relever les dividendes que pour la période 1979-1982. Le pourcentage de 89,42 p.cent qui lui est attribué, bien que rapporté aux seules émissions de la période, sous-estime vraisemblablement l'importance relative des distributions. Ensemble, ces entreprises ont versé 410,80 millions de $ sous forme de dividendes et émis pour 388 millions de $ d'actions auxquelles était attaché un crédit d'impôt. Il semble donc difficile de prétendre que le programme ait pu jouer un rôle important dans la croissance de ces entreprises. En l'absence de celui-ci, il aurait suffi de réduire le versement des dividendes pour disposer des fonds requis par la croissance.

Insérer ici le tableau 12

Un second groupe est composé d'entreprises qui ont versé peu de dividendes et qui semblent avoir utilisé les fonds pour augmenter leur capitalisation. Il s'agit de Cascades, du Groupe Transcontinental GTC, de Métro-Richelieu et de Tembec. Ce n'est que pour ce sous-ensemble d'entreprises que l'on peut défendre que le programme ait pu avoir un impact sur la croissance. Cet impact peut être mesuré en exprimant les fonds émis en pourcentage de la variation nette des fonds propres. Cette mesure est une estimation de l'importance relative des émissions RÉAQ dans l'augmentation de la capitalisation. Ce pourcentage varie de 10,37 p.cent, dans le cas de Québécor, à 42,29 p.cent dans le cas de Tembec.

Cette analyse sommaire montre que la situation des entreprises de grande taille face au régime est fort diverse. Il est difficile de tirer des conclusions générales de cet exercice, mais il semble clair que le programme a été superflu pour la majorité des entreprises étudiées ici, puisqu'elles ont été en mesure de distribuer aux actionnaires des montants supérieurs à ceux prélevés au Québec dans le cadre du programme. Pour trois des entreprises qui ont versé peu de dividendes ordinaires, les fonds obtenus lors d'émissions RÉAQ représentent environ 20 p. cent de l'augmentation des fonds propres. Dans un seul cas (Métro-Richelieu), les fonds RÉAQ représentent une part importante de la variation des fonds propres (42,29 p.cent). Toutefois, dans ce cas précis, l'augmentation relativement faible des fonds propres est lié aux faibles bénéfices de la période 1986-1990 (1,69 millions de $ en moyenne par année).

L'étude des entreprises qui ont le plus largement profité du RÉAQ ne semble pas mettre en évidence le caractère essentiel du programme pour financer la croissance. Il est possible qu'il ait eu un impact important pour quelques

entreprises, mais la majorité de celles analysées auraient pu disposer de fonds équivalents simplement en réduisant leurs dividendes. Ces observations rapportées ici recoupent celles obtenues par SECOR (1986) lors d'une étude par questionnaire. Les dirigeants d'entreprises dont l'actif dépassait 25 millions de $ répondaient, dans une proportion de 67 p. cent, qu'en l'absence du RÉAQ, la croissance de leur entreprise aurait été identique ou seulement affectée de façon très légère. Seulement 22 p.cent des répondants ont mentionné que leur croissance aurait été nulle ou considérablement affectée.

Cette étude de cas devra être poursuivie car plusieurs questions n'ont pas été abordées. En particulier, il semble que pour plusieurs entreprises les fonds prélevés lors d'émissions RÉAQ aient permis des investissements à l'étranger ou encore des modernisations qui n'ont pas eu d'effets positifs sur l'emploi au Québec. Il conviendra également de tenir compte des multiples facettes de l'intervention des gouvernements qui, au cours de la période étudiée, ont également accordé des subventions et des crédits d'impôt aux entreprises. Ce travail dépassait cependant le cadre de la présente étude.

3.5 Les très grandes entreprises

Bien qu'elles soient à l'origine d'une part très importante des crédits accordés dans le cadre du RÉAQ, les très grandes entreprises ne font pas l'objet d'analyses particulières dans le cadre de cette étude. La capitalisation boursière de la plupart de ces entreprises dépassait le milliard de $ au milieu de la période d'étude.[25] L'argument des difficultés de financement ne peut être invoqué pour aucune de ces entreprises et l'étude de l'effet du régime sur leur endettement serait sans signification. Les seuls objectifs visés en rendant admissible au programme les actions de ces entreprises étaient la réduction du fardeau fiscal et l'accroissement de la part de l'épargne détenue sous forme de capital-actions. Le niveau d'atteinte de ces deux objectifs a été discuté par ailleurs.

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[25] Les principales entreprises qui ont bénéficié du programme sont les suivantes (capitalisation boursière au 31 décembre 1987, en milliards de $): Entreprises Bell Canada (10,5), Canadian Pacifique (6,18), Alcan Aluminium (5,9), Banque Royale (4,1), Banque de Montréal (3,1), Consolidated Bathurst (2,03), Banque Nationale (1,36), Power Financière (1,3).

4 Conclusion

Le RÉAQ visait de multiples objectifs, dont l'un au moins a été atteint. Il s'agit de la réduction du fardeau fiscal des contribuables, qui ont bénéficié de crédits estimés à près d'un milliard de $. Il semble cependant exister des moyens moins complexes de réduire l'impôt des particuliers. La détention d'actions par les québécois a augmenté mais, compte tenu de la qualité d'une partie des titres émis dans le cadre du programme et des pertes encourues par plusieurs contribuables, il est possible que cet accroissement revête le caractère temporaire observé au niveau des émissions initiales. Celles-ci, tout comme les nouvelles inscriptions en Bourse, ont retrouvé le niveau (relatif à celui de Toronto) qui prévalait avant la mise en place du programme.

La stimulation de l'entrée en Bourse d'entreprises de petite taille au moyen de crédits d'impôt semble être un échec. Une proportion très faible des corporations qui ont émis des titres dans le cadre du programme a connu le succès, si l'on accepte comme critère une performance boursière supérieure à celle de l'indice. La proportion de faillite et de perte importante de valeur a été particulièrement élevée parmi les entreprises de petite taille, dont les émissions ont perdu plus de 42 p.cent de leur valeur initiale. L'analyse de l'endettement des entreprises montre que l'amélioration de la capitalisation n'a été que temporaire. Après trois ans, la distribution des ratios d'endettement des entreprises dont l'actif était inférieur à 250 millions de $ lors de l'émission est statistiquement la même que celle qui prévalait avant les émissions. L'observation la plus troublante est vraisemblablement la baisse importante de la rentabilité de l'avoir et de l'actif des entreprises émettrices, qui persiste trois ans après l'émission. L'explication la plus plausible de cette situation est que les entreprises ne disposaient pas de projets rentables à financer à l'aide des émissions RÉAQ. L'étude détaillée des quelques entreprises de plus grande taille qui ont profité à plusieurs reprises du programme montre d'ailleurs qu'elles ont été souvent en mesure de verser à leurs actionnaires des montants égaux ou supérieurs à ceux ainsi prélevés.

Il semble donc difficile de démontrer que le RÉAQ ait pu avoir un effet durable sur la capitalisation des entreprises. Il a plutôt entraîné l'entrée en Bourse d'entreprises qui ne disposaient pas de projets dont le taux de rendement était supérieur au coût de financement. Il est vraisemblable, et normal, que ces entreprises aient éprouvé de la difficulté à financer ces projets en l'absence du programme. Par son intervention, le gouvernement a permis leur réalisation. Le résultat net est que celles des entreprises qui survivent ont maintenant des taux de rendement comptable très faibles et significativement inférieurs à ceux qui prévalaient avant les émissions. Cette faible rentabilité se traduit par des rendement boursiers décevants pour les investisseurs.

Il existe bien sûr quelques exceptions à cette description. Il est possible que certaines petites entreprises soient devenues des firmes de dimension mondiale en s'appuyant sur le RÉAQ. Quelques investisseurs ont également

réalisé des gains appréciables. Toutefois, à l'issue de l'analyse de toutes les émissions effectuées par des entreprises dont l'actif était inférieur au milliard de $, et après avoir étudié l'évolution de toutes les entreprises admissibles depuis leur première émission dans le cadre du programme, il nous est impossible de défendre que le RÉAQ ait eu un effet significatif sur la capitalisation et la croisssance des entreprises du Québec.

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Tableau 1: Montants émis dans le cadre du RÉAQ, catégorie et véhicule d'émission, limite des classes et pourcentage de déduction, 1979-1994. Seuls les montants souscrits au Québec sont comptabilisés. Les montants émis par l'intermédiaire des régimes de réinvestissement des dividendes et de souscription d'actions sont estimés à partir de 1988. Le tableau est basé sur les catégories définies suivant les règles du programme. Les montants qui découlent d'estimations apparaissent en italique.

	Importantes				Intermédiaires				En voie de développement		Autres		Total
Année	%*	Propect**	Plans***	Total	%	Propect**	Plans***	Total	%	M$	%	M$	M$
1979	100	55,41	22,90	78,31	100	17,23	4,05	21,28	100	0,00	100	9,40	109,00
1980	100	0,00	51,43	51,43	100	69,87	10,83	80,70	100	0,67	100	17,61	150,41
1981	100	0,00	157,31	157,31	100	64,68	6,58	71,25	100	9,72	100	9,45	247,73
1982	100	47,08	129,96	177,04	100	27,09	7,91	34,99	100	0,00	100	2,05	214,08
1983	100	173,00	445,38	618,38	100	74,36	9,65	84,01	100	63,15	100	0,00	765,54
1984	75	38,82	475,97	514,79	100	81,58	12,00	93,58	150	106,06	100	2,02	716,45
1985	50	243,94	459,04	702,97	100	267,70	25,00	292,70	150	261,52	100	15,59	1.272,78
1986	50	210,19	192,06	402,26	75	871,08	22,00	893,08	100	449,66	75	1,12	1.746,12
1987	50	24,14	200,28	224,42	75	104,28	21,00	125,28	100	197,03	75	6,44	553,17
1988	50	91,83	*247,02*	*338,85*	75	0,00	*8,50*	*8,50*	100	28,16	n.a.	0,00	*375,51*
1989	50	24,31	*65,39*	*89,7*	75	1,80	*0,23*	*2,03*	100	21,87	n.a.	0,00	*113,60*
1990	50	44,22	*118,95*	*163,17*	75	4,12	*0,55*	*4,67*	100	6,00	n.a.	0,00	*173,84*
1991	50	63,79	*171,59*	*235,38*	75	60,50	*7,87*	*68,37*	100	35,00	n.a.	0,00	*338,75*
1992	50	209,17	*569,67*	*778,84*	75	115,62	*15,03*	*130,65*	100	40,86	n.a.	0,00	*950,35*
1993	50	0,00	*236,14*	*236,14*	75	83,35	*10,83*	*94,18*	100	37,98	n.a.	0,00	*368,30*
1994	50	0,00	*236,14*	*236,14*	75	0,00	*8,50*	*8,50*	100	396,16	n.a.	0,00	*640,80*
Total		1225,9	*3779,23*	*5005,13*		1843,24	*170,52*	*2013,77*		1653,84		63,68	*8736,43*

Sources: Rapports Martin de 1979 à 1987; Liste des émissions de la Bourse de Montréal ensuite.

* Pourcentage de déduction accordé aux actions ordinaires de cette catégorie.

** Montant total des émissions par voie de propectus, effectivement placé au Québec, en millions de $.

*** Montants obtenus par l'intermédiaire de plans de réinvestissement et de souscription (les Plans). À partir de 1988, les montants sont estimés à l'aide des pourcentages moyens calculés au cours de la période 1979-1987. Pour les sociétés importantes, les montant souscrits par l'intermédiaire de Plans représentent 269% de ceux obtenus à la suite l'émission d'un prospectus. Le montant annuel moyen émis à l'aide de Plans de 1979 à 1987 (236,14 millions de $) a été employé lorsque les émissions par voie de propectus étaient nulles (1993 et 1994). Pour les sociétés intermédiaires, les montants obtenus à l'aide de Plans représentent 13 p.cent des montants obtenus via un prospectus. Les entreprises des deux autres catégories n'ont pratiquement pas utilisé les Plans.

Tableau 2: Déductions, nombre de participants, crédits accordés et recouvrements dans le cadre du RÉAQ, 1979-1994. À partir de 1989, les déductions et les crédits ont été estimés, puisque les déductions n'apparaissent plus dans les statistiques fiscales. Le montant total des émissions admissibles placé au Québec a été converti en déductions potentielles, en tenant compte des pourcentages de déduction attribués à chacune des catégories. Le rapport des déductions effectivement réclamées aux déductions potentielles a ensuite été estimé pour la période 1979-1988, période pour laquelle les déductions effectivement réclamées sont connues. Ce pourcentage (58 p.cent) est inférieur à 100 p.cent parce que les investisseurs institutionnels qui achètent des titres admissibles ne peuvent bénéficier des déductions. Le crédit correspondant a été calculé en multipliant par 0,25 (taux d'impôt approximatif maximal pour la période) le montant des déductions estimées nettes des recouvrements. Le montant des déductions de 1992 a été obtenu directement du Ministère du Revenu.

Année	Déductions réclamées			Recouvrement de déductions		Crédits accordés (coût du régime)
	Montants (M $)	Nombre de participants (milliers)	% des contribuables	Montants (M $)	Nombre de contribuables	
1979	49,36	14,35	0,43	s.o.	s.o.	14,70
1980	103,94	28,39	0,83	9,97	5,92	31,03
1981	120,38	33,53	0,90	2,45	1,24	36,27
1982	176,68	44,16	1,29	5,36	2,98	53,39
1983	493,58	108,56	2,89	7,51	3,60	145,19
1984	531,44	121,71	3,15	13,10	6,30	160,41
1985	706,02	155,98	3,98	16,04	8,25	193,69
1986	487,36	169,36	4,26	14,14	13,85	127,13
1987	181,65	102,33	2,49	60,02	29,80	*30,40*
1988	113,11	80,91	1,96	22,72	15,57	*22,60*
1989	*39,58*	n.d	n.d	13,80	12,61	*6,44*
1990	*52,83*	n.d	n.d	10,27	8,77	*10,64*
1991	*118,30*	n.d	n.d	7,83	6,24	*27,61*
1992	84,00	n.d	n.d	4,28	4,26	*19,93*
1993	*131,48*	n.d	n.d	4,47	3,40	*31,75*
1994	*301,95*	n.d	n.d	n.d	n.d	*75,49*
Total	3691,66			191,96		986,67

Sources: *Portrait de la fiscalité des particuliers au Québec*, Ministère du Revenu du Québec, diverses années et Rapports Martin, CVMQ, diverses années. Lorsque les deux sources ne concordaient pas, les données du Ministère du Revenu ont été utilisées. Les données estimées sont présentées en italique.

Tableau 3: Distribution de l'actif des entreprises qui ont émis des actions admissibles au RÉAQ, dans les diverses catégories définies dans l'étude

	Petites entreprises		Entreprises moyennes		Grandes entreprises		Très grandes entreprises	
Actif total lors de l'émission, en millions de $	Nombre (% des émissions)	Montants et % du produit brut	Nombre et % des émissions	Montants et % du produit brut	Nombre et % des émissions	Montants et % du produit brut	Nombre et % des émissions	Montants et % du produit brut
Moins de 3,5	41	153 670						
	(22,04%)	(12,23%)						
de 3,5 à 7	42	207 807						
	(22,58%)	(16,54%)						
de 7 à 14	51	279 462						
	(27,42%)	(22,24%)						
de 14 à 25	52	615 513						
	(27,96%)	(48,99%)						
de 25 à 50			40	475 627				
			(41,24%)	(33,07%)				
de 50 à 100			31	468 866				
			(31,96%)	(32,60%)				
de 100 à 250			26	493 954				
			(26,80%)	(34,34%)				
de 250 à 500					22	440 401		
					(56,41%)	(44,41%)		
de 500 à 1 000					15	498 452	1	31 388
					(38,46%)	(50,26%)	(4%)	(3,42%)
1 000 et plus					2	52 856	24	886 123
					(5,13%)	(5,33%)	(96%)	(96,58%)
Total*	186	1 256 452	97	1 438 447	39	991 709	25	917511

* Nous n'avons pu obtenir les montants placés au Québec (produit brut) pour 10 entreprises alors que pour 34 autres émissions, nous ne pouvions disposer de l'actif au moment de l'émission (un total donc de 44 émissions manquantes).

Tableau 4: Proportion des actions dans l'actif total et dans l'actif financier des ménages, pour quelques provinces et pour l'ensemble du Canada

Région	Valeur des actions par rapport à l'actif total		Valeur des actions par rapport à l'actif financier	
	1977	1984	1977	1984
Québec	0,8	2,3	3,8	9,2
Ontario	2,6	2,7	12,7	11,6
Colombie Britannique	1,5	2,9	5,6	13,8
Ensemble du Canada	1,7	2,2	8,5	10,0

Sources: Statistique Canada: *la répartition de la richesse au Canada*, 1984; *Revenu, avoir et dette des familles au Canada*, 1977

Tableau 5: Évolution du taux d'actionnariat au Québec, en Ontario, au Canada et aux États-Unis

	1977	1983	1984	1985	1986-87	1988
Québec	4,4	7,5	9,6	10,0	16,0	15,0
Ontario	11,4	12,3	14,9	n.d.	20,0	n.d.
Ensemble du Canada	8,5	10,0	12,0	12,0	18,0	n.d.
États-Unis	n.d.	18,5	19,6	21,8	n.d	n.d.

Sources: Statistique Canada: *la répartition de la richesse au Canada*, 1984; *Revenu, avoir et dette des familles au Canada*, 1977;
Toronto Stock Exchange: *Canadian Shareowners*, avril 1984, décembre 1986
Martin, M: *L'actionnariat au Québec en 1986*, CVMQ, août 1985, mai 1986
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Tableau 6: Récapitulation de l'état des émissions des sociétés de petite taille au 31/12/1994; l'échantillon est composé de l'ensemble des entreprises dont l'actif total était inférieur à 25 millions de $ (de 1986) au moment de l'émission (volet A) alors que le volet B ne comprend que les émissions initiales.

Situation de l'émission au 31/12/1994	Nb (1)	Produit brut des émissions (2)	Valeur de l'émission au 31/12/1994 (3)	Mise de fonds nette des investisseurs (4)	Valeur accumulée de la mise de fonds (5)	Gain ou perte d'opportunité (3) - (5)
Volet A: Entreprises de petite taille (actif inférieur à 25 millions de $)						
En faillite	35	170,42	0,00	121,05	186,87	-186,87
Rachat, MRA > P_{ea}	11	54,72	132,62	38,18	62,87	69,74
Rachat, 0,20 P_{ea} > MRA > P_{ea}	18	95,19	86,13	68,76	105,71	-19,58
Rachat, MRA < 0,20 P_{ea}	5	28,09	5,40	18,64	40,10	-34,70
Transigée, P_m > P_{ea}	27	243,53	605,25	178,56	234,28	415,36
Transigée, 0,20 P_{ea} > P_m > P_{ea}	47	372,09	225,94	267,71	371,86	-145,92
Transigée, P_m < 0,20 P_{ea}	40	287,99	34,12	215,08	349,81	-315,69
Total des émissions ouvertes	183	1252,03	1089,46	907,98	1351,5	-217,66
Sociétés fermées et nd	34	24,75	na			
Volet B: Emissions initiales des entreprises de petite taille (actif inférieur à 25 millions de $)						
En faillite	28	109,62	0,00	79,88	116,80	-116,80
Rachat, MRA > P_{ea}	8	31,51	90,98	21,32	38,23	52,75
Rachat, 0,20 P_{ea} > MRA > P_{ea}	17	90,26	82,58	64,76	101,06	-18,48
Rachat, MRA < 0,20 P_{ea}	4	17,29	4,03	12,35	25,64	-21,61
Transigée, P_m > P_{ea}	24	191,38	585,00	139,50	180,21	404,79
Transigée, 0,20 P_{ea} > P_m > P_{ea}	42	342,76	208,02	246,00	339,77	-131,74
Transigée, P_m < 0,20 P_{ea}	31	185,26	27,15	138,70	208,02	-180,87
Total des émissions ouvertes	154	968,08	997,76	702,51	1009,73	-11,96

P_m: le prix du titre à la fermeture des marchés le 31/12/1994; P_{ea} : le prix d'émission brut, ajusté pour la fluctuation de l'indice *Small Caps* entre la date d'émission et le 31 décembre 1994, date de l'évaluation; MRA: montant reçu par les actionnaires lors de la fusion ou de l'acquisition, accumulé depuis cette date pour les variations de l'indice *Small Caps*. Le classement des titres dans les diverses catégories se fait donc sans tenir compte du crédit d'impôt.
Le produit brut est égal au nombre de titres multiplié par le prix d'émission. La valeur de l'émission au 31/12/94 est nulle pour les sociétés en faillite ou retirées de la cote. Elle est égale au prix à la fermeture des marchés (P_m) multiplié par le nombre de titres pour les titres transigés. Dans les cas de fusion ou d'acquisition, le montant reçu par les actionnaires (MRA) est multiplié par le nombre de titres. La mise de fonds nette est donnée par le prix d'émission net du crédit d'impôt, multiplié par le nombre de titres. L'accumulation de ce montant au taux de rendement de l'indice donne la valeur accumulée, qui représente la richesse qu'aurait accumulé l'investisseur en plaçant les fonds dans un portefeuille indicé, depuis la date de l'émission. Le gain ou la perte d'opportunité est donné par la différence entre la valeur de l'émission au 31/12/1994 et cette valeur accumulée. Ce calcul prend donc en compte le crédit d'impôt.

Tableau 7: Récapitulation de l'état des émissions des entreprises de taille moyenne au 31/12/1994; l'échantillon est composé des entreprises dont l'actif total était compris entre 25 et 250 millions de $ (de 1986) au moment de l'émission (volet A) alors que le volet B ne comprend que les émissions initiales.

Situation de l'émission au 31/12/1994	Nb (1)	Produit brut des émissions (2)	Valeur de l'émission au 31/12/1994 (3)	Mise de fonds nette des investisseurs (4)	Valeur accumulée de la mise de fonds (5)	Gain ou perte d'opportunité (3) - (5)
Volet A: Entreprises de taille moyenne (entre 25 et 250 millions)						
En faillite	7	46,51	0,00	36,27	58,90	-58,90
Rachat, MRA > P_{ea}	7	112,93	226,82	87,73	140,09	98,72
Rachat, 0,20 P_{ea} > MRA > P_{ea}	10	112,24	123,50	82,74	134,16	-10,66
Rachat, MRA < 0,20 P_{ea}	0	0	0	0	0	0
Transigée, P_m > P_{ea}	23	481,11	952,33	391,07	571,35	380,98
Transigée, 0,20 P_{ea} > P_m > P_{ea}	33	504,71	420,44	383,76	522,12	-101,68
Transigée, P_m < 0,20 P_{ea}	13	173,76	32,72	134,91	224,69	-191,97
Total des émissions	93	1431,26	1755,81	1116,48	1651,31	116,49
Volet B: Émisssions initiales des entreprises de taille moyenne (entre 25 et 250 millions)						
En faillite	5	29,63	0,00	26,86	34,78	-34,78
Rachat, MRA > P_{ea}	6	90,44	184,30	68,17	111,45	84,84
Rachat, 0,20 P_{ea} > MRA > P_{ea}	7	90,07	96,64	66,07	104,09	-7,44
Rachat, MRA < 0,20 P_{ea}	0	0	0	0	0	0
Transigée, P_m > P_{ea}	9	225,64	424,92	184,52	267,27	157,65
Transigée, 0,20 P_{ea} > P_m > P_{ea}	14	201,21	160,70	151,19	206,63	-45,93
Transigée, P_m < 0,20 P_{ea}	5	54,91	9,25	44,00	71,91	-62,65
Total des émissions initiales	46	691,9	875,81	540,81	796,13	91,69

P_m: le prix du titre à la fermeture des marchés le 31/12/1994; P_{ea} : le prix d'émission brut, ajusté pour la fluctuation de l'indice *Small Caps* entre la date d'émission et le 31 décembre 1994, date de l'évaluation; MRA: montant reçu par les actionnaires lors de la fusion ou de l'acquisition, accumulé depuis cette date pour les variations de l'indice *Small Caps*. Le classement des titres dans les diverses catégories se fait donc sans tenir compte du crédit d'impôt.

Le produit brut est égal au nombre de titres multiplié par le prix d'émission. La valeur de l'émission au 31/12/94 est nulle pour les sociétés en faillite ou retirées de la cote. Elle est égale au prix à la fermeture des marchés (P_m) multiplié par le nombre de titres pour les titres transigés. Dans les cas de fusion ou d'acquisition, le montant reçu par les actionnaires (MRA) est multiplié par le nombre de titres. La mise de fonds nette est donnée par le prix d'émission net du crédit d'impôt, multiplié par le nombre de titres. L'accumulation de ce montant au taux de rendement de l'indice donne la valeur accumulée, qui représente la richesse qu'aurait accumulé l'investisseur en plaçant les fonds dans un portefeuille indicé, depuis la date de l'émission. Le gain ou la perte d'opportunité est donné par la différence entre la valeur de l'émission au 31/12/1994 et cette valeur accumulée. Ce calcul prend donc en compte le crédit d'impôt.

Tableau 8: Comparaison des composantes des coûts des émissions en Ontario et au Québec, pour des émissions de taille similaire, 1979-1985

	Québec (RÉAQ)				Ontario			
Taille de l'émission (millions de $)	Obs	Autres frais (%)	Rémunération (%)	SEI (%)	Obs	Autres frais (%)	Rémunération (%)	SEI (%)
Moins de .50					3	6,49	11,13	19,93
0,50 à 0,99	1	2,38	10	22,57	7	6,76	8,10	28,31
1,00 à 1,99	4	7,19	8,52	-1,98	10	3,76	8,93	30,24
2,00 à 4,99	21	5,32	7,62	6,06	15	4,87	7,47	18,42
5,00 à 9,99	15	2,86	6,84	-0,46	14	2,58	6,94	5,11
10,00 à 19.99	9	1,29	6,55	-6,33	18	2,00	6,32	5,62
20,00 à 49.99	9	1,29	5,98	-4,23	10	0,91	6,05	2,79
50,00 à 99.99					5	0,56	5,80	-3,46
100,00 et plus					4	0,20	4,81	-1,63
Moyenne		3,57	7,07	-0,32		3,07	7,11	12,66

Les divers coûts ont été mesurés comme suit:
La SEI est ajustée pour tenir compte de la fluctuation du marché entre la date de fixation du prix et les premiers jours de transaction.

$$SEI = \frac{P_m - P_e}{P_e} \beta_j \frac{M_1 - M_0}{M_0}$$

P_m = Prix au marché observé, mesuré par la moyenne des cours de fermeture pour les cinq premiers jours de transaction.
P_e = Prix d'émission, relevé dans le prospectus définitif.
β_j = Risque systématique de la firme j calculé à partir des rendements hebdomadaires ultérieurs à l'émission, sous l'hypothèse que les investisseurs sont, en moyenne, capables d'apprécier correctement le niveau de risque systématique des titres à partir des données disponibles lors de l'émission.
M_1 = Indice du marché (XXM ou TSE) aux premiers jours de transaction du titre j,
M_o = Indice du marché à la date du prospectus définitif, ce qui correspond au moment de fixation du prix d'émission.
Les autres frais et la rémunération du courtier ont été relevés au prospectus, puis exprimés en proportion du produit brut de l'émission.

Tableau 9: Évolution des inscriptions en Bourse et des nouvelles émissions, Toronto et Montréal, 1979-1994

	Nombre de nouvelles sociétées inscrites en Bourse			Nombre de premières entrées en Bourse		
Année	Montréal	Toronto	Mtl / Toronto	Montréal	Toronto	Mtl / Toronto
1979	5	29	0,17	0	n.d	
1980	16	39	0,41	1	6	0,17
1981	13	73	0,18	2	23	0,09
1982	6	34	0,18	1	8	0,13
1983	38	96	0,40	8	48	0,17
1984	52	100	0,52	17	25	0,68
1985	71	73	0,97	41	21	1,95
1986	177	165	1,02	83	70*	1,19
1987	123	180	0,66	29	30	0,97
1988	52	87	0,58	30	4	7,50
1989	30	72	0,41	10	10	1,00
1990	17	49	0,35	2	14	0,14
1991	18	35	0,49	11	17	0,65
1992	22	62	0,37	9	27	0,33
1993	38	153	0,25	31	89	0,35
1994	42	143	0,30	17	63	0,27
Total	720	1390	0,51	292	455	0,64
Analyse par sous-périodes						
1979-1982	40	175	0,23	4	36	0,11
1983-1987	481	630	0,76	149	165	0,90
1987-1994	199	600	0,33	139	254	0,55

Sources: *Statistiques, recherche et information sur le marché*, Bourse de Montréal, 1986-1992 et *Revue de la Bourse de Toronto*, 1986-1994.

* De 1986 à 1990, les données portant sur les émissions ontariennes sont tirées de Jog et Srivastava (1995). Elles ne comprennent pas les émissions complexes, ni celles réalisées par les fonds d'investissement. Le nombre total des émissions ontariennes de cette période est donc sous-évalué.

Tableau 10: Principales caractéristiques des distributions des ratios d'endettement total, d'endettement à long terme, du taux de rendement de l'avoir et du taux de rendement de l'actif, par année, pour divers échantillon d'émissions composés sur la base de la disponibilité des données après l'émission. L'année 0 est le dernier exercice précédant l'émission. L'avoir des actionnaires n'incorpore donc pas le produit de cette émission, qui n'affecte les ratios qu'à partir de l'année 1.

	Ratio de la dette totale à l'actif						Ratio de la dette à long terme à l'actif total						Taux de rendement de l'avoir des actionnaires						Taux de rendement de l'actif					
Année	-1	0	+1	+2	+3	+4	-1	0	+1	+2	+3	+4	-1	0	+1	+2	+3	+4	-1	0	+1	+2	+3	+4
Volet A: Échantillon des 192 observations disponibles jusqu'à l'exercice financier +2																								
Moyenne	0,65	0,62	0,47	0,54			0,21	0,21	0,17	0,21			0,48	0,38	-0,53	-0,42			0,08	0,08	0,03	-0,01		
Mediane	0,65	0,63	0,49	0,53			0,17	0,17	0,14	0,18			0,22	0,23	0,11	0,10			0,07	0,07	0,06	0,04		
Écart type	0,26	0,24	0,22	0,24			0,24	0,20	0,17	0,17			1,86	1,82	6,11	4,93			0,19	0,15	0,14	0,22		
Étendue	2,8	2,3	1,1	1,5			2,6	1,8	1,0	1,0			21,7	27,1	65,4	75,1			2,8	2,4	1,2	2,0		
Minimum	0,0	0,0	0,0	0,0			0,0	0,0	0,0	0,0			-3,3	-2,0	-64,9	-64,9			-1,7	-1,2	-1,0	-1,7		
Maximum	2,8	2,3	1,1	1,5			2,6	1,8	1,0	1,0			18,5	25,1	0,5	10,2			1,1	1,1	0,2	0,4		
Volet B: Échantillon des 173observations disponibles jusqu'à l'exercice financier +3																								
Moyenne	0,65	0,62	0,47	0,55	0,70		0,21	0,21	0,17	0,21	0,27		0,50	0,40	-0,60	-0,46	-0,27		0,07	0,08	0,03	-0,01	-0,12	
Mediane	0,66	0,62	0,49	0,53	0,56		0,17	0,17	0,14	0,19	0,21		0,22	0,25	0,12	0,10	0,08		0,07	0,07	0,06	0,04	0,03	
Écart type	0,27	0,24	0,22	0,24	1,39		0,24	0,20	0,17	0,17	0,39		1,96	1,91	6,43	5,19	2,90		0,20	0,16	0,15	0,22	1,04	
Étendue	2,8	2,3	1,1	1,5	17,9		2,6	1,8	1,0	1,0	4,4		21,7	27,1	65,4	75,1	133,4		2,8	2,4	1,2	2,0	17,9	
Minimum	0,0	0,0	0,0	0,0	0,0		0,0	0,0	0,0	0,0	0,0		-3,3	-2,0	-64,9	-64,9	-35,0		-1,7	-1,2	-1,0	-1,7	0,0	
Maximum	2,8	2,3	1,1	1,5	17,9		2,6	1,8	1,0	1,0	4,4		18,5	25,1	0,5	10,2	356,0		1,1	1,1	0,2	0,4	17,9	
Volet C: Échantillon des 147observations disponibles jusqu'à l'exercice financier +4																								
Moyenne	0,65	0,62	0,47	0,55	0,58	0,68	0,20	0,20	0,17	0,21	0,25	0,34	0,53	0,42	-0,35	-0,52	0,01	0,01	0,09	0,08	0,04	0,00	-0,07	-0,02
Mediane	0,67	0,62	0,49	0,53	0,55	0,57	0,17	0,17	0,15	0,19	0,21	0,21	0,24	0,25	0,12	0,11	0,09	0.06	0,07	0,07	0,06	0,05	0,04	0,02
Écart type	0,28	0,25	0,22	0,23	0,47	1,24	0,25	0,20	0,15	0,15	0,39	1,18	2,10	2,08	5,36	5,60	0,71	1,44	0,16	0,16	0,14	0,19	0.77	0,23
Étendue	2,8	2,3	1,1	1,3	5,5	15,2	2,6	1,8	1,0	0,7	4,4	14,4	21,7	27,1	65,4	75,1	9,7	22,8	2,4	2,4	1,2	1,2	9,1	2,6
Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-3,3	-2,0	-64,9	-64,9	-6,2	-13,4	-1,2	-1,2	-1,0	-1,0	-8,9	-2,3
Maximum	2,8	2,3	1,1	1,3	5,5	15,2	2,6	1,8	1,0	0,7	4,4	14,4	18,5	25,1	0,5	10,2	356,0	9,4	1,1	1,1	0,2	0,2	0,1	0,3

Tableau 11: Distributions de fréquences absolues et relatives des ratios d'endettement total et de rentabilité de l'avoir pour un échantillon constant de 142 émissions réalisées dans le cadre du REAQ par des entreprises dont l'actif lors de l'émssion était inférieur à 250 millions de $

	Année -1		Année 0		Année 1		Année 2		Année 3		Année 4	
Volet A: Ratio de la dette totale à l'actif												
inférieur à 0,1	4	2,72%	2	1,36%	5	3,40%	5	3,40%	3	2,04%	4	2,72%
de 0,1 à 0,2	4	2,72%	6	4,08%	13	8,84%	9	6,12%	7	4,76%	6	4,08%
de 0,2 à 0,3	3	2,04%	8	5,44%	14	9,52%	5	3,40%	6	4,08%	10	6,80%
de 0,3 à 0,4	8	5,44%	7	4,76%	23	15,65%	19	12,93%	21	14,29%	13	8,84%
de 0,4 à 0,5	13	8,84%	16	10,88%	20	13,61%	24	16,33%	28	19,05%	20	13,61%
de 0,5 à 0,6	22	14,97%	29	19,73%	38	25,85%	33	22,45%	32	21,77%	34	23,13%
de 0,6 à 0,7	31	21,09%	28	19,05%	20	13,61%	21	14,29%	17	11,56%	24	16,33%
de 0,7 à 0,8	36	24,49%	28	19,05%	4	2,72%	14	9,52%	15	10,20%	13	8,84%
de 0,8 à 0,9	17	11,56%	13	8,84%	5	3,40%	9	6,12%	5	3,40%	8	5,44%
de 0,9 à 1,0	4	2,72%	7	4,76%	2	1,36%	5	3,40%	7	4,76%	5	3,40%
de 1,0 à 1,1	3	2,04%	1	0,68%	2	1,36%	1	0,68%	3	2,04%	6	4,08%
supérieur à 1,1	2	1,36%	2	1,36%	1	0,68%	2	1,36%	3	2,04%	4	2,72%
Volet B: Ratio du taux de rendement sur les fonds propres (ROE)												
inférieur a -0,1	4	2,72%	7	4,76%	7	4,76%	16	10,88%	21	14,29%	27	18,37%
de -0,1 à -0,05	3	2,04%	1	0,68%	1	0,68%	6	4,08%	7	4,76%	4	2,72%
de -0.05 à 0	6	4,08%	6	4,08%	11	7,48%	10	6,80%	11	7,48%	11	7,48%
de 0 à 0,05	3	2,04%	5	3,40%	14	9,52%	12	8,16%	14	9,52%	23	15,65%
de 0,05 à 0,1	12	8,16%	14	9,52%	28	19,05%	29	19,73%	28	19,05%	27	18,37%
de 0,10 à 0,15	16	10,88%	14	9,52%	34	23,13%	29	19,73%	33	22,45%	24	16,33%
de 0,15 à 0,2	16	10,88%	17	11,56%	32	21,77%	21	14,29%	15	10,20%	12	8,16%
de 0,2 à 0,25	17	11,56%	9	6,12%	11	7,48%	17	11,56%	9	6,12%	9	6,12%
de 0,25 à 0,3	9	6,12%	14	9,52%	5	3,40%	5	3,40%	3	2,04%	2	1,36%
de 0,30 à 0,35	15	10,20%	18	12,24%	2	1,36%	0	0,00%	2	1,36%	0	0,00%
de 0,35 à 0,4	12	8,16%	6	4,08%	0	0,00%	1	0,68%	0	0,00%	0	0,00%
de 0,40 à 0,45	6	4,08%	6	4,08%	0	0,00%	0	0,00%	0	0,00%	1	0,68%
de 0,45 à 0,5	3	2,04%	9	6,12%	1	0,68%	0	0,00%	0	0,00%	0	0,00%
de 0,5 à 0,55	4	2,72%	3	2,04%	1	0,68%	0	0,00%	0	0,00%	1	0,68%
plus de 0,55	21	14,29%	18	12,24%	0	0,00%	1	0,68%	4	2,72%	6	4,08%

Tableau 12: Montants totaux prélevés dans le cadre du RÉAQ par les entreprises de taille moyenne qui ont réalisé au moins trois émissions, évolution de leur actif et de leur avoir des actionnaires, montants versés sous forme de dividendes entre la première émission RÉAQ et 1993.

	Émissions			Actif total		Fonds propres		Aug. des fonds propres	Dividen -des	Fonds REAQ en % de l'aug. des fonds propres	Dividendes versés en % des fonds RÉAQ
	N[1]	Produit brut		Lors de la première émission (79-86)	en 1993	Lors de la première émission (79-86)	en 1993				
		Total	Placé au Québec								
Bombardier	4	247,2	103,4	277,4	4270,0	98,3	984,1	885,8	130,5	11,67%	126,21%
Cascades Inc	4	65,7	64,1	24,4	1400,9	6,3	383,7	376,9	0,2	17,01%	0,27%
Donohue	3	119,2	61,5	570,4	766,2	121,3	379,6	258,3	119,6	23,82%	194,38%
Gaz Métropolitain*	5	170,2	126,4	304,8	1204,4*	107,8	430,6	322,8	39,2	39,15%	89,42%
Groupe G.T.C.	3	57,3	48,2	32,9	616,1	5,7	247,7	242,0	5,3	19,92%	10,97%
Mémotec Data (Téléglobe)	5	221,7	120,9	4,5	1768,2	1,0	701,4	700,4	67,4	17,26%	55,72%
Métro-Richelieu	3	84,0	84,0	257,5	587,4	43,1	241,6	198,5	0,0	42,29%	0,00%
Québécor	3	116,7	73,4	75,8	2986,6	34,5	742,3	707,9	57,8	10,37%	78,76%
Tembec	4	113,6	40,9	130,4	974,7	35,4	234,2	198,7	0,0	20,58%	0,00%
UAP	3	31,9	29,3	73,6	306,2	22,8	165,1	142,4	35,5	20,56%	121,11%
Total	37	1227,3	752,0	1751,6	25132,9	433,1	4268,7	3835,6	165,9	19,61%	22,06%

* Les données relatives à cette compagnie sont incomplètes. L'actif au dernier exercice financier, avant le rachat des actions émises, est celui de 1991. Les dividendes n'ont été relevés que pour la période 1979 à 1982. Ils ont été rapportés au montant des émissions, placé au Québec, pour la période correspondante. Les données proviennent principalement de la base de données CANCORP.

[1] Nombre total d'émissions effectuées dans le cadre du régime, toutes catégories confondues.

Annexe 1: Principales modifications apportées au RÉAQ de 1979 à 1994

Les principales étapes qui ont marqué l'évolution du Régime d'épargne-actions sont les suivantes[2]:

22 juin 1979: le Régime d'épargne-actions du Québec est créé.

Budget du 10 mai 1983: réorientation du régime d'épargne-actions pour favoriser l'accès au régime par la petite et moyenne entreprise

1) Introduction de la notion de "corporation en voie de développement": dont l'actif doit se situer entre 2 et 25 million $ ou l'avoir net des actionnaires doit se situer entre 750 000 et 10 000 000 $; dont les actions donnent droit une déduction égale à 150 % de leur coût d'achat.

2Seules les actions ordinaires à plein droit de vote (ou des actions privilégiées convertibles en de telles actions) sont dorénavant admissibles.

Déclaration ministérielle du 3 mai 1984: les actions subalternes à droit de vote deviennent admissibles.

Budget du 23 avril 1985:

1 Réaménagement des pourcentages de déduction à compter du 1er janvier 1986:

SVD: réduit de 150 % à 100 % pour les actions ordinaires; réduit de 100 % à 75 % pour les actions subalternes
Intermédiaires: réduit de 100 % à 75 % pour les actions ordinaires; réduit de 75 % à 50 % pour les actions subalternes
Importantes: maintenu à 50 %, déduction annuelle plafonnée à 1000 $

2)Limite sur la déduction annuelle permise: le moins élevé de 20 % du revenu total ou 20 000 $.

3)Annonce de la réduction du plafonnement de 20 000 $ à 12 000 $ en 1986.

4)Annonce de la possibilité de constituer des sociétés d'investissement RÉA et des fonds d'investissement RÉA (FIR) à partir du 24 avril 1985. Un fond RÉA s'engage à utiliser la totalité ou une partie des fonds recueillis pour effectuer des investissements dans des actions admissibles au RÉA, et permet de bénéficier de déductions similaires à celles permises par l'acquisition directe des titres RÉA.

Budget du 1er mai 1986 et déclaration ministérielle du 29 mai 1986: annonce des mesures contenues dans le projet de Loi 120

11 novembre 1986: dépôt du projet de Loi n° 120 (Loi modifiant diverses dispositions législatives d'ordre fiscal) **et déclaration ministérielle:**

Dispositions limitant la possibilité de rachat d'actions à partir des fonds recueillis dans le cadre d'une émission admissible.
La limite de déduction de 1000$ pour les actions de grandes corporations s'applique désormais aux actions des corporations dont l'actif dépasse 250 millions de $; l'abaissement de la limite inférieure de cette classe modifie les pourcentages de déduction.
Le taux de déduction des actions subalternes est ramené à 50%.

11décembre 1986: déclaration ministérielle:

Création d'un nouveau type de corporation admissibles: les corporations à capital de risque à vocation régionale.
Inscription en Bourse: pour être admissibles, les corporations (sauf les corporations à capital de risque à vocation régionale) sont tenues de procéder à l'inscription en bourse de Montréal des actions admissibles au RÉA, dans les 60 jours qui suivent la date d'émission.
Nouvelles restrictions aux possibilités de rachat d'actions à l'aide du produit des émissions.

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[2] Pour une relevé plus détaillé des dispositions légales et de leur évolution, voir Lacroix (1987a) et Dorion (1985).

Budget 1987:

Annonce de la réduction du plafonnement de 12 000 $ à 5 500 $ en 1987.

Budget du 12 mai 1988:

Le montant maximal qu'un particulier peut déduire dans une année est limitée par le plafond de 10 p. cent de son revenu total. Abolition de la limite de 5 500 $.
La catégorie des SVD est élargie: actif entre 2 et 50 millions $ ou avoir net entre 750 000 $ et 20 000 000 $.
Mesures visant à favoriser le marché secondaire: aux fins de couverture seulement, possibilité d'acheter des titres de sociétés en voie de développement sur le marché secondaire, pour remplacer des titres acquis au cours des deux années d'imposition précédentes, sans entraîner d'incidence fiscale.

Budget du 16 mai 1989:

Afin d'insuffler un souffle nouveau au RÉA, on rend admissibles au régime les actions qui seraient autrement admissibles et qui sont acquises par un particulier suite à la conversion de débentures ou d'actions privilégiées convertibles d'entreprises dont l'actif est inférieur à 250 millions $ (donc, les intermédiaires et les SVD seulement). Le taux de déduction est celui qui est en vigueur sur les actions en question.

Budget du 26 avril 1990:

Assouplissement des règles des FIR: s'ils placent au moins 50 % des leurs produits d'émission dans des SVD, ils disposent d'un sursis de 12 mois pour placer le solde dans des actions admissibles au RÉA.

Budget du 2 (ou 17) mai 1991:

1)Changement dans les classements et les taux de déduction:

SVD: actif entre 2 et 250 millions $, le critère de l'avoir net des actionnaires est retiré, le taux de déduction demeure 100 %.
Corporations de taille moyenne: actif entre 250 millions $ et 1 milliard $, taux de déduction haussé à 75 %, le plafond de déduction de 1000 $ est retiré.
Grandes corporation: actif entre 1 et 2,5 milliards $, le taux de déduction demeure 50 % mais le plafond de 1000 $ est haussé à 2 500 $ pour les années 1991 et 1992.

2) Changement des taux de déduction dans le cas des titres convertibles: déduction temporaire sur le titre convertible 50 % (SVD) et de 25 % (INT) (on ne doit plus attendre la conversion pour bénéficier de la déduction fiscale).

3) Suite à la décision de la Bourse de Montréal de ne plus permettre l'émission d'actions subalterne, cette catégorie disparaît.

Budget 1992: aucun changement

Tableau A1: Principales modifications apportées aux paramètres du régime, de 1983 à 1991

	1983	1984	1985	1986	1987	1988	1989[1]	1990	1991	1992	1993	1994
Société importante												
Limites de taille	plus d'un milliard				plus de **250** millions				de **1** à **2,5** milliards			
% de déduction Actions ordinaires	100	75	50	50	50	50	50	50	50	50		
% de déduction, subalternes (DV)	n.a.	75	50	50	50	50	50	50	n.a.	n.a.	n.a.	n.a.
Société intermédiaire												
	de 25 millions à un milliard				de 25 à **250** millions	de **50** à 250 millions			de 250 millions à 1 milliard			
% de déduction Actions ordinaires	100	100	100	75	75	75	75	75	75	75		
% de déduction, subalternes (DV)	n.a.	75	75	50	50	50	50	50	n.a.	n.a.	n.a.	n.a.
% de déduction, titres convertibles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	25	25		
Société en voie de développement												
	entre 2 et 25 millions ou avoir entre 750 et un million				de 2 à 25 millions ou avoir des actionnaires entre 750 000 $ et 1 million	de 2 à **50** millions ou avoir des actionnaires entre 750 000 $ et 1 million			entre 2 et **250** millions			
% de déduction Actions ordinaires	150	150	150	100	100	100	100	100	100	100		
% de déduction, subalternes (DV)[2]	n.a.	100	100	75	75/50	75/50	75/50	75/50	n.a.	n.a.	n.a.	n.a.
% de déduction, titres convertibles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	50	50		
Autres sociétés												
	100	100	100	75	75	75	75	n.a.	n.a.	n.a.	n.a.	n.a.

1 A partir de 1989, les titres SVD et Intermédiaires acquis par conversions sont déductibles pour fins fiscales au taux indiqué.
2 Dans le cas des SVD, pour les actions subalternes, à partir de 1987, le premier % indiqué concerne les action subalternes ayant plus de 1/10 du vote d'une action ordinaire alors que le second % concerne les actions subalternes ayant moins de 1/10 du vote d'une action ordinaire.

Preliminary, do not quote.
Comments welcome.

LABOUR-SPONSORED VENTURE CAPITAL FUNDS : ANALYSIS AND LESSONS FROM QUÉBEC†

by

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with

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This paper examines the role of labour-sponsored venture capital funds (LSVCF) in Canada and, in particular, draws upon the Québec evidence to assess their costs to society and their contribution to employment. This topic was assigned to us by the conference organizers, but is of interest since venture capital (VC) is a topic of interest to policy makers while LSVCF have only recently appeared outside Québec. The paper is divided into four parts. In the first one, we review the importance of VC in Canada and examine the possible public policy role of the government. In the second, we briefly present LSVCF. In the third, we examine the tax expenditures associated with them and in the fourth, their impact on employment in Québec.

1. THE VENTURE CAPITAL MARKET

In this section, we examine the importance of the VC market in Canada. We first define VC and then examine the quantitative evidence.

1.1 The definition of venture capital

Three aspects of financing must be considered when defining capital as venture or not : the nature of the claim, the period of investment and the control of ownership.

i) To be considered as VC, the claim has to confer a residual right to its owner; that is, the venture capitalist bears the risk of the firm. Thus, the form of VC can be anywhere between pure equity and unsecured participating debt (which is called quasi-equity or quasi-debt).

ii) The venture capitalist is necessarily patient and invests in firms which are not publicly traded, so it can take many years before cashing out of the investment. Generally, the horizon of investment varies between 3 to 10 years.

iii) Since the stake of the venture capitalist is significant, risky and frozen for a long period of time, participation in an active way in the decision process of the firm is appropriate. This implies, on the one hand, that the initial stockholders have to share their control and, on the other hand, that the VC supplier usually provides business advice.

Inside these bounds, the definition of VC can still vary substantially. We can observe, however, that the definition of VC tends to be more specific as the market is developed. For instance, there is a noticeable difference between the American and the French view of VC (Bessis, 1988). The former considers VC as an equity investment in a high-risk and high-potential project (generally related to the high-tech sector), and the latter considers VC as an equity or quasi-equity investment in any business which is not publicly traded. In other respects, the British definition of VC seems to be closer to the American one.

The French view of VC is appropriate for the Canadian market and especially for the Québec market, since the size of the VC market and the politics of intervention of the Québec government are more like what we observe in France than in the United States.

Thus, VC is any equity or quasi-equity invested in a nonpublicly traded firm at the time of investment which is operating in any sector. This long-term investment may bring the initial stockholders to share control and decisions, and business services may be supplied by the venture capitalist. The money so invested may come from any formal sources : private institutions, individuals or governmental agencies.

1.2 The size of the VC market in Canada

There does not appear to be an official estimate of the size of the VC market in Canada, i.e., a Bank of Canada or Statistics Canada number. Table 1 presents what appears to be the most reliable data for two years. It thus seems reasonable to assume

a 4-4.5 billion stock of VC or about 0.6% of GDP in 1994. This percentage was also observed in 1990 and is similar to the percentage then reported for the US as shown in Table 2.

Is the supply of VC capital in Canada adequate or not in 1995? If so, is it because of, not due to, or in spite of, government interventions, either directly or through tax incentives supporting LSVCF? There is no straightforward answer to this question. In our opinion, however, there is evidence that the effective supply, i.e., the amount of VC invested as opposed to the amount available, is adequate and that the overall capitalization of VC sources may be too high.

As evidence, one notes that :

- in 1995, there were 55 VC firms (BDBC, p. 1) that over the 1991-1994 period had invested about 2 billion in 754 businesses;

- there is no massive entry by foreign (American) VC funds, as one would expect to observe, if Canadian institution were deficient;

- LSVCF do not invest most of their funds as they obtain them.

Thus, we see little reason for government intervention.

2. LSVCF IN CANADA

LSVCF in Canada are a growing sector financed in substantial part by tax expenditures. Table 3 presents the major funds (Table A-1 presents the legal provincial framework). Bélanger and Martin (1993) reviewed the origin of LSVCF and showed that they first emerged in Germany, Sweden and Japan. These funds can be organized along various lines. For example, Matthews (1989) puts forward a six-way classification

Table 1
Contribution of VC by Type of Supplier in Canada 1989 and 1993
(in Billions of $)

	1993		1989	
	($)	(%)	($)	(%)
Private funds				
Private independent firms	1.631	40.6	1.510	44.9
Corporate subsidiaries	0.357	8.9	1.038	30.9
Others	0.294	7.3	0.295	8.8
Subtotal	2.282	56.8	2.843	84.6
*Public funds**				
Labour-sponsored funds	1.263	31.5	0.265	7.9
Government	0.468	11.7	0.252	7.5
Subtotal	1.731	43.2	0.517	15.4
TOTAL	**4.013**	**100.0**	**3.360**	**100.0**

Source : "The Role and Performance of Labour-Sponsored Investment Funds in Canada", Canadian Labour Market and Productivity Centre, Ottawa, March 1995, p. 16, Figure I.

Note : * A public fund is either a fund financed by the government or a fund which benefits from some tax incentives.

Table 2
Worldwide Market for VC in 1990 and Its Relative Importance

Country	VC (billions of U.S. $)	VC/GNP (%)
U.S.A.	35.0	0.64
United Kingdom	13.9	1.49
Japan	10.0	0.32
Europe (others)	5.8	0.15
France	3.5	0.32
The Netherlands	3.2	1.23
Canada	3.0	0.53
Belgium	2.6	1.46

Source : *L'État du Monde 1992.*

Table 3
LSVCF, Canada, 1994

Name	Year	Shareholders	Assets (000,000$)	Province
Fonds de solidarité des travailleurs du Québec Inc. (FSTQ)	1983	238 000	1.200	Québec
Working Venture Canadian Fund Inc.	1988	80 100	479.2	Ontario New Brunswick Prince Edward Island Nova Scotia Saskatchewan
Working Opportunity Fund (EVCC) Ltd.	1991	14 000	77.9	British Columbia
Crocus Investment Fund Inc.	1992	7 200	29.3	Manitoba
Integrated Growth Fund Inc.	1993	6 600	26.2	Ontario
DGC Entertainment Ventures Corporation Inc.	1993	3 500	17.0	Ontario
Active Communications Growth Fund Inc.	1994	3 500	15.6	n/a
Canadian Medical Discoveries Fund Inc.	1994	4 000	14.4	n/a
Capital Alliance Ventures Inc.	1994	1 300	5.0	n/a
CI-CPA Business Ventures Fund Inc.	1994	1 500	4.5	n/a
FESA Enterprise Venture Capital Fund of Canada Ltd.	1994	1 200	4.2	n/a
First Ontario Labour-Sponsored Investment Fund Inc.	1994	850	3.4	n/a
Sports Fund Inc.	1994	600	2.0	n/a
TCU Development Fund Inc.	1994	n/a	n/a	n/a
Trillium Growth Capital Inc.	1994	n/a	n/a	n/a
Vengrowth Investment Fund Inc.	1994	n/a	n/a	n/a
Worker's Investment Fund Inc.	1994	n/a	n/a	New-Brunswick

Source : Canadian Labor Market and Productivity Centre; "The Role and Performance of Labour-Sponsored Investment Funds in Canada : Some Preliminary Findings", March 1995.

Note : n/a : not applicable.

according to their decision-making rules and their source of funds. The first fund in Canada appeared in 1983 in Québec and was created by the largest private-sector union as a follow up to other concertation measures between labour and capital. Thus, not surprisingly, the Fonds de solidarité des travailleurs du Québec (FSTQ) is the largest fund in Canada in 1995 both in terms of shareholders and assets. Therefore, we will focus on that fund in the last two sections of the paper, since it is the only one with a sufficiently long record to allow some evaluation of its impact.

3. THE FINANCING OF LSVCF : TAX EXPENDITURES

In this part of the paper, we present the evidence on the use of tax expenditures in financing the FSTQ for three years - 1986, 1989 and 1993 - and for the latter compare it to the situation prevailing in Canada as a whole. We first review the small relevant literature then turn to our own results.

There appears to be three studies of possible relevance. Two of them, Suret (1994) and Allen (1994), focus mainly on the FSTQ tax expenditure, while St-Hilaire (1995) examines the whole range of tax expenditures. Suret and Allen's studies are complementary in that the second was designed as a counter to the first. Both examine not only the immediate revenue losses to the federal and provincial government, but also the rate of return to these investments and thus the eventual fiscal payback. They differ in their assumed rate of returns over a 25 year period and thus on the ultimate cost to society of the FSTQ.

The methodology used by these two authors, while interesting, neglects the distributional dimension of these tax expenditures and requires farsigthed assumptions about rates of returns, income levels of FSTQ shareholders and tax rates. It is different from the usual analysis of personal income tax expenditures that focuses on the foregone revenues in a given year (Bruce, 1989).

In this study, we examine the distributional impact of the 20% tax credit allowed for in the Québec income tax law. We do this for three years : 1986, the first year for which we have published data; 1993, the last available year at the time of writing and 1989, an intermediate point.

Table 4 presents the incidence for the value of FSTQ tax credits for the 15 nominal income groups for which the information is reported in Québec's tax statistics. It shows that the amount of tax credit claimed more than doubled from 1986 to 1993, that this was accompanied by a reduction in the average nominal claim and by a shift to higher income categories. During the same period, the number of taxfillers claiming the FSTQ credit tripled (Table A-2).

The shift to higher income categories may be illusory, however, in that it may result from inflation over the period. We thus constructed inflation-adjusted distribution as follows :

- increase the midpoint income (1986) of each income interval by the relevant inflation rate;

- redistribute the relevant percentage points around the inflated midpoint in the appropriate income internal assuming a uniform distribution around the midpoint. Such an assumption is probably quite reasonable for the first eleven (5,000 or less) income intervals and acceptable for the remainder.

The results are found in Table 5. When compared to those of Table 4, they show an increase in the share of the tax expenditures claimed by higher income groups (60,000 $ +) relative to what could be projected for both 1986 and 1989.

Is the distribution of these tax expenditures an appropriate one? Table 6 allows us to examine this using three indices put forward by St-Hilaire (1995). In general, they show greater benefits for the middle and upper middle class.

Table 4
FSTQ Tax Credit by Income Group, Québec, 1986, 1989 and 1993

Year	1986			1989			1993			
Income Range (in Thousands of $)	FSTQ Tax Credit (000 $)	Average ($)	% by Income Class	FSTQ Tax Credit (000 $)	Average ($)	% by Income Range	Income Range (in Thousands of $)	FSTQ Tax Credit (000 $)	Average ($)	% by Income Class
0 - 5	0	0	0.0	0	0	0.0	0 - 5	0	0	0.0
5 - 10	38	64	0.4	25	75	0.2	5 - 10	26	74	0.1
10 - 15	256	178	2.9	256	156	1.9	10 - 15	251	130	1.1
15 - 20	591	220	6.8	630	182	4.7	15 - 20	584	149	2.5
20 - 25	930	244	10.7	1 155	195	8.7	20 - 25	1 084	159	4.6
25 - 30	1 235	271	14.2	1 565	219	11.8	25 - 30	1 837	181	7.8
30 - 35	1 519	293	17.4	1 846	241	13.9	30 - 35	2 262	212	9.6
35 - 37.5	683	301	7.8	984	253	7.4	35 - 40	2 638	237	11.2
37.5 - 40	630	176	7.2	922	255	6.9	40 - 45	2 837	257	12.1
40 - 45	1 037	315	12.0	1 699	276	12.8	45 - 50	2 521	271	10.7
45 - 50	711	333	8.2	1 317	281	10.0	50 - 60	4 252	302	18.1
50 - 60	646	351	7.4	1 517	319	11.4	60 - 70	2 407	344	10.2
60 - 100	381	414	4.4	1 193	395	8.9	70 - 100	2 162	414	9.2
100 - 200	51	510	0.6	183	504	1.3	100 - 200	587	497	2.5
200 +	0	0	0.0	13	448	0.1	200 +	70	609	0.3
Total	8 708	282	100.0	13 305	253	100.0	Total	23 518	253	100.0

Source : Portrait de la fiscalité des particuliers au Québec, various years.

Note : The calculations are from the author.

Table 5
Inflation Corrected Income Class Distribution, Québec, Projection for 1989 and 1993 FSTQ Tax Credit

Income Range (in Thousands of $)	1989		1993	
	% by Income Class	Cumulative Distribution (%)	% by Income Class	Cumulative Distribution (%)
0 - 5	0.0	0.0	0.0	0.0
5 - 10	0.3	0.3	0.2	0.2
10 - 15	2.4	2.7	0.8	1.0
15 - 20	3.9	6.6	6.4	7.4
20 - 25	5.5	12.1	11.3	18.7
25 - 30	11.4	23.5	2.1	20,8
30 - 35	18.3	41.8	3.0	23.8
35 - 40	27.2	69.0	18.3	42.1
40 - 45	10.0	79.0	22.4	64.5
45 - 50	8.9	87.9	15.0	79.5
50 - 60	7.8	95.7	16.0	95.5
60 - 100	3.7	99.4	4.0	99.5
100 - 200	0.4	99.8	0.2	99.7
200+	0.2	100.0	0.003	100.0
Total	100.0		100.0	

Source : Canadian Economic Observer : Historical Statistics supplement, Statistiques Canada, cat. 11-210, Table 12 (CPI all items).

Note : The calculations are from the authors.

Table 6
Relative Advantage Index for Tax Expenditures by Income, Québec, 1993

Income Range (in Thousands of $)	FSTQ Tax Credit		
	Index 1	Index 2	Index 3
0 - 5	0.0	0.0	0.0
5 - 10	0.3	0.0	0.3
10 - 15	0.5	0.2	0.5
15 - 20	0.6	0.3	0.5
20 - 25	0.6	0.5	0.7
25 - 30	0.7	0.8	0.9
30 - 35	0.8	1.1	1.1
35 - 40	0.9	1.3	1.2
40 - 45	1.0	1.6	1.4
45 - 50	1.0	1.7	1.4
50 - 60	1.2	1.8	1.4
60 - 70	1.4	1.8	1.3
70 - 100	1.6	1.4	1.0
100 - 200	1.9	0.5	0.3
200 +	3.0	0.1	0.1

Source : Portrait de la fiscalité des particuliers au Québec. Statistiques 93.

Notes : The calculations are from the authors.

Index 1 : % of lost revenue / % of number of taxpayers.

Index 2 : % of lost revenue / % of income assessed.

Index 3 : % of lost revenue / % of Net provincial tax payable.

A ratio equivalent to 1 means that the share of advantage is proportional to the share of taxpayers, of income and of Net provincial taxable for that income class.

How does the situation in Québec compare to the situation elsewhere? Table 7 makes a comparison with Ontario : it shows greater regressivity in Ontario than Québec.

Table A-3 allows comparisons with other provinces by the interested reader. It also shows that 65% of all LSVCF tax credit claimants at the federal level are from Québec.

4. THE IMPACT OF THE FSTQ ON EMPLOYMENT

This section examines the impact, if any, that the FSTQ has had on employment in Québec since one of its objectives is to help maintain jobs and/or create new ones by investing in small- and medium-sized enterprises in need of capital. Lamonde, Martineau and Allen (1994) argue that the FSTQ was responsible for maintaining jobs and creating new ones by helping enterprises who had financial problems and even saving enterprises who were about to close down.

They state that the largest positive impacts of these investments occurred in the following manufacturing sectors : Rubber and Plastic, Furniture, Wood and Wood products, Printing and Publishing, Paper, Chemical Products and other Manufacturing sectors.

This study shows the total direct, indirect and induced impacts on employment of the fund's investments in the manufacturing sector and states that the FSTQ tends to favor investment in these particular manufacturing groups because it is in those groups that they find the largest impacts on employment. They state that the FSTQ generated (created or maintained) 11,778 jobs in these sectors. But their result is obtained by first *assuming* an impact on employment of the FSTQ and then examining the overall impact using an input-output model.

Table 7
Distribution of Tax Expenditures Relative to the Income, Québec and Ontario, 1993, in Thousands of $

Income Range (in Thousands of $)	FSTQ Tax Credit	Average ($)	% by Income Class	Ontario LSVCF Tax Credit	Average ($)	% by Income Class
0-5	0	0	0.0	0	0	0.0
5-10	27	79	0.1	16	229	0.1
10-15	228	126	1.0	147	350	0.6
15-20	563	140	2.5	380	494	1.5
20-25	1 061	149	4.6	644	631	2.5
25-30	1 819	174	8.0	1 028	681	4.1
30-35	2 226	208	9.7	1 427	706	5.7
35-40	2 596	231	11.4	1 854	739	7.4
40-45	2 788	252	12.2	1 998	751	8.0
45-50	2 454	268	10.7	2 075	757	8.3
50-100	8 493	333	37.2	12 857	815	51.3
100 +	583	503	2.6	2 642	908	10.5
Total	22 838	247	100.0	25 068	774	100.0

Source : Special tabulation from Revenue Canada, Statistical Services Division, 1995.

Note : The calculations are from the authors.

We will study the impact on employment of the FSTQ using a model of employment derived by Ball and St-Cyr (1966). In that model, employment is a function of output, the input of other factors, factor prices, the state of technology and a lagged dependant variable, i.e.,

$$\ln E_t = a - (\lambda\rho / \alpha)\, t + (\lambda / \alpha) \ln Q_t + (1 - \lambda) \ln E_{t-1}$$

where

E_t is employment in period t,

t is a time trend proxying increases in the capital stock and changes in technology,

Q_t is output in period t,

α is the elasticity of output with respect to the labour input in the production function,

ρ represents the rate of technological progress,

λ is a partial adjustment parameter reflecting adjustment costs.

For our analysis of the impacts of the fund's presence on employment, a FSTQ variable is introduced in that model. We use two specifications :

- a dichotomous variable : 0, for the years between 1970 and 1983; 1, for the years between 1984 and 1994, when the FTQ was present;

- a spline variable : 0.1 in 1985, 0.2 in 1986, ... 1 in 1994.

Our analysis is for the years 1970-1994 (N = 25) except for "Printing and Publishing" (1970-1993).

RESULTS

We present our results in Table 8 for six manufacturing sectors with the two FSTQ specifications for a total of 12 equations. The FSTQ variable, which controls for the impact of the fund is not significant in 11 out of 12 regressions. Our results show that the investments of the FSTQ in small or medium sized enterprises in part of the manufacturing sector had no significant impact on the level of employment of those sectors. It is important to note that we examined the sectors in which the fund claimed the largest positive impact on employment. Our results contradict the conclusions of Lamonde, Martineau and Allen.

CONCLUSION

This paper has examined selected aspects of the LSVCF in Canada. Given the absence of evidence on the lack of VC in Canada, their total revenue costs and its distribution, and their lack of an impact on employment in Québec, it is reasonable to conclude that their existence is not well justified. Perhaps other arguments than economic need such as social solidarity or Canadian/Québec ownership are more appropriate to justify their existence.

Table 8
OLS Analysis of FSTQ Impact, Six Manufacturing Sectors, Québec, 1970-1994

Variable Name	Chemical $R^2 = 0.5235$	Wood $R^2 = 0.9132$	Furniture $R^2 = 0.8778$	Paper $R^2 = 0.9266$	Printing $R^2 =$	Petroleum $R^2 = 0.9395$
t						
Coefficient	-0.0050645	-0.022168	-0.0080701	-0.0069713	-0.0088841	-0.013897
(T-ratio)	(-1.6490)	(-6.9694)	(-1.8670)	(-3.3411)	(-2.2802)	(-2.1103)
ln Q_t						
Coefficient	0.044087	0.85323	1.1195	0.25499	0.45184	0.036891
(T-ratio)	(0.42743)	(7.9913)	(5.8329)	(3.6748)	(3.1658)	(0.55083)
ln E_{t-1}						
Coefficient	0.76909	0.16871	0.15476	0.82022	0.55045	0.25017
(T-ratio)	(4.2516)	(1.8614)	(1.2687)	(7.4634)	(3.8279)	(1.2169)
FSTQ (0.1)						
Coefficient	0.030936	-0.058083	-0.059205	0.020544	0.11024	-0.28761
(T-ratio)	(0.81260)	(-1.4478)	(-0.87584)	(0.77356)	(2.5464)	(-2.4047)
a						
Coefficient	1.6530	-2.1969	-5.2787	-1.5115	-1.4262	5.4009
(T-ratio)	(0.74650)	(-1.9865)	(-2.9726)	(-1.1733)	(-0.76380)	(3.5073)
Variable Name	**Chemical $R^2 = 0.6304$**	**Wood $R^2 = 0.9057$**	**Furniture $R^2 = 0.9237$**	**Paper $R^2 = 0.9252$**	**Printing $R^2 = 0.8851$**	**Petroleum $R^2 = 0.9221$**
t						
Coefficient	0.0003340	-0.025694	-0.00078344	-0.0047558	-0.010563	-0.021633
(T-ratio)	(0.10943)	(-5.1303)	(-0.22297)	(-1.9152)	(-1.3061)	(-2.4472)
ln Q_t						
Coefficient	0.20467	0.78516	1.1741	0.25854	0.62457	0.021992
(T-ratio)	(2.1489)	(8.1757)	(9.4255)	(3.6315)	(2.5199)	(0.28458)
ln E_{t-1}						
Coefficient	0.49051	0.19699	0.14511	0.77290	0.61294	0.66795
(T-ratio)	(2.5678)	(2.0859)	(1.5881)	(5.7124)	(3.6677)	(3.7813)
FSTQ (0.1-1)						
Coefficient	-0.15215	0.039330	-0.22797	-0.025617	0.10611	0.10139
(T-ratio)	(-2.4614)	(0.70587)	(-3.4732)	(-0.49711)	(0.94988)	(0.69192)
a						
Coefficient	2.1576	-1.6071	-5.9019	-1.0808	-4.2437	2.4215
(T-ratio)	(1.1096)	(-1.5363)	(-4.9759)	(-0.63310)	(-1.5553)	(1.9289)

Source : Calculations made by the authors.

Table A-1
Provincial Laws on LSVCF

Province	Year	Law	Fund
Québec	1983	Loi constituant le Fonds de solidarité des travailleurs du Québec	- Fonds de solidarité des travailleurs du Québec
Ontario	1992	Labour-Sponsored Venture Capital Corporation Act	- Integrated Growth Fund Inc. - DGC Entertainment Ventures Corporation Inc. - Active Communications Growth Fund Inc. - Canadian Medical Discoveries Fund Inc. - Capital Alliance Ventures Inc. - CI-CPA Business Ventures Fund Inc. - FESA Enterprise Venture Capital Fund of Canada Ltd. - First Ontario Labour-Sponsored Investment Fund Inc. - Sports Fund Inc. - TCU Development Fund Inc. - Trillium Growth Capital Inc. - Vengrowth Investment Fund Inc.
British Columbia	1989	Employee Investment Act	- Working Opportunity Fund Ltd.
Manitoba	1991	Manitoba Employee Ownership Fund Corporation Act	- Crocus Investment Fund Inc.
New Brunswick	1994	Act respecting Workers Investment Fund Inc.	- Worker's Investment Fund Inc.

Source : Canadian Labor Market and Productivity Centre, "The Role and Performance of Labour-Sponsored Investment Funds in Canada : Some Preliminary Findings", March 1995.

Table A-2
Distribution of Tax Expenditures Relative to the Number of Taxpayers, Québec, 1986, 1989 and 1993

Income Range (in Thousands of $)	1986		1989		1993		
	Number of Return	% by Income Class	Number of Return	% by Income Class	Income Range (in Thousands of $)	Number of Return	% by Income Class
0 - 5	0	0.0	0	0.0	0 - 5	0	0.0
5 - 10	592	1.9	335	0.6	5 - 10	353	0.4
10 - 15	1 438	4.7	1 640	3.1	10 - 15	1 932	2.1
15 - 20	2 687	8.7	3 459	6.6	15 - 20	3 918	4.2
20 - 25	3 819	12.4	5 912	11.2	20 - 25	6 804	7.3
25 - 30	4 560	14.8	7 145	13.6	25 - 30	10 175	11.0
30 - 35	5 188	16.8	7 675	14.6	30 - 35	10 677	11.5
35 - 37.5	2 268	7.3	3 896	7.4	35 - 40	11 145	12.0
37.5 - 40	2 046	6.6	3 614	6.9	40 - 45	11 031	11.9
40 - 45	3 296	10.7	6 157	11.7	45 - 50	9 313	10.0
45 - 50	2 135	6.9	4 680	8.9	50 - 60	14 064	15,1
50 - 60	1 840	5.9	4 753	9.0	60 - 70	6 997	7.5
60 - 100	921	3.0	3 017	5.7	70 - 100	5 218	5.6
100 - 200	100	0.3	363	0.6	100 - 200	1 182	1.3
200 +	0	0.0	29	0.1	200 +	115	0.1
Total	**30 890**	**100.0**	**52 675**	**100.0**	**Total**	**92 924**	**100.0**

Source : Portrait de la fiscalité des particuliers au Québec. Statistiques Québec 86.

Note : The calculations are from the author.

Table A-3
Labour Sponsered Funds Tax Credit, Canada, 1993, in Thousands of $

	Newfoundland		Prince Edward Island		Nova Scotia		New Brunswick	
Income Range	Number of Taxpayers	Amount	Number of Taxpayers	Amount	Number of Taxpayers	Amount	Number of Taxpayers	Amount
0 - 5	0	0	0	0	0	0	0	0
5 - 10	0	0	0	0	0	0	0	0
0 - 15	0	0	0	0	0	0	0	0
15 - 20	0	0	20	9	0	0	10	4
20 - 25	0	0	30	13	0	0	30	17
25 - 30	0	0	40	21	0	0	30	17
30 - 35	0	0	50	29	0	0	50	33
35 - 40	0	0	60	38	0	0	70	55
40 - 45	0	0	40	27	0	0	60	42
45 - 50	0	0	60	36	0	0	60	46
50 - 100	0	0	150	113	10	5	350	279
100 +	0	0	30	24	0	0	60	51
Total	**0**	**0**	**480**	**311**	**20**	**10**	**730**	**547**

	Québec		Ontario		Manitoba		Saskatchewan	
Income Range	Number of Taxpayers	Amount	Number of Taxpayers	Amount	Number of Taxpayers	Amount	Number of Taxpayers	Amount
0 - 5	0	0	0	0	0	0	0	0
5 - 10	340	27	70	16	20	2	20	3
10 - 15	1 810	228	420	147	60	17	150	46
15 - 20	4 020	563	770	380	110	37	290	118
20 - 25	7 110	1 061	1 020	644	140	55	340	164
25 - 30	10 450	1 819	1 510	1 028	190	83	380	195
30 - 35	10 710	2 226	2 020	1 427	240	112	520	283
35 - 40	11 220	2 596	2 510	1 854	300	137	600	341
40 - 45	11 050	2 788	2 660	1 998	260	124	600	344
45 - 50	9 160	2 454	2 740	2 075	230	113	640	371
50 - 100	25 520	8 493	15 770	12 857	710	423	2 110	1 334
100 +	1 160	583	2 910	2 642	70	50	240	166
Total	**92 540**	**22 837**	**32 400**	**25 069**	**2 320**	**1 153**	**5 890**	**3 367**

Table A-3 (continued)

	Yukon		N.T.W.		Alberta		British Columbia	
Income range	Number of taxpayers	Amount	Number of taxpayers	Amount	Number of taxpayers	Amount	Number of taxpayers	Amount
0 - 5	0	0	0	0	0	0	0	0
5 - 10	0	0	0	0	0	0	10	2
10 - 15	0	0	0	0	0	0	80	26
15 - 20	0	0	0	0	0	0	160	67
20 - 25	0	0	0	0	0	0	210	119
25 - 30	0	0	0	0	0	0	300	189
30 - 35	0	0	0	0	0	0	380	241
35 - 40	0	0	0	0	0	0	530	372
40 - 45	0	0	0	0	0	0	570	403
45 - 50	0	0	0	0	0	0	590	421
50 - 100	0	0	0	0	20	10	2 500	1 969
100 +	0	0	0	0	0	0	340	314
Total	**0**	**0**	**0**	**0**	**40**	**21**	**5 670**	**4 122**

All Canada		
Income range (in thousands of $)	Number of taxpayers	Amount
0 - 5	0	0
5 - 10	460	50
10 - 15	2 520	468
15 - 20	5 390	1 182
20 - 25	8 890	2 072
25 - 30	12 890	3 357
30 - 35	13 960	4 351
35 - 40	15 300	5 396
40 - 45	15 240	5 728
45 - 50	13 480	5 517
50 - 100	47 160	25 490
100 +	4 820	3 833
Total	**140 110**	**57 444**

Source : Special tabulation from Revenu Canada, Statistical services division 1995.

Table A-4
Data Used in OLS Analysis of FSTQ Employment Impact, Québec

Year	Industry											
	Wood		Furniture		Paper		Printing		Petroleum		Chemical	
	Number of Employees	Value-Added	Number of Employees	Value-Added	Number of Employees	Value-Added	Number of Employees	Value-Added	Number of Employees	Value-Added	Number of Employees	Value-Added
1971	17,006	175,749	14,629	159,781	31,890	602,974	13,554	300,839	1,844	122,035	12,276	413,290
1972	19,861	250,936	15,736	188,900	31,816	658,193	14,423	336,131	1,956	135,707	12,046	443,048
1973	21,808	344,312	16,731	217,148	31,039	746,186	14,978	418,472	2,070	172,960	12,354	519,290
1974	20,817	358,290	16,787	254,739	34,420	1,164,250	15,417	485,995	2,282	343,892	12,814	648,250
1975	19,800	362,388	15,995	260,112	33,749	1,052,705	15,797	537,801	2,355	211,029	13,300	673,546
1976	20,853	435,684	15,544	279,029	34,887	1,156,514	15,998	610,820	2,290	311,241	13,437	732,496
1977	20,934	501,975	13,383	269,085	33,090	1,309,456	14,883	619,912	2,216	382,888	13,216	790,137
1978	23,598	646,155	14,844	310,741	33,656	1,564,676	15,923	703,612	2,522	328,692	13,539	926,372
1979	24,087	812,515	16,274	360,498	34,142	1,900,076	16,345	801,307	2,027	511,704	13,037	1,097,632
1980	23,708	740,001	14,944	389,519	33,042	2,142,681	16,698	947,175	1,961	541,566	13,719	1,235,001
1981	22,503	766,368	14,229	418,483	33,875	2,380,690	16,673	1,013,330	1,935	681,030	13,837	1,264,700
1982	19,014	629,215	11,692	364,910	30,873	2,115,134	16,109	1,109,289	2,093	543,992	12,703	1,388,566
1983	22,128	877,020	11,892	428,797	30,971	2,068,269	16,920	1,299,577	1,595	547,195	12,704	1,534,095
1984	23,417	1,037,285	12,341	491,824	31,467	2,568,104	17,742	1,513,674	1,206	747,288	12,896	1,681,804
1985	24,533	1,085,450	14,107	554,612	31,121	2,720,839	20,068	1,515,557	1,224	594,945	13,131	1,782,683
1986	25,210	1,260,555	14,332	581,414	31,528	2,935,800	20,511	1,705,660	1,203	348,351	13,573	1,944,690
1987	30,088	1,487,858	18,437	692,426	32,463	3,409,009	22,149	1,815,424	1,064	115,381	13,506	2,281,082
1988	29,195	1,516,475	18,282	754,273	32,328	3,835,040	22,424	1,970,775	1,118	235,289	13,344	2,668,873
1989	27,288	1,463,629	17,303	796,585	31,316	3,461,170	22,682	2,077,347	1,238	253,035	13,490	2,901,111
1990	25,454	1,339,781	16,193	796,008	30,143	3,124,699	22,627	2,290,273	1,112	389,222	14,118	2,943,917
1991	21,276	1,234,545	11,716	667,522	28,623	2,731,399	18,305	2,191,895	1,172	260,547	12,414	2,622,944
1992	21,190	1,406,990	11,459	656,064	26,444	2,402,128	17,740	2,261,599	1,130	321,470	11,985	2,820,695
1993	21,289	1,690,736	11,415	649,574	24,563	2,628,543	17,986	2,327,553	967	193,734	11,983	2,745,908
1994	23,148	2,149,853	11,968	684,369	23,700	3,118,880	17,977	2,400,315	905	278,669	11,561	2,779,658

Source : Statstique manufacturière du Québec, Bureau de la statistiqe du Québec.

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RAISING EQUITY CAPITAL FOR SMALL AND MEDIUM SIZED ENTERPRISES USING CANADA'S PUBLIC EQUITY MARKETS*

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INITIAL REPORT FOR INDUSTRY CANADA'S
CAPITAL MARKETS ISSUES RESEARCH PROJECT

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RAISING EQUITY CAPITAL FOR SMALL AND MEDIUM SIZED ENTERPRISES USING CANADA'S PUBLIC EQUITY MARKETS

EXECUTIVE SUMMARY

The long-run health of an economy depends upon the emergence of new firms; however, the creation of a new firm is often hindered by the inability of an entrepreneur to raise start-up capital. The debt markets are unsuited to the financing of start-ups, and venture capital firms prefer to finance firms that have advanced beyond the start-up phase. Medium sized firms also experience difficulty when attempting to raise additional capital for growth. The purpose of this research study is to determine whether the Canadian equity markets provide an effective means for small and medium sized enterprises (SMEs) in Canada to raise equity capital.

The study begins with an examination of the costs of listing on a public equity exchange. It identifies two main costs of public listing: cash expenses, consisting of regulatory expenses and the underwriter's commission, and the underpricing of a firm's equity during the initial public offering (IPO). The study estimates that the cash costs of publicly listing a security range from a minimum of under $40,000 for an Alberta Stock Exchange (ASE) Junior Capital Pool (JCP) security, to over $100,000 for a regular listing on the other Canadian exchanges. Much of this cost is a fixed cost, so there are significant economies of scale in the issuing of securities in the public markets. The extent of these fixed costs makes it very expensive for a firm to issue less than $1 million of equity on all exchange except the ASE, where it is possible to list a public company with a market capitalization of several hundred thousand dollars. The study examines the extent of underpricing in Canada and finds that it varies over time and is dependent on a number of factors including issue size, industry of issuer, reputation of the underwriter and

auditor, and the intended use of the IPO proceeds. Using data from the ASE JCP program, the study finds that the recent underpricing in this market for small Canadian IPOs is similar to the underpricing experienced by small equity issues in the United States (US).

The study also examines the listing requirements for the Canadian exchanges and determines that the tightening of the regulations on the Toronto Stock Exchange (TSE) makes listing on this exchange possible for only well established medium sized firms. There is thus a gap in the public financing of small and medium sized Ontario firms which is being partially filled by the Over-the-Counter (OTC) market and the regional exchanges in Canada. The listing requirements are lower on the Montreal Exchange (ME) and the Vancouver Stock Exchange (VSE), but again they preclude the listing of firms with much less than $1 million in assets or market capitalization. In Alberta, the listing requirements of the ASE allow JCP firms with as little as several hundred thousand dollars in equity to become publicly listed. In fact, the principals of a JCP firm are required to invest only $100,000 in seed capital before seeking a public listing.

Potential problems in the development of a stock exchange program geared to Canadian SMEs were identified by examining the experience of similar programs around the world. In the US, the public financing of small firms using blind pool programs was unsuccessful because lax regulations and a lack of enforcement led to fraudulent securities trading. In Europe, a number of stock exchange introduced programs geared to SMEs in the 1980s, but today these programs suffer from a significant lack of liquidity which has forced many of them to be discontinued. In Canada, the ASE JCP program has been in existence since 1986, and evidence is provided that the majority of the firms listed have been successful after issue. From an initial equity base of

$77 million, JCP firms have raised an additional $475 million in equity capital by the end of 1992. As well, these firms have issued $20 million worth of preferred shares, and raised $165 million in debt financing. Thus, JCP firm's have been successful in using the capital markets after their initial listing to raise additional funds which suggests this program has been very successful in helping small firms in Alberta become established and grow.

Based on the results of the ASE study, and the earlier examination of costs and listing requirements at other exchanges, the paper provides a series of conclusions and recommendations. First, the study concludes that it is possible to establish a stock exchange program which allows small and medium sized enterprises to raise equity through an IPO, and through secondary financings. The program has to be regionally based, and needs to build on the existing infrastructure, such as regional brokerage firms and a strong retail investor base, in the region. In an area which is dominated by national investment dealers, such as Ontario, it is unlikely that adding a second-tier to the existing stock exchange will be successful. The experience in other countries has been that the national dealers do not have the incentive to actively support this second tier market, and the market languishes with low liquidity. Thus, a new market mechanism for the junior equities will need to be introduced. Any program which is introduced has to be closely monitored by the regulatory authorities to ensure the program does not develop a reputation for including low quality firms. As well, the program should be transitory in that listing firms must be given a strong incentive to grow and leave the junior market or face delisting.

There are a number of possible extensions to this research study. First, the time period over which the JCP program was studied can be expanded to determine the recent performance

of the program. Although the number of JCP listings fell to a low level in the early 1990s, it rebounded strongly beginning in 1993. The ASE also adopted another program in the early 1990s, called the Exchange Offer Prospectus (EOP) program, which was intended to reduce the cost and regulatory burden associated with publicly listing a medium sized firm on the exchange. This program has been in existence for a number of years, and has helped a number of firms become listed on the ASE. It would thus be useful to study the success of this program in terms of its ability to reduce listing costs, and its ability to attract firms which have used their public listing to seek additional equity financing to fuel their growth.

RAISING EQUITY CAPITAL FOR SMALL AND MEDIUM SIZED ENTERPRISES USING CANADA'S PUBLIC EQUITY MARKETS

1. Introduction

Continued economic development in a country, or region, depends upon the emergence and growth of new economic entities. New firms increase the level of competition in existing industries, and develop many of the technological innovations that fuel economic growth. One barrier to the creation and growth of new firms is that raising seed and secondary capital for such ventures is difficult.

Entrepreneurs have trouble raising debt capital because they often lack the proven cash flows or collateral required by lenders. This means that until a firm has grown to a certain size the owner must search for equity capital. Unfortunately, raising equity capital can be just as difficult. Venture capital firms provide limited support for start-ups because they prefer to invest in a few selected businesses in which they can take a substantial equity interest and exert control over management (see Barry, Muscarella, Peavy and Vetsuypens (1990) and Sahlman (1990)). A more important source of equity capital for start-ups are investment angels (see Wetzel (1983) and Riding, Dal Cin, Duxbury, Haines, and Safrita (1993)). Riding et al. found that in Canada, these angels provide almost twice as much equity for small firms as formal venture capitalists.

There have been a number of recent studies which examine the problems of raising equity financing for small and medium-sized enterprises (SMEs). The definition of an SME varies from study to study, and the Ontario Securities Commission's (OSC) Task Force adopted the definition that any firm with annual sales of under $10 million should be considered an SME (see OSC (1994)). The Task Force noted that a major problem for these SMEs is "... the relative scarcity of equity capital financing deals at the low end of the market, generally in the range from $50,000 or $100,000 to $1,000,000" (OSC 1994, p. 6).

The regulatory and institutional barriers for firms attempting to arrange private equity financing of this amount in Canada are discussed in MacIntosh (1994a, 1994b). As well, the OSC Task Force analysed this problem and provided a number of recommendations. These recommendations consider ways in which to reduce the cost and regulatory burden placed on issuers of private placements in Ontario.

The OSC Task Force also considered the problems experienced by SMEs in accessing public equity financing. One major problem they note is "... the lack of a developed distribution network in the Canadian marketplace for offerings of less than $10 million" (OSC 1994, P. 6). The Task Force provided a number of recommendations to lower the cost and regulatory burden associated with the raising of public equity by SMEs. Their recommendations include the establishment of a simplified "small business prospectus form", a simplification and liberalization of the escrow requirements of these issuers, and an elimination of the requirement to involve an underwriter in public offerings by SMEs.

The purpose of this study is to examine whether the public equity markets in Canada currently provide a viable alternative source of equity financing for SMEs. It will focus on whether the public markets are suitable for the raising of small amounts of equity, in the range of $50,000 to $1,000,000; however, it will also discuss the role of these markets in the raising of larger equity amounts. Section 2 will examine the costs of publicly listing a security in Canada to see if these costs impose a major obstacle to SMEs in Canada. In Section 3, the listing requirements of Canadian exchanges will be examined to see if they serve to restrict the ability of SMEs to raise equity capital. Section 4 will consider other institutional issues which may restrict the availability of equity capital to SMEs. Section 5 reviews programs which have been initiated in Canada and other countries to increase the ability of SMEs to seek public sources of equity. In Section 6, the results of the study are summarized and recommendations of how to improve the access of SMEs to the public equity markets are provided.

2. Costs of Raising Capital through an Initial Public Offering

There are two major cost components associated with an Initial Public Offering (IPO). The first cost component is the cash expenses the firm must pay in order to have its equity distributed to the public. This component has two elements, a regulatory cost and the underwriter's commission. The regulatory cost includes the legal fees, accounting and auditing fees, listing fees, and printing costs associated with the preparation of the IPO prospectus and with satisfying the regulators and a stock exchange. The underwriter's commission typically has two components, a direct fee, usually based on a fixed percentage of the issue, and warrants issued to the underwriter with an exercise price equal to the issue price.

The second major cost component of an IPO is the discount at which the firm must offer its shares to the public to ensure that the issue will be sold.

2.1 Cash Expenses of an IPO

Before a firm can issue its shares to the public using an IPO, it must pass a number of hurdles. The first hurdle is to locate an underwriter willing to distribute the shares. Underwriting firms are concerned about their reputation and thus want to ensure that the firm's shares will have value to investors. The underwriting firm will thus conduct a due diligence examination of the firm and incur expenses which will be charged to the IPO firm. Once the underwriter is satisfied, the IPO firm must be approved by the appropriate securities' regulator and exchange officials. In order to receive this approval the IPO firm will incur legal expenses, accounting and auditing expenses, and may be required to have an independent evaluation of its business plans prepared. Following the approval of the securities commission and the exchange, the IPO firm must incur the expense of printing the prospectus to be distributed to potential investors.

The above regulatory costs are direct cash expenditures which are over and above any costs the firm itself must bear, eg. the opportunity cost of management in planning the IPO and searching for an underwriter. The length of the period from inception of the IPO to the listing of the security on an exchange can vary from case to case. In general, the more established the firm, and the higher its earning potential, the shorter the listing time.

These regulatory costs are in place to protect the investing public. The intention of the securities' regulators and stock exchange officials is to impose a minimum level of information disclosure to the investing public. These regulators also attempt to ensure that the information which is presented is a factual representation of the situation facing the IPO firm. The continued confidence of the investing public is necessary to ensure that the equity markets function effectively, and that investors will be willing to purchase additional IPO securities in the future.

Many of the regulatory expenses are fixed, eg. legal fees and exchange listing fees, and thus it is expected that there are economies of scale in the distribution of shares to the public. Thus, the percentage cost of an IPO's regulatory expenses should be a decreasing function of the amount of capital raised.

A brokerage firm will also charge the IPO firm a fee for conducting the underwriting. There are two predominant methods of underwriting a security issue. In a best-efforts underwriting, the investment dealer attempts to sell as many shares as possible at an agreed upon selling price. In this case, the investment dealer does not guarantee the amount of capital which will be raised for the IPO firm; therefore, the risk of the share offering being undersubscribed is borne by the IPO issuer. With a firm-commitment share offering, the underwriting firm guarantees the proceeds of the issue to the IPO firm and thus the underwriter bears the risk of an undersubscription. In general, best-efforts underwriting is used by smaller, more risky, companies in which the underwriter is unwilling to guarantee the amount of proceeds which will be received from the issue, or the cost of the guarantee to the issuing firm is too high.

As compensation for its efforts, the underwriting firm charges the IPO firm a commission based on the amount of capital raised. This commission takes the form of a percentage of the proceeds of the issue and is deducted from the issue proceeds which are forwarded to the IPO issuer. In general, the commission if higher for firm-commitment underwriting than for best-efforts underwriting. For the smaller equity issues, the underwriter may also take share warrants with an exercise price equal to the IPO price.

2.1.1 An Examination of the Cash Costs of US IPOs

Ritter (1987), in a study of 1,028 IPOs between 1977 and 1982, finds evidence that there are economies of scale in the cash expenses of an underwriting, and determines that the cash expense can be estimated as $250,000 plus 7% of the gross proceeds of the underwriting. Aggarwal and Rivoli (1991), in a study of 1,852 IPOs between 1977 and 1987, also find economies of scale in the cost of an IPO, and determine that the average regulatory cost of a best efforts IPO under $3 million is $108,510 and the average underwriter commission is $193,860 for a total cash cost of $302,370, see Table 1, Panel A. This table also shows that the average cost of an IPO is higher for firm commitment IPOs than for comparable best efforts IPOs. This result is expected due to the higher risk borne by the underwriter of a firm commitment IPO. The magnitude of these underwriting costs suggests that it would be uneconomic for a US firm to conduct an underwriting of less than $1 million.

On a percentage basis, Ritter finds that for best efforts IPOs between $1 million and $2

million that the regulatory and underwriter commission expenses are 9.52% and 10.63% of the issue proceeds, for a total cash cost of 20.15%, see Table 2. This table also provides a good illustration of the economies of scale in the costs of IPOs as the percentage cost of an IPO is steadily decreasing as a function of issue size. Aggarwal and Rivoli report similar results, see Table 1, Panel B. In their sample, small best efforts IPOs, under $3 million, had average regulatory and commission expenses of 5.87% and 10.25% respectively, for a total cash cost of 16.13%. Note that the percentage regulatory cost reported by Aggarwal and Rivoli for offerings under $4 million are much lower than the values reported by Ritter which suggests that the regulatory costs decreased over time in the US.

2.1.2 An Examination of the Cash Costs of Canadian IPOs

The cost of issuing securities in Canada will depend on the type of underwriting and the province in which the underwriting is being conducted. According to industry participants, the leat expensive jurisdiction for an underwriting is Alberta. In the Alberta Stock Exchange (ASE) publication entitled Going Public, the ASE estimates the regulatory costs of an IPO will range from $28,000 up to $105,000, with average underwriting costs of between 5% and 20% of the issue proceeds. The low end of the fixed cost range will be observed for Junior Capital Pool (JCP) IPOs. These details of this special type of IPO are discussed in subsequent sections.

To conduct a regular IPO in Alberta will usually cost a firm between $65,000 and $150,000 in regulatory expenses. The underwriter's commission would be an additional 7.5%-10% of the capital raised. In Alberta, it is possible to use the Exchange Offer Prospectus (EOP) program to lower the regulatory expenses. This program would reduce the regulatory expenses to the range of $40,000 to $75,000 but would restrict the security to being listed only on the ASE. As an illustration, the EOP underwriting for Vicom Multimedia in November 1994 had a regulatory cost of $70,000, and an agent's commission of 7.5%. Thus, the total cost of issue ranged would have been $257,500 for the minimum underwriting of $2.5 million, and $370,000 for the maximum underwriting of $4.0 million.

As mentioned above, the lowest dollar cost form of underwriting in Alberta is the JCP program. Table 3, Panel A illustrates that the average regulatory cost of a JCP IPO has been under $25,000 since the program's inception in 1986, and although the underwriter's commission

has been increasing in recent years it is still under $15,000. Thus, the average total cost of a JCP IPO between 1986 and 1992 has been less than $40,000. In percentage terms, the average total IPO costs have never exceeded 18% of the issue proceeds, and were usually less than 16% (see Table 3, Panel B). Thus, the percentage costs of small JCP IPOs on the ASE are comparable with the percentage costs of small issues in the US contained in Table 1, Panel B and Table 2. This table also illustrates that the average size of a JCP has been steadily increasing over time.

To issue securities on the Vancouver Stock Exchange (VSE) in British Columbia (BC) would increase the cost of an underwriting by approximately $20,000 to $30,000 over the cost of a similar issue in Alberta. The reason for this increase is the requirement to have an independent evaluation of the business as specified in Local Interim Policy Statement 317. This policy statement also has the effect of increasing the length of time required to conduct the underwriting in BC versus Alberta.

In Ontario and Quebec the dollar cost of conducting an IPO would be much higher than in Alberta or BC, with a minimum regulatory cost of between $100,000 and $150,000. Due to the larger size of IPOs on these exchanges, however, the percentage cost of an IPO in these provinces will be lower than in Alberta or BC. Using a sample of 46 IPOs on the Toronto Stock Exchange (TSE) between 1991 and 1993, MacIntosh (1994a) estimates the average regulatory costs of an IPO under $5 million at 5.6% of the issue proceeds, and the average underwriting cost at 17% (although this was skewed by an underwriting with a commission of 40%), for a total cash cost of 22.6%. He finds evidence of economies of scale in TSE IPO expenses, as the average percentage cash cost is decreasing in issue size. For example, the average total cost for IPOs between $5 and $10 million is approximately 12%.

The above evidence suggests that the dollar cost of publicly listing a security is lower in Canada than in the US. Thus, it is possible to economically raise an amount ranging from several hundred thousand for an ASE JCP, to an amount of over $1 million for a regular IPO on the major exchanges. For a firm attempting to raise several hundred thousand dollars of equity financing using the public equity markets in Canada, the ASE's JCP program is the only economical alternative. Medium sized enterprises could use either the ASE or VSE to raise a minimum amount of approximately $1 million. According to the OSC Task Force report, in

Ontario investment dealers prefer to issue equity offerings of $10 million and above. The investment dealers in Quebec are expected to have minimum offer sizes between greater than Alberta and Vancouver, but lower than Ontario.

2.2 Underpricing of IPOs

The second major cost of an IPO underwriting is an indirect cost born by the issuing firm. This cost results from the underwriting firms' habit of setting the IPO price at a level below the equilibrium value of the firm's shares. This empirical phenomena has been noted in many countries around the world, including Canada, and a number of explanations have been forwarded to account for it.

Baron (1982) developed a theory for the demand for investment banking advisory services in which the advisor is better informed about the capital markets than the issuing firm. In this situation, the issuer contracts with the investment dealer for the provision of both advisory and distribution services, and dealers use their superior information to establish an issue price below the first-best offer price. This results in IPOs being initially underpriced when they are first issued. Baron's theory has been directly tested by Muscarella and Vetsuypens (1989). They examined the IPOs for a set of investment banks which went public over the period 1970 to 1987. Since in these cases the investment dealer is acting as their own advisor and distributor of shares there will exist no asymmetry in the information between the issuer and the advisor. Muscarella and Vetsuypens found that, contrary to Baron's theory, these self-marketed IPOs experienced underpricing which was significantly higher than other IPOs. Using a sample of IPOs for Canadian brokerage firms, Cheung and Krinsky (1994) were also unable to find support for Baron's hypothesis.

Rock (1986) and Beatty and Ritter (1986) developed alternative models to explain the IPO underpricing. In their models, there are two classes of investors: informed investors and uninformed investors. The informed investors are able to determine the investment quality of a particular IPO and will attempt to purchase a large amount of the underpriced IPOs and a less amount of the overpriced IPOs. The uninformed investors are unable to differentiate between the types of IPOs and thus will wind up purchasing a higher percentage of the overpriced IPOs,

thereby incurring the winner's curse, and a lower percentage of the underpriced IPOs. Thus, to entice the uninformed investors to purchase IPOs, all IPOs must be sufficiently underpriced to allow the uninformed investors to cover their losses on the overpriced IPOs. Beatty and Ritter contended that underwriters will enforce the IPO underpricing to maintain their reputation, and provide weak evidence that investment firms which price IPOs incorrectly lost market share in subsequent periods. A direct test of this hypothesis was conducted using data from Singapore by Koh and Walter (1989). Due to the institutional arrangements in that country it was possible to gather information on the rationing of IPO securities. Using this data, the authors found that when the rationing associated with new issues was accounted for that the underpricing of new issues disappeared.

Other authors have tried to determine what elements of information will reduce the level of investor uncertainty about a particular security, and thus lower the extent of the underpricing of the new issue. In Canada, Jog and Riding (1987) found that IPO underpricing was significantly related to the firm's industry group and the use of the proceeds of the issue. Clarkson and Merkley (1994) found that the underpricing was higher the younger the firm and the lower the level of pre-issue annual sales. As well, firms in the extractive industries had higher levels of underpricing than firms in the retail trade, services, financial and consumer products sectors. The authors also identified a number of management choice variables which explained cross-sectional differences in IPO underpricing. Underpricing was lower for firms which used a Big Eight accounting firm versus other auditing firms, was lower for high prestige than lower prestige underwriting firms, and was lower if the managers included an earnings forecast in the prospectus. Finally, they found that the underpricing was lower if the proceeds of the issue were to be used for financing purposes than if the proceeds were to be used for operational or investment purposes.

Tinic (1988) developed and tested a hypothesis that the underpricing of IPOs occurs because the investment dealers are protecting their firm against legal liabilities of an overpriced issue, and also want to minimize the damage to the firm's reputation of an overpriced issue. Keloharju (1993) found high initial IPO returns in a study of Finnish IPOs and notes that there is a much lower probability of shareholder lawsuits in Finland than in the US Thus, the legal liability hypothesis was a not a likely explanation for the underpricing of Finnish IPOs.

More recently, Allen and Faulhaber (1989), Chemmanur (1993), Grinblatt and Hwang (1989), and Welch (1989) developed signalling models which explained the new issue underpricing. Under these models, issuers have better information than underwriters or investors about the value of the firm. The high-quality firms view the IPO as the first stage of their financing program, and intend to raise additional capital through a secondary offering in the future. To signal that their firm is high-quality, and thus to sell their stock at a higher price in secondary offerings, these high-quality firms choose to underprice their IPO to signal investors that the firm is high-quality. Thus, the high-quality firms will incur the higher underpricing cost in the initial market to realize a higher selling price in the secondary market. Lower quality firms which do not intend to return to the market with a secondary offering will have no incentive to deliberately underprice their IPO, and thus the high-quality firm behaviour will not be mimicked by the lower quality firms. An empirical examination of this hypothesis by Jegadeesh, Weinstein and Welch (1993) found only weak evidence in support of this hypothesis.

US empirical evidence, Aggarwal and Rivoli (1990) and Ritter (1991), and Canadian evidence, Cheung and Krinsky (1994), suggests that IPO underpricing is a short-run phenomena. Rudd (1993) and Hanley, Kumar and Seguin (1993) propose an alternative explanation for the underpricing of IPOs based on the stabilization activities of the underwriters of IPOs. These stabilization activities effectively put a floor on the losses of IPOs, and thus truncate the left tail of an IPO returns' distribution. Since most studies of IPO underpricing measure underpricing from the initial issue price to the closing price at the end of the first trading day, this truncated distribution would result in a higher average day 1 return than would be the case if the stabilization activity did not occur. The authors point out that this stabilization is acknowledged by the SEC to be a form of price manipulation, but the SEC argues that firms which engage in stabilization for the purposes of manipulation will suffer a loss in reputation which will lower their ability to sell securities in the future. Using data from firm commitment underwriting, Rudd demonstrated that the distribution of one-day stock returns was positively skewed and inordinately peaked at a zero return. She also demonstrated that most securities with a day 1 return of zero subsequently fell in price which is consistent with the evidence that IPO underpricing is a short-run phenomena. A more recent paper by Schultz and Zaman (1994) supported this dealer stabilization hypothesis by reporting that underwriters, on average, repurchase over 20% of the shares issued in an IPO during the first three days following the stock's listing.

2.2.1 Empirical Evidence of the Underpricing of IPO Securities

Early US studies that document high returns immediately after issue for IPO securities include Reilly and Hatfield (1969), Stoll and Curly (1970), and Ibbotson (1975). Ibbotson reports that this return, measured over the first month of trading for a security, averages 11.4%. A summary of IPO underpricing in many countries around the world is presented in Kunz and Aggarwal (1994, Table 1).

Ibbotson and Jaffe (1975) examined the existence of "hot issue" markets for US IPO's and find that IPO returns in the immediate after-market vary over time. They also found that a time series of IPO returns exhibited serial dependence, and that "hot issue" markets persist over time. Ritter (1984) demonstrates the extent of this phenomena when he notes that over the 15 months beginning January 1980, US IPO securities experienced a gain of 48.4% on the first day of trading. This return was significantly higher than the average return of 16.3% earned during the rest of the six year period 1977-1982. Ritter found that the "hot issue" phenomena was restricted to natural resource securities.

Ritter (1987) provided evidence that the underpricing of an IPO security depended on whether the issue was distributed on a best efforts basis, or as a firm commitment offer, see Table 4. Using a firm commitment issue will send a signal to investors that the underwriting firm has confidence in the issue price, and thus the results show a much lower degree of underpricing for the firm commitment issues. The table also illustrates the total cost of underwriting an IPO, including both the cash costs and the underpricing. The results indicate that for best efforts issues under $2 million, the total issue cost is 60%, while for a firm commitment issue the total cost is 46%. For the most part, the total average issue costs are a decreasing function of issue size.

In a more recent study, Aggarwal and Rivoli (1991) report higher underpricing for best efforts issues, but lower underpricing for firm commitment issues than Ritter, see Table 5. For best efforts underwritings under $3 million, they found average underpricing of 65% and total average issue costs of 81%, while for the firm commitment issues of similar size they found average underpricing of 23% and total issue costs of 40%. Consistent with the Ritter results, Aggarwal and Rivoli found that firm commitment issues had lower underpricing and total costs than best efforts issues, and the underpricing and issue costs were decreasing in issue size.

Canadian studies of IPO's that report underpricing include Jog and Riding (1987), Krinsky and Rotenberg (1989), and Falk and Thornton (1992). Jog and Riding report that the returns earned over the first three days following the initial listing of a security averaged 9.0%-11.5% over the time period 1971-1983. Over the period 1983-1988, Falk and Thornton reported even higher returns on the first day of trading for a security. Their average returns, adjusted for market returns, were 19% for Toronto Stock Exchange IPO's, 25% for Montreal Exchange IPO's, and 307% for ASE IPO's. Their sample of ASE securities included both regularly listed ASE securities and JCP's. The large difference between the returns reported by Jog and Riding (1987) and Falk and Thornton (1992) suggests that there exist "hot issue" markets in Canada.

The underpricing, and total issue costs, of ASE JCP securities are illustrated in Table 6. Over the first time period, some blind pools listed on the ASE were subject to fraudulent trading and thus the results in this time period are biased upwards. It was these illegal trading activities which resulted in the establishment of the JCP guidelines beginning in late November 1986. Thus, only the last three time periods in Table 6 include true JCP securities. The results over these periods indicate a high degree of underpricing in the early days of the JCP program, but a dramatic reduction in this underpricing over time as investors became accustomed to the characteristics, eg. risk and return, of the securities. Since the minimum issue price was raised to $0.10, the degree of underpricing of JCP securities is very similar to the underpricing of small US securities. Thus, the total percentage costs of a JCP issue are currently similar to those of small US firms.

2.3 Summary of the Literature Concerning the Issue Costs of an IPO

The cash expenses associated with an IPO consist of fixed regulatory expenses, plus a commission expense which varies with the issue size. In Canada, these costs make it uneconomical to conduct an IPO with a value of much less than $1 million on the Toronto, Montreal or Vancouver stock exchanges. On Alberta, it is possible to conduct an IPO of only a few hundred thousand dollars using the JCP program.

A large component of the cost of an IPO is the fact that the securities are issued to the public at an initial price lower than the security's equilibrium price. Recent evidence suggests that some of the empirical evidence of underpricing is due to the support activities of an IPO's

underwriters after issue. Nonetheless, it does appear that underwriters do set the issue price of an IPO at less than the equilibrium price. The most commonly accepted explanation for this phenomena is the asymmetry in information which exists between issuers and uninformed investors. Uninformed investors will reduce the price they are willing to pay for a firm's IPO to offset the winner's curse, suffered from purchasing proportionately too many overvalued IPOs. Further research has identified IPO characteristics, some of which are under management control, which can lower the extent of the information asymmetry and thus the extent of the underpricing. Some researchers use these findings to suggest that there may be an optimal strategy for deciding when and how to conduct an IPO. For example, Aggarwal and Rivoli (1991) suggest that firms can seek to minimize their total costs of an IPO by waiting until the firm has a strong history of earnings, can justify an issue size approaching $10 million, and can convince a prestigious underwriting firm to conduct the IPO. They conclude (Aggarwal and Rivoli (1991, p. 360) , "... the entrepreneur is likely to pay dearly in going public prematurely."

This advice ignores the important question of how a firm raises equity prior to the time when it is optimal to go public. Implicit in the recommendations is the belief that it is less costly to use private equity financing than public equity financing for small equity issues. In Canada, MacIntosh (1994a, 1994b) and the OSC (1994) present evidence that there exist significant regulatory and institutional barriers which make it difficult for small firms to access private equity financing. Discussions with brokerage industry participants in Alberta has indicated that it is much more difficult to raise seed capital from individual investors for a company which intends to stay private, than for a private company which intends to conduct a public offering in the near term. Thus, the fact that there are economies of scale in the issuing of IPOs does not mean that using the public equity markets is impractical for small equity issuers.

3. Listing Requirements of the Canadian Stock Exchanges

The listing requirements of the ASE, ME, TSE and VSE for the different industry types are presented in Appendix A. The TSE, which dramatically tightened its listing requirements in 1992, has the toughest requirements. Since 1992 the required public share float of all new companies has been $2 million, up from the previous level of $1 million. As well, any industrial firms with annual profits of less than $100,000 are required to have at least $5 million in tangible assets, an increase from the previous $1 million level. These changes effectively limit the TSE

to the larger IPO issues of several million dollars. Thus, smaller Ontario firms which want to access the public equity markets are forced to consider listing on the Ontario Over-the-Counter (OTC) market, the Canadian Dealing Network (CDN), or listing on one of the Canadian junior stock exchanges.

The ME currently has significantly lower listing requirements than the TSE. An ME industrial firm requires only $1 million in public equity, provided it has adequate assets and income. Similarly, the minimum public equity for mining firms is $500,000, and the minimum public equity for oil and gas exploration firms is $750,000. In the case of these resource industries, however, the firm must also have strong assets and earning potential to be able to list with the minimum amount of equity.

Regular listing on the VSE requires a minimum public equity level of $1.8 million for industrial firms and non-oil resource firms, and a level of $1 million for oil and gas firms. These does, however, exist a listing category on the VSE for Venture Companies. The minimum listing requirements for these firms is much lower than for a regular listing. Resource companies need a minimum of $450,000 in equity, while non-resource companies need a minimum of $850,000.

The lowest listing requirements in the country are on the ASE. For example, it is possible to list an industrial firm with a minimum asset base of $400,000, as long as a minimum of 500,000 shares are held by at least 300 public shareholders. Using the JCP program, it is possible for entrepreneurs with at least $100,000 in seed capital to raise up to several hundred thousand dollars from public investors. In the first years of the JCP program, the entrepreneurs did not need a clear idea of the purpose for which the funds were being raised; however, in recent years underwriting firms are unwilling to take a JCP public unless the entrepreneurs have a strong business track record and a good idea of how the funds will be invested.

Many authors like to discuss how the US OTC markets, the National Association of Security Dealers Automated Quotation/National Market System (NASDAQ/NMS) and the regular NASDAQ market, have allowed the listing of many small start-up companies in the US. It should be noted, however, that the listing requirements of these exchanges are higher than the listing requirements of most of the Canadian exchanges. For example, the pre-eminent market,

the NASDAQ/NMS requires a minimum equity float of $3 million which is higher than even the TSE (see Schwartz (1991), p. 51). Even the second-tier market, the regular NASDAQ, requires a firm to have a minimum of $2 million is assets, $1 million in capital and retained earnings, but has no minimum market float value. Clearly, the listing requirements of the major US OTC markets are more stringent than those of the smaller Canadian exchanges.

Summarizing the information concerning the listing requirements at Canadian exchanges, it is clear that there exists the potential to raise equity capital of less than $1 million for venture firms using the ASE and VSE, and for resource issues on the ME. Due to the costs of listing discussed in the previous section, however, for practical purposes most of the regular IPOs on these exchanges will not be much below the $1 million level. The TSE remains reserved for medium and large firms requiring equity of over $2 million. Although there does exist an OTC market in Ontario, it appears that there is a gap in the availability of public equity of less than $1 million in that province. Small Ontario firms can seek to list on the ASE or VSE; however, the underwriters and regulators of these exchanges have difficulty with listing applications from other jurisdictions. One of the reasons for the success of the ASE's JCP program, discussed in the next section, is that the majority of the issues were Calgary firms. This allowed the underwriters and regulators the ability to find out a great deal of information about the principals of the offering. As well, since only Alberta residents were able to purchase IPO shares in a JCP, it allowed the principals to identify investors, called "President's List" investors, for the public offering. In many cases, JCP principals of Alberta companies were able to go to the underwriter of the JCP offering with almost the entire issue placed with their friends and business associates.

4. Other Constraints to Public Listing of SME Equity

The two major reasons why junior firms will choose to list their shares on a stock exchange are to allow the seed equity investors the opportunity to fully or partially cash in their investment, or to allow the firm the opportunity to re-enter the equity market with a secondary offering to raise additional equity capital. In either case, it is vitally important that an active secondary market for the firm's shares develops after the initial listing. Without this secondary market, the firm's share price will drift lower after issue making it harder for the firm to issue a secondary offering, and making it harder for investors to sell their shares.

MacIntosh (1994a) notes that there exists a "catch-22" in the development of a market for junior equities. Primary offerings in such a market are not likely to be successful unless there is some assurance that there will be an active secondary market following the initial listing. Unfortunately, an active secondary market for such securities cannot develop until there have been successful primary offerings in the market.

Further exacerbating the liquidity issue is the fact that large underwriting firms in a country are unlikely to be interested in participating in the issuance of junior equity issues. MacIntosh states that "The national investment dealers have shown very little interest in servicing the IPO market for offerings of less than $25 million". In the US, Wolfe, Cooperman and Ferris (1994) find that prestigious underwriters avoid the smaller, riskier, new issues.

Large underwriting firms avoid the smaller firms for three main reasons. First, they are concerned about the reputation of their firm being affected if they begin to participate in the underwriting of the smaller firms. Second, as noted in an earlier section, the underwriting commission is typically a function of the issue size. Thus, the larger firms have an incentive to participate in only the larger size issues because of the overhead associated with maintaining their position as a prestigious firm. Finally, as Rasch (1994) notes the low turnover of the small firms makes it unprofitable for the brokerage firms to research the companies because the costs associated with collecting and processing the company information will not be recovered by brokerage commissions.

In studying the development and decline of special stock market segments for small firms on European exchanges, Rasch notes that when there is a decline in trading for these types of firms there develops a "Vicious Circle" of illiquidity. There are two elements to this circle: flow of information, and flow of funds. Within the flow of information circle, a lack of stock exchange turnover leads to a low demand for research about the companies and thus low incentive for brokerage firms to generate the research. Without the research, however, there is low investor interest in the securities and thus a low level of stock turnover. Within the flow of funds circle, low stock turnover creates an illiquid secondary market for these securities which increases the transactions' costs in this market. The higher transactions' costs reduce the incentive of investors to trade in these securities and thus leads to low investor interest and low levels of trading.

Rasch also observes that a low liquidity in the secondary market for the equity of junior firms will have a significant impact on the issuing firms. Rasch (1994, p. 24) states , "In order to attract investors, these companies have to offer a higher expected return than blue chips. This, however, raises their cost of equity and puts them at a disadvantage against large companies in terms of competitiveness."

Thus, the successful development of an active primary market for junior equity issues requires the establishment of a viable secondary market for these securities. Unfortunately, the evidence from Canada, the US and Europe indicates that the large prestigious national brokerage firms avoid underwriting and supporting the junior equities. Thus, the development of a market for this type of equity security requires strong regional and boutique investment dealers. In Canada, MacIntosh (1994a, p. 140) notes that, "The development of a regional dealer network in Canada has greatly lagged that in the United States". One reason for the lack of these dealers in Canada is that there exist economies of scale in the investment industry, and Canada's capital markets are not large enough to support specialized investment dealers. MacIntosh also points out that limits on the underwriting compensation of small issues in Ontario, due to Ontario Policy Statement 5.2, has hampered the activities of investment dealers in the junior market

In Alberta, a number of regional brokerage firms have taken advantage of the JCP program to carve out a profitable underwriting and trading niche. The compensation to these dealers for an underwriting consists of a cash commission, plus stock warrants equal to 10% of the issued shares. In the early years of the JCP program, the underwriters kept the cash commissions low in order to build the program, but recently the cash commissions have been increasing. The client base for the JCP is predominately retail, although a number of the JCP firms are able to arrange private placements soon after issue from institutional investors.

A regional brokerage firm in Ontario indicated that there is a market for underwriting small equity issues, but the majority of these issues are listed on the OTC market. The disadvantage of this form of listing for junior equities is the lack of liquidity for firms listed on the CDN. As discussed above, an active secondary market is essential before the primary market for these securities can fully develop. The regional firm indicated that for slightly larger firms it is possible to take the firm public by conducting a reverse takeover (RTO) of a TSE shell.

MacIntosh (1994a) points out that the price of a TSE shell is approximately $200,000 to $250,000. After acquiring a shell, a firm would incur additional regulatory and underwriting expenses when raising additional equity capital.

5. History of Junior Equity Issues

In this section, the history of junior stock program is a number of countries will be examined. In the US, blind pool programs were implemented in the 1980s to assist start-up firms raise equity. In a blind pool stock offering the prospective shareholder invests in a company with no earnings history, and receives little indication of how the money being raised will be spent. Unfortunately, the experience of US investors with blind pools has been poor. Out of a sample of sixty-eight US blind pools in existence in 1986, only twenty-three, 33.8%, were trading at a price above the initial subscription price, and one blind pool underwriter estimated that only 2% of these pools were successful (see Stern and Bornstein (1986)). One problem with these programs is that dishonest promoters use the fact that securities regulations, especially for small stock offerings in certain states, are inadequate or supervision is lax to defraud investors of millions of dollars (see Holdman (1984) and Stern, Schifrin and Poole (1989)). Stern and Bornstein (1986, p. 41) report, "One state securities director says the SEC regularly brushes aside complaints involving securities fraud under $1 million as too small for them to look into". States with relatively lax regulations, such as Utah, attracted criminals interested in fraudulent stock trading (see Business Week, 1984). These lax states have attempted to improve their legislation and enforcement to combat the fraud. As well, recent rule changes by the US Securities and Exchange Commission have been instituted to combat fraud in the trading of low priced US stocks (see Reuter (1992)).

During the 1980s, a number of major European stock exchanges established special stock market segments for the trading of the shares of small firms, see Rasch (1994). The first special segments included the Unlisted Securities Market (USM) of the London Stock Exchange, the "Official Parallel Market" (OPM) of the Amsterdam Stock Exchange, the "Mercatto Ristretto" in Italy, and the "Second Marche" in Paris. The "Geregelter (Regulated) Market" was established in Germany in 1987. These exchanges were introduced to combat the low number of new equity listings on European stock exchanges. Rasch (1994, p. 2.) states, "By the end of the 1970s the European stock exchanges had lost their role as an important source of finance".

These special market segments were introduced to be an intermediate market between the existing major stock exchanges and the OTC markets. The admission and disclosure requirements were set at a lower level than for the major stock markets. For example, in the junior markets a firm had to offer a minimum of only 10% of its equity to the general public to qualify for listing, while the requirement was a minimum of 25% on the major exchanges. These special market segments were designed to be transition markets to allow firms to grow to a size where they could be listed on a major exchange.

During the first years of their development, many of these exchanges experienced great success in primary offerings and secondary market trading. For example, the USM of the London Stock Exchange began in 1980 and by 1988 more than 780 had been listed on this exchange. In January 1987, the LSE opened a "Third Market" specifically designed to appeal to even smaller firms which could not satisfy the USM listing requirements. This third market did not develop strong investor interest and in the face of declining interest this market was closed in 1990 with about half of the listed companies being transferred to the USM. Since 1990, the USM has suffered a significant drop in secondary market trading and only 7 new companies were listed in 1992. One reason for the decline in listing was the lowering of listing requirements for regular LSE firms, and an increase in the costs of issue of USM firms to a level close to the costs of a regular LSE listing. The LSE decided to close the USM in 1992, but postponed the implementation date to 1996.

Similar experiences have been observed for the French exchanges' "Second Marche", Amsterdam's OPM (closed in 1992), Italy's "Mercatto Ristretto", and for Germany's "Geregelter Market". These markets were significantly affected by the stock market decline in October 1987; however, there were also structural problems with these markets. Since the exchanges were regarded as transitory, the strong firms would grow into regularly listed firms and only the weaker firms would be left on the junior exchanges. When the supply of new listings dried up in the early 1990s, this established a reputation for these exchanges as containing inferior securities which affected secondary market trading and the willingness of new firms to seek listings on these markets. As well, there was inadequate differentiation between the junior markets and the regular markets in some countries so that as regulations and costs associated with listing on the major exchanges were lowered there was little incentive for firms to list on the junior markets.

A final problem is that the growth in importance of institutional investors in Europe increased the demand for large, heavily traded, European securities at the expense of the junior securities. Many of these institutions adopted passive investment strategies which entailed duplicating stock market indices based on blue-chip securities only. As discussed above, this lack of demand for junior securities meant that many brokerage firms did not research or support the trading of the juniors, and the liquidity of these securities declined.

5.1 Alberta's Junior Capital Pool Program

The Junior Capital Pool (JCP) program was initiated in November 1986, after a series of public hearings held to examine the performance of a series of blind pools which had been introduced in Alberta earlier in the year. The stated objective of the JCP program is as follows (see ASE Circular No. 7, p. 7-1):

> "The Junior Capital Pool concept is designed to provide junior start up companies with an enhanced opportunity to become listed on The Alberta Stock Exchange thereby providing a viable and efficient mechanism to enable junior companies to raise further equity capital from the investing public. The Exchange recognizes however that as the listing and prospectus disclosure requirements for Junior Capital Pool Companies are substantially less than what is required for other companies, additional requirements are necessary to provide the market with sufficient disclosure and to limit abuse of this system."

To set up a JCP firm, a group of inside investors (promoters) raise seed capital by issuing themselves shares in exchange for cash. The amount of seed capital required before an offering can be made to outside shareholders has been changed four times to $30,000, to $50,000, to $75,000 and recently to $100,000. The firm raises additional equity capital through a JCP IPO to outside shareholders with a minimum share value of at least ten cents. Regulations designed to protect outside investors include the fact that all stock offerings are required to be conducted by registered investment dealers who are bound by "Know your Client" rules. Following the IPO, promoters are not allowed to trade in shares of their firm prior to the company becoming listed as a JCP on the ASE.

A JCP listing is transitory because once listed on the ASE the JCP firm has 18 months in which to complete a Major Transaction, an asset acquisition, which will change the firm from a JCP to a regularly listed ASE firm. To minimize the possibility of investor funds being misappropriated, only Canadian assets are eligible for Major Transactions. Failure to complete

a Major Transaction within the allowed time period may result in the JCP being delisted by the ASE. To further protect outside investors in a JCP, inside investors are required to provide full disclosure regarding the details of a Major Transaction prior to its implementation, and the majority of the outside shareholders must approve the transaction before it can be completed.

The JCP rules have been tightened over time to provide further protection for investors. For example, in late 1987 the minimum price of a JCP share was raised to ten cents from five cents, and more recently the minimum price of seed capital was set at 50% of the public offer price. The net result of these rule changes has been to increase the level of protection afforded to outside shareholders in a JCP company; however, they also increased the cost of listing a JCP company. Alberta regulators were attempting to make the appropriate tradeoff between ensuring full disclosure and fair treatment for minority shareholders, and the cost of publicly listing a company.

One problem with all junior equities, including JCPs, is that the market float is relatively low making it easier for the price of securities to be manipulated. Some enforcement experts maintain that fraud in the junior Canadian markets is widespread (see Mathias 1994a, p. 10), and the odds of transgressors being caught and convicted very low (see Mathias 1994a, 1994b and 1994c). The severe escrow requirements of the JCP program help to offset this risk, because one hundred percent of the shares of inside shareholders, the seed capital providers, are required to be held in escrow at the time of initial listing of the security. One-third of the escrowed securities are released on the first, second and third anniversary of the firm's Major Transaction.

The JCP program was very successful in the late 1980's in increasing the number of firms that were publicly listed in Alberta. Over the period 1986-1992, 405 companies were listed as JCP's (or were converted in JCPs) and a total of over $77 million was raised in initial JCP offerings (including seed capital and IPO proceeds), see Table 7. Although the table indicates that the number of JCPs being issued declined significantly in the early 1990s, the number of new JCP listings approached 100 in 1993 and 1994.

A major objective of the JCP program was to allow small start-up companies to become listed in Alberta, making it easier for them to access the equity capital markets to finance their

further expansion. To determine the success of the JCP program in meeting this objective, a number of issues were examined: how many JCP's completed Major Transactions and became regularly listed ASE firms, and how successful have JCP companies been in raising capital in the secondary markets, both equity and debt, to finance their growth.

Table 8 illustrates that of the 384 JCP's that went public over the 1986 to 1992 time period, 324 or 85.9% had completed a Major Transaction by the end of 1992. Excluding the fifteen JCP firms listed in the eighteen months prior to the end of 1992, which were actively searching for a Major Transaction, the success rate increases to 87.8%. In Table 8, firms are assigned to industry categories based on the investment intentions outlined in the firm's initial prospectus. These intentions were not binding on the promoters of the security, but in most cases the promoters did complete a Major Transaction in the indicated industry. Note that in the majority of JCP's, the promoters had no clear idea of how they would invest the proceeds of the IPO. When the success of JCP's in completing Major Transactions is considered as a function of the industry category, we find that in 210 of 213 (excluding twelve JCP's recently listed and still searching for a Major Transaction), or 99.5% of, cases where the promoters of a JCP indicated the industry in which they would invest, the firm did complete a Major Transaction. When the promoters did not have a clear purpose for the funds, only 120 out of 156 (excluding three JCP's recently listed and still searching for a Major Transaction), or 76.9%, of the firms completed a Major Transaction.

Table 8 also shows how many JCP companies are still listed on the ASE at the end of 1992. The fact that a firm is no longer listed on the ASE does not necessarily mean that it has gone bankrupt. Some firms are taken over or move to more senior exchanges, while other firms stop paying ASE listing fees and in essence become private companies. Overall, 131 of the original 384 firms have been delisted, but 32 of these firms were either taken over, or moved to another exchange. Thus, the number of failures is 99 of 384 firms, or 25.8%. Examining the failure rate by industry, shows that it was just 3.1% for oil and gas firms, around 17% for manufacturing, real estate, and financial services firms, 21.2% for mining firms, and 30.6% for firms in the service industry. The failure rate was a much higher 41.5% for JCP's where the promoters had no stated industry. The survival rate for JCPs with an industry listed compares favourably with the success rate of US venture capital investments since a study of 383 such

investments over the period 1969 to 1985 found that 34.5% of the investments had decreased in value, and 11.5% had lost all their value (see Venture Economics (1988)). As the JCPs listed in recent years all had a specified industry, and raised a larger amount of initial capital, it is expected that the survival rate of JCP firms has increased over time.

For JCP companies to grow and become viable businesses they are required to access sources of capital following the IPO. From an initial capital base of just under $77 million, JCP companies (including pre-JCP firms) have raised an additional $475,472,297 in equity since the JCP program was initiated, see Table 9. Over half of this amount came from share for asset exchanges; however, a significant amount of cash, $214,987,263, has been raised by the selling of shares for cash. JCP firms have also been successful in raising capital by using preferred share and debt financing. Since the program's inception, $19,703,002 of preferred shares have been issued, and $165,205,874 of debt financing arranged. While some of the debt was issued to sellers of assets to JCP firms, $34,024,197 represents bank loans.

The above results show that the JCP program has been successful in helping entrepreneurs use the public equity markets to raise the initial capital for their businesses, and have been able to grow their businesses by accessing secondary financing. A summary of survey results gathered from interviews with JCP principals, underwriters and regulators is contained in Appendix B. These results suggest that these participants have been happy with how the JCP program has developed and view it as a viable program for the financing of small Canadian firms. The program reduces the regulatory cost and burden with accessing the public equity markets, yet it is still monitored and regulated at a high level.

Summarizing the above information, and the results in Appendix B, provides some insights into the success of the JCP program and suggests some ideas of how a similar program could be adopted in other jurisdictions. The JCP program evolved as a regional program to meet the needs of issuers and investors in Alberta, particularly Calgary. Before the establishment of the program, the ASE had strong membership from regional brokerage firms which were in the business of listing junior firms, and had a client base of retail investors who wished to invest in these types of securities. The JCP was thus just an evolution for the exchange, not a dramatic change in focus.

The program's success in its early years was in the listing of oil and gas firms. The introduction of the JCP program coincided with the downsizing of the major oil firms in Calgary, which put a large number of highly trained oil professionals on the street with generous severance packages. The JCP program allowed these individuals to gather a pool of capital to use to purchase the properties which the major oil and gas firms were selling because they were not economically viable for a large company; however, the junior companies had much lower overhead than the major oil firms and were able to economically manage these properties. Over time, the JCP program has diversified its listings to include the manufacturing, services and high technology sectors.

From the start, the JCP program was a transitory program. JCP firms had a limit of eighteen months in which to complete their major transaction or they were delisted by the ASE. This time limit imposed discipline on JCP issuers, and also removed the weak firms from the program so that it did not develop a reputation of consisting of only poor quality firms. As well, the restrictive escrow requirements of the program ensured that the JCP issuer would only be able to benefit if the firm actually turned into a regularly listed ASE firm.

Finally, as mentioned above, the JCP program began as, and still remains, essentially a local program. This allows the underwriters and regulators to learn a great deal about prospective JCP issuers before approving the firm's listing. This close monitoring has helped ensure that any JCPs which come to market have a strong management team and a good change of success.

6. Summary and Recommendations

The future growth on an economy depends on the development of new economic entities; however, accessing financing for small and medium size enterprises is difficult in many countries. The reasons for the difficulty include regulatory and institutional restrictions, as well as an unwillingness of investors to provide equity for these firms. An element of this unwillingness of investors to provide equity is the fact that most investments in small and medium enterprises is illiquid.

This report considered whether it is possible for SMEs to provide liquidity to potential investors by listing their equity on a public stock exchange. It examined the costs of publicly

listing in Canada, and the US, and found that these costs place a lower limit on equity financing of approximately $1 million for the ME and VSE. Thus, these exchanges will not be a source of financing for small Canadian firms, but are suitable for the listing of medium sized firms. The ASE's JCP program does allow the listing of small firms on a public equity exchange. For seed capital of only $100,000 an entrepreneur, or group of entrepreneurs, with a strong business opportunity, and an unblemished record, can raise an additional several hundred thousand dollars to pursue the opportunity. The costs of listing on the TSE make it suitable for equity issues of an amount over $1 million. This report notes that the dollar costs of public listing in Canada is lower than the cost of listing on a US exchange, and finds that the percentage cost of listing in Canada for small and medium firms is similar to the cost in the US.

This report also examined the listing requirements of the Canadian exchanges to see if these requirements imposed a restriction on the availability of equity financing to SMEs. The TSE has significantly increased its listing requirements in the recent past and is now suitable for the listing of only well established medium sized firms. This has created a gap in the financing of smaller firms in Ontario, a gap which is only partially filled by the OTC market and the other Canadian regional exchanges. Regular listing on the VSE and ME is also available for only medium sized firm requiring over $1 million in equity capital, although there are less stringent requirements for resource firms on the ME, and venture firms on the VSE. The ASE listing requirements are much lower than those on the other exchanges, and an industrial firm can become listed with a minimum asset base of $400,000. In addition, the ASE's JCP program allows the public listing of equity with a market capitalization of several hundred thousand dollars.

This report also discussed the experience of a number of countries in the development of special programs to allow the listing of small and medium sized firms on public equity markets. It notes that there is a potential problem with market manipulation in junior equity markets, and regulators have to develop strong regulations and enforcement practices to combat this problem. The report also found that a significant problem in the development of a program for the listing of junior equities is the need to ensure a liquid secondary market for these securities following issuance. Failure to develop a strong secondary market will doom the primary market to failure.

Examining the JCP program on the ASE provided some insights into how a program for the listing of junior Canadian equities can be developed. The important characteristics of the JCP program are that it was an evolutionary, not a revolutionary change, for the ASE. The ASE already had a well established regional dealer network and a strong retail following for junior equity issues. Thus, any attempt to add a second tier of equity trading to a larger senior exchange will be difficult. The experience in Europe was that the large prestigious brokerage firms which traded on the senior exchanges did not find it economical to underwrite and research the smaller equity issues of the junior exchange. The current trend in Europe is to establish new markets for smaller companies which are independent of the existing stock exchanges.

The JCP program also succeeded because it began as a local program geared to the needs of Alberta. When it began there was a dramatic change in the employment and activities of the senior oil companies in Alberta which generated great opportunities for junior oil companies. Thus, the program satisfied a local need for capital formation. In other regions, the needs of firms and investors may necessitate a different type of junior program. Finally, the JCP program has had strong regulations from its inception, including strict escrow requirements which require the JCP principals to build a successful company before being able to sell their shares.

Overall, the results provide evidence that it is possible to establish a system for financing small equity ventures using public stock exchanges as long as there are strict regulations governing the program, and careful monitoring of the program once it is established. In the first year of its existence, Alberta's JCP program experienced some of the problems that have plagued similar programs in the US, but Alberta regulators reacted quickly to these events and minimized the damage to Alberta's investing public and to the reputation of the program.

TABLE 1
AVERAGE ISSUE COSTS FOR US IPOs BETWEEN 1977 AND 1987

Panel A: Average Dollar Costs of Issue (In Thousands of Dollars)

Type and Size of IPO	Regulatory Expenses	Underwriter Commission	Average Issue Size
Best Efforts			
Group 1	108.51	193.86	1,897.05
Group 2	175.46	384.69	3,918.21
Firm Commitment			
Group 1	148.72	217.51	2,188.44
Group 2	288.59	493.72	5,723.35
Group 3	406.30	1,031.66	13,434.32
Group 4	522.17	2,573.60	38,838.00

Panel B: Average Percentage Costs (Of Issue Proceeds)

Type and Size of IPO	Regulatory Expenses (%)	Underwriter Commission (%)	Total Cash Expenses (%)
Best Efforts			
Group 1	5.87	10.25	16.12
Group 2	4.72	9.88	14.60
Firm Commitment			
Group 1	7.03	9.99	17.01
Group 2	5.29	8.83	14.12
Group 3	3.09	7.81	10.90
Group 4	1.58	6.84	8.42

Based on a sample of 1,852 IPOs (1,556 firm commitment and 296 best efforts) between 1977 and 1987. The groups are categorized by the amount of capital raised (in thousands of dollars):
Group 1 - Amount raised < $3,000
Group 2 - $3,000<= Amount Raised < $9,531
Group 3 - $9,531 <= Amount Raised < $18,925
Group 4 - Amount Raised >= $18,925

Source: Aggarwal and Rivoli (1991), Table 2.

TABLE 2
AVERAGE ISSUE COSTS FOR US IPOs BETWEEN 1977 and 1982

Type and Size of IPO	Regulatory Expenses (%)	Underwriter Commission (%)	Total Cash Expenses (%)
Best Efforts			
Group 1	9.52	10.63	20.15
Group 2	6.21	10.00	16.21
Group 3	3.71	9.86	13.57
Group 4	3.42	9.80	13.22
Group 5	2.40	8.03	10.43
Firm Commitment			
Group 1	9.64	9.84	19.48
Group 2	7.60	9.83	17.43
Group 3	5.67	9.10	14.77
Group 4	4.31	8.03	12.34
Group 5	2.10	7.24	9.34

Based on a sample of 1,028 IPOs (664 firm commitment and 364 best efforts) between 1977 and 1982. The groups are categorized by the amount of capital raised (in thousands of dollars):

Group 1 - $1,000 <= Amount Raised < $2,000
Group 2 - $2,000 <= Amount Raised < $4,000
Group 3 - $4,000 <= Amount Raised < $6,000
Group 4 - $6,000 <= Amount Raised < $10,000
Group 5 - $10,000 <= Amount Raised < $120,174

Source: Ritter (1987), Table 3.

TABLE 3
AVERAGE ISSUE COSTS FOR CANADIAN JCP IPOs BETWEEN 1986 and 1992

Panel A: Average Dollar Costs of Issue (In Thousands of Dollars)

Time Period	Regulatory Expenses	Underwriter Commission	Average Issue Size
1986	$11.97	$0.78	$97.93
1987	$15.30	$1.87	$136.13
1988	$18.86	$4.63	$154.38
1989	$19.55	$8.26	$181.05
1990	$24.94	$6.34	$195.81
1991	$22.67	$14.08	$204.42
1992	$18.38	$12.57	$224.22

Panel B: Average Percentage Costs (Of Issue Proceeds)

Time Period	Regulatory Expenses (%)	Underwriter Commission (%)	Total Cash Expenses (%)
1986	12.23	0.80	13.03
1987	11.24	1.38	12.62
1988	12.45	3.10	15.55
1989	10.80	4.56	15.36
1990	12.74	3.24	15.98
1991	11.09	6.89	17.98
1992	8.20	5.61	13.81

Source: Alberta Stock Exchange Public Files.

TABLE 4
AVERAGE UNDERPRICING AND TOTAL ISSUE COSTS FOR US IPOs
IN PERCENTAGE TERMS BETWEEN 1977 AND 1982

Type and Size of IPO	Average Cash Expenses (%)	Average Underpricing (%)	Average Total Issue Costs (%)
Best Efforts			
Group 1	20.15	39.62	59.77
Group 2	16.21	63.41	79.62
Group 3	13.57	26.82	40.39
Group 4	13.22	40.79	54.01
Group 5	10.43	-5.42	5.01
Firm Commitment			
Group 1	19.48	26.92	46.40
Group 2	17.43	20.70	38.13
Group 3	14.77	12.57	27.34
Group 4	12.34	8.99	21.33
Group 5	9.34	10.32	19.66

Based on a sample of 1,028 IPOs (664 firm commitment and 364 best efforts) between 1977 and 1982. The groups are categorized by the amount of capital raised (in thousands of dollars):

Group 1 - $1,000 <= Amount Raised < $2,000
Group 2 - $2,000 <= Amount Raised < $4,000
Group 3 - $4,000 <= Amount Raised < $6,000
Group 4 - $6,000 <= Amount Raised < $10,000
Group 5 - $10,000 <= Amount Raised < $120,174

Source: Ritter (1987), Table 4.

TABLE 5
AVERAGE UNDERPRICING AND TOTAL ISSUE COSTS FOR US IPOs
IN PERCENTAGE TERMS BETWEEN 1977 AND 1987

Type and Size of IPO	Average Cash Expenses (%)	Average Underpricing (%)	Average Total Issue Costs (%)
Best Efforts			
Group 1	16.13	65.32	81.45
Group 2	14.60	40.74	55.34
Firm Commitment			
Group 1	17.01	23.17	40.18
Group 2	14.12	10.16	24.28
Group 3	10.90	6.01	16.91
Group 4	8.42	7.08	15.60

Based on a sample of 1,852 IPOs (1,556 firm commitment and 296 best efforts) between 1977 and 1987. The groups are categorized by the amount of capital raised (in thousands of dollars):

Group 1 - Amount raised < $3,000
Group 2 - $3,000<= Amount Raised < $9,531
Group 3 - $9,531 <= Amount Raised < $18,925
Group 4 - Amount Raised >= $18,925

Source: Aggarwal and Rivoli (1991), Table 2.

TABLE 6
AVERAGE UNDERPRICING AND TOTAL ISSUE COSTS FOR ASE JCP IPOs
IN PERCENTAGE TERMS BETWEEN 1986 AND 1992

Time Period	Average Cash Expenses (%)	Average Underpricing (%)	Average Total Issue Costs (%)
04/18/86-10/31/86	13.03	864.00	877.03
12/01/86-10/16/87	12.62	529.00	541.62
10/19/87-07/19/88	15.55	248.00	263.55
07/20/87-12/31/92	15.78	62.00	77.78

The time periods were chosen to correspond to dates in which major changes were made to the JCP program, or to investor confidence. The first time period starts when the first blind pool offering is made and ends when a moratorium was placed on new blind pool registrations. The second period begins when the moratorium is lifted and the JCP program was officially started. JCP regulations include a requirement for a minimum number of shareholders, escrow requirements, etc. The second time period ends on the day before the stock market crash on October 19, 1987. The third time period begins with the stock market crash of 1987 and ends on the day that the last five cent stock offering is first listed. In the last time period, only stocks with an initial price of ten cents are included. (Although the Alberta Securities Commission raised the minimum share offering price to ten cents in late 1987, it was several months before the last five cent stock offering actually became listed on the Alberta Stock Exchange.) The average cash expenses for the first three time periods were the costs is 1986, 1987, and 1988 respectively. The average cash expense in the last time period is the average of the cash expenses in 1989, 1990, 1991, and 1992.

Source: Alberta Stock Exchange data records.

EXHIBIT 7
INITIAL CAPITAL RAISED BY JCP COMPANIES

Year	Number Listed	Seed Capital	JCP IPO Capital
Pre-JCP	21	$752,500 (35,833)	$2,094,500 (99,738)
1986	1	10,000 (10,000)	60,000 (60,000)
1987	172	6,527,949 (37,953)	23,414,849 (136,133)
1988	156	6,268,106 (40,180)	24,083,711 (154,383)
1989	24	1,027,322 (42,805)	4,345,222 (181,051)
1990	8	456,500 (57,063)	1,566,500 (195,813)
1991	6	306,495 (51,083)	1,226,495 (204,416)
1992	17	991,750 (58,338)	3,811,750 (224,221)
TOTAL	405	$16,340,622 (40,347)	$60,603,027 (149,637)

This table illustrates the total equity raised, and the average amount in brackets, for each year of the JCP program.

TABLE 8
REVIEW OF HOW MANY ASE JCP IPOs BECAME VIABLE BUSINESSES

Industry[1]	Number Listed Since Program Was Initiated	Number of Major Transactions Completed	Number of[2] Firms Delisted By December 31, 1992	Number of Firms Delisted Due to a Takeover	Number of Firms Delisted Due to a Move to the TSE
Oil and Gas	96	90	23	12	8
Manufacturing	17	17	3	0	0
Service	49	42	17	1	1
Real Estate	24	24	5	1	0
Mining	33	31	9	2	0
Financial Services	6	6	1	0	0
Other[3]	159	120	73	6	1
TOTAL JCP	384	330	131	22	10
Pre-JCP	21	16	11	0	0

[1] Firms were assigned to industries based on the stated investment intentions of the firm at the time of the JCP IPO.

[2] Two possible reasons for delisting are presented in the following two columns.

[3] Business was specified as an Investment or Holding Company, or was unspecified.

Source: Alberta Stock Exchange data records.

TABLE 9
SECONDARY EQUITY FINANCING BY JCP FIRMS BY INDUSTRY

Industry	Private Placements	Options And Warrants	Acquisitions[1]
Oil and Gas	82,872,065	3,822,286	64,361,609
Manufacturing	4,023,535	1,175,056	6,505,694
Services	35,701,097	1,842,083	53,073,595
Real Estate	5,820,645	894,083	17,233,622
Mining	15,396,849	1,707,802	17,322,577
Financial Services	1,110,640	137,500	1,012,951
Other	50,529,532	3,238,970	72,125,943
TOTAL JCP	$195,454,363	$12,817,870	$231,636,031
Pre-JCP	$19,532,900	$894,820	$15,136,403

[1] Shares were issued by the JCP firm to either acquire assets or to take over an existing private, or public, company.

Source: Alberta Stock Exchange public files and data records.

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APPENDIX A

EXHIBIT A1
ALBERTA STOCK EXCHANGE
MINIMUM LISTING REQUIREMENTS

Requirements
There are different requirements for companies to obtain a listing depending on classification. The Alberta Stock Exchange may exercise its discretion to list companies that may not meet the specified requirements. The staff of The Alberta Stock Exchange should be consulted by the company at an early stage as this may alleviate technical problems arising at the time of formal listing. All companies except Junior Capital Pool Companies must have a minimum of 500,000 shares held by at least 300 public shareholders (other than principals and promoters), each holding a Board Lot (normally 500 shares) or more. In addition, at least 20% of the issued and outstanding shares must be free-trading and held by public shareholders. Specific requirements for companies (in industry sectors) are:
Industrial Company: • Net tangible assets of $400,000. • Adequate working capital to carry on business. • History of profitable operations. • Where there is no record of earnings, the company must have a working commercial prototype of its product, a minimum of $250,000 in development expenses must have been spent in the previous 5 years, and the company must have a feasibility study prepared by an independent qualified consultant which demonstrates the economic viability of the company's product or service, together with a management plan for at least one year.
Real Estate Company: • Net tangible assets of $750,000 if the company has a record of earnings or $1,000,000 if no record of earnings. • Adequate working capital to carry on business. • History of profitable operations. • If the company has no history of earnings, each application will be considered based on its own merits.
Investment Company: • Net tangible assets of $750,000 if the company has a record of earnings or $1,000,000 if no record of earnings. • Stated investment guidelines and restrictions. • History of profitable operations in cases where the company has a history of earnings.

Requirements (Cont'd)
Mining: • An interest in a resource property with geological merit. • A minimum of $100,000 in exploration and development costs must have been expended on the property in the previous 5 years. • Exploration or development program of a minimum of $200,000. • Net working capital sufficient to carry out the work program with an additional $100,000 in unallocated funds. • An up-to-date report on the property by an independent engineer or geologist.
Oil & Gas: • For producing companies -- $50,000 cash flow and proved producing reserves of $500,000 discounted at 15%. • For development companies -- sufficient working capital to carry out an identified work program and a minimum of $100,000 in unallocated funds and proven and probable reserves of $500,000 discounted at 15% and probable reserves discounted a further 50%. Proven producing reserves must account for at least $250,000 of the above stated value. • For exploration companies -- sufficient net working capital to carry out an identified work program of a minimum of $500,000 consisting of at least a four-well drilling program and an additional $100,000 in unallocated funds. • An up-do-date independent petroleum engineer's or geologist's report.
Research & Development: • A minimum of $500,000 in research and development expenses in the last 5 years. • Independent technical assessment of previous research which recommends a further research program of at least $500,000. • Net working capital sufficient to carry out the research program together with an additional $100,000 in unallocated funds.
Junior Capital Pool: • The founders of the applicant company are required to inject a minimum of $100,000 into the company at a price not less than 50% of the public offer price. • A maximum of $500,000 may be raised prior to listing, including funds raised prior to the public offering and the proceeds of the public offering. • Only companies which do not have significant operating assets, other than cash, nor agreements in place to acquire operating assets would be eligible to apply for listing under the Junior Capital Pool program. • The minimum offering price is $0.10 per share and the maximum purchase by any subscriber under the prospectus is 2% of the number of shares distributed to the public. • A minimum of 500,000 shares held by at least 300 public shareholders each holding a board lot.

Source: Going Public, The Alberta Stock Exchange, 1994.

EXHIBIT A2
MONTREAL STOCK EXCHANGE
INDUSTRIAL, FINANCIAL & REAL ESTATE COMPANIES
MINIMUM LISTING REQUIREMENTS

Requirements	Requirements For Exemption[1]
(a) Minimum tangible net worth of $1,000,000.	(a) Minimum tangible net worth of $3,500,000.
(b) Net income of at least $100,000 before taxes in the fiscal year immediately preceding the filing of the listing application and a minimum of two of the last three years must have been profitable.	(b) Net income of at least $200,000 before taxes in the last fiscal year.
(c) Adequate working capital and capitalization to carry on it business.	(c) Pre-tax cash flow of $500,000 in the last fiscal year.
(d) A minimum market value of $1,000,000 of publicly held shares which must be free of any trading restrictions.	(d) Adequate working capital and capitalization to carry on its business.
(e) A minimum of 1,000,000 publicly held securities which must be free of any trading restrictions.	
(f) If the applicant company is a financial company, the Exchange may apply reduced prior earnings requirements to the extent appropriate for its nature of business and long term growth policy.	
(g) If the applicant is a financial investment company, the Exchange must be satisfied as to the independence and qualifications of the investment manager and as to the trustee which will be holding the securities.	

[1] Requirements for exemption from the provision of Paragraph (b) of Article 9153 of the Rules of the Montreal Exchange for Industrial, Financial and Real Estate Companies.

Source: Canadian Securities Law Reports, CCH Canadian Limited, 1995.

EXHIBIT A3
MONTREAL STOCK EXCHANGE
MINING EXPLORATION COMPANIES
MINIMUM LISTING REQUIREMENTS

Requirements	Requirements For Exemption[1]
(a) Definition: A mining exploration company is a company principally engaged in the exploration and development of mineral properties. The company must hold at least one mineral property of demonstrable merit which must be satisfactory to the Exchange. (b) Seed capital and previous work: A company which is making an initial public offering or which is being revived after a long period of inactivity, must have raised previously by way of the sale of common shares, net proceeds of a minimum total amount of $100,000 and must have expended during the last twelve months a minimum amount of $50,000 in exploration or development work on its properties. (c) Exploration program: The company shall submit a report prepared by an independent mining expert which must include recommendations for a program of exploration or development for a minimum amount of $300,000. (d) Additional reports: When the company is scheduling a significant program (more than $100,000) on one or more additional properties within the next two years, using funds on hand at the time of listing, the Exchange may require the submission of additional reports recommending such programs. (e) Working capital: The company shall have adequate working capital to carry out the recommended program of exploration or development work on its mineral properties for the current year with a minimum of $400,000, including a minimum of $100,000 of unallocated funds. This amount is net of funds required to keep important property options in good standing in the next twelve months. (f) Capitalization: The capitalization of the company must be adequate to carry on its business.	(a) Definition: A mining company is a company principally engaged in the development and bringing into production of mineral properties. (b) Proven reserves of ore: The company must have proven reserves of ore sufficient to yield a mine life of at least three years as evidenced by an independent feasibility study which must be satisfactory to the Exchange. (c) Financial requirements: (i) pre-tax profitability in the last fiscal year; (ii) pre-tax cash flow of $350,000 in the last fiscal year; (iii) an average pre-tax cash flow of $300,000 for the two last fiscal years; and (iv) adequate working capital and capitalization to carry on its business. (d) Market value of publicly held shares: The market value of publicly held shares free of any trading restrictions must be at least equal to $1,000,000. (e) Publicly held securities: A minimum of 1,000,000 publicly held securities which must be free of any trading restrictions.

EXHIBIT A4
MONTREAL STOCK EXCHANGE
MINING EXPLORATION COMPANIES
MINIMUM LISTING REQUIREMENTS (Cont'd)

Requirements	Requirements For Exemption[1]
(g) Market value of publicly held shares: The market value of publicly held shares free of any trading restrictions must be at least equal to $500,000. (h) Publicly held securities: A minimum of 500,000 publicly held securities which must be free of any trading restrictions.	

1 Requirements for exemption from the provision of Paragraph (b) of Article 9153 of the Rules of the Montreal Exchange for Mining Companies.

Source: Canadian Securities Law Reporter, CCH Canadian Limited, 1995.

EXHIBIT A5
MONTREAL STOCK EXCHANGE
OIL AND GAS EXPLORATION COMPANIES
MINIMUM LISTING REQUIREMENTS

Requirements	Requirements For Exemption[1]
(a) Definition: An Oil and Gas Exploration Company is a company principally engaged, directly or indirectly, in the exploration of and development of oil or gas properties.	(a) Definition: An Oil or Gas Company is a company principally engaged, directly or indirectly, in the development and bringing into production of oil or gas properties.
(b) Program to increase reserves: The company shall submit a program, not limited to proposed acquisitions of undeveloped acreage, satisfactory to the Exchange, which can reasonably be expected to increase reserves.	(b) Proven reserves: The company must have proven reserves of recoverable oil or gas having a value of at least $5,000,000 (based on the discount rate generally used by the industry) as evidenced by an independent study which must be satisfactory to the Exchange.
(c) Reserves: The company must have proven reserves of recoverable oil or gas of $2,000,000 (based on the discount rate generally used in the industry).	(c) Financial Requirements: (i) pre-tax profitability in the last fiscal year; (ii) pre-tax cash flow of $500,000 in the last fiscal year; (iii) an average annual pre-tax cash flow of $400,000 for the two last fiscal years; and (iv) adequate working capital and capitalization to carry on its business.
(d) Working capital: The company shall have adequate working capital to execute its program and to carry on its business, with a minimum of $400,000.	
(e) Capitalization: The capitalization of the company must be adequate to carry on its business.	
(f) Market value of publicly held shares: The market value of publicly held shares free of any trading restrictions must be at least equal to $750,000.	(d) Market value of publicly held shares: The market value of publicly held shares free of any trading restrictions must be at least equal to $1,000,000.
(g) Publicly held securities: A minimum of 750,000 publicly held securities which must be free of any trading restrictions.	(e) Publicly held securities: A minimum of 1,000,000 publicly held securities which must be free of any trading restrictions.

[1] Requirements for exemption from the provision of Paragraph (b) of Article 9153 of the Rules of the Montreal Exchange for Oil and Gas Companies.

Source: Canadian Securities Law Reporter, CCH Canadian Limited, 1995.

EXHIBIT A6
TORONTO STOCK EXCHANGE
INDUSTRIAL COMPANIES
MINIMUM LISTING REQUIREMENTS

Requirements	Requirements For Exemption[1]
(a) (i) net tangible assets of $1,000,000; (ii) earnings of at least $100,000, before taxes and extraordinary items, in the fiscal year immediately preceding the filing of the listing application; (iii) pre-tax cash flow of $400,000 in the fiscal year immediately preceding the filing of the listing application; and (iv) adequate working capital and capitalization to carry on the business. OR (b) (i) net tangible assets of $5,000,000; (ii) evidence, satisfactory to the Exchange, indicating a reasonable likelihood of future probability; and (iii) adequate working capital and capitalization to carry on the business. OR (c) (i) earnings of at least $200,000, before taxes and extraordinary items, in the fiscal year immediately preceding the filing of the listing application; (ii) pre-tax cash flow of $500,000 in the fiscal year immediately preceding the filing of the listing application; and (iii) adequate working capital and capitalization to carry on the business.	(i) net tangible assets of $5,000,000; (ii) earnings of at least $200,000, before taxes and extraordinary items, in the fiscal year immediately preceding the filing of the listing application; (iii) pre-tax cash flow of $500,000 in the fiscal year immediately preceding the filing of the listing application; and (iv) adequate working capital and capitalization to carry on the business.
Public Distribution of at least 1,000,000 freely-tradable shares with an aggregate market value of $2,000,000.	
At least 300 public shareholders each owning at least one board lot.	

[1] Requirements for eligibility for exemption from Section 19.09 of the Toronto Stock Exchange General By-Law.

Source: Members' Manual, The Toronto Stock Exchange, 1995.

EXHIBIT A7
TORONTO STOCK EXCHANGE
MINING COMPANIES
MINIMUM LISTING REQUIREMENTS

Requirements	Requirements For Exemption[1]
(a) (i) proven reserves to provide a mine life of at least three years, calculated by a qualified and independent technical authority; (ii) evidence, satisfactory to the Exchange, indicating a reasonable likelihood of future profitability; and (iii) adequate working capital and capitalization to carry on the business. OR (b) (i) net tangible assets of $2,000,000; (ii) a programme of exploration and/or development, satisfactory to the Exchange, on an advanced property, and prepared by a qualified and independent technical authority; (iii) sufficient funds (at least $500,000) to complete at least the next phase of the recommended exploration and/or development programme on the company's properties; (iv) sufficient funds to meet estimated general, administrative and capital expenditures for a reasonable period of time (at least 18 months); and (v) adequate capitalization to carry on the business.	(i) net tangible assets of $5,000,000; (ii) pre-tax profitability in the fiscal year immediately preceding the filing of the listing application; (iii) pre-tax cash flow of $350,000 in the fiscal year immediately preceding the filing of the listing application and an average pre-tax cash flow of $300,000 for the two fiscal years immediately preceding the filing of the listing application; (iv) proven reserves to provide a mine life of at least three years, calculated by a qualified and independent technical authority; and (v) adequate working capital and capitalization to carry on the business.
Public distribution of at least 1,000,000 freely-tradable shares with an aggregate market value of at least $2,000,000.	
At least 300 public shareholders each owing at least one board lot.	

[1] Requirements for eligibility for exemption from Section 19.09 of the Toronto Stock Exchange General By-Law.

Source: Members' Manual, The Toronto Stock Exchange, 1995.

EXHIBIT A8
TORONTO STOCK EXCHANGE
OIL AND GAS COMPANIES
MINIMUM LISTING REQUIREMENTS

Requirements	Requirements For Exemption[1]
(a) (i) proven developed reserves of $2,000,000 based on the discount rate prescribed by the Exchange; (ii) a definitive programme, satisfactory to the Exchange, which can reasonably be expected to increase reserves, and sufficient funds available to execute the programme; (iii) adequate working capital to carry on the business with a minimum of $500,000; and (iv) adequate capitalization to carry on the business. OR (b) (i) proven developed reserves of $5,000,000 based on the discount rate prescribed by the Exchange; (ii) a definitive programme satisfactory to the Exchange, which can be reasonably expected to increase reserves, and sufficient funds to execute the programme; (iii) minimum annual pre-tax cash flow of $200,000; and (iv) adequate working capital and capitalization to carry on the business.	(i) proven developed reserves of $5,000,000 based on the discount rate prescribed by the Exchange; (ii) pre-tax profitability in the fiscal year immediately following the filing of the listing application; (iii) pre-tax cash flow of $500,000 in the fiscal year immediately preceding the filing of the listing application and an average annual pre-tax cash flow of $400,000 for the two fiscal years immediately preceding the filing of the listing application; and (iv) adequate working capital and capitalization to carry on the business.
Public distribution of at least 1,000,000 freely-tradable shares with an aggregate market value of at least $2,000,000.	
At least 300 public shareholders each owning at least one board lot.	

[1]Requirements for eligibility for exemption from Section 19.09 of the Toronto Stock Exchange General By-Law.

Source: Members' Manual, The Toronto Stock Exchange, 1995.

EXHIBIT A9
VANCOUVER STOCK EXCHANGE
COMMERCIAL/INDUSTRIAL COMPANIES
MINIMUM LISTING REQUIREMENTS

Commercial/Industrial Company Listing Requirements	Without History of Earnings	With a History of Earnings
Public Distribution & Market Capitalization	At lease 1,000,000 shares without Resale Restrictions having an aggregate market value of $1,800,000, held by at least 300 shareholders, each holding one Board Lot or more.	
Assets	$3,000,000 net tangible assets.	$900,000 net tangible assets.
Profitability	Evidence indicating a reasonable likelihood of profitability.	At least $100,000, before income taxes and extraordinary items, in the immediately preceding fiscal year.
Working Capital & Financial Resources	Adequate to carry on the business.	

Source: Listing Policy and Procedure Manual, Vancouver Stock Exchange, 1995.

EXHIBIT A10
VANCOUVER STOCK EXCHANGE

RESOURCE COMPANY (OTHER THAN OIL & GAS)
MINIMUM LISTING REQUIREMENTS

Company Listing Requirements	With Proven Reserves or Exploration and/or Development of Industrial Mineral Properties	In the Exploration and/or Development Stage
Public Float & Market Capitalization	At least 1,000,000 shares without Resale Restrictions, having an aggregate market value of $1,800,000 held by at least 300 shareholders (exclusive of Insiders), each holding one Board Lot or more.	
Assets	Interest in a mineral property with proven reserves for a three year mine life.	$1,800,000 net tangible assets.
Profitability or Development Program	Evidence indicating a reasonable likelihood of future profitability.	A program of exploration and/or development on an advanced property.
Working Capital & Financial Resources	Adequate to carry on the business.	Sufficient funds, at least $450,000, to complete the next phase of recommended exploration and/or development.
		Sufficient funds to meet estimated general, administrative & capital expenditures for at least eighteen months.

OIL AND GAS RESOURCE COMPANY
MINIMUM LISTING REQUIREMENTS

Public Float & Market Capitalization	At least 1,000,000 shares without Resale Restrictions, having an aggregate market value of $1,000,000 held by at least 300 shareholders (exclusive of Insiders), each holding one Board Lot or more.
Assets	$1,800,000 proven developed reserves.
Profitability or Development Program	A definite program which can reasonably be expected to increase reserves.
Working Capital & Financial Reserves	Financial resources to carry on the business with a minimum of $300,000.
	Sufficient funds to meet estimated general, administrative and capital expenditures for at least eighteen months

Source: Listing Policy and Procedures Manual, Vancouver Stock Exchange, 1995.

EXHIBIT A11
VANCOUVER STOCK EXCHANGE
VENTURE COMPANIES
MINIMUM LISTING REQUIREMENTS

Initial Listings Requirements	Natural Resource Company	Non-Resource Company
Seed Capital price per share	$0.25	$0.25
Net Seed Capital proceeds	$175,000	$400,000
Minimum Prospectus price per share or unit (net)	$0.30/share; $0.40/unit	$0.30/share; $0.40/unit
Combined net proceeds from Seed Capital and first public distribution by Prospectus	$450,000	$850,000
Minimum number of shares sold under Prospectus	500,000	600,000
Minimum number of shares in Public Float	300,000	300,000
Number of public shareholders holding at least a Purchase Lot	300	300
Prior expenditures on properties or business to be funded by Prospectus	$100,000	$300,000
Minimum funds allotted for exploration in Prospectus	$100,000 in first phase	Not applicable
Unallocated working capital on full listing	$100,000	$100,000

Source: Listings Policy and Procedure Manual, Vancouver Stock Exchange, 1995.

EXHIBIT A12
VANCOUVER STOCK EXCHANGE
EXEMPT COMPANIES
MINIMUM LISTING REQUIREMENTS

<table>
<tr><th>Exempt Company Listing Requirements</th><th>Resource Companies Other Than Oil & Gas</th><th>Oil & Gas Resource Companies</th><th>Commercial/Industrial Companies</th></tr>
<tr><td>Public Float</td><td colspan="3">At least 300,000 shares which are beneficially owned by 300 shareholders, exclusive of Insiders, each of whom must beneficially own one or more Board Lots which are free of Resale Restrictions.</td></tr>
<tr><td rowspan="2">Assets</td><td>$5,000,000 in net tangible assets.</td><td rowspan="2">$5,000,000 in proven developed reserves.</td><td rowspan="2">$5,000,000 in net tangible assets.</td></tr>
<tr><td>Proven reserves to provide a mine life of at least three years.</td></tr>
<tr><td>Profitability</td><td colspan="2">Pre-tax profitability in the immediately preceding fiscal year.</td><td>At least $200,000 in pre-tax profitability in the immediately preceding fiscal year.</td></tr>
<tr><td rowspan="3">Working Capital & Financial Resources</td><td>Average annual pre-tax cash flow of $300,000 in the immediately preceding fiscal year.</td><td colspan="2">Pre-tax cash flow of $5,000,000 in the immediately preceding fiscal year.</td></tr>
<tr><td>Average annual pre-tax cash flow of $300,000 for the two immediately preceding fiscal years.</td><td colspan="2">Average annual pre-tax cash flow of $400,000 for the two immediately preceding fiscal years.</td></tr>
<tr><td colspan="3">Adequate working capital and financial resources to carry on the business.</td></tr>
</table>

Source: Listing Policy and Procedure Manual, Vancouver Stock Exchange, 1995.

APPENDIX B
A REVIEW OF ALBERTA'S JUNIOR CAPITAL POOL (JCP) PROGRAM[1]

The purpose of this appendix is to and summarize the experiences and perceptions of JCP participants and is based on interviews with underwriters and principals of JCP firms, and with a regulator at the Alberta Stock Exchange (ASE). The sample of JCP firms ranges from firms that have just started through to firms that have been listed for several years, including one of the original JCP companies from 1986. The responses from the interviews have been consolidated in copies of the actual questionnaires and are located in Table B1, B2, and B3.

Interviews with principals of established JCP firms indicated that the main reasons why most of the respondents used the JCP program was that it was a relatively inexpensive, easy, and quick form of obtaining a public stock listing. The average cost of listing their JCP firms was approximately $15,000 which was significantly less than the cost of a traditional listing on either the ASE or VSE. The cost savings of the JCP form of listing stem from the reduced paper and legal work. As well, the principals' initial seed capital requirement of $75,000 (the initial capital now required is $100,000), was less than half the seed capital requirement for a regular ASE or VSE listing.

The prospectus requirements of a JCP are significantly less than that of a traditional listing, and several of the principals interviewed stated that they merely copied the prospectuses of other JCP firms and reworded the areas that had direct reference to their own JCP. This does not imply that the regulations regarding JCPs are less stringent than those associated with the traditional form of listing, as JCP firms are well regulated and closely monitored. The difference is that a JCP listing faces a smaller number of regulations. In terms of time, the principals stated that the normal time period from firm inception to ASE listing was usually less than three months, which they believed was a much shorter time period than required for a traditional form of listing.

The responses to questions regarding the usefulness of the JCP program in allowing individuals access to public markets were unanimous: all of those interviewed agreed that JCPs are an extremely beneficial method of obtaining a public listing for firms which otherwise could not access public funds. All of the individuals stated that they would not have been able to finance their project or business with their own resources. The principals also stated that their firm's access to debt financing was limited, as the debt servicing would have strangled their cash

[1] The material in this appendix is drawn from Hopkins and Robinson (1994).

flow in the formative years of the business, and it would have been necessary to pledge personal assets in order to borrow the finances needed. In fact, the existence of the JCP program is what inspired the people interviewed to pursue a particular project or business.

One disadvantage of the JCP program, noted by some principals, is that the amount of capital raised in the initial offering is very low. Thus, unless JCP principals are able to act quickly to identify a Major Transaction, and have investors lined up for a private placement of stock, or investors who will buy an additional issue of stock at a higher price, the JCP will have difficulty becoming a viable entity. The principals recommended that anyone contemplating a JCP listing should have people on the Board of Directors, and within the JCP company, that have strong contacts in the industry in which the JCP will operate, and have a network of investors to buy additional stock issues and support the aftermarket. Failure to have any of the above may weaken the ability of the JCP to purchase assets that will provide long term potential for the company, and hamper any attempts to raise additional capital.

The majority of the principals felt that the escrow regulations encouraged them to pursue long-term objectives that added asset value to their JCP. All of the respondents were fully aware of the significant financial gain they could make, in the form of value appreciation of their stock if their JCP was a long-term success. One of the respondents did not favour the escrow regulations. This individual believed that the escrow regulations should be relaxed and the market could determine if directors could sell stock, ie. if the company had no value the stock would also have no value and thus trade at a low price and discourage insiders from selling. One problem with this principal's proposal is that certain promoters can do a very good job of increasing the price of a stock that has no underlying value, and they may try to sell out before creating a viable company. This overvaluation of a firm could occur because the market for low-priced, thinly traded stocks is not always as efficient as the market for large capitalization securities.

Interviews with members of the brokerage community in Calgary provided additional support for the JCP program. Firms that had underwritten JCP offerings strongly believed that without this type of vehicle available to raise seed capital, many ideas and projects would have never come to fruition. As previously mentioned, the firms that are actively involved in the issuing of JCP listings are much smaller than the larger national brokerage houses. The main reason for the reluctance of one larger brokerage firm to underwrite JCP stock offerings was its belief that the work required to put a JCP listing on the market and sell the issue was not that much different than a regular issue, but the profit involved was much smaller. As well, an employee of the firm

indicated that his firm would not participate in share issues that raised less than $10,000,000. Finally, the employee felt that the risk characteristics of a JCP were not suitable for the risk profile of his firm's client investors.

Thus, the JCP vehicle became a perfect niche market, and a major source of revenue, for the smaller brokerage firms. Revenues came from fees collected for underwriting JCP IPOs plus the commissions earned on the aftermarket trading of JCP securities. As well, underwriting firms were granted options to purchase up to 10% of the numbers of shares in the JCP offering at the initial issue price. In many cases, the underwriting firms earned profits from the exercise of these JCP options. Finally, the original underwriters of a JCP issue usually had the opportunity to participate in secondary market offerings when the JCP firm had grown.

Brokerage houses that underwrite JCP issues are very selective when deciding which firms to list. In order to have their JCP application accepted, the principals involved must have a proven track record in the industry they have identified for a possible Major Transaction. The main interests of the brokerage house are who is going to be running the JCP, what skills does this person possess that will help ensure the success of the JCP, and does the person have adequate industry and financial contacts. Member of the brokerage firms that conducted JCP underwritings believe that the level of industry regulation is adequate and keeps disreputable characters out of JCPs. The proponents point to the relatively unblemished track record of the JCPs, and note that there have only been a few disreputable JCP companies, and they operated in the very early stages of the JCP program. Without having any direct evidence to support their contentions, some members of larger brokerage firms, that do not underwrite JCP issues, believed that there is something inherently unsavoury about JCPs and their principals.

Certain members of the brokerage community felt that some principals were involved with too many JCP firms. These brokers argued that management effectiveness of any one JCP firm may suffer if a principal was spread too thinly. Recently, there has been a regulatory change with the JCP program to address this problem. Currently, an individual is allowed to be a principal for only two JCP firms at any one time.

The perspective of the regulatory agencies was gained through an interview with the Vice-President of the Alberta Stock Exchange. He commented that the initial blind pool stock offerings were conducted prior to the development of JCP regulations. The JCP regulations that were developed focused on curtailing any abuses that might be committed by individuals

associated with JCPs. He felt that the objective of controlling and ensuring proper regulation of the JCPs has been achieved by the regulatory agencies. As well, he noted that there exists a mechanism for ensuring that regulatory changes occur when needed to provide for increased or decreased control in any one area of concern. Thus, regulatory changes occur on an as needed basis. As of December 1993, he felt that there were no areas related to JCP firms in which adequate regulation did not exist.

He also felt, that the pre-screening process of the JCP applications by the brokers, and lawyers, and the pre-filing meetings with the ASC had been very effective in weeding out the applications that should not get listed. The rejection rate once an application made it to the regulators was estimated at only 1 or 2%. The main reason for the rejection of a JCP by the regulators was that the management listed on the applications had a bad business track record or who have been disciplined by the regulators in the past.

The stringent regulations surrounding JCPs have, for the most part, insured that abuses do not occur. The regulated connection between the release of escrowed stock and the performance of the JCPs assets has been very successful in encouraging the long term commitment of management to the success of the JCP.

There was also agreement among JCP participants, that the main factor affecting the success of a JCP was the individuals involved with the JCP. If the management team of a JCP can hit the ground running after the initial listing of the firm, then the JCP has a much greater chance of success. Thus, the key to success is to have a viable business plan prior to listing, have the industry and financial contacts lined up to pursue a major transaction immediately after listing, and then be able to follow up the initial listing with a subsequent issue of stock. Once the capital is received from the subsequent share issue, the JCP is essentially on the same footing as a traditional listing, and can then pursue larger business ventures and projects.

The results of these interviews indicate the JCP method of publicly listing a company has been very successful. The JCP method is quicker, less costly, and easier to implement than other forms of listing on Canadian stock exchanges. The majority of the JCP principals interviewed believed that although the JCP method of raising capital had many advantages, that there was still room for the JCP listing process to be streamlined. The research also discovered that in the absence of the JCP form of listing, many of the individuals interviewed would not have been able to raise the capital necessary to develop their firm.

EXHIBIT B1

SUMMARY OF INTERVIEWS WITH JCP PRINCIPALS

This Appendix summarizes the results of twelve interviews with individuals who had been involved in starting a JCP firm. The firms were drawn from a large number of industries, and had been in existence anywhere from a few months to seven years. One potential bias in the sample, is that only principals of successful JCP firms, defined as firms that were still listed and operational in their industry, were interviewed.

1) In point form please describe the process of listing a JCP, and state the involvement of the broker/underwriter at each step.
REFER TO SECTION II IN HOPKINS AND ROBINSON (1994).

2) At which steps did complications occur?
IN THE EARLY JCP LISTINGS, COMPLICATIONS AROSE DUE TO THE ONGOING CHANGES IN REGULATIONS AS BOTH THE ASE AND ASC HAD TO ADJUST THE REGULATIONS AROUND THIS NEW FORM OF LISTING.
PRINCIPALS OF RECENT JCP LISTINGS HAVE STATED THAT NO MAJOR UNFORESEEN COMPLICATIONS HAVE OCCURRED.

3) What are the total costs of listing a JCP?
INITIAL SEED CAPITAL REQUIREMENT WAS $75,000 ($50,000 PRIOR TO AUGUST 1993, AND CURRENTLY $100,000).

INCORPORATING COSTS $300-$400.
LEGAL FEES $10,000-$15,000.
AGENTS COMMISSION FROM CAPITAL RAISED $15,000 (10%).
LEGAL FEES TO BROKERAGE HOUSE LAWYER $2,500-$3,500.
LISTING AND REGULATOR FEES $3,000-$4,000.
PRINTING COSTS $500-$1,000.

TOTAL MONIES NEEDED PRIOR TO LISTING IN 1993 WERE $91,000-$95,000 COMPARED WITH AN AMOUNT OF $20,000-$25,000 IN 1986.

4) What are the ongoing listing costs of a JCP?
ANNUAL AUDIT COST IS $1,000.

QUARTERLY ACCOUNTING COSTS ARE $1,000 ANNUALLY.
ANNUAL ASE LISTING FEES ARE $3,000-$4,000.

5) Are the costs of listing a JCP higher than other forms of raising seed capital, explain?
JCP LISTING COSTS ARE INITIALLY LOWER THAN STANDARD IPO OR EOP LISTING COSTS, BUT THE NEED TO ISSUE MORE STOCK IN THE FUTURE INCREASES THE LONG-TERM COSTS OF JCP LISTING MORE SO THAN A STANDARD ISSUE. THUS A PERSON MUST DETERMINE IF IT WILL BE MORE COSTLY TO DO SEVERAL SMALL ISSUES VERSUS ONE LARGE INITIAL ISSUE LIKE THAT OF A TRADITIONAL FORM OF LISTING.

IN COMPARISON, A VSE LISTING IS $150,000+ AND TO PURCHASE AN EXISTING SHELL COMPANY WOULD COST $70,000 WHICH WOULD GIVE MANAGEMENT MUCH LESS OF THE SHARES OUTSTANDING; HOWEVER, THE VSE LISTING WOULD RAISE SUBSTANTIALLY MORE CAPITAL.

6) On a scale of 1-10, with 1 being the easiest and 10 being the most difficult, how easy or difficult was it, or will it be to sell out your JCP initial offering?
HIGHLY DEPENDENT ON CURRENT MARKET SENTIMENT WHICH CHANGES DAILY. THE AVERAGE WAS OF THE RESPONSES WAS 1.25 GIVEN THE CURRENT MARKET CONDITIONS.

7) If initially successful, will you consider issuing additional stock to raise further capital?
ALL COMPANIES PLANNED TO DO SUBSEQUENT SHARE OFFERINGS VERY SOON AFTER THEY COMPLETED THEIR MAJOR TRANSACTION. THE INITIAL POOL OF CAPITAL RAISED IS USUALLY MUCH LESS THAN THE AMOUNT REQUIRED TO ACTUALLY UNDERTAKE ANY KIND OF MAJOR PROJECT. THE MAXIMUM CAPITAL THAT CAN BE RAISED IS $500,000.

THOSE COMPANIES THAT HAVE BEEN LISTED FOR SEVERAL YEARS HAVE DONE SUBSEQUENT COMMON SHARE ISSUES AND FLOW-THROUGH SHARE OFFERINGS.

THE OFFERINGS HAVE BEEN BOTH PUBLICLY AND PRIVATELY PLACED.

8) On a scale of 1-10, with 1 being very beneficial and 10 being not beneficial at all, was the JCP

program helpful in allowing companies to list on a stock exchange?
THE AVERAGE OF THE RESPONDENTS REPLIES WAS 1. ALL OF THOSE INTERVIEWED STRONGLY BELIEVED IN THE JCP PROGRAM AS A VEHICLE TO EFFICIENTLY RAISE INITIAL SEED CAPITAL. THEY ALSO STATED THAT THEY PROBABLY COULD NOT HAVE PROCEEDED WITH THEIR IDEAS IF THEY DID NOT HAVE ACCESS TO THE JCP LISTING.

9) Could you have financed your project with your own personal savings?
THE UNANIMOUS RESPONSE WAS NO THEY COULD NOT HAVE FINANCED THE PROJECTS WITH THEIR OWN MONEY, NOR WOULD THEY HAVE WANTED TO TAKE THE RISK.

10) On a scale of 1-10, 1 is easy, 10 is difficult, how easy or difficult is it for a person/company seeking seed capital for a new venture to raise debt financing?
MOST RESPONDENTS SAID 10, THE AVERAGE WAS 9. WITHOUT ANY ASSETS TO PLEDGE AS SECURITY, IT WOULD HAVE BEEN VIRTUALLY IMPOSSIBLE TO RAISE ANY AMOUNT OF DEBT FINANCING.

11) What advantages or disadvantages do JCPs have over debt financing?
JCPs DO NOT REQUIRE THE PLEDGING OF ASSETS, THUS AN INDIVIDUAL CAN RAISE MONEY BASED ONLY ON AN IDEA/ PLAN. THIS TYPE OF FINANCING IS IMPOSSIBLE TO GET VIA DEBT FINANCING.

AT PRESENT THE EQUITY MARKET IS VERY WELCOMING TO NEW ISSUES AND JCPs, THUS EQUITY FINANCING IS RELATIVELY EASY TO GET, AND IT SIGNIFICANTLY LOWERS THE FINANCIAL RISK OF FAILURE TO ANY ONE INDIVIDUAL.

ONE OF THE MOST IMPORTANT BENEFITS WAS THAT THERE IS NO DEBT TO SERVICE.

12) What advantages or disadvantages do JCPs have over traditional forms of listings?
ADVANTAGES: LESS COSTLY INITIALLY, QUICKER, NO ASSETS HAVE TO BE PLEDGED, PROSPECTUS WAS VERY EASY TO PREPARE (UNLIKE REGULAR EOP PROSPECTUS), CURRENT MARKET IS FAVOURABLE FOR JCPs, OPPORTUNITY TO

ISSUE MORE STOCK IN THE FUTURE.

DISADVANTAGES: CAPITAL RAISED IS NOT ENOUGH TO UNDERTAKE ANY MAJOR VENTURE, AND THUS THE FIRM MUST HAVE SUBSEQUENT ISSUES OF STOCK. MUST COMPLETE MAJOR TRANSACTION WITHIN 18 MONTHS, ESCROW REGULATIONS ALLOW ONLY PARTIAL SALE OF PRINCIPAL STOCK EACH YEAR, HIGH DEGREE OF REPORTING REQUIREMENTS, AND EXTREMELY CLOSE MONITORING BY ASE.

13) What other methods of raising capital did you consider, and why were they rejected?
ALL OF THE RESPONDENTS DID NOT CONSIDER OTHER METHODS OF RAISING CAPITAL, THE JCP VEHICLE INSPIRED THE INDIVIDUALS TO PURSUE STARTING THEIR OWN PUBLIC COMPANY OR DEVELOPING AN IDEA.

14) What risks do you see in using a JCP as a method of raising seed capital?
THE RESPONDENTS ALL SAID THAT THE INITIAL FINANCIAL OUTLAY DID NOT REPRESENT A LARGE FINANCIAL RISK TO ANY ONE INDIVIDUAL. HOWEVER, THEY DID SAY THAT THE UPFRONT COSTS WERE FAIRLY LARGE AND THAT THERE WAS NO GUARANTEE THAT THE ISSUE WOULD SELL OUT.

ALSO, IF THE MARKET TURNED FOR THE WORSE ANY SUBSEQUENT ISSUE AFTER THE MAJOR TRANSACTION MAY BE UNSUCCESSFUL, AND THUS THE COMPANY WOULD BE UNABLE TO CONTINUE.

OVERALL THE RESPONSE WAS THAT THERE WAS VERY LITTLE RISK IN USING A JCP AS MEANS OF RAISING EQUITY CAPITAL.

15) Did (do) you have a major transaction planned prior to starting the JCP?
75% OF THE RESPONDENTS SAID YES, 25% SAID NO.

16) If not how did (do) you plan to identify one?
ALL OF THE RESPONDENTS HAD A CLEAR IDEA OF A SPECIFIC INDUSTRY OR TYPE OF BUSINESS THEY WERE GOING TO BE IN. THE PROCESS OF IDENTIFYING A POTENTIAL MAJOR TRANSACTION WAS THEN MERELY EVALUATING DIFFERENT PROJECTS WITHIN THE INDUSTRY IN WHICH THEY WISHED TO PARTICIPATE. THIS

ANSWER PARALLELS THE ASE'S WISHES IN THAT THEY TRY TO INSURE THAT THE PEOPLE INVOLVED IN A JCP HAVE A TRACK RECORD IN THE PARTICULAR INDUSTRY THEY PLAN TO TARGET WITH THE JCP LISTING. ALL OF THE RESPONDENTS ALSO HAD CONTACTS WITHIN THE INDUSTRY AND PLAYERS WHO WERE INTERESTED IN PURCHASING FURTHER ISSUES OF STOCK. THIS POINT IS VERY IMPORTANT BECAUSE IT IS MUCH QUICKER AND LESS COSTLY TO DO A PRIVATE PLACEMENT OF STOCK IN SUBSEQUENT ISSUES THAN IT IS TO DO ADDITIONAL PUBLIC ISSUES.

17) Are there any securities regulations for JCPs that have hindered your listing?
MOST RESPONDENTS SAID THAT THERE WAS NO ONE ISSUE THAT HINDERED THEIR PROGRESS, HOWEVER THERE WAS A CONSENSUS THAT THE PROCESS COULD BE STREAMLINED IN ORDER TO SHORTEN THE TIME FROM INCEPTION TO LISTING (CURRENTLY IT IS 3-4 MONTHS).

A COMPANY THAT WAS ONE OF THE ORIGINAL JCPs LISTED WAS EXTREMELY CRITICAL OF THE REGULATIONS AND BELIEVED THAT THE VERY TIGHT RESTRICTIONS SERVED TO GREATLY HINDER THE JCPs IN THEIR INITIAL STAGES OF DEVELOPMENT AFTER LISTING. THIS COMPANY WAS FACED WITH NUMEROUS POLICY CHANGES IN THE INITIAL YEARS OF ITS LISTING AND IN FACT FACED THE POSSIBILITY OF LOSING THE BUSINESS DUE TO THE SEEMINGLY CONSTANTLY CHANGING POLICIES. THE MANAGEMENT OF THIS COMPANY SAID THERE HAS TO BE SOME LOOSENING OF THE POLICIES IN ORDER FOR JCPs TO FUNCTION EFFECTIVELY AS ON-GOING BUSINESSES.

18) Does the JCP form of listing encourage you as a manager (principal) to seek long term goals and success for the JCP?
ALL RESPONDENTS STATED THAT THE ESCROW REGULATIONS DO/HAVE ENCOURAGED THEM TO PURSUE LONG-TERM OBJECTIVES. UNLESS THE COMPANY IS SUCCESSFUL OVER THE LONG-TERM MANAGEMENT CAN GET VERY LITTLE STOCK OUT OF THE ESCROW. THUS, THE INCENTIVE IS STRONG TO SEEK TO ADD LONG-TERM ASSET VALUE TO THE COMPANY.

THE ASE AND ASC POLICY OF ONLY ALLOWING ESCROWED STOCK OUT BASED ON THE PERFORMANCE OF THE ASSETS IS UNDERSTOOD AND ACCEPTED BY MOST

OF THE RESPONDENTS AS A GOOD MEANS OF ENCOURAGING MANAGEMENT TO STRIVE FOR LONG-TERM SUCCESS OF THEIR JCP'S BUSINESS.

19) Why did you choose a JCP as the method of raising venture capital?
THE QUICK AND RELATIVELY INEXPENSIVE ACCESS TO CAPITAL WERE THE OVERRIDING FACTORS. THE ABILITY TO ACCESS MORE PUBLIC FUNDING AGAIN IN THE FUTURE WAS ALSO A SIGNIFICANT BENEFIT TO CHOOSING THE JCP FORM OF LISTING.

ALL RESPONDENTS STATED THAT THERE WAS NO ALTERNATIVE VEHICLE FOR THEM TO PURSUE.

20) Why do you think a JCP is a good method of raising seed capital?
ALL OF THE RESPONDENTS STATED THAT THE JCP ALLOWED THEM AS ENTREPRENEURS TO ACCESS PUBLIC FUNDS AND THUS NOT HAVE TO RISK ALL OF THEIR OWN ASSETS IN ORDER TO PURSUE THE DEVELOPMENT OF AN IDEA OR PROJECT.

AGAIN THE EASY AND QUICK ACCESS TO MARKET WERE THE MAIN FACTORS WHY THE RESPONDENTS BELIEVED A JCP WAS A GOOD METHOD OF RAISING SEED CAPITAL.

21) Would you use a JCP as a method of raising equity capital again?
66% OF THE RESPONDENTS GAVE AN OUTRIGHT YES, 17% SAID NO, AND 17% SAID MAYBE.

THE DETRACTORS STATED THAT THE EXPERIENCE THEIR COMPANIES HAD WITH THE STRICT REGULATIONS AND ENSUING COMPLICATIONS WOULD MAKE THEM CHOOSE ANOTHER ROUTE, POSSIBLY A TRADITIONAL FORM OF LISTING, SHOULD THEY PURSUE THE DEVELOPMENT OF ANOTHER PUBLIC COMPANY.

EXHIBIT B2

INTERVIEWS WITH STOCKBROKERS/UNDERWRITERS

These notes are based on an series of four interviews held with employees of brokerage firms in Calgary. Three of the firms would underwrite JCP stock offerings, while the fourth brokerage firm was a large national firm that would not do JCP underwriting.

1) In point form please describe the process of listing a JCP, and state the involvement of the broker/underwriter at each step.
REFER TO SECTION II OF HOPKINS AND ROBINSON (1994).

2) What are the complications that occur?
ISSUE DOES NOT SELL OUT.
PRINCIPALS BUSINESS RECORD IS TAINTED.

3) At which steps do most of the complications usually occur?
STRUCTURING THE DEAL.
PLACING THE ISSUE.

4) On a scale of 1-10, with 1 being the easiest and 10 being the most difficult, how easy or difficult is it to sell out a JCP initial offering for a new venture, and for a traditional listing?
THE RESPONSES STATED THAT THERE WAS ONLY MARGINALLY MORE EFFORT NEEDED TO SELL A STANDARD ISSUE AS COMPARED TO A JCP.

5) What are the total costs of listing a JCP?
$30,000, EXCLUDING THE SEED CAPITAL REQUIREMENT.

6) What are the ongoing listing costs of a JCP?
APPROXIMATELY $4000-$5000.

7) Are the costs of listing a JCP higher than other forms of raising seed capital, explain?
MUCH HIGHER THAN PRIVATELY BORROWING MONEY OR PRIVATELY PLACING SHARES OF THE COMPANY.

8) What is the percentage chance of success of a JCP?
SOLELY DEPENDENT ON THE MANAGEMENT OF THE COMPANY.

9) If initially successful, how easy or difficult is it for JCP firms to raise additional capital via share offerings, 1 being easy, 10 being difficult?
AVERAGE WAS 5.

10) On a scale of 1-10, with 1 being very beneficial and 10 being not beneficial at all, are JCPs helpful in allowing companies to list on a stock exchange?
ALL STATED 1.

11) What factors assist your company in deciding which applicants to accept and which applicants to reject?
PERSONAL INFORMATION STATEMENTS.
PREVIOUS PUBLIC COMPANY EXPERIENCE.
EXPERIENCE IN BUSINESS TO BE PURSUED.

12) What advantages or disadvantages do JCPs have over traditional forms of listings?
ADVANTAGES:
LARGE DILUTION IN FAVOUR OF FOUNDERS.
QUICK, RELATIVELY EASY TO LIST.

DISADVANTAGES:
MINOR AMOUNT OF MONEY RAISED IN INITIAL ISSUE.

13) What advantages or disadvantages do JCPs have over debt financing?
ADVANTAGES:
NO INTEREST SERVICING REQUIRED.
CREATES OPPORTUNITY FOR ACCESS TO ADDITIONAL CAPITAL.

14) On a scale of 1-10, 1 is easy, 10 is difficult, how easy or difficult is it for a person/company seeking seed capital for a new venture to raise debt financing?
A MINIMUM OF 5 DEPENDING ON THE DEAL AND THE ASSETS THAT ARE TO BE PLEDGED.

15) Which new venture companies are at higher risk of financial problems in their first year, JCPs or debt financed companies?
NO CLEAR RESPONSE.

16) What are the risks in using a JCP as a method of raising seed capital?
LISTING NEVER GETS TO MARKET.
POOR AFTERMARKET.

17) Are there particular industries that are more or less attractive for JCPs?
THE PRINCIPALS OF THE JCP ARE THE MOST IMPORTANT FACTOR, IT WAS ALSO NOTED THAT INDUSTRIES THAT ARE NOT CAPITAL INTENSIVE IN THE EARLY GOING ARE ALSO BETTER SUITED TO JCPS.

18) Does the JCP form of listing encourage managers (principals) to seek long-term goals and success for the JCP?
THE RESPONSES WERE YES BECAUSE OF THE ESCROW ARRANGEMENT.

19) Why are JCPs a good method of raising seed capital?
ANYONE CAN PARTICIPATE IN THEM.
PRINCIPALS RECEIVE MANY SHARES FOR CASH, NOT ASSETS.
RELATIVELY LITTLE RISK FOR PRINCIPAL.
QUICKER AND EASIER THAN TRADITIONAL FORM OF LISTING.

EXHIBIT B3

INTERVIEW WITH A REGULATOR AT THE ASE

1) What is the objective of the ASC by allowing the listing of JCPs?

THE OBJECTIVE OF THE ASE AND ASC IS TO CURTAIL THE ABUSES OF THE JCP FORM OF LISTING. THE BLIND POOL METHOD OF FINANCING, THE PRECURSOR TO THE JCP, WAS DEVELOPED BY PERSONS THAT TOOK ADVANTAGE OF A LOOPHOLE IN THE SECURITIES REGULATIONS. THUS, THE JCP REGULATIONS THAT HAVE BEEN DEVELOPED HAVE FOCUSED ON ENSURING THAT THE JCP FIRMS OPERATE IN A LEGITIMATE AND LEGAL FASHION.

2) Has the objective been realized?

THE REGULATOR WAS HAPPY WITH THE CURRENT LEVEL OF JCP REGULATION AND THE COMPLIANCE BY THE JCP FIRMS TO THESE REGULATIONS.

3) What future developments will be seen in the regulators' control of JCPs?

CHANGES ARE MADE ON AN ONGOING AND AS NEEDED BASIS.

4) What are some of the shortcomings of the JCPs?

AT PRESENT THERE ARE NO OBVIOUS SHORTCOMINGS.

5) What advantages are there in allowing JCPs?

THE QUICK AND LOW COST ACCESS TO THE MARKET.

6) On a scale of 1-10, one being bad, 10 being excellent, what has been the effect of the JCP's on the well-being of the ASE?

JCPS HAVE INCREASED THE NUMBERS OF LISTINGS AND THE VOLUME OF STOCK TRADED ON THE EXCHANGE. IT IS, HOWEVER, THE EXCHANGE'S BELIEF THAT 75%-80% OF THE JCPS WOULD HAVE LISTED IN A TRADITIONAL FORM HAD THE JCP VEHICLE NOT BEEN AVAILABLE.

7) What would make the ASE reject listing a JCP?

MAINLY THE TRACK RECORD OF THE PRINCIPALS INVOLVED IN THE JCP.

8) Out of 100 JCP listing applications, how many would be rejected outright?

ONLY ABOUT 1 DUE TO THE PRESCREENING DONE BY THE BROKERS AND THE PRE-LISTING MEETINGS WITH THE EXCHANGE.

9) Do brokerage houses do an adequate job in evaluating what JCP firms should be listed?
YES.

10) What industries are best suited for JCPs?
MANAGEMENT DEPENDENT MORE SO THAN INDUSTRY DEPENDENT.

11) What industries are not suited for JCPs?
NONE.

12) In comparing JCPs to regular listings are there more or less breaches of securities regulations?
NO MEASURABLE DIFFERENCE, THIS IS DUE TO THE VERY STRICT JCP LISTING REQUIREMENTS.

13) Do you believe that the current JCP regulations are adequate enough to encourage management to act in the shareholders long-term interests?
YES, MAINLY DUE TO THE ESCROW REGULATIONS.

14) What, if any, major legal problems have occurred with regard to JCPs, ie., director liability etc.
NONE TO SPEAK OF.

15) What advice would you give to someone contemplating listing a JCP, ie., initial advice, listing advice, choosing an underwriter, fulfilling regulations requirements, ongoing listing advice?
EXPLORE ALL OF THE ALTERNATIVES AND MAKE SURE THAT A JCP VEHICLE IS THE CORRECT FORM OF RAISING CAPITAL FOR THE PROJECT YOU HAVE. DO NOT JUMP TO THE CONCLUSION THAT A JCP IS ALWAYS THE QUICKEST AND EASIEST METHOD OF RAISING CAPITAL.

ON THE CARE AND NURTURE OF LOAN GUARANTEE PROGRAMS

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ON THE CARE AND NURTURE OF LOAN GUARANTEE PROGRAMS

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EXECUTIVE SUMMARY

A. Objective of the Paper

This paper reports on analysis of issues that pertain to programs that provide loan guarantees for SMEs. The work was prompted by recent experinece with the Canadian Small Business Loan Act. Changes made in April of 1993 to the program attributes were followed by an eight-fold increase in lending volume. This activity raised concerns regarding

- the economic impact of the program,
- the extent of incrementality or deadweight, and,
- the prospect of higher government obligations related to honoring the defaults.

These issues all pertain to program effectiveness. This paper addresses two issues: the need for loan guarantees for SMEs; and, principles behind establishing the parameters of such programs. This is accomplished by drawing on economic theory and from international experience

B. Findings and Conclusions

B.1 Objective of Loan Guarantee Programs

The primary objective of the all loan guarantee programs are to redress a perceived flaw in the credit market.

The desired outcome is to faciliate access to debt capital for small firms.

B.2 Implications of the Guarantor - Bank Relationship

The agency relationship is such that the guarantor controls the level of the guarantee and the level of fees. The delivery agent lenders control the quality of the loan portfolio. This separation of responsibilities makes sense. Alternatives are to abolish the scheme or for the guarantor to become heavily involved in operational decisions.

- Economic theory implies a strong case against program discontinuance because normal operation of the credit markets is consistent with disproportionate difficulty for firms that are seeking small amounts of loans.
- The alternative of closer government involvement does not solve the essential problem and merely raises the administrative costs of program delivery. Moreover, well-trained loan account managers are best qualified to make lending assessments than civil servants.

B.2.1 Default Rates

The agency relationship between guarantor and the delivery agent lenders dictates a default rate that is necessarily higher than that in lenders' portfolios of non-guaranteed loans. The default rate is highly sensitive to the level of the guarantee. This implies a necessary subsidy, both to the delivery agents and to the riskier firms that obtain loan guarantees. Because of the absence of rigorous longitudinal evaluation, the extent to which the economic benefits compensate for the subsidy remains unknown.

Default rates associated with the Canadian SBLA are of the order of four to six percent, part of which is compensated from fee income. By international standards, this was seen to be extremely low.

Agency theory predicts default rates for the SBLA that are consistent with experience. According to the agency theory relationship, the temporary increase in the guarantee level from 85 to 90 percent in 1994 could lead to a material increase in the level of defaults. This is because the higher level of guarantees allows lenders to tolerate a higher proportion of defaults in their portfolios without reduction of profits.

B.2.2 Incrementality

There seems to be considerable deadweight in the program. A high proportion of loans have been advanced to firms that do not appear to require use of the guarantee to obtain credit. This lack of incrementality was occasioned by two factors:

- the low fees, and,
- the high level of the guarantee.

These are the two primary determinants of the take-up rate of the program. Driven, also, perhaps by lenders' ability to make greater profits on guaranteed than on non-guaranteed loans, the take-up rate of the SBLA soared

during 1994 when fees were two percent of the loan and the level of the guarantee was 90 percent.

In the context of loan guarantees, as in the context of insurance, deadweight is not necessarily a problem. The fees paid by the (majority of) firms that will not default provide partial or even complete offset to the liabilities resulting from the defaults of the (minority) of firms.

B.2.3 Fees

- Setting fee levels involves striking a balance. On the one hand, higher fees provide the funds to honor losses from defaults. Conversely, if fees are excessive a vicious cycle can be established such that only poor quality firms would use the guarantees. It is highly likely that the high fees associated with the Loan Guarantee Scheme in the UK have created "a market for lemons" and contribute to the 35-45 percent default rates.
- The central task of the guarantor is to set the level of the guarantee sufficiently high that lenders have (economic) incentive to deliver the program yet not so high that lenders lose incentive to discriminate on the basis of borrower quality. The level of the guarantee and the fee level need to be established in conjunction with each other. The guarantee rate implies the default rate and thereby the loan loss rate. The level of fees must offset the loan losses yet remain low enough that poor quality risks do not drive out the high quality borrowers whose success subsides the failures.

B.3 International Comparisons

The parameters of loan guarantee program in other countries studied have not been set to provide the program efficiency of the Canadian SBLA.

B.3.1 The US

- Historically, the US SBA program has experienced default rates in the order of 20 percent. In part, the higher default rate in the US was occasioned through a guarantee level of 90 percent.
- The operating budget of the SBA program is far higher than that for the SBLA, even though the absolute levels of activity of both programs are comparable.
- During the past few years, the SBA has been evolving towards lower levels of guarantee and more passive government involvement. It seems highly likely that these steps will result in better quality portfolios and lower costs of administration. The early experience with this change in strategy has been encouraging.

B.3.2 The UK

- The Loan Guarantee Scheme [LGS] in the UK was seen to be in need of extensive revision., with guarantee levels comparable with those of the SBLA, default rates remain of the order of 40 percent.
- This level of default was the highest of all countries examined.
- In part, this is attributable to the very high fees. However, the guarantor body appears to be in a dilemma: defaults are so high that high fee incomes are necessary to honor the losses; in turn, the high fees continue to attract poor credit risks and discourage high quality borrowers.
- A high proportion of defaults occur within two years of the original loan. The does not speak well of the process being used to screen applicants. In short, the relatively few good risks are being asked to subside the relatively many poor risks.
- Nonetheless, there are some attractive features of the LGS. The distinction between established and new firms is useful. The scheme also contains provisions for targeting loan guarantees according to particular government priorities.

B.3.3 Germany and Japan

The governments of Germany and Japan have taken a somewhat different approach to the provision of loan guarantees. Both have, in effect, privatized the scheme.

- In Japan, a one-off funding of the Credit Insurance Corporation has provided for a re-insurance process, one that is financially self-sufficient.
- In Germany, the role of the Burgschaftsbanks and their re-insurance from *lander*, federal government, and the European Recovery Commission provide for a similar operation.
- While the default rates in Germany are very low, it also seems that the extensive and demanding selection process may defeat the goals of program delivery.

B.4 Implications of Economic Theory

Economic theory provides several analyses of the response of lenders to risk: the literature of credit rationing. However, the objectives of loan guarantee programs is to respond to the perception that small firms, not so much risky firms, suffer disproportionate access to credit. It remains the role of lenders to discriminate according to risk. It may be true that, on average, smaller firms are more risky. Yet, at any level of size, there is a distribution of firms according to risk. This paper outlined a theoretical analysis of the responses of profit-maximizing lenders to size, given risk.

- Theory suggests that lenders demand disproportionately more collateral from firms seeking smaller loans.
- To the extent that such firms are unable to provide the requisite security, their access to capital would be restricted.
- This disproportionate demand for collateral is not temporary: it is a normal result of the operation of the credit market.
- The presence of a loan guarantee, however, mitigated the lenders' collateral demand, thereby expanding access to capital for small firms.

C. Implications for Public Policy

- The need for ongoing loan guarantees targeted to SMEs is supported.
- It has been demonstrated here that program delivery implies economic incentive to lenders and a small degree of subsidization of the riskier firms in the portfolio.
- Analytically, the optimal level of guarantee is a fifty-fifty risk sharing between guarantor and lender. This implies both low fees and the need for lenders to exercise full due diligence.
- The fifty-fifty risk sharing arrangement, however, is based on several simplifying assumptions, including negligible recoveries by lenders from non-guaranteed loans. In practice, a level of guarantee of 70 to 80 percent is likely to be more effective.
- In turn, this level of guarantee implies fees of two to three percent and default rates of less than four percent. Under such conditions, the following are likely outcomes:
    1. the level of fees are low enough and the rate of guarantee sufficiently high that owners of SMEs would find the terms of the guarantee attractive;
    2. delivery agent lenders would have economic incentive to deliver the scheme broadly; to manage carefully the quality of the portfolio; and, to carry out sufficient due diligence to control defaults;
    3. income from fees would at least offset the contingent liabilities represented by the guarantees; and,
    4. fees would be sufficiently low that good credit risks would not abandon the market to risky firms, yet the level of guarantee, being lower, would reduce deadweight.

D. Future Directions

Loan guarantee programs form the cornerstone of small business finance support for many of Canada's most important international competitors. Currently, the SBLA provides Canada with competitive advantage through several attractive attributes:

1. the ease of access attendant on passive government involvement;
2. extraordinarily low, internationally, administration costs;
3. reasonable default rates when compared with international competition;
4. fees that do not discourage good quality firms from seeking guarantees.

If further revisions to the program attributes are to be contemplated, these should take the form of small reductions in the levels of guarantee and fees. Before doing so, econometric analysis of the determinants of take-ups rates needs to be undertaken so that the relative sensitivity of take-up rates to each factor can be ascertained.

Existing attempts to measure the economic benefits that attend this subsidy have not been convincing.

Rigorous longitudinal analysis of the social welfare benefits accruing to firms that have received loan guarantees must be undertaken. Such a study ought necessarily compare these benefits with those from a control group of firms that did not avail themselves of loan guarantees. Without such an analysis a fully-informed decision about program continuance cannot be taken.

NOTATION

Lower case characters indicate percentages or proportions, upper case are absolute dollar values:

α	1+spread between i and k
β	liquidity of collateral
δ, ω	default probabilities
c	ratio of collateral to loan
f	guarantee fee as proportion of loan principal
g	level of guarantee as percentage of principal
i	1+interest rate on loan,
k	1+lender's cost of funds
r	1+entrepreneurs rate of return
v	variable cost of due diligence
K	principal of loan
F	fixed cost of due diligence

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1. INTRODUCTION

It is often assumed that smaller firms are less able to obtain debt capital than larger firms. It is this premise that forms the basis for the provision of loan guarantees by governments and other institutions. Although implemented differently, governments of Canada, the UK, the USA, Japan, and those of most European Union countries all provide loan guarantee schemes for small firms. This paper reports on three issues that pertain to the provision of loan guarantees to small firms. It draws on economic theory to examine the case for loan guarantee programs. It reviews the development and experience of the Canadian Small Business Loan Act [SBLA, henceforth] and addresses design issues using agency theory. It examines loan guarantee schemes in other nations and extracts lessons from their experience.

The structure of loan guarantee programs is found to be similar from country to country. The common stated objective of all such schemes is to redress a perceived flaw in the credit markets whereby small firms are unable to access debt capital. The process is initiated when an SME approaches a lender institution for a loan. If the borrower is eligible and in need of a guarantee, the guarantee is invoked with differing degrees of involvement of the guarantor. On approval, a proportion of the loan principal is guaranteed (usually by government) and the borrower and lender risk the balance. Borrowers pay a fee for the guarantee and lenders charge interest and require security. In the event of default, the guarantor makes good on the guaranteed proportion of the borrowing and the lender usually takes a loss on the balance.

Without exception, the loan guarantee schemes of most countries are intended to provide access to capital for small businesses. Also without exception, there is controversy surrounding these programs. The tenor of the debate may be understood from the following comments, both made before the US Congress' House Committee on Small Business. On the one hand, advocates of the loan guarantee programs argue along the lines of Brown (1987):[1]

[1] B. H. Brown, vice-president Allied Lending Corporation, quoted to the US Congress, House Committee of Small Business, 99'th Congress, Second Session, 1987, as noted in Rhyne (1988, p.6).

> "...[the] loan guarantee program is a vital source of long term capital for this country's small business community. It is a program which generates revenues in excess of its costs to the government and is an excellent partnership between the public and private sectors"

Conversely, the arguments of opponents' follow along the lines of Stockman (1986)[2]:

> "...[the loan guarantee program] serves no rigorously-defined public purpose at all ...[and] may inflict unfair private economic harm to the 99 percent of non-SBA borrowers who must compete with government-fostered and subsidized competitors"

While these comments reflect the tenor of the debate in the US, similar comments may be heard in the halls of various governments, including those of Canada. The pressure on such programs is the greater given the national deficits faced by many developed countries and the contingent liability and obligatory cash flows associated with honoring loan guarantees. In part, the debate flourishes because both proponents and opponents have lost sight of the intention of loan guarantee programs. Debates surround the economic benefits of supporting risky firms and the programs' potential to guide investment to disadvantaged business owners. In no case, however, have such objectives been articulated. The single objective expressed in all loan guarantee schemes is the same as that of Canada's Small Business Loan Act:

> "to increase the availability of loans for the purpose of the establishment, expansion, modernization and improvement of small business enterprises" (SBLA, 1991, p. 2).

The objective is to assist small firms, *not* to subsidize risky firms. At any level of firm size, there exists a distribution of risk of borrower. It is the task of the credit markets to discriminate according to quality of borrower. It is the objective of the loan guarantee scheme to facilitate capital formation for small firms.

This paper reports on an analysis of issues that pertain to the provision of loan guarantees to small firms. It proceeds, following this short introductory section, by drawing on economic theory to justify loan guarantee programs. The third section provides a review of the history and experience of the Canadian SBLA program. Issues in program design are identified. These are addressed by invocation of agency theory. Government, as the principal, wants private sector lenders to deliver the program. The lenders, as government's agents, have their own objectives of profit maximization. Alignment of the goals provides useful and practical guidelines for program design. The fourth section describes the generic features of loan guarantee programs of the USA, Japan, Germany, and the UK. The paper closes with a section that summarizes the issues and provides recommendations.

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[2] D. Stockman, Director, Office of Management and Budget, remarks to the US Congress, House Committee of Small Business, 99'th Congress, Second Session, 1986, as noted in Rhyne (1988, p. 6).

2. Economic Theory of Loan Guarantee Programs: A Case for Intervention

2.1 The Premise of Loan Guarantee Programs

The underlying premise of loan guarantee programs is that small firms cannot obtain proportionally as much credit (or credit on as good terms) as larger firms *of equal credit risk.* To illustrate this point of departure, it is instructive to review the stated goals of loan guarantee programs enacted in various countries. These are listed in Table 2-1.

Table 2-1
Stated Objectives of Loan Guarantee Programs

Country	Objective
Canada	"... to encourage lenders in the private sector to increase the availability of loans for the purpose of the establishment, modernization and improvement of small business enterprises." (SBLA, p2)
Japan	... to facilitate loans from financial institutions to smaller enterprises for business needs by extending insurance coverage to guarantee liabilities ... for loans to smaller enterprises made by financial institutions."[3]
UK	to provide "government-backed guarantees to support viable propositions from small business owners who have insufficient resources [due to lack of security or track record] to obtain conventional loans." (Pieda, (1992) p. 6.)
US	"... an attempt to increase access of small- and medium-sized enterprises to credit and in so doing to stimulate growth in the small business sector." Rhyne (1988, p. 11)

Without exception, the goals of the various programs relate to correction of a perceived flaw in the credit market: that small firms have disproportionately less access to credit than larger firms of equivalent credit risk. The goal statements do not ordain that firms whose debt has been guaranteed should be any riskier than other firms. Proper design of loan guarantee programs must bear in mind that there is a distinction between size and risk. It may be true that, on average, smaller firms are riskier;[4] however, within a size category, there is always a distribution of risk.

The goals listed previously are the stated principles behind the programs. There are, in addition, a variety of other potential and real objectives of loan guarantee schemes. Resolution of the debates requires assessment of the extent to which the existing programs are meeting their stated objectives. Improvements to the program designs must be versed in

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3 Outline of Small Business Credit Insurance Corporation, Research Department, Small Business Credit Insurance Corporation, Tokyo, Japan, October 1976, p. 6.

4 Conversely, there is some evidence that particularly small firms are less likely to default or exceed limits on operating loans. See, for example, Orser, Riding, and Swift, 1993.

alignment of the objectives of the program with those of the agent lenders who implement the initiatives.

2.2 Alternative Objectives of Loan Guarantee Programs

Rhyne (1988, Chapter 5) has identified three categories of objectives for loan guarantee programs: credit market imperfections; externality benefits associated with small firms; and distributional aims.

The first category, credit market imperfections, includes three different objectives that may be attributable to loan guarantee plans. The first is to overcome a credit gap due to equilibrium quality credit rationing; the second is to protect against credit tightening during recessions; and the third is to allow small businesses access to credit. In addition, the UK loan guarantee scheme also views its program as a means of "training" lenders to deal with small firms.

The issue of credit rationing is discussed at length in subsequent sections; however, the findings of those sections may be succinctly summarized. First, it is not clear from either theory or empirical evidence what form, if any, of credit rationing obtains. Second, credit rationing is not necessarily a problem if the role of credit markets is to discriminate on the basis of quality and if such discrimination is not a binding constraint to the growth of those firms that contribute to economic development. It is true that small firms account for most growth in employment and that small firms often have difficulty raising expansion capital. However, it is the growth of a minority of such firms (estimated at 4 percent of the total), that drive economic development. If this minority is not rationed, credit rationing of the other is not necessarily a constraint.

The objective of preventing recession-related so-called "credit crunches" was also identified by Rhyne. However, lending ceilings are normally established based on demand or legislation and none of the loan guarantee schemes reviewed for this research are designed to include a countercyclical element:. Thus, the "market flaw" rationale reduces to the third possibility: that *small* firms, with attendant small borrowing balances, fall below a threshold that lenders find economically viable to consider. According to this rationale, the flaw is related to the financial system vis-à-vis the *size* of the firm - *not* in the *quality* of the firm.

The second category of objectives that Rhyne notes are those related to the external benefits associated with SMEs: job creation; support for technological innovation; promotion of competition; etc. Indeed, the findings of the Wilson Committee, the study that recommended formation of the UK loan guarantee scheme, notes explicitly that the promotion of a guarantee program could be justified if (Wilson Committee, 1979, p. 26): [5]

[5] The Financing of Small Firms, HMSO, (Cmnd 7503), 1979, Department of Employment, Government of the United Kingdom, p. 26.

> "...the public return from the activities of small firms was greater than the private benefit because, for example, of their importance to job creation. In the latter case it would also follow that some public subsidy was justified."

If this rationale is accepted, the issue becomes one of comparing the cost of the implied subsidy with the value of external benefits necessary to justify it. To perform such a study with the necessary rigor requires a longitudinal comparison of guarantee-assisted borrowers[6] vis-à-vis a valid benchmark sample of borrowers who did not use a guarantee. No such study has been performed. In general, studies of the impact of loan guarantee programs have been simplistic. As a result, hard evidence about external benefits of loan guarantees is lacking. This is a surprising result in view of the significant amount of government funds at stake.

Distributional aims are mentioned as a third set of objectives for guarantee programs. According to this objective, loan guarantees are argued to assist disadvantaged borrowers. However, with some minor exceptions, the design of most loan guarantee initiatives do not provide lender agents with any explicit targeting directives.

The problems of program design, justification, and political defense are vested in the objective(s) of the initiative. The goals of loan guarantee programs are invariably stated in terms of the first of these categories: to address the flaw in credit markets whereby small firms are thought to be unable to access capital to the same extent as large firms. If ***size*** of firm is the issue, there ought be no subsidy and the only firms that ought receive loan guarantees are the less risky ones within the small firm universe. The presence of a subsidy, made manifest through high default rates, is not consistent with the nominal objective of any of the loan guarantee programs investigated.

For the balance of this study, the operating premise is taken as the stated objective: that loan guarantee programs are intended to facilitate access to capital for small but viable firms. The thrust of what follows, then, is directed towards the design of loan guarantee schemes that accomplish this objective. To succeed, such programs need to align, in an explicit way, the objectives of the program and those of the agent lenders. Accordingly, a review of the operation of credit markets is in order.

2.3 THE RESEARCH LITERATURE ON CREDIT MARKETS

2.3.1 THE BANK-SME INTERFACE

Hanson (1983) argues that the availability of expansion capital is *the* central issue in economic development:

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[6] Such a study would require time series information changes in firm performance before and after the loan, subsequent credit experience, evaluation of relationships with lenders, a sense of the degree to which the guaranteed loan was incremental, and a taxonomy of firm attributes.

> "Access to capital is the central issue . . . Entrepreneurial talent is not the prerogative of the wealthy, but is broadly distributed throughout the population as a whole. Without reasonable access to financing, many of our countries' most talented and aggressive entrepreneurs will be cut out of the economic system. Innovation and business development will become a luxury reserved for the wealthy, and the economy as a whole will suffer."

Therefore, the decision to grant credit is critical, not just to the entrepreneur whose particular request is being considered, but also to society. Justification of loan guarantee initiatives is often based by invocation of the literature on credit rationing (see, for example, and among others, the works of Berger and Udell (1992), Chan and Kanatas (1985), deMeza and Webb (1987,1992), Besanko and Thakor (1987), Stiglitz and Weiss (1981)). Cressy (1995) argues convincingly that access to capital is not a barrier in the credit rationing sense; rather, he makes a strong case to the effect that human capital is the more essential ingredient to survival. Growth, however, does require capital. To the extent that smaller firms suffer disproportionately less access, availability of capital is a public policy issue. The basis of government intervention in financial marketplaces is an understanding that markets operate such that smaller firms face proportionately greater difficulty raising credit than larger firms, other factors (including risk) being equal.

In Canada, the demand side of the marketplace for small business debt capital comprises approximately 900,000 small businesses. On the supply side, banks are the primary, indeed almost exclusive, suppliers of debt capital to small business. The supply side of the market comprises six national multi-branch banks, several smaller regional lenders, and (in some provinces) small co-operative lending institutions. The six large banks, however, hold more than 85 percent of the market share and loans from these lenders are the focus of this study.

The relationship between banks and small business borrowers has been turbulent. Wynant and Hatch (1990), Orser, Riding, and Swift (1993) and others reveal dissatisfaction among a high proportion of SME clients. In the spirit of Cressy (1995) bankers argue that poor management skills on the part of some small business owners are problematic. Banks' fiduciary responsibilities to their depositors mitigate against lending to firms that do not present fiscally-responsible management.[7]

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[7] Thornton (1981) added some empirical substance to these contentions. Thornton used discriminant analysis to study several aspects of the financial management of Canadian small businesses. One dependent grouping was whether or not the small firm owner respondent had been turned down for financing in the past three years. Fifty-two of 289 respondents reported loan turndowns. Thornton found that significant variables associated with the turndown decision included: an industry dummy variable (a variable which took the value 1 if the respondent was a manufacturer and 0 if the respondent was not a manufacturer); financial management ability (which took the value of 1 if the person managing the firm's finances had a formal designation in accounting or finance, and 0 if not); and the size of the firm as measured by the number of full time employees.

Smaller firms, in particular, seem less able to obtain debt from banks. Grant (1988) reported that banks turned down newer, smaller companies most frequently; a finding confirmed by Orser, Riding, and Swift (1993). Further, Wynant and Hatch (1990) and Riding and Haines (1994) find that (unlike in the US and other countries) the margins on bank loans to Canadian SMEs are almost universally less than three percent above prime. Riskier firms tend to be turned down in attempts to arrange bank financing. This is a finding consistent with credit rationing.

Credit rationing carries with it implications for credit markets. Foremost is that under credit rationing, there remains an excess of demand for credit over supply. With credit rationing, lenders are unwilling to provide, at current market rates, the loans that SMEs seek. Lenders ration credit to control the quality of their loan portfolios. It follows that the so-called laws of supply and demand and of single price do not hold. This restricts the application of conventional methods of economic theory development. Moreover, and most importantly, the level of investment may be at variance with that which is socially optimal (Stiglitz and Weiss, 1981; deMeza and Webb, 1987).

It is worth reviewing the literature on credit rationing because it is often invoked as a justification for loan guarantee programs (for example, Pieda, 1992). It will be seen that the literature on credit rationing does not address directly the role of firm size as it pertains to access to credit. The literature of credit rationing focuses on risk. Nonetheless, the literature provides a template by which the issue of size may be considered.

2.3.2 The Literature on Credit Rationing

In their seminal work, Stiglitz and Weiss (1981) identified severe informational asymmetries as a potential cause of equilibrium quantity credit rationing. Stiglitz and Weiss distinguish low-risk from high-risk firms according to the relative variances of the (mean preserving) probability distributions of business owners' projects. They assume, *inter alia*, that banks control the price and quantity of credit and that borrowers have access only to banks. They argue that the interest rate set by lenders affects that riskiness of loans in the marketplace in two ways. First, because of adverse selection,[8] borrowers willing to pay high rates may, on average, be poor risks. Second, as the interest rates rise, borrowers who had been good risks

[8] *Adverse selection* can follow if lenders are unable to distinguish good credit risks from poor risks. As originally noted by Ackerlof (1970), the lender will charge all borrowers fees and interest rates that reflect the average level of risk in the marketplace. As a result, good risk borrowers would be overcharged and would be subsidizing poor credit risks. Consequently, the argument maintains that good risk borrowers drop out of the market. This worsens the mix and initiates a cycle that ultimately results in a marketplace in which only high risk remain as they are the only ones willing to pay the higher rates. The market degenerates. It can be argued that such asymmetry of information reflects the reality of the Canadian marketplace. Wynant and Hatch (1990) report that bank loan account managers typically manage of the order of 100 accounts. Given training, administrative duties, vacation, etc., this leaves the account manager with approximately one working day per year per client. Moreover, the rate of account manager turnover is non-trivial. It may be argued, therefore, that loan account managers do not, in the Canadian setting, have sufficient time to perform the due diligence necessary to distinguish good from poor risks.

are increasingly encouraged to present moral hazard[9] by undertaking projects with higher returns but lower likelihoods of success. Stiglitz and Weiss contend that there may then exist an optimal interest rate on loans beyond which profits to banks decrease because additional defaults from riskier borrowers offsets the increase in profits.[10] As an additional result, the authors argue that entrepreneurs will prefer debt as the financing source of choice.[11]

deMeza and Webb (1987) challenge SW's findings. Their analysis relaxes the assumption of mean preserving distributions of project risk. deMeza and Webb then arrive at findings that seem to contradict those of Stiglitz and Weiss: that asymmetric information leads good projects to draw in bad risks. They conclude that one consequence of informational asymmetry is more investment than is socially efficient and that business owners prefer debt to equity as a means of financing.

In their 1992 study, deMeza and Webb again review the Stiglitz and Weiss result under the assumption that entrepreneurs can vary in their ability such that the assumption of mean-preserving distributions of project returns is replaced by the assumption of first-order stochastic dominance between projects. deMeza and Webb conclude (p. 214):

> "... this payoff structure implies equity rather than debt ... although if equity contracts are costly ... debt emerges [and] even under risk neutrality investment will be socially too low.

Thus, the credit rationing issue has implications that go beyond the market for debt capital and that spill over into the demand for equity funds by entrepreneurs.

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9 Once a loan is advanced, the lender must ensure that the borrower does not act contrary to the lender's interests, a problem known as *moral hazard.* Clearly, moral hazard can arise from self-serving behaviors such as diversion of perquisites, fraud, misrepresentation, etc. However, moral hazard can also arise from simple inconsistencies between the wealth-maximizing objectives of the lender and borrower. In particular, the debt contract fixes the repayment from borrower to lender. However, the borrower reaps most of the benefits if projects are successful. That is, benefits of success are skewed in favor of the borrower. However, the lender stands to lose the entire loan capital in the event of failure while the borrower is protected by limited liability. This yields incentive for the borrower to undertake high risk projects. Losses fall to the lender and gains (less fixed interest and principal repayment) fall to the borrower. Moreover, the potential for moral hazard is greatest when the owner has little to lose (e.g. low levels of equity on the balance sheet).

10 Again, the Canadian setting is consistent with these predictions. Wynant and Hatch (1990), Riding and Haines (1994), and others have found that very few bank loans to SME customers are priced at more than 3 percent above prime rate. Storey (1994) contends that when a lender is concerned about a particular borrower, the lender is likely to apply quantity rationing to future lending rather than to ration by price. According to Storey, quantity rationing is likely to take the form, initially, of shorter maturities rather than credit limits, signaling a loss of bank confidence.

11 Mankiw (1986) notes that in the event of credit rationing as described by SW, a sharp exogenous rise in interest rates could trigger a general collapse of the marketplace. Mankiw argues that monetary tightening leads to additional adverse selection as good risks increasingly refuse to pay higher rates. Adverse selection is exacerbated because the effect of the shock makes it more difficult for lenders to screen borrowers. Moreover, shock-related decreases in the value of collateral further reduces lender confidence. Finally, shock-related decreases in the values of borrowers' assets induces a greater likelihood of moral hazard type of borrower activities. The result is a general decline in borrowing, a decline that has its largest impact on borrowers whose credit quality is difficult to determine.

Besanko and Thakor (1987) addressed the role of collateral in the context of asymmetric information between lenders and borrowers. Their analysis modeled collateral as being costly to liquidate, leading them to conclude that in a monopolistic market, lenders would not seek collateral as it was "an inefficient tool for extracting borrower surplus" (p. 675).

The Stiglitz and Weiss study and those of deMeza and Webb and Besanko and Thakor differ with respect to certain key assumptions about the nature of the marketplace, assumptions that lead to divergent findings. The crucial assumption appears to be that which relates to the parameters of the distributions of entrepreneurial returns. Thus, implications of economic theory with regard to credit rationing and the role of collateral are seen to depend on the researchers' assumptions about the underlying distributions of the returns on projects undertaken by borrowers.

Regardless of the result, equilibrium quality credit rationing is not necessarily a flaw: credit markets are *supposed* to discriminate on the basis of credit risk. At issue is whether or not credit markets discriminate on the basis of size. The literature on credit rationing explains why *riskier* firms have difficulty accessing bank loans; however, it does not explain why *smaller* firms are necessarily accorded reduced access to debt. This is because studies of credit rationing have not explicitly allowed for firm size as a variable. Usually, interpretations of these studies have tacitly assumed that risk and size are related; alternatively, they proceed on a marginal basis and consider only the incremental dollar of debt financing.

2.4 Lenders' Response to Size of Loan: A Case for Intervention

As noted, the literature on credit rationing is a treatment of lenders' responses to risk. Given risk, it does not address lenders' responses to size of loan. This section attempts to provide such an analysis.

2.4.1 Lending in the Absence of a Loan Guarantee

The approach used by Besanko and Thakor (1987) and others to investigate the response of lenders to risk is adapted here to explore theoretically how lenders might respond to size. To do so requires two changes. First, the size of the loan must enter directly into the lenders' profit maximization problem. Second, lenders' constraint on bad debt losses (heretofore ignored in the literature) must be recognized.

Using notation consistent with that of Besanko and Thakor (1987), it is supposed that the business owner faces an investment that will return R (R = 1+rate of return) with probability (1-δ). The investment therefore has a probability of failure of δ, in which event the firm will be unable to pay the loan and the lender will claim the collateral. The lender requires collateral of c percent of the loan. The investment requires $\$K$, an amount that will be raised entirely by borrowing at a rate i (i =1 + prime + risk premium over prime). The borrower's

opportunity cost of funds is *b* percent.[12] The business owner will decide to invest if the expected net return exceeds the opportunity return:

$$(1-\delta)(R-i)K - \delta cK > bK \tag{2.1}$$

That is:

$$R > i + \delta(1-\delta)^{-1}c + b(1-\delta)^{-1} \tag{2.2}$$

It is assumed that the lender makes decisions on the basis of profit maximization and that they specify a maximum bad debt loss of *d* percent of the loan portfolio. Lenders discriminate on the basis of risk. In advancing loan they face their internal cost of funds *(k= 1 + cost of funds)*, a variable and a fixed cost of due diligence *(v, F)*. Thus, the bank's margin on the loan is α *(=1+ i-k)*. It is supposed that banks realize β percent of the value of the collateral in the event of default. Thus, the bank's decision problem is to maximize profits subject to a constraint on bad debts and that the project has an expected return in excess of its opportunity cost. That is:

Max:
$$(1-\delta)\alpha K + \delta\beta cK - vK - F \tag{2.3}$$

Subject to:

$$(1-\delta)(R-i)K - \delta cK > bK \tag{2.4}$$

$$\delta(kK + vK + F) - \delta\beta cK < dK \tag{2.5}$$

The quantities are now those that are characteristic of bank portfolios. The bank's credit policy is given by *{i, c}*. Solving for these quantities yields:

$$i = k + R - \delta(1-\delta)^{-1}c - b(1-\delta)^{-1} \tag{2.6}$$

$$c = [k + v - d\delta^{-1} + FK^{-1}]\beta^{-1} \tag{2.7}$$

This solution reveals that the lender's collateral requirement has a bank-specific component *(k, v, d, F)*, a risk component (δ), and a size element *(K^{-1})*. The impact of size results from the requirement for a minimum element of due diligence regardless of size or quality of loan. The liquidity of the collateral (β) is seen to be a moderating variable. The lender sets the collateral requirement such that the fixed costs of due diligence are warranted; firms unable to meet the collateral requirement would not be advanced credit. Since $c \geq 0$, equation (2.7) implies a minimum loan size that depends jointly on the lenders costs and bad debt limit and on the risk of the investment.

The interest rate has four components: the lender's internal cost of funds; the profitability of the investment, a term that expresses the interaction of risk and collateral protection; and a firm-specific risk term. These theory-based predictions require empirical validation before further analysis is warranted.

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[12] All quantities are net of taxes.

2.4.2 EMPIRICAL TESTS OF PREDICTIONS

To test 2.6 and 2.7 data were drawn from a sample of loan file data that had been collected in conjunction with a different project. Details of the data and the collection procedures may be found in Riding and Haines (1994). Suffice that the data represented 1,393 case histories of bank lending to SMEs. The data were drawn randomly from the six major bank lenders, nationally, according to bank market share and SME distribution according to telephone area code.

Expression 2.7 predicts that the collateral to loan ratio is jointly determined by the risk of the borrower, the size of the loan, and a bank-specific component. The latter was modelled by a vector of dummy variables that identified each of the banks. The data collected from the bank files included each bank's risk rating of the borrower. However, each bank used a different means of scoring risk. Therefore, the borrowers of each bank were ranked by internal risk ranking. The borrowers in the quartile with the highest risk rating were identified as "high risk" firms. These were identifed with a dummy variable that so signified. Equation 2.7 specifies that collateral to loan ration depends in the reciprocal of loan size. The was computed. The distributions of collateral to loan and of the reciprocal of loan size were skewed. Accordingly, natural logarithms of both were taken. In addition, the denominators of the dependent variable (collateral to loan ratio) and the reciprocal of loan size are common, the latter were ranked and the ranks of loan size used in the regression. The results are listed in Table 2.2.

Table 2-2
Regression Results: Estimation of 2.7

Variable	Estimated Coefficient	t - value	Significance Level
Risk	0.1220	0.81	0.424
Rank of Loan Size	0.0098	19.68	0.000
Vector of Bank Identifiers*	*	F(6,237) = 5.04	<0.05

*The confidentiality agreement under which the bank file data were collected prohibits reporting of bank-specific results. The F statistic reported here tests the contibution to reduction of the sum of squared errors of the addition of the vector of six bank specific dummy variables. Four of the six dummy variables were positive and significant at the one percent level.

Table 2-3 reports OLS estimation of the predictions of equation 2.6. Here, the natural logarithm of the interest rate on term loans was the dependent variable. Independent variables included a vector of six dummy variables that identified the firm's banker, a dummey variable equal to one for those firms ranked in the highest-risk quartile of each bank's clients, and the natural logarithm of the collateral to loan ratio.

Table 2-3
Regression Results: Estimation of 2.7

Variable	Estimated Coefficient	t - value	Significance Level
Risk	0.212	3.445	0.0007
Log of Collateral to Loan Ratio	0.040	1.913	0.0569
Vector of Bank Identifiers*	*	F(6,237) = 2.26	<0.05

*The confidentiality agreement under which the bank file data were collected prohibits reporting of bank-specific results. The F statistic reported here tests the contibution to reduction of the sum of squared

errors of the addition of the vector of six bank specific dummy variables. Four of the six dummy variables were positive and significant at the one percent level.

Tables 2-2 and 2-3 provide partial support to the predictions of equations 2-6 and 2-7. The effect of individual bank costs and policies is validated. The collateral requirement is found to be highly correlated with the isze of the loan and in the manner predicted. Risk is not as strong a determinant of collateral, but is strobgly related to interest rates and in the manner predcited b y theory. Interest rates are also dependent on the collateral to loan ratio; however, the direction of the relationship is not as predicted. This is possibly attribuatble to an interaction with risk (as predicted by 2-6). At time of writing, further empirical work is underway to examine these aspects.

2.4.3 Lending in the Presence of a Loan Guarantee

With a loan guarantee the borrower pays a fee of *f* percent of the in return for which *g* percent of the loan is guaranteed. In this setting, the owner decides to invest in the opportunity if:

$$(1-\omega)(R - i - f)K - \omega cK > bK \tag{2.8}$$

That is, the owner's required return is:

$$R > i + f + \omega(1 - \omega)^{-1}c + b(1 - \omega)^{-1} \tag{2.9}$$

Thus, in the presence of a costly loan guarantee, the owner will require a higher rate of return to compensate for the cost of the guarantee. Increasing the fees, then, acts as a disincentive to business owners to invest.

From the lender's perspective, profits are as for the case of no loan guarantee with the guarantee replacing part of the collateral. However, under the terms of the SBLA the loan must also be secured by either a first fixed charge on the assets required, or by a *pari passu* fixed charge with the other sources of financing provided for the project by the SBLA lender. The bank's lending policy *{i, c}* then depends on the profit maximization problem modified for the presence of the guarantee, as follows:

Max:

$$(1-\omega)\alpha K + \omega gK + \omega\beta cK - vK - f \tag{2.10}$$

Subject to:

$$(1-\omega)(R - i - f)K - \omega cK > bK \tag{2.11}$$

$$\omega(kK + vK + F) - \omega gK - \omega\beta cK < dK \tag{2.12}$$

Solving this for credit policy yields:

$$i = k + R - f - \omega(1-\omega)^{-1}c - b(1-\omega)^{-1} \tag{2.13}$$

$$c = [k + v - g + FK^{-1} - d\omega^{-1}]\ \beta^{-1} \tag{2.14}$$

As seen, the effect of the loan guarantee is two-fold. First, the guarantee reduces the lender's demand for collateral, making debt more generally accessible to firms, particularly small firms, that lack the resources to pledge for security. Moreover, the lender assesses a lower rate of interest, recognizing that the business owner's return on the investment is reduced by the amount of the fees. As a result of this, higher fees not only discourage owners from investing, they reduce the profits to the lender, discouraging their involvement.

2.5 SUMMATION

In this section, it has been noted that the objective of loan guarantee schemes is to facilitate capital for small viable firms. The stated goals do not include, except as side benefits, economic development, countercyclical, or distributional aims. Given that the programs focus on redressing the perception that small firms suffer disproportionately less access to capital, this section has shown that loan size, a close proxy for firm size, is indeed a natural barrier to capital formation given the profit maximization motives of institutional lenders. It has further been shown that introduction of a loan guarantee scheme ameliorates the size problem. What remains, then, is the provision of guidance for program design. This will be advanced following a review of the SBLA, a consideration of the agency relationship between guarantor and lender, and examination of international experience.

3. THE SBLA PROGRAM

As noted in the preceding section, the role of a loan guarantees is a means of ensuring that small- and medium-sized enterprises [SMEs] have adequate access to financing is an important public policy issue. This is especially true for the Canadian federal government, a government elected in 1993 on a platform that stressed economic recovery through support for small businesses. Since financial markets do not provide appropriate access to capital for small loans, government intervention is warranted. Loan guarantee programs are a primary means by which national governments of our international competitors facilitate access to debt capital for small businesses.

Small businesses are particularly reliant on debt financing. For small firms, it is estimated that the annual investment rate of equity in Canada is less than $500 million per year. This comprises approximately $100 to $200 million from institutional venture capital firms (ACVCC, 1993) and $200 to $300 million from private, informal, investors (DalCin, Haines, Riding, and Safrata, 1993). Only a minority of business have access to equity through organized stock exchanges. By contrast, bank lending under the terms of the SBLA alone exceeded $4 billion in 1994. Operating loans, commercial mortgages, and non-guaranteed term loans were additional to this amount. Loan guarantee programs are intended to ensure that debt capital is, in principle, available to the smallest of firms.

Governments face a predicament with respect to loan guarantee initiatives. On the one hand, difficulty with access to capital is, indeed, a significant barrier to SME growth and the attendant economic development. On the other hand, it is argued that firms that must avail themselves of loan guarantees are subject to rates of default that exceed those of banks' other borrowers. The costs of default can be significant for governments that face material budgetary deficits. At a more basic level is the question of whether or not the public should underwrite SME borrowing. Conversely, loan guarantee programs that accomplish the objectives without cost to the public are feasible This study seeks to address these issues.

3.1 BACKGROUND, HISTORY, AND GOALS OF THE PROGRAM

Since its inception in 1961, the Small Business Loans Act has provided for federally-guaranteed term loans through approved lenders. The relationship between the government and the approved lenders is an application of agency theory. The government, acting as the principal, has objectives for the loan guarantee program that it would like its agents, the lenders, to fulfill. The lenders, have their own objectives, ones that need not coincide with the aims of the government. In the setting of agency theory, the design of the contract between agent and principal must be based on a clear articulation of the objectives of each party. Program design must align the goals of the principal with those of the delivery agents.

To obtain an SBLA-guaranteed loan, borrowers obtain a loan from an approved lender. Approved lenders include the six multi-branch national chartered banks as well as other institutions. Within the terms of eligibility, the loan guarantee decision rests in the hands

of the lender and borrower. Lenders have full discretion regarding the loan decision. The SBLA Administration Branch is responsible primarily for maintaining registration of the loans and, in the event of default, the Administration Branch honors the guarantee. Unlike loan guarantee schemes in the US and the UK, the role of the Canadian government is passive. Chart 3-1 shows the take up of the program in terms of loan and dollar volume from 1970 to 1993.

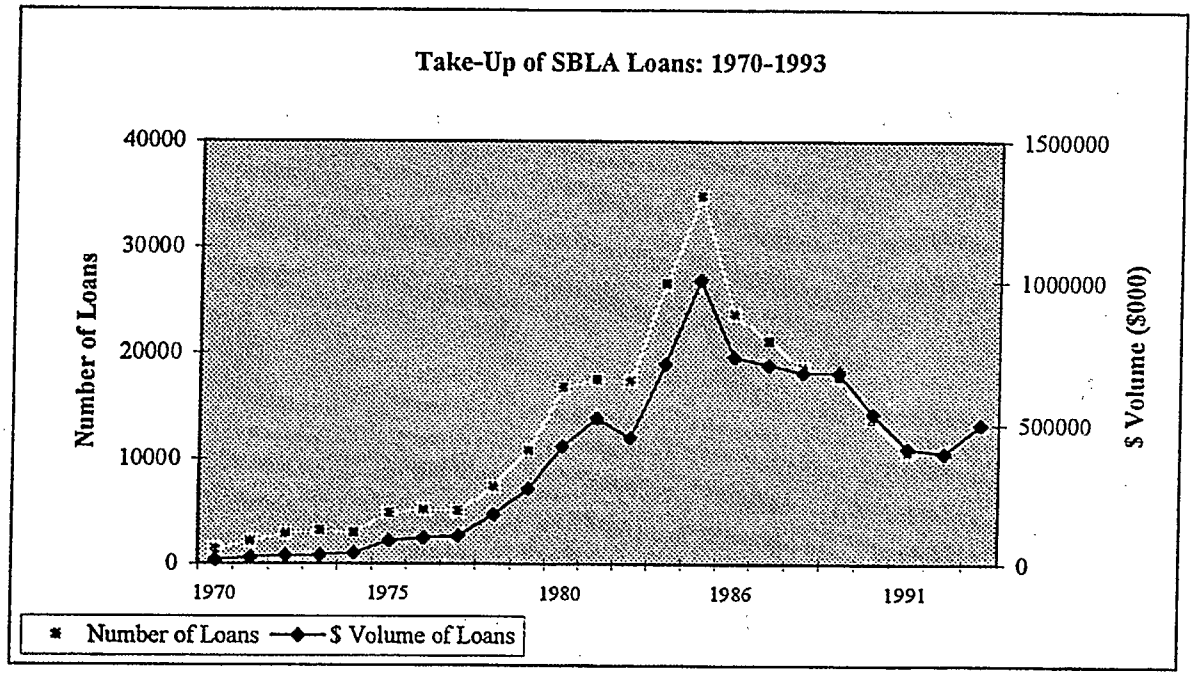

Chart 3-1

The SBLA program provides exclusively for guarantees of term loans where the proceeds are used to finance land, premises, equipment, and certain other items. Proceeds may not be used to finance working capital, share acquisition, refinancing, and intangibles (including franchise and operating permits).

In April 1993 the Canadian federal government amended the Act in a variety of ways. These changes included:

- increasing the level of the guarantee temporarily from 85% of loan loss to 90%;
- widening eligibility to firms with annual revenues of up to $5 million (the previous limit was set at $2 million);
- increasing the maximum loan size from $100,000 to $250,000;
- widening eligibility to firms in sectors such as finance, insurance, mining, the professions; and,

- providing for a higher interest rate spread to 1.75 percent over prime on floating rate term loans and allowing for interest rates as high as 1.75 percent over the residential mortgage rate on fixed rate term loans.

As a partial result of these changes, lending volume under the terms of the Act increased dramatically. From a dollar volume of approximately $500,000 in 1993, SBLA lending approached $3.5 billion during 1994. Cumulative lending under the SBLA surpassed the $4 billion legislated ceiling, prompting significant concerns. These concerns include:

- issues of the economic impact of SBLA lending;
- issues of risk and the exposure of the government; and,
- issues of incrementality.

These issues are considered in this section.

3.2 Economic Impacts of SBLA Borrowing

Assessment of the impact of loan guarantee schemes is not straightforward. As yet, no rigorous and comprehensive analysis appears to have been conducted of any loan guarantee program in the US, the UK, or Canada. In order to conduct such an analysis, it is necessary that such evaluations be conducted frequently, ideally using longitudinal data. Such data, according to Rhyne (1988) would need to encompass:

1. change(s) in firm performance before and after the loan;
2. compilation of credit experience subsequent to the loan, including development of customer relationship with the lender;
3. compilation of alternatives to loan guarantees;
4. measurement of attributes and credit experience with reference to a control group.
5. measurement, from the lenders' perspectives, of the performance of lenders' portfolios of guaranteed loans including long-run default and charge-off rates and returns to lenders.

In short, without comprehensive longitudinal data, it is virtually impossible to assess the level of external benefits accruing from the loan guarantee program. Evaluation of such benefits are beyond the scope of this study.

Nonetheless, several attempts to estimate external benefits have been reported. According to the SBLA (SBLA, 1991, p.12) the cost per job is of the order of $656 to $1113; moreover, between 1990 and 1993, the additional employment associated with SBLA lending was in excess of 100,000 new jobs.

These findings are suspect for at least two reasons. First, they are based on firms' self-reports of expected job creation at the time of application for the loan guarantee. Accordingly, they likely overstate the level of external benefit. Second, they do not take into

account the issue if incrementality in that some proportion of the loans (and the resultant jobs) would have been advanced if the SBLA were not available.

There is an additional concern regarding evaluation of economic impacts. Implicit in such an investigation is a cost-benefit analysis. Some of the costs are clear: program administration and obligations to honor loans in default. Such costs constitute an implicit subsidy to risky firms if not offset by fee incomes. The implicit benefits of job creation etc. are then weighed against the implicit subsidy. However, the goal of the program is not to subsidize risky firms. Hence, the subsidy, if any, ought be negligible.

3.3 Issues of Incrementality

One of the concerns raised recently with respect to the SBLA is that of incrementality. Incrementality involves two aspects. One relates to the 1993 revisions to the eligibility criteria. According to these changes, firms with sales of $2 million to $5 million became eligible borrowers. In addition, firms in particular industrial sectors became newly eligible. In this sense, some borrowers are incremental in that they would not have been eligible prior to April 1993. In terms of this definition of incrementality, 8.6 percent of borrowers reported sales in excess of $2,000,000 per year and are incremental in the first sense. In terms of the new sectoral criteria, 8 percent of borrowers are in the professions; another 4 percent are in the finance, insurance, and real estate sector. (Haines and Riding, 1994).

The second aspect of incrementality relates to the "bankability" of the firm. The question has arisen as to whether or not firms that have borrowed under the SBLA would have qualified for a term loan without the need for a government guarantee. That is, "...what proportion of SBLA lending is really incremental, in the sense that the loans would not have been made without the program?"[13]

Evaluation of incrementality in this second sense, or 'bankability', is less straightforward. One means of investigating incrementality is to examine the banks' treatment of SBLA clients with respect to terms of credit on operating loans and non-SBLA term loans. For example, in a random sample of 1,393 bank loan files, 254 firms had borrowed under the terms of the SBLA and *also* maintained an operating loan facility with the same lender. Likewise, 326 firms had both a term loan under the SBLA as well as one or more term loans that were not guaranteed. Table 3-1 presents the distributions (and cumulative distributions) on operating loans held by SBLA borrowers and by non-SBLA term loan borrowers. Table 3-2 presents similar distributions of rates on non-SBLA term loans for borrowers who also held a SBLA loan and for term loan borrowers who did not report an SBLA loan.

The median rate on operating loans paid by non-SBLA borrowers is 125 basis points above prime. In finance theory and according to stated bank practice, the interest rates

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13 Internal memorandum, ESBO, Industry Canada, April 1994.

charged by lenders reflects the lenders' assessments of client riskiness. From Table 3-1, it is seen that among SBLA borrowers, 30.3 percent have been assessed an operating loan interest rate that reflects a ranking that lies in the *lower* half of rates assessed operating loan clients. Even though SBLA borrowers are, on average, smaller, younger, and have fewer assets etc., 30.3 percent of these firms do not seem to have been regarded by the lender as among the riskier firms. Likewise, in Table 3-2, 39.4 percent on SBLA borrowers paid lower than median (150 basis points above prime) rates on non-SBLA term loans from the same lender from whom an SBLA loan had been advanced.

Table 3-1
Distributions of Interest Rates on Operating Loans

Interest Rate Ranges Above Prime	SBLA Borrowers (%)	SBLA Borrowers (Cumulative %)	Non-SBLA Borrowers (%)	Non-SBLA Borrowers (Cumulative %)
0 to 0.25	1.6		7.4	
0.251 to 0.5	3.9	5.5	10.5	17.9
0.501 to 0.75	2.4	7.9	6.6	24.5
0.751 to 1.00	17.3	25.2	21.0	45.5
1.001 to 1.25	5.1	30.3	5.5	51.0
1.251 to 1.5	24.0	54.3	16.3	67.3
1.501 to 1.75	4.3	58.7	2.9	70.2
1.751 to 2.0	21.3	79.9	17.3	87.4
Greater than 2.0	20.0	100.	12.6	100.

*Source: 1994 Carleton University survey of bank loan files.

Table 3-2
Distributions of Interest Rates on Term Loans

Interest Rate Ranges Above Prime	SBLA Borrowers (%)	SBLA Borrowers (Cumulative %)	Non-SBLA Borrowers (%)	Non-SBLA Borrowers (Cumulative %)
0 to 0.25	1.8		2.5	
.251 to 0.5	0.0	1.8	4.0	6.5
.501 to 0.75	1.8	3.6	4.6	11.0
.751 to 1.00	12.5	16.1	17.2	28.2
1.001 to 1.125	5.4	21.5	4.3	32.5
1.126 to 1.5	17.9	39.4	19.9	52.5
1.501 to 1.75	8.9	48.3	4.3	56.7
1.751 to 2.0	31.3	79.6	24.8	81.6
Greater than 2.0	20.5	100	18.4	100

*Source: 1994 Carleton University survey of bank loan files.

These results indicate that from 30 to 40 percent of SBLA loans were to firms that are among the *least* risky in the lenders' portfolios. Perhaps as many borrowers again were assessed interest rates commensurate with rates that banks charge borrowers who do not used

the program. This finding speaks directly to the question of incrementality. Incrementality, however, is a multi-faceted concept. On the one hand, extension of loans to less risky SMEs is good news for the government: each firm pays a two percent fee but the likelihood of default is low. Moreover, lenders have been subject to considerable pressure to increase lending to SMEs. The SBLA provides an useful vehicle through which this goal may be accomplished. On the other hand, non-incremental loans are deadweight use up part of the limit on the portfolio of guarantees available under the terms of the SBLA.

A caveat to this measure of incrementality is that it views the incremental borrower as one that is incrementally *riskier*. It needs to be recalled that the program objectives relate primarily to size, not to risk and incrementality ought ideally be viewed on the domain of size. However, the result is not very different. Of the SBLA loans outstanding in 1994, an estimated 36 percent were to firms that had been in business for less than three years. This compares with 12.5 percent of non-SBLA terms loans outstanding at the same time. An indication that by this measure, approximately one quarter of SBLA were incremental. Fifty-three percent of SBLA term loans were made to firms with sales of less than $500 thousand, compared to 45 percent of non-SBLA term loans.

The Canadian experience with respect to incrementality is not unique. According to Pletcher and Tootelion (1989), the extent of incrementality of the SBA program is estimated to be about one-third.[14] Pieda (1989) estimate a 68 percent level of incrementality for the UK LGS. Such estimates are inherently ball-park in nature in that it is heroic to attempt to measure what would have happened in the absence of the guarantee program.

With the high take-up rate, increased absolute dollar costs should be expected in the future: additional loan losses due to defaults, and higher costs of program administration due to the volume of program-related responsibilities. Estimation of these costs is not straightforward.

3.4 Default Rates

Default rates of SBLA loans were analyzed by Goss Gilroy Inc. (1994) using an event history analysis approach. According to the Gilroy findings, the long term mean default rates on SBLA loans ranges from 4.8 to 6.7 percent. Between 1970 and 1991, $8.1 billion of loans under the SBLA resulted in losses of $307 million, a 3.8 percent loss rate. These estimates are not inconsistent. The Goss Gilroy Ltd. estimates represent the number of loans that default. Most defaults occur during the third and fourth year of the term of the loan. (Figure 2-2 illustrates the chronology of defaults and plots the proportion of defaulted loans that occur

[14] Pletcher, D. D., and D. H. Tootelion, (1989) "SBA Loans Recipients Societal Benefits - A Comparison with National Averages", Working Paper, School of Business Administration, California State University, Sacramento as noted in Pieda (1989).

in each year of the term.) Therefore, dollar value losses as a proportion of dollar loan volume are likely to be less than the proportion of loans that default.

These findings are instructive. It will be seen that the default rates are, on an international scale, extremely low for a loan guarantee program. It will also be seen that the agency relationship between the government and the private sector program delivery agents necessarily implies a somewhat higher default rate than the lenders would accept in the absence of a loan guarantee program. However, of prime importance is the observation that very few defaults occur within the first two years; less than ten percent of defaults occur within this period. This is strong evidence to the effect that lenders have been appropriately screening loan applicants for risk. In the absence of such screening, high *initial* default rates would be expected. It will be seen that the experience of US and UK loan guarantee programs is quite different in this respect.

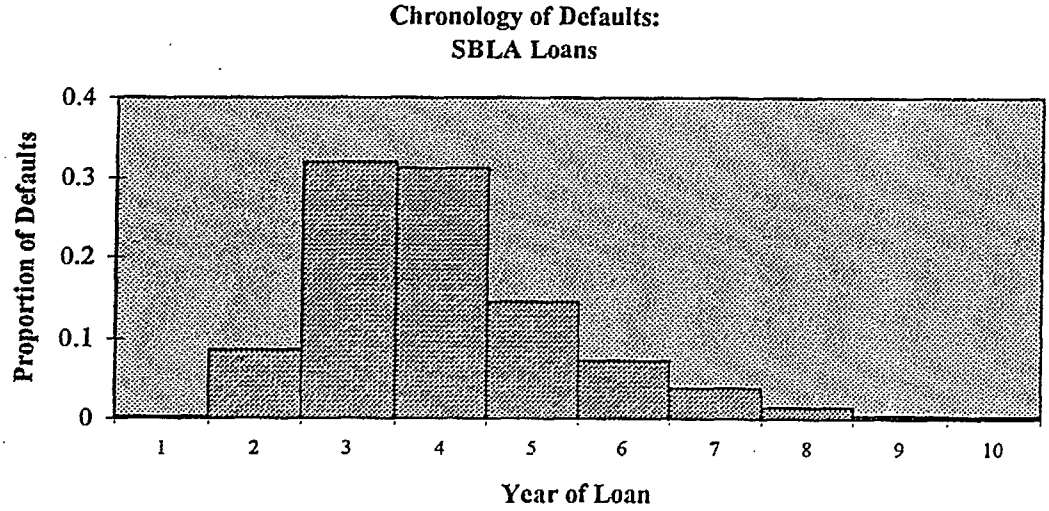

Chart 3-2

3.5 Issues in the Design of the SBLA: Fees, Default Rates, and the Guarantee Level

The single objective of the SBLA is to facilitate access to capital for small firms. In the face of government budget deficits, it would be desirable that this objective is accomplished with no fiscal impact on government. The primary source of income for a fiscally self-sufficient SBLA is fee income. Thus, the objective is to ensure that fee income covers the costs of default and administration.[15] A small amount of income obtains from recoveries of defaulted loans;[16]

[15] For the SBLA, the annual operating budget in 1994 was of the order of $1.3 million. This compares rather favourably with the annual budget of the US SBA loan guarantee program which, in 1984, was $68.5 million. Both programs

however, for the SBLA, the cost of administration is approximately offset by the income from recoveries. Hence, to a very close approximation, fees must cover defaults: Mathematically, this is expressed as:

$$f=\omega g \tag{3.1}$$

where f is the fee income, expressed as a percentage of the loan principal;

g is the level of the guarantee, set by the guarantor;

ω is the rate of default in the portfolio of guaranteed loans.

For the program to be delivered by the lending institution delivery agents, the lenders must have incentives to do so. Among potential incentives are reductions in administration costs for the lenders (reduce costs of due diligence and monitoring given the presence of the guarantee), customer development, and the guaranteed loans' contribution to profits. Clearly, it is not in the interests of the guarantor to set the guarantee level so high that banks fail to carry out adequate due diligence and monitoring. Thus, the task is to set the level of the guarantee such that the profit to lenders is equivalent (after allowing for defaults and recoveries) to the profits from non-guaranteed loans to SMEs.

Lenders' incomes have two components: the receipt of the amortized principal and interest from loans that do not default; the value of collateral realized from firms that do default. Their costs arise from the internal cost of the invested capital and the variable and fixed costs of due diligence and monitoring. These components can be expressed mathematically as profits to lenders. For non-guaranteed loans to SMEs lender's profits may be expressed as:

$$(1-\delta)\alpha K + \delta\beta cK - vK - F \tag{3.2}$$

where: δ is the relative frequency of defaults in the portfolio of unguaranteed loans;

α is one plus the spread between the interest rate and the lender's cost of funds;

β is the proportion of the value of collateral that the lender can realize in the event of default;

c is the ratio of collateral to loan;

K s the amount of the loan; and

v, F are the variable and fixed costs, respectively, of due diligence and monitoring.

administer a comparable quantity of guaranteed lending. For 1991, recoveries from the defaulted SBLA loans were $1.7 million, more than offsetting administration expenses.

16 Recoveries of prior years' claims from 1970 through 1991 amounted to $7.5 million on loans of $8.1 billion and claims of $307 million over the same period (SBLA, 1991, Tables 1 and 3, pp.13 and 15).

In the presence of a loan guarantee, the level of defaults in the portfolio may change. If the relative frequency of defaults in the portfolio of guaranteed loans is given now by ω, lender's profit function is given by:

$$(1-\omega)\alpha K + \omega g K + \omega \beta c K - vK - F \tag{3.3}$$

The proceeds of the guarantee replace the realized value of collateral in the event of default, *ceteris paribus*. Since the program objective remains to facilitate capital for small firms (and not to subsidize risky firms) differential risk is not an issue except to the extent that lenders adjust the quality of their portfolio to retain profitability. Equating (3.2) with (3.3) yields the following relationship between default rates {δ and ω) and the level of the guarantee:

$$\omega = \frac{\alpha - \beta c}{\alpha - \beta c - g}\delta \tag{3.4}$$

This result shows that the frequency of defaults in the portfolio of guaranteed loans is extremely sensitive to the level of guarantee set by the guarantor body. Recourse to Canadian experience allows this generic expression to be simplified. First, as shown in Tables 3-1 and 3-2, interest rates on loans to SMEs rarely exceed prime rate plus three percent. Moreover, the rates to SBLA and non-SBLA borrowers are not significantly different from each other. Hence, one plus the spread on loans to SMEs (α) is of the order of 1.02 to 1.05. Second, , recall that recoveries under the SBLA between 1970 and 1991 totaled $7.5 million on claims of $307 million, this implies $\beta c \cong 0.024$. As a good approximation, then, (3.4) may be rewritten:

$$\omega \approx \frac{1}{1-g}\delta \tag{3.4a}$$

This expression may be used to predict the default rate as a function of the loan guarantee. In Canada, bank lenders target a maximum bad debt loss (δ) of less than one percent; typically 0.6-0.8 percent and the level of SBLA guarantee is 85 percent. Based on these data, (3.4a) predicts loan losses at the rate of 4.0 to 5.3 percent, estimates that are highly consistent with the Canadian experience. Note also that in 1993 the level of guarantee was temporarily raised from 85% to 90%. Based on (3.4a), this change would lead to an increase in the default rate in the SBLA portfolio of 50 percent.[17]

The sensitivity of the default rate to the level of guarantee is underscored by expressing the rate of change of the default rate with respect to the level of guarantee mathematically:

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17 The 5.5% default rate implied from (4) is consistent with actual default experience of the SBLA (Goss Gilroy Associates, 1994). A further increase in the level of guarantee to 95 percent (as for the US SBA program during the 1980's) implies a default rate of 11.5 percent. According to Rhyne (1988) actual default experience in the US was between 17 and 25 percent.

$$\frac{\partial \omega}{\partial g} = -(1-g)^{-2}\delta \tag{3.5}$$

Substitution of (3.4a) into (3.1) and optimizing for the level of guarantee suggests that the optimum level of guarantee is 50 percent. Higher levels of guarantee imply both higher default rates, the concomitant need for higher fee income, and greater bank profits from their portfolios of guaranteed loans. To set the level of guarantee too low, however, removes incentive from the delivery agent lenders to deliver the program. Accordingly, a level of guarantee of the order of 70 to 80 percent is indicated. Table 3-3 lists the implied default rates and fee rates, based on a bad debt loss on non-guaranteed loans of 0.7 percent and (4) and (1), respectively, for a range of guarantee levels.

Table 3-3
Simulated Default Rates and Fee Requirements by Level of Guarantee

Level of Guarantee (g)	Implicit Default Rate (%) (ω)	Implicit Fee Requirement (f)
.50	1.40	0.70
.55	1.56	0.86
.60	1.75	1.05
.65	2.00	1.30
.70	2.33	1.63
.75	2.80	2.10
.80	3.50	2.80
.85	4.67	3.97
.90	7.00	6.30
.95	14.00	13.30

In general, the higher the level of the guarantee, the greater the proportion of poor quality loans that lenders can tolerate in their portfolio. On the other hand, if the guarantee is too low, lenders lose incentive to deliver the program. For the current Canadian situation, it seems likely that bank lenders may earn more from their portfolio of guaranteed loans than from their portfolio of non-guaranteed loans to SMEs.

It is instructive to examine the experience of loan guarantee programs in other countries to further investigate how their experiences are affected by the parameters of the relationship.

4. SMALL BUSINESS LOAN GUARANTEE PROGRAMS: AN INTERNATIONAL PERSPECTIVE

4.1 THE US SMALL BUSINESS ADMINISTRATION [SBA] LOAN GUARANTEE PROGRAM

The SBA was created in 1953 to make direct loans, loans in partnership with banks, and to provide loan guarantees. The premise of the SBA was that banks were too risk averse to lend to small firms, yet that there were plenty of "good" small businesses that were worthy of credit. At its inception, it was intended that the SBA would not compete with bank lenders. Accordingly, over time, the SBA has moved away from direct lending towards loan guarantees.[18] Such guarantees were intended for borrowers who, because of their small size, did not meet bank credit standards.

Historically, a borrower seeking a loan that a lender was unwilling to provide could apply, through the lender, to the SBA for a guarantee. The application was reviewed by SBA staff and, if approved, a guarantee of up to 90 percent of loans up to $155,000 could be advanced. The guarantee could be triggered when the borrower was 60 days in arrears of monthly amortization requirements. Then, on demand from the lender, the SBA purchases the outstanding principal and interest under the terms of the guarantee. The SBA then becomes responsible for further collection.

To be eligible, the borrower must be a small business (the definition of which varies by industry) and the lender must have certified that the business would not have qualified for credit without the guarantee but that the likelihood of repayment is sound. The loan must be secured to the extent that tangible assets are available and the Chief Executive's personal guarantee is required. Personal assets of owners may also be required as collateral. Interest rates are negotiated between borrower and lender subject to the SBA maxima of 2.75 percent above prime for maturities of seven years or more and 2.25 percent over prime for shorter maturities.

Recently, the SBA has moved away from approval of all loan applications to place more responsibility on the lenders. The SBA identifies several categories of SBA lenders. Approximately two-thirds of US banks act as lenders under the SBA program, yet there is considerable variation in the extent to which various lenders actually participate. Rhyne (1988) identifies four categories of SBA lenders:

1. *Nonusers.* These tend to be small, rural, conservative institutions with low loan to equity ratios. They constitute approximately 28 percent of bank lenders.

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[18] Rhyne (1988) reports that in 1986 the SBA had $160 million in direct loans outstanding and $2.8 billion in loan guarantees extended.

2. *Infrequent users.* These are defined to include those banks that carry fewer than 10 SBA loans. Making up 54 percent of the SBA lender population, infrequent users extend about one-third of SBA loan guarantees, usually on an ad-hoc basis.

3. *Active Users.* Active users are defined to be those that carry more than 10 SBA loans but that the SBA portfolio comprises less than 20 percent of their commercial and industrial lending. This includes large and moderately-sized banks and these banks tend to have devoted staff departments to SBA.

4. *Intensive Users* are banks with more than 10 SBA loans that comprise more than 20 percent of their commercial lending. This category accounts for only five percent of all banks. These lenders are usually small but with relatively large lending portfolios. They tend to be highly leveraged and aggressive, often using SBA loans to promote the growth of the bank.

In 1982, the SBA established its *Preferred Lender* Program.. *Preferred Lenders* were banks that were accorded the ability to authorize SBA loans without prior SBA approval. Lenders qualify for this status through their track records of SBA lending. The intention of the Preferred Lender program was to increase the level of SBA guarantees. An additional benefit is the attendant reduction in SBA staff costs. The level of guarantee, however, is only 75 percent of the loan, compared with the then 90 percent of traditional SBA loan guarantees.

The SBA's experience with the preferred lender program has been sufficiently good that the SBA has continued to move in this direction. The program has put more SBA loans into the hands of lenders that are committed to the SBA program, has reduced costs both to lenders and the SBA, has approached the true market-perfecting aim of the loan guarantee scheme, and has reduced default rates. As noted by Rhyne (1988), the raw purchase rate of defaulted loans under the preferred lender program was 2.6 percent, a rate that compares with the 14 percent for non-certified lenders.[19]

The average size of SBA-backed loans is considerably high than that of Canadian SBLA-guaranteed loans. In 1982 the average SBA loan was $109,000 and by 1986 this had increased to $155,000. Both values exceed the average size of non-guaranteed commercial bank loans. Moreover, according to Rhyne's (1988) findings, SBA borrowers tend to have received larger loans than they might otherwise have obtained and for longer maturities.

As noted, the SBA has come under considerable praise, but has also been subject to intense criticism. Among the major causes of concern are the high costs of program administration and purchase of loans in default. The operating budget of the SBA is of the

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[19] However, it was also found that clients may already have been bankable under the preferred lender program. Accordingly, a fee of 2 percent was instituted in 1986.

order to $70 million per year (Rhyne, 1988) and estimates of long-run default rates range from 16.4 percent (SBA, 1983) and 23.5 percent (Rhyne, 1988). Both of these costs compare badly with those of the Canadian SBLA (administration cost of approximately $1.3 million per year with long-run default rates of the order of 4-6 percent).even though the level of outstanding loan guarantees does not differ materially between the Canadian SBLA and the SBA program.

4.2 THE UK DTI LOAN GUARANTEE SCHEME [LGS]

The LGS was introduced in 1981 following the recommendations of the Wilson Committee (1979) that "competition between banks ...was insufficiently ineffective to ensure that viable small businesses always had the necessary access to sufficient funds on reasonable terms".[20] While the Wilson Committee recognized the disproportionate public benefits stemming from the expansion of small firms, it is clear that the primary objective of the LGS is to remedy the market for small, *viable*, firms. This remediation is reflected in two aims:

- to facilitate the supply of debt capital to viable small businesses that are unable to obtain conventional loans due to lack of security; and,
- to provide lenders with experience lending to businesses that are viable but which do not satisfy traditional lending criteria.

The Department of Trade and Industry (DTI) restricts loan guarantees to firms that have tried and failed to obtain a loan. The scheme is a joint venture between the DTI and lenders. Lenders must satisfy themselves that they would have offered conventional loans but for the lack of collateral or track record and that all available personal assets have been used for conventional loans.

The small firm's application to a lender for credit initiates the process. In the event that the lender decides that the applicant has a viable business proposal but that there is insufficient security to justify the loan, they apply to the DTI. On acceptance, the DTI provides the lender with a guarantee for 85 percent of the total loan. In return for government backing, the borrower must pay the DTI an annual premium.[21] In addition, the lender may require a pledge of real assets as security and will usually take a fixed or floating charge on such assets. The security applies to the whole loan, and the borrower remains liable for the full debt. Lenders seek recovery, possibly through liquidation, in the event of default. The term of LGS loans may not exceed seven years.

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20 Wilson Committee, 1979, The Financing of Small Firms. Interim Report of the Committee to Review the Functioning of the Financial Institution, Cmnd 7503, London: HMSO.

21 As of June 1993, this premium was 2.5 percent per year on the guaranteed portion of the loan or 1.5 percent on the whole loan for variable rate loans.

Originally the loan guarantee was set at 80 percent and a three percent premium of the guaranteed amount was payable. Since then, the program has been altered on several occasions:

1982: Lenders may not use the LGS to reschedule debts;

1983: Borrowers must demonstrate a person stake in the success or failure of the firm;

1985: Borrowers must submit formal business plan as part of application process and submit quarterly accounts. LGS borrowers must have pledged all business and personal assets against conventional loans before a guarantee would be provided;

1993: Maximum loan size increased.

In addition, the size of the guarantee and the amount of the premium have also been varied, with significant impact on the take-up rate of the program. According to Cowling and Clay (1995), the loan guarantee was reduced to 70 percent from June 1984 through July 1993, when it was increased to 85 percent. The premium, originally 3 percent, was increase to five percent in June of 1984 and reduced to 2.5 percent in May of 1986. According to Cowling and Clay, these are the two primary determinants of the take-up rate.

The scheme differentiates between new and "established" businesses. "Established" businesses are defined as those that have been trading for two years or more. For established firms, the guarantee and the maximum loan size are higher. The loan guarantee may be obtained, up to the maximum amount only once by any one *individual*.

Fees are relatively high and represent annual payments to the guarantor, reducing the cost of the program by means of reducing default risk. To the extent that DTI approval is involved, the program is one that is not fully delivered by the private sector. Moreover, the program is somewhat restrictive and unwieldy and requires lenders to undertake the expense of the due diligence process. Nonetheless, the program has provided at least £1 billion in loans to more than 33,000 SMEs between 1981-1993.

The four major trading banks in the UK account for 80 percent of the LGS lending. Most LGS loans are extended to firms in the distribution, manufacturing, and service sectors. Unlike to Canadian SBLA proceeds of the loan can be used to finance working capital, an application that comprises approximately 40 percent of the cases. As noted by Pieda (1992, Appendix 5) defaults were more common among those firms that used the guarantee to finance working capital. This is a result to be expected: the use of long-term obligations to finance short-term assets contravenes long-standing financial wisdom.

As noted in Pieda (1992), the default rates of LGS loans is substantial. A long-run default rate of approximately 40 percent has been experienced for loans granted between June

1981 through March 1984, with the majority of defaults occurring within the first two years. Also according to Pieda, the UK Department of Employment reports that 30 percent of loans granted from October 1988 through September 1989 had defaulted within the first two years.[22]

4.2.1 DEFAULT RATES: THE US, THE UK, AND CANADA

Figure 4-1 charts the cumulative default rates for the Canadian SBLA, the US SBA program and the UK LGS for seven-year maturity loans.

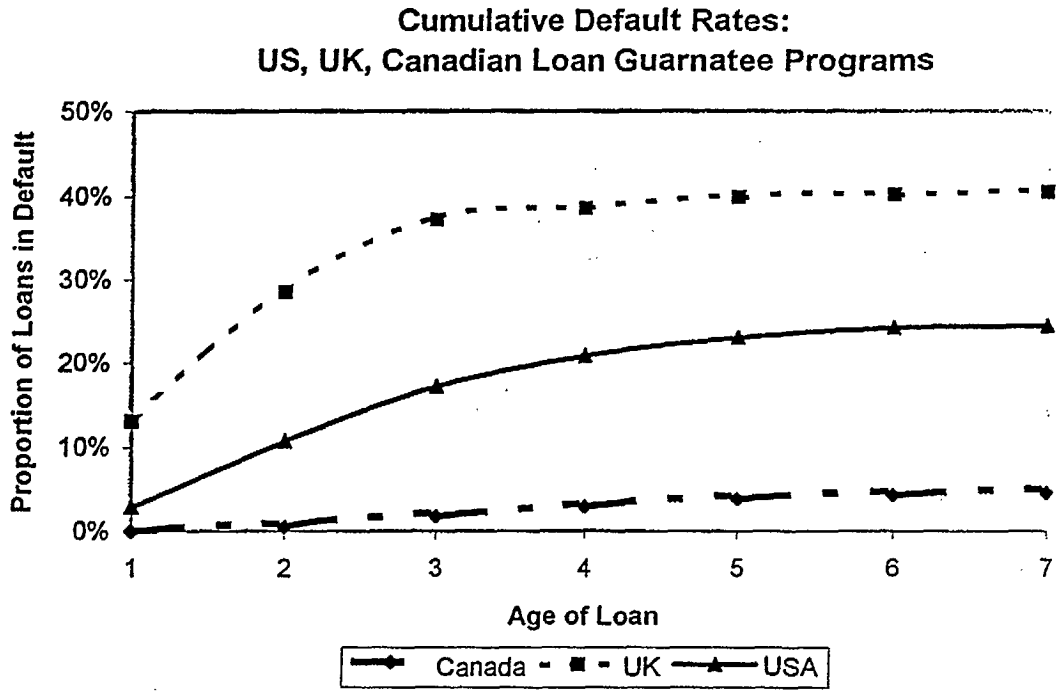

Chart 4-1

This chart is revealing in that the high default rates during the initial years of the UK, and to a lesser extent, the US approaches imply that loans have been advanced to non-viable businesses, in contravention of the explicit objectives of the two programs. Three differences in program design may be pertinent to this finding.

First, both the UK and US approaches have traditionally involved the guarantor in the loan approval step, at least in name. This is time-consuming, costly, and at variance with the idea that commercial lenders are best equipped to make credit decisions. In Canada, the

22 Pieda plc (1992). Evaluation of the Loan Guarantee Scheme, Reading, UK.

decision is left exclusively to the lender, relying to a greater extent on the expertise that the banking sector can contribute. Second, the level of guarantee has been seen to have a dramatic impact on default rates. For the period during which the default rates in the USA were measured, the level of the guarantee had been set at 90 percent. This implies (Table 2-3) somewhat higher default rates, although not to the extent seen above. Third, the level of fees can also affect the quality of borrower drawn to the program. If the fees are too high, good quality borrowers will not use the program and the cycle of market deterioration described by Akerlof, 1970) can result: that the only users of the program in the context of high fees would be poor credit risks. The analogy from life insurance is that when life insurance is extremely costly, the only customers would be those who are extremely ill.

4.3 Other Approaches to Loan Guarantee Systems

Most developed countries have schemes designed to facilitate SME financing. In the Netherlands and Germany, governments provide guarantees for all or part of business loans. Organizations external to government issue loan guarantees on behalf of the governments in Belgium, Luxembourg, Ireland, France, Portugal, and Greece. Loan guarantee associations are formed in Spain to guarantee loans for their members. The operating policies and details of the various programs differ considerably across jurisdictions. To illustrate the gamut of such programs, and also because they each display particularly interesting attributes, the loan guarantee programs of Japan and Germany are described presently.

4.3.1 Japan: The Credit Supplementation System

The Credit Supplementation System was founded in Japan in 1958. It comprises two levels of operation. The *Credit Guarantee Corporations* (CGCs, of which there were 52 in 1993) provide lenders with guarantees for their loans to SMEs. When a small firm applies for a loan, the prospective lender may ask the CGC to act as guarantor. If, after investigation, the CGC agrees, the lender extends credit to the business and the business pays a guarantee fee to the CGC. As a rule, the guarantee is then automatically insured by the second component of the Credit Supplementation System: the national *Credit Insurance Corporation* (CIC). The CGC pays an insurance premium to the CIC.

In the event of default, the CGC repays the remaining principal to the original lender. The CGC then applies to the CIC under the terms of the insurance and normally the CIC would pay the CGC 70-80 percent of the original capital. The CGC takes the remaining 20-30 percent as a loss, pending recoveries. The CGCs must make "the utmost efforts" to recover the outstanding debt directly from the business. From recoveries, 70-80 percent must be refunded to the CIC.

The CGCs obtain their capital from contributions by banks and local governments and they borrow their operating funds from local governments and the CIC. The CIC was initially endowed with a capital fund by the national government. Between 1987 through 1991 the

CIC's insurance payouts have been less than incomes received from insurance premia and recovered moneys. The 1992 recession resulted in a deficit.

This clearly meets the goal of enabling small firms to overcome financial disadvantages. It also removes from the lender much of the onus for due diligence and efforts towards recoveries. Moreover, the CIC's impact on the national budget is minimal: from 1987 through 1991 revenues from recoveries and fees exceeded insurance payouts by more than ¥325 billion (c. $Cdn 3.5 billion).

4.3.2 GERMANY: THE BURGSCHAFTSBANK[23]

The German credit guarantee system is one part of a system of support of SMEs in Germany. The system includes direct cash subsidies related to particular interest and research and development expenses and large direct lending programs. A system of loan guarantees has been established in Germany since 1954. The credit guarantee system is decentralized and bears a similarity to that of Japan in that a re-insurance step is involved and the guarantor body is self-financing.

Potential business borrowers (including professionals) approach their banks for credit. If they lack traditional security for the loan, they may apply for a loan guarantee to the Burgschaftsbank in their state ("lander"). (One Burgschaftsbank is to be established for each of the 16 lander of the united Germany.) The purpose of the Burgschaftsbank is to provide guarantees for SMEs so that trading banks can advance debt capital. The application entails a business plan and documentation of professional affiliations. The application is reviewed at several levels: the firm's original banker, the management of the Burgschaftsbank, and the Applications Committee of the Burgschaftsbank. This latter committee is comprised of industry representatives and is elected. The proposal must survive each level of appraisal. According to Licht, this appraisal process results in a lower take-up rate and low default rates.[24]

Borrowers must pay both an initial premium of one percent of the guaranteed portion of the loan as well as an annual fee of 0.5 to 1.0 percent of the outstanding debt. Loans can be for any amount, but the maximum guarantee is DM 1 million. Loans may not be used for refinancing. Interest rates are determined between the borrower and the original banker.

Originally endowed with capital raised from government and participating organizations, the Burgschaftsbanks act as the initial guarantors of loans. If the Burgschaftsbank approves the application, it issues a guarantee for up to 80 percent of the

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23 This section is based on Pieda (1992, Annex A), Economic Incentives in Germany's New Federal States (Federal Ministry of Economics, Germany, 1994), and interviews with Prof. B. Harrison, Associate Professor of Economics, Humboldt University, L. Neu, Manager of Corporate Relations, Deutsche Handelsbank, and Dr. Peter Wieczorek, Bundesministerium für Wirtschaft.

24 Dr. Georg Licht, Zentrum für Europäische, Mannheim, Germany, Personal Interview, Sept 13, 1995.

funds. In turn, the Burgschaftsbank receives reinsurance of 60 percent of the loan from the state and federal governments and a further 12.5 percent guarantee from the European Recovery Program. The Burgschaftsbanks appears to operate autonomously and are financially self-sufficient. Their sources of income include the initial guarantee fees, annual fees, and interest on invested capital.

The long-run default rate does not appear to be public information. However, defaults in 1990 amounted to about 4 percent of the guarantees extended that year (Licht, personal interview).

4.4 SUMMARY

The fact that most of Canada's primary international competitors use loan guarantee programs is a compelling reason that Canada's SMEs also require this form of support. Loan guarantee systems that boast high rates of default, such as those in the UK and the US, are essentially government-based subsidies for risky firms - not merely means of remedying a flaw in the credit market. Such a subsidy potentially places Canadian SMEs in a vulnerable position.

It is seen that the Canadian SBLA scheme has much to recommend it. Among its attractive features are its extraordinarily low administrative cost and the low costs associated with honoring guarantees. Administration costs and the costs of default associated with any of the other national approaches are many times greater that those of the SBLA. Moreover, the UK and German schemes are seen to be considerably more expensive for borrowers, who must pay fees annually. The German and Japanese experience, however, demonstrate that loan guarantees can be provided by a financially self-sufficient intermediary.

Whether or not the programs accomplish their primary objective (remediation of the credit markets for small firms), they do appear to provide societal benefits. In general, the programs provide indirect benefits to governments in the form of tax payments, reductions of welfare payments, etc. Mandel (1992) notes that evidence to the US House of Representatives suggest an internal rate of return of the order of 26 percent on the government's investment in SBA guaranteed loans when these corollary benefits are accounted for. These estimates, however, lack the rigor that would be achieved if proper longitudinal tests of social welfare benefits were to be conducted.

There are other attributes of foreign approaches that may be of benefit. The UK distinction between 'established' and 'un-established' firms may be useful in terms of program design. The UK rule that an individual may avail himself or herself of a guarantee only once might be a useful means of combating mis-use of the program.

At the heart of all programs is the agent-principal relationship between the government guarantor and the lenders. The relationship requires careful nurturing and adjustment if the program objectives are to be fulfilled and if costs to the public are to be minimized, or even eliminated. The next chapter turns to these issues. To do so requires a clear understanding of the objectives of the program.

5. SUMMARY, IMPLICATIONS, AND FUTURE RESEARCH

This paper reported on an analysis of several issues that pertain to programs that provide loan guarantees to small firms. The development and experience of the Canadian Small Business Loan Act was reviewed from which issues of program design were identified. Three issues, in particular were considered: economic impact, incrementality, and defaults. Together, these issues all pertain to program effectiveness.

First, it was noted that the primary, indeed, virtually exclusive, objective of the loan guarantee programs of all countries are to ease access to debt capital for small businesses: that is, to redress a perceived flaw in the credit market, to "level the playing field". While economic benefits arising from this intervention are clearly desirable, no satisfactory assessment of such benefits has been carried out. In this regard, it was found that the agency relationship between guarantor and the lender-delivery agents dictate a default rate that is necessarily higher than that in lenders' portfolios of non-guaranteed loans. This implies a necessary subsidy, both to the lender-delivery agents and to the riskier firms that obtain loan guarantees. Because of the absence of rigorous longitudinal evaluation, the extent to which the economic benefits compensate for the subsidy remains unknown.

It was also found that there seemed to be considerable deadweight in the program. This lack of incrementality was occasioned by two factors: the low fees and the high level of the guarantee. As shown empirically by Cowling and Clay (1995), these factors are the two primary determinants of the take-up rate of the program. Driven, also, perhaps by lenders' ability to make greater profits on guaranteed than on non-guaranteed loans, the take-up rate of the SBLA soared during 1994 when fees were two percent of the loan and the level of the guarantee was 90 percent. In the context of loan guarantees, as in the context of insurance, deadweight is not necessarily a problem. The fees paid by the (majority of) firms that will not default provide partial or even complete offset to the liabilities resulting from the defaults of the (minority) of firms.

As shown by Cowling and Clay, the fee level affects take up rates. However, a balance is necessary. On the one hand, higher fees are necessary to provide sufficient funds to honor losses from defaults. Conversely, if fees are excessive a vicious cycle can be established. As noted by Akerlof (1970) and Stiglitz and Weiss (1981) high cost loans drive good credit risks from the market: only poor quality firms would be willing to pay high costs. By analogy, high cost insurance is attractive only to ill people. Likewise, high loan insurance is only attractive to high-risk SMEs. It is highly likely that the high fees associated with the Loan Guarantee Scheme in the UK have created "a market for lemons" and contribute to the 35-45 percent default rates.

Default rates associated with the Canadian SBLA are of the order of four to six percent, much of which is compensated from fee income. By international standards, this was seen to be extremely low. Relative to other approaches, then, the Canadian approach to loan guarantees has much to recommend it. Agency theory was applied to show that the level of

defaults is extremely sensitive to default rates. The agency relationship predicted default rates for the SBLA that were highly consistent with experience. According to the agency theory relationship, the temporary increase in the guarantee level from 85 to 90 percent in 1994 could lead to a material increase in the level of defaults. This is because the higher level of guarantees allows lenders to tolerate a higher proportion of defaults in their portfolios without reduction of profits.

The agency relationship is such that the guarantor controls the level of the guarantee and the level of fees. The delivery agent lenders control the quality of the loan portfolio. This separation of responsibilities makes sense. The alternatives are to abolish the scheme or for the guarantor to become heavily involved in operational decisions. It was found that economic theory implies a strong case for continued government involvement because normal operation of the credit markets implies disproportionate difficulty for firms that are seeking small amounts of loans. On the other hand, well-trained loan account managers are far better qualified and able to make lending assessments than civil servants. The alternative of closer government involvement does not solve the essential problem and merely raises the administrative costs of program delivery.

The central task of the guarantor, then, is to set the level of the guarantee sufficiently high that lenders have (economic) incentive to deliver the program yet not so high that lenders lose incentive to discriminate on the basis of borrower quality. The level of the guarantee and the fee level need to be established in conjunction with each other. The guarantee rate implies the default rate and thereby the loan loss rate. The level of fees must offset the loan losses yet remain low enough that poor quality risks do not drive out the high quality borrowers whose success subsides the failures.

It was found that the parameters of loan guarantee program in other countries studied (Japan, Germany, the UK, the US) have not been set to provide the program efficiency of the Canadian SBLA. Historically, the US SBA program has experienced default rates in the order of 20 percent. Moreover, the operating budget of the SBA program was found to be far higher than that for the SBLA even though the absolute levels of activity of both programs are comparable. In part, the higher default rate in the US could be attributed to a guarantee level of 90 percent. During the past few years, the SBA has been evolving towards lower levels of guarantee and more passive government involvement. It seems highly likely that these steps will result in better quality portfolios and lower costs of administration. The early experience with this change in strategy has been encouraging (Rhyne, 1988) and Mandel (1992).

The Loan Guarantee Scheme [LGS] in the UK was seen to be in need of extensive revision., with guarantee levels comparable with those of the SBLA, default rates remain of the order of 40 percent. This level of default was the highest of all countries examined. In part, this is attributable to the very high fees. However, the guarantor body appears to be in a dilemma: defaults are so high that high fees incomes are necessary to honor the losses; in turn, the high fees continue to attract poor credit risks and discourage high quality borrowers. It was also seen that a high proportion of defaults occur within two years of the original loan.

The does not speak well of the process being used to screen applicants. In short, the relatively few good risks are being asked to subside the relatively many poor risks.

Nonetheless, there are some attractive features of the LGS. The distinction between established and new firms is useful. The scheme also contains provisions for targeting loan guarantees according to particular government priorities.

The governments of Germany and Japan have taken a somewhat different approach to the provision of loan guarantees. Both have, in effect, privatized the scheme. In Japan, a one-off funding of the Credit Insurance Corporation has provided for a re-insurance process. In Germany, the role of the Burgschaftsbanks and their re-insurance from *lander*, federal government, and the European Recovery Commission provide for a similar operation. While the default rates in Germany are very low, it also seems that the extensive and demanding selection process may defeat widespread program delivery.

It was also found that while economic theory provides theories of the response of lenders to risk (the literature of credit rationing), little seems to have been published regarding the response of lenders to size. This is important because the objectives of loan guarantee programs is to respond to the perception that *small* firms, not so much *risky* firms, suffer disproportionate access to credit. While it may be true that, on average, smaller firms are more risky, at any level of size, however, there is a distribution of firms according to risk. It remains the role of lenders to discriminate according to risk. This paper outlined a theoretical analysis of the responses of profit-maximizing lenders to size, given risk.

This investigation revealed that lenders do demand disproportionately more collateral from firms seeking smaller loans. To the extent that such firms are unable to provide the requisite security, their access to capital would be restricted. This disproportionate demand for collateral is not temporary: it is a normal result of the operation of the credit market. The presence of a loan guarantee, however, mitigated the lenders' collateral demand, thereby expanding access to capital for small firms. The need for ongoing loan guarantees targeted to SMEs is implied.

Given the need for ongoing intervention, the issue returns to that of program design. Analytically, the optimal level of guarantee is a fifty-fifty risk sharing between guarantor and lender. This implies both low fees and the need for lenders to exercise full due diligence. The fifty-fifty risk sharing arrangement, however, is based on several simplifying assumptions, including negligible recoveries by lenders from non-guaranteed loans. In practice, a level of guarantee of 70 to 80 percent is likely to be more effective. In turn, this level of guarantee implies fees of two to three percent and default rates of less than four percent. Under such conditions, the following are likely outcomes:

1. the level of fees are low enough and the rate of guarantee sufficiently high that owners of SMEs would find the terms of the guarantee attractive;
2. delivery agent lenders would have economic incentive to deliver the scheme broadly; to manage carefully the quality of the portfolio; and, to carry out sufficient due diligence to control defaults;

3. income from fees would at least offset the contingent liabilities the guarantees; and,
4. fees would be sufficiently low that good credit risks would not abandon the market to risky firms, yet the level of guarantee, being lower, would reduce deadweight.

Loan guarantee programs form the cornerstone of small business finance support for many of Canada's most important international competitors. Currently, the SBLA provides Canada with competitive advantage through several attractive attributes:

1. the ease of access attendant on passive government involvement;
2. extraordinarily low, internationally, administration costs;
3. reasonable default rates when compared with international competition;
4. fees that do not discourage good quality firms from seeking guarantees.

If further revisions to the program attributes are to be contemplated, these should take the form of small reductions in the level of guarantee and fee levels. Before doing so, econometric analysis of the determinants of take-ups rates, in the manner that Cowling and Clay (1995) conducted for the UK LGS, should be undertaken.

It has been demonstrated here that program delivery implies economic incentive to lenders and a small degree of subsidization of the riskier firms in the portfolio. Existing attempts to measure the economic benefits that attend this subsidy have not been convincing. A rigorous longitudinal analysis of the social welfare benefits accruing to firms that have received loan guarantees must be undertaken. Such a study ought necessarily compare these benefits with those from a control group of firms that did not avail themselves of loan guarantees. Without such an analysis a fully-informed decision about program continuance cannot be taken.

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