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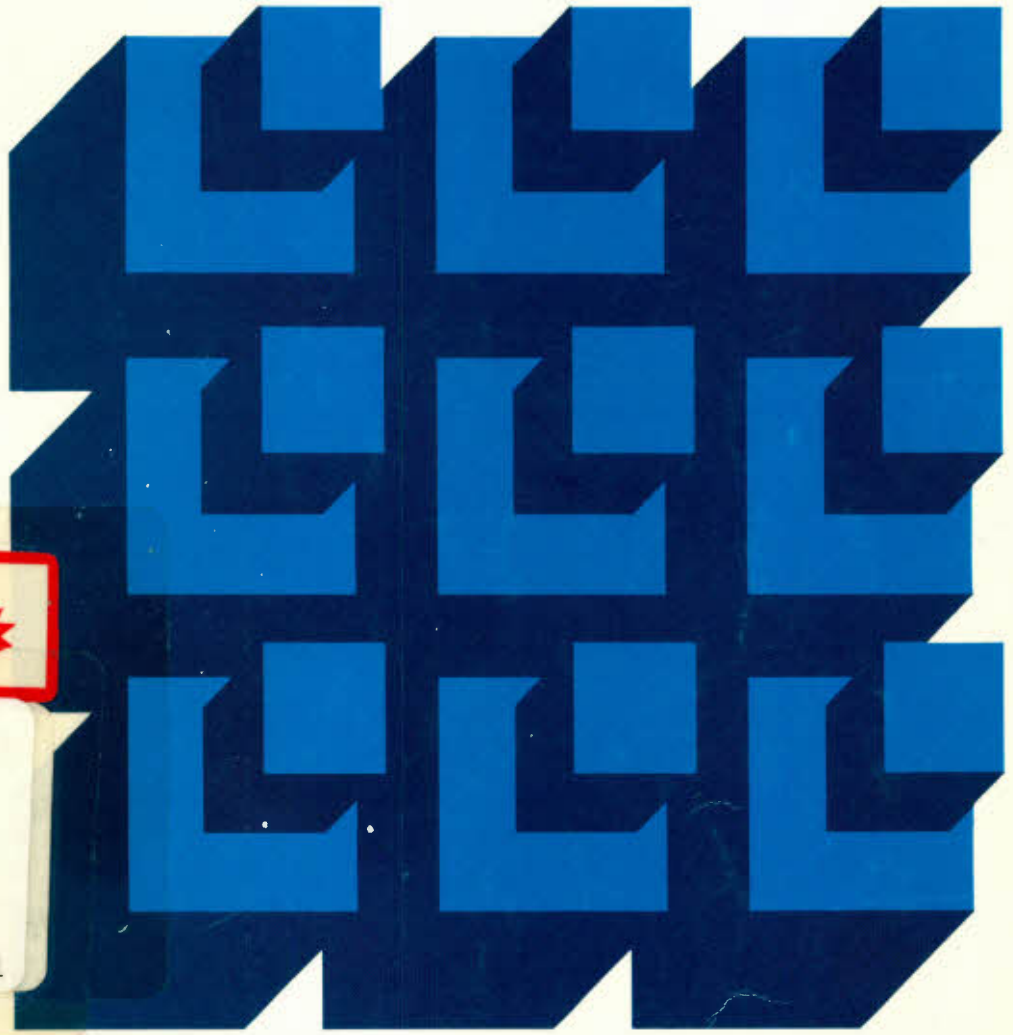

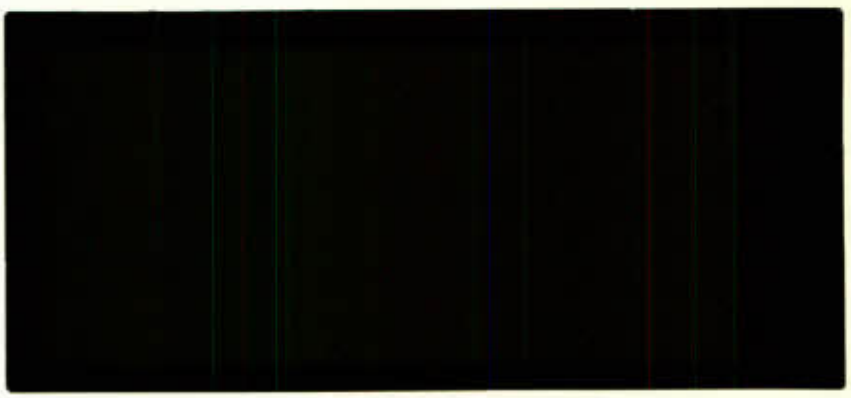

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DISCUSSION PAPER NO. 318

Taxes and Indebtedness of Canadian Corporations

by

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and Josée St-Pierre

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RÉSUMÉ

La présente étude est composée de trois chapitres.

Le premier analyse le comportement de AAF un indicateur de l'incitation fiscale à s'endetter personnellement plutôt que par l'intermédiaire d'une entreprise dont on est actionnaire. On observe que cet indicateur capture les caractéristiques principales des lois fiscales canadiennes ainsi que les changements qui y ont été apportés. Par conséquent, on l'utilise dans le second texte, qui porte sur les structures financières. Une meilleure connaissance des effets de la réforme fiscale de 1972 constitue un sous-produit des simulations conduites ici. On constate que seules les queues des distributions de fréquence des ratios des dividendes aux profits ont été modifiées après 1972. Cet ajustement a pu résulter de la réduction de l'écart entre les taux d'imposition auxquels sont assujettis les dividendes et les gains en capital.

Le second chapitre présente une analyse statistique des coefficients d'endettement de quelques grandes sociétés canadiennes. Aucune des variables qui représentent la fiscalité n'est statistiquement significative. Cette observation suggère que l'impôt sur le revenu ne joue, dans les choix de structure financière, qu'un rôle indirect lié à son impact sur les flux monétaires. Il est donc possible que l'importance des distorsions attribuables à l'impôt sur le revenu ait été exagérée et que la complexité de nos lois et règlements fiscaux ne soit pas justifiée.

Le troisième chapitre -- qu'on peut lire en premier -- résume les enseignements de la recherche présentée ici et de quelques autres aux fins de la politique fiscale. On n'a pu déceler les effets sur les structures financières et les taux de rendement des titres de la subvention fiscale accordée au financement par emprunt et de l'écart entre les taux d'impôt qui frappent les dividendes et les gains en capital. Il y a donc lieu de s'interroger sur leur importance.

SUMMARY

The present study is made up of three chapters.

The first one describes an experiment with TAP, an indicator of the tax incentive to borrow on personal as opposed to corporate account. It is shown that this indicator does reflect the main characteristics and changes of the Canadian tax laws. Therefore, it is used in the statistical analysis of debt-to-assets ratios presented in the second paper. As a by-product of the simulations conducted in this paper, it is found that only the tails of the frequency distributions of the payout ratios were modified after the Tax Reform of 1972. This may be a consequence of a reduction in the spread between income taxes on dividends and capital gains.

The second chapter presents a statistical analysis of the debt-to-assets ratios of some large Canadian corporations. None of the proxies for the tax factors is statistically significant. This result suggests that income taxes have only an indirect effect on capital structure decisions, through their impact on cash flows. Therefore, distortions attributed to income taxes may have been overestimated and complexity in the tax laws serves no useful purpose.

The third chapter -- which may be read first -- summarizes the implications of the present and other research for tax policy. It suggests that the deductibility of interest expense by corporations and the differential taxation of dividends and capital gains have had no discernible impact on financial structures and rates of return realized on the stock exchanges. One wonders about their importance.

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FOREWORD

This paper is one of the outputs from Council's three year study of the taxation of capital income -- or of the income derived from savings and investment. The study program had important dimensions in both time and space. The effects of capital taxation on both present and future output and standards of living were scrutinized. Taxes levied by all levels of Canadian government were studied as were the international implications of the taxation of capital income. Another important emphasis in the study program was on the interrelationship among specific measures of capital taxation. Here, general equilibrium and other techniques were used to examine the various measures as an interrelated system. Separate studies were also undertaken of specific measures of capital taxation including the personal and corporate income taxes, sales and transaction taxes, property taxes, and resource taxes.

An important characteristic of the income tax is its differential treatment of income from debt- and equity-financed capital. The latter is taxed both in the hands of corporations and again when distributed to shareholders.

Dividend tax credits and partial exclusion of capital gains from taxable income provide relief from this double taxation. Even so, it is possible that taxation discourages the equity-finance and is responsible for part of the debt-burden of Canadian business. The present study is one of two commissioned to investigate the difficult empirical relationship between taxes and indebtedness.

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Judith Maxwell
Chairman

CHAPTER 1

TAX INCENTIVES TO BORROW:

SOME NUMERICAL RESULTS

INTRODUCTION

An earlier study (Gagnon-Suret, 1985) studied the impact of the Canadian tax structure on corporate financing. In particular, the problem posed by the distribution of debt between personal and corporate accounts was addressed. For this purpose, the concept of the "tax advantage of personal debt" (TAP) was introduced: the higher the algebraic value of this indicator, the greater the incentive to a shareholder to take on personal debt rather than to borrow through the company he owns.

This chapter has two objectives. First, it seeks to find out how sensitive TAP is to actually observed changes in tax parameters and financial policies. If such changes are captured by the indicator, then it may be possible to use it in further empirical work. Second, the chapter should also provide an assessment of the nature and effects of the Tax Reform of 1972.

The first part of the chapter will review the concept of tax advantage of personal debt and will discuss the various parameters required for its estimation. The second one will examine the results of simulations aimed at computing TAP for different groups of corporations at various points in time. By examining the resulting frequency distributions, it will be discovered that there are significant differences between groups and that the impact of the Tax Reform of 1972 is evident. Part three will study the role of dividend policies in fluctuations of TAP. Part

four will present several hypotheses regarding corporate debt policies, based on the study of frequency distributions of TAP. It will be concluded that empirical testing of these hypotheses fails to establish a direct relationship between TAP and debt levels.

Thus this chapter casts doubt on the existence of a direct link between the structure of corporate taxation and corporate borrowing decisions.

1 TAX ADVANTAGE OF PERSONAL DEBT (TAP)

1.1 The Model and its Parameters

Let us assume the following:

1 The corporation's taxable income (before interest) is such that any additional interest on borrowed capital results in a tax saving at rate T_c;

2 The stockholder's income is such that any amount borrowed in order to invest in the corporation will reduce his personal taxable income by the amount of interest paid on debt;

3 The stockholder has already decided on the level of consolidated debt (i.e., personal plus corporate debt) that he would prefer to attain.

Given these assumptions, it can be shown that the tax advantage of personal debt, TAP, is a measure of the incentive per dollar of interest to borrow on personal rather than on corporate account.[1] In algebraic terms, this is expressed as follows:

$$TAP = \frac{PR_p - PR_c}{r_c D} = (1-T_c)\,[d\,(1-((1-\Phi)(\gamma T_p-\alpha))) + (1-d)(1-LT_p)] - \varepsilon(1-T_p) \qquad (1)$$

Where:

PR_p = stockholder's income when he or she borrows on personal account;

PR_c = stockholder's income when debts are assumed by the corporation;

r_c = interest rate on corporate debt;

r_p = interest rate on personal debt;

D = amount of debt;

T_c = corporation's marginal tax rate relevant to borrowing decisions;

d = payout ratio (i.e., ratio of dividend to profit available to common shareholders);

$\varepsilon = r_c/r_p$ or ratio of corporate to personal interest rate;

ϕ = depletion allowance rate for dividends from corporations in the natural resources sector;

α = tax credit for dividends from taxable Canadian corporations;

γ = gross-up factor for dividends from taxable Canadian corporations;

T_p = marginal tax rate on stockholder's income;

L = proportion of capital gains subject to income tax.

Tax parameters, which are under government control, affect both federal and provincial taxes. As shown in Table 1-1, the actual parameter values can vary from budget to budget. For the purposes

Table 1-1

Values for Parameters[1] Used to Calculate TAP, 1966-82

Taxation year	ϕ	α	γ	L	ε	λ
1966	0.20	0.200	1.00	0.00	1.13	0.25
1967	0.20	0.200	1.00	0.00	1.13	0.25
1968	0.20	0.200	1.00	0.00	1.13	0.25
1969	0.20	0.200	1.00	0.00	1.13	0.25
1970	0.20	0.200	1.00	0.00	1.13	0.28
1971	0.20	0.200	1.00	0.00	1.13	0.30
1972	0.00	0.348	1.33	0.50	1.13	0.30
1973	0.00	0.348	1.33	0.50	1.13	0.30
1974	0.00	0.348	1.33	0.50	1.06	0.30
1975	0.00	0.348	1.33	0.50	1.06	0.30
1976	0.00	0.344	1.33	0.50	1.06	0.30
1977	0.00	0.356	1.33	0.50	1.06	0.30
1978	0.00	0.540	1.50	0.50	1.06	0.30
1979	0.00	0.540	1.50	0.50	1.06	0.28
1980	0.00	0.540	1.50	0.50	1.06	0.28
1981	0.00	0.548	1.50	0.50	1.06	0.28
1982	0.00	0.503	1.50	0.50	1.06	0.28

1 Paramerers α and γ are applicable to dividend received, and not to taxable dividend.

Parameter α is a combined federal and Ontario figure.

Parameter ϕ applies to dividends received, and also combines federal and Ontario allowances.

Variable ε is the average ratio, for sub-periods 1967-73 and 1974-82, of interest rates on mortgages to the yield of long-term corporate bonds.

Variable λ is the alternative U.S. tax rate on long-term capital gains.

of this paper, it will be assumed that all personal and corporate taxpayers are subject to Ontario tax, and this tax will be lumped together with federal tax. Note that symbols have been defined and numerical values chosen in such a way that equation (1) applies before as well as after the Tax Reform of 1972.

1.2 TAP and Types of Control

When TAP is positive, the stockholder should, from a purely fiscal point of view, find personal debt preferable to corporate debt. The reverse is true when TAP is negative. The model is "myopic" in the sense that it only deals with the relationship between a given stockholder and a given corporation. Thus it does not attempt to predict what impact the tax structure will have on the relative values of corporations in a capital market in equilibrium, although it does have implications for that question also (see Gagnon-Suret, 1985).

It is reasonable to assume that each taxpayer seeks to minimize his overall tax burden. Thus he must juggle the various variables in the above equation and choose both a payout ratio (d) and a debt-to-assets ratio (D/A). The resulting "Miller-type" clientele effect (see Miller, 1977) is complex, because those two decision variables complement one another. Consequently, it is unlikely that their relationship with tax rates will be simple or univariate. The clientele hypothesis even implies that this

relationship can never be empirically detected. In addition, as noted earlier, the values of the model's variables and parameters vary from one corporation to another and from one stockholder to another. Obtaining estimates precise enough to allow a conclusive statistical analysis may well prove a relatively costly proposition.

Nevertheless, by grouping together corporations with similar tax parameters, it may be possible to predict their financial policies and their reactions to major tax changes, such as the 1972 Reform. A strategy for research along these lines will be outlined below; we will leave the empirical aspects of the question until part 2.

The first step is to divide Canadian corporations into three categories or types of control (to be defined more precisely in section 2):

a those controlled by a clearly identifiable group of individuals or family ("private companies");

b those that are subsidiaries of other Canadian or foreign companies ("subsidiaries");

c those whose stock is largely publicly owned ("public companies").

It will be assumed that stockholders of private companies are subject to the highest personal marginal tax rate (T_p). In the case of subsidiaries, equation (1) must be modified to reflect the way intercorporate dividends are taxed. In Canada, dividends paid by one taxable Canadian corporation to another taxable Canadian corporation are taxfree. Thus parameters α and γ must be zero, and ε will be equal to unity, assuming that risks for the subsidiary and the parent company are the same. The equation thus becomes as follows:

$$TAP = (1-T_f)\,[d + (1-d)(1-LT_m)] - (1-T_m) \qquad (2)$$

where T_f and T_m are the tax rates for the subsidiary and the parent company respectively.

When the parent company is American, any Canadian dividend received, grossed-up by the tax already paid by the subsidiary, must be added to company revenues. Then a credit can be claimed equal to the amount of foreign tax deemed paid by the subsidiary. If this exceeds the U.S. tax on the dividend, the credit can, since 1975, be used to reduce a credit deficit in another country or may be carried over to next year. A realized long-term foreign capital gain is taxed as though it was made in the United States, and the applicable rate has remained close to 30 per cent over the last few years. When all these factors are taken into account, the following equation results:

$$TAP = (1-d)\ [(T_m-1) + (1-T_f)(1-\lambda)] \qquad (3)$$

where λ is the tax rate on U.S. capital gains.

While it is possible that public corporations, taken individually, attract homogeneous clientele groups, overall the fiscal status of their stockholders varies widely. Some stockholders, such as retirement savings funds, are not subject to income tax, while others are, and still others may fall into the highest marginal rates. It will be assumed that public corporations behave as if their shareholders were subject to the median marginal rate.

In this way, we have attributed a marginal tax rate to the shareholders of each corporation. Given adequate homogeneity in the three groups described above and given that the influence of taxation on decisions conforms to the foregoing schema, it can be expected that the frequency distributions of the variables representing corporate financial policy will be different in each group.

For instance, if T_p for private corporation shareholders is actually at the top of the scale, the tax advantage factor for these corporations will be generally positive and relatively high.[2] Their debt-to-assets (D/A) ratios should be lower than in the case of subsidiaries or public corporations. Their payout

ratios should also be lower. The dispersion of these ratios should also be linked to the control group. Assuming, for example, that private companies represent the most homogeneous group, the dispersion of their "d" and "D/A" ratios should be less than in the other two groups.

Finally, corporations operating in the natural resources sector should also be segregated. As they have enjoyed lower income tax rates than other corporations,[3] their tax incentive to borrow on corporate account is less than that of other comparable corporations.

1.3 TAP and the Tax Reform

The 1972 Tax Reform brought three important changes to the tax system. First, the principle of integrating corporate and personal taxes was introduced. From then on the "before tax" profits of corporations were taxable once in the hands of individual taxpayers in the form of dividends. On the other hand, the dividend recipient became entitled to claim a partial credit for the taxes paid by the company in question. (This process is represented in equation (1) by parameters α and γ.) If integration were perfect, the value of TAP would be zero: all taxpayers would be indifferent to personal versus corporate debt. But this is not necessarily the case when integration is only partial (i.e., the values of fiscal parameters are identical for all individuals and all corporations, but the values of T_p and T_c are

different). In this case, debt and dividend policies must be chosen in such a way that the algebraic value of TAP is maximized. Second, capital gains, which previously were taxfree, became partly taxable. As a result, dividend income lost some of its fiscal disadvantage. For taxpayers with low enough marginal tax rates, dividends actually became more attractive than capital gains. Third, maximum marginal rates were substantially reduced, as shown in Table 1-2.

Some of the effects of these three changes can be predicted. First of all, the value of TAP should be positive and relatively high for private corporations, since they are presumably the most homogeneous group and have a high mean value for T_p. Second, the introduction of the capital gains tax, and the simultaneous reduction in maximum rates, should attenuate differences between frequency distributions of TAP for various groups. Third, the effect of the Tax Reform on private corporations should have been the most pronounced, since it was their stockholders whose fiscal status changed the most.

We will attempt to verify these predictions using a "simulation" of the Tax Reform. This approach consists of calculating TAP for the three corporate groups for each year in the 1966-82 period. This will allow us to combine, using different sorts of assumptions, the effect of changes in government-controlled and taxpayer-controlled parameters both before and after the Tax Reform.

Table 1-2

Estimated Individual Income Tax Rates, 1966-82

Taxation year	Maximum[1]	Median federal tax rate	Ontario tax rate[2]
		(Per cent)	
1966	80.00	30.00	24.00
1967	80.00	30.00	28.00
1968	80.00	30.00	28.00
1969	80.00	30.00	28.00
1970	80.00	30.00	28.00
1971	79.60	30.00	27.50
1972	61.30	27.60	30.50
1973	61.30	31.00	30.50
1974	61.30	31.00	30.50
1975	61.30	31.00	30.50
1976	61.30	31.00	30.50
1977	61.90	28.00	44.00
1978	61.90	28.00	44.00
1979	61.90	28.00	44.00
1980	61.90	28.00	44.00
1981	62.80	28.00	46.00
1982	50.30	25.00	48.00

1 Federal government and province of Ontario.

2 As a percentage of the basic federal tax.

Source Revenue Canada, Taxation Statistics, Ottawa, annual issues.

2 SIMULATIONS OF TAP

Numerical values for T_c and T_p which represent the marginal rates relevant to borrowing decisions are required to calculate TAP. It is these two variables that pose the most difficult estimation problems. Our methods for handling them and the sources of data are described below.

2.1 Estimates of Tax Rates

2.1.1 Tax rate on corporate income

In attempting to determine the appropriate tax rates, it must be recognized that interest is only one of many tax deductions to which corporations are entitled. These deductions can be divided into four categories according to the order in which they should be claimed (Gagnon-Suret, 1985).

- Type 1 deductions are non-transferable and must be used by the corporation in the fiscal year during which they occurred. The exemption for dividend income received by a corporation is one example.

- Type 2 deductions may be carried over within a given number of fiscal years. Deduction of business losses falls into this category.

- Type 3 deductions, such as the capital cost allowance, can be carried over time indefinitely.

- Type 4 deductions may be both carried over time through business losses and transferred to stockholders. The best example of this is interest on debt. The fact that this deduction is transferable is actually the basis for the concept of TAP.

A corporation should only claim deductions at one of the above levels when all deductions at preceding levels have been exhausted. Thus, a corporation that has not claimed a capital cost allowance in a particular year has no incentive, from a purely fiscal point of view, to increase its indebtedness. In this case, the corporate tax rate relevant to borrowing decisions is assumed to be zero. If, on the other hand, the maximum capital cost allowance has been claimed, then interest payments will have a "tax value." If, in addition, the small business deduction is not available or has already been used, then, in general, the tax deduction for interest will be proportional to the maximum corporate tax rate applicable to the type of income the company is generating. Those rates are given in Table 1-3.

We have also paid special attention to corporations operating in the natural resources sector. Over the years, they have been granted additional deductions and credits of three kinds:

Table 1-3

Canadian[1] and American Corporate Tax Rates, 1966-82

Taxation year	Income from services	Income from manufacturing	Income from mining, oil and gas[2]	U.S. rates on income from service industries
		(Per cent)		
1966	52.00	52.00	34.67	52.80
1967	52.00	52.00	34.67	52.80
1968	53.41	53.41	35.61	52.80
1969	53.41	53.41	35.61	52.80
1970	53.41	53.41	35.61	49.20
1971	48.71	48.71	32.47	48.00
1972	48.50	48.50	32.33	48.00
1973	51.00	42.00	34.00	48.00
1974	52.60	42.00	34.65	48.00
1975	50.20	42.00	33.00	48.00
1976	48.00	42.00	36.00	48.00
1977	48.00	42.00	36.00	48.00
1978	49.00	43.00	36.75	46.00
1979	50.00	43.00	36.75	46.00
1980	51.80	44.50	38.10	46.00
1981	51.80	44.50	38.10	46.00
1982	51.80	44.50	38.10	46.00

1 Canadian rates are combined federal and Ontario top rates.

2 Takes into account earned or automatic depletion allowance (assumed to be equal for provincial and federal tax purposes) and the Ontario tax rate on mining profits. For 1974 and 1975, a basic tax rate of 50 per cent is assumed and the abatement (or credit) for oil and gas companies is deducted.

Source Canadian Tax Foundation, The National Finances, 1982-83, Toronto, 1984. C.C.H. Canadian Limited, Canada Income Tax Guide, Don Mills, Ontario.

resource allowance, depletion allowance, and credits for exploration and development costs. To obtain an annual estimate of the tax rate relevant to the borrowing decisions of resource companies, we had to take into account the considerations mentioned in the next three paragraphs.

The resource allowance has taken two forms. From May 1974 to January 1976, it consisted of a credit (or abatement) to be applied against federal tax on corporate profits as compensation for the taxes and royalties paid to provincial governments. This reduced the value of the tax credit for interest. A nominal tax rate of 47 per cent, for example, was effectively reduced to 35 per cent if the credit was 12 per cent. In 1976, the credit was replaced by a deduction equal to 25 per cent of net income derived from natural resource exploitation, not taking into account interest, operating and development costs and depletion. According to this system, the resource allowance reduces the effective tax rate of the company, but not the marginal rate which determines the amount of the tax credit due to interest payments. Thus this allowance is not a factor in the corporation's choice of a financial structure, but credits such as those available in 1974 and 1975 are.

As of May 1974, the depletion allowance also was modified and took the form of a deduction equal to 25 per cent of natural resource revenues, not to exceed the cumulative amount earned.

Previously the deduction was 33 1/3 per cent. It should be noted that this deduction is applied against income net of interest, so that it effectively reduces the latter's "tax value." We have thus included it in the computation of the marginal tax rate applied to mining, gas and oil corporations, assuming it applied to both federal and provincial taxes.

Credits for exploration and development costs, on the other hand, are not a function of income as is the depletion allowance, but of funds invested. Assuming that the corporation generates sufficient revenues to absorb all other credits and deductions, the marginal tax rate appropriate for financing decisions will not be affected. Thus these credits are not relevant to our estimate of the tax rate applicable to interest payments.

2.1.2 Individual tax rates

The tax status of individual stockholders of any corporation can vary widely. For example, T_p is equal to zero when a stockholder's investment income is below $1,000; yet another shareholder in the same corporation may be subject to a marginal tax rate of from 80 to 60 per cent, depending on the taxation year. For the purposes of our calculations, it was assumed that shareholders in private companies were subject to the maximum tax rate for the study period and that they immediately remitted all tax payable on capital gains. This amount is assumed to be

directly proportional to the reinvestment rate, i.e., (1-d). It was also assumed that in each case the taxpayer was an Ontario resident as of December 31. The rates used are listed in Table 1-2, which is based on taxation statistics from Revenue Canada.[4]

We have assigned a median rate to shareholders in so-called "public" corporations. This rate was computed from Taxation Statistics, a Canadian government publication. We had at our disposal selected data on the income of taxpayers reporting investment income for all fiscal years between 1972 and 1982. These data were used in the following way:

1 The median income of all returns reporting taxable capital gains was computed for each year;

2 The rate of federal individual income tax applicable to the median income computed above was taken from tax tables;

3 This marginal rate was multiplied by one plus the Ontario tax rate to arrive at the median rate given in Table 1-2.

Available statistics for the years 1966 to 1971 are less complete than those mentioned above. For these years, the median income of portfolio holders was taken as the starting point. In most cases, this figure fell in the $8,000 - $10,000 range,

meaning that the marginal tax rate was approximately 30 per cent. This rate was adjusted in the manner described above in order to include Ontario taxes.

Prior to the 1972 Tax Reform, the Canadian Income Tax Act allowed an additional 10, 15, or 20 per cent deduction to investors receiving dividends from mining, oil or gas companies. This credit was included by assuming that shareholders were entitled to the maximum deduction of 20 per cent on dividends from such companies.

When the corporation under study was a subsidiary, the personal rate used to calculate TAP was set equal to the marginal tax rate of the parent company. A procedure similar to that described above was used to compute this rate. When the parent company was American, it was assigned the maximum marginal rate for each year applicable to its particular industrial sector, as determined by data from the Financial Post Corporation Service (F.P.). With one exception, the companies all fell into the services category. All foreign-owned non-American subsidies were eliminated, since the data needed to compute their tax rates were not available.

2.1.3 Payout ratio

Equation (1) calls for an estimate of d, the payout ratio, which is assumed stable. In order to eliminate shocks due to random

fluctuations in profits, we used a five-year moving average of dividends to profits available for common stockholders.

2.1.4 Sources of financial data

For the purposes of this study, the Compustat data base for 1981 and 1982 was used (Standard and Poor's, 1982). The Canadian section of that data bank includes up to 269 corporations. Following a verification process, it was decided to use the data as they stood, with minor adjustments described in Note 5.

Intercorporate Ownership (IO) published by Statistics Canada and the Financial Post Corporation Service (F.P.) were used to assign firms to the three types of control described above. All corporations considered subsidiaries in the IO classification were assigned to the same category in our study. The remaining corporations were classified as private when F.P. records indicated that over 10 per cent of capital stock was held by members of one family, a family trust, or a group of persons (such as the top management of the organization). All other companies were considered to be public.

On the basis of the three tables presented so far, financial statements from the Compustat data base and the classification of corporations into three groups (subsidiaries, private, and public), TAP can be calculated for each corporation. The results,

which are in the nature of a simulation rather than a statistical analysis, will be discussed in the following section.

2.2 Simulation Results

2.2.1 General characteristics

The first step was to calculate TAP for all corporations for which data were available from the Canadian section of the Compustat data base. Table 1-4 summarizes the results.

With the exception of 1982, over the last 10 years the average value of TAP was consistently negative. This indicates that, given the prevailing tax parameters and dividend policies, corporate was slightly preferable to personal debt. In 1981, this advantage amounted to an average of 1.4 per cent of annual interest payments. The maximum distribution mean during the study period was 11 per cent.

The mean and the median figures show that the distribution shifted towards negative values from 1972 onward. In addition, the falling values for standard deviation and quartile deviation indicate a simultaneous reduction in dispersion. This can presumably be attributed to the Tax Reform.

Table 1-4

Main Parameters of Distributions of TAP, 1966-82

Year	Number of observations	Mean	Standard deviation	Quartile deviation	Coefficient of Skewness	Coefficient of Kurtosis	Median
1966	124	0.03	0.31	0.46	0.82	0.36	0.00
1967	128	0.06	0.33	0.50	0.73	-0.27	0.00
1968	146	0.11	0.34	0.50	0.38	-0.61	0.12
1969	173	0.10	0.31	0.43	0.36	-0.43	0.09
1970	180	0.10	0.32	0.50	0.52	-0.53	0.07
1971	185	0.11	0.32	0.47	0.48	-0.54	0.06
1972	196	-0.06	0.19	0.37	0.33	-0.33	-0.09
1973	205	-0.06	0.20	0.28	0.53	0.31	-0.09
1974	210	-0.06	0.19	0.17	0.25	0.89	-0.08
1975	217	-0.04	0.17	0.17	0.82	0.33	-0.07
1976	218	-0.04	0.18	0.22	0.05	0.36	-0.06
1977	220	-0.03	0.18	0.29	-0.02	0.03	-0.06
1978	219	0.00	0.17	0.28	0.23	0.07	-0.05
1979	217	-0.03	0.17	0.29	0.26	0.50	-0.06
1980	210	-0.03	0.19	0.17	-0.09	0.77	-0.07
1981	200	-0.01	0.20	0.33	-0.05	-0.38	-0.06
1982	153	0.03	0.20	0.39	0.06	1.32	0.00

The frequency distributions are non-normal and, therefore, not amenable to standard parametric tests. We shall therefore emphasize comparisons of entire frequency distributions.

2.2.2 TAP and types of control

Frequency distributions of TAP were computed for each of the three corporate groups for the years 1966 to 1982. (The similarity in the distributions for Canadian and U.S. subsidiaries led us to lump these two categories, in such a way that only the three groups mentioned earlier were left.) The distributions are listed in tabular form in Appendix 1-1. They are all statistically distinct from each other (as indicated by chi-square tests, the results of which are listed in Table 1-5), except for public corporations and subsidiaries, which display similar distributions between 1978 and 1980.

Charts 1-1 and 1-2 diagram these distributions for the typical years 1970 and 1980 respectively. It is interesting to note the high frequency of negative observations among public corporations, while the opposite is true of private corporations. This result stems from the fact that the assumed tax rates of public corporation stockholders are generally lower than those of the corporations themselves, while in the case of private corporations the reverse is most often true (by construction).

Table 1-5

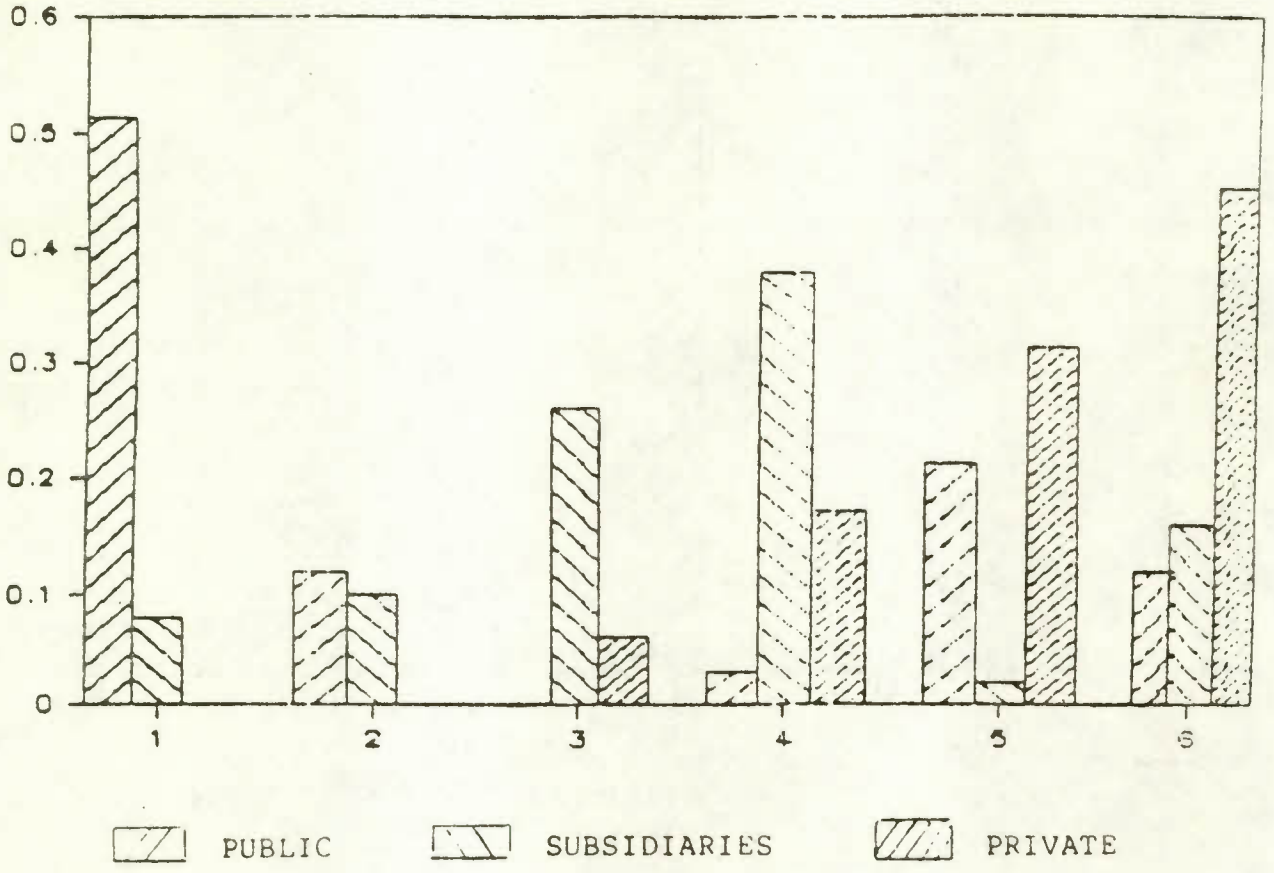
Comparisons of Frequency Distributions of TAP
(Chi-Square Values)

Year	Groups compared			
	All 3 groups	Subsidiaries and private	Public and private	Public and subsidiaries
1966	133.31*	96.00*	50.60*	50.98*
1967	132.76*	97.70*	51.33*	50.47*
1968	113.21*	74.86*	47.75*	44.15*
1969	148.94*	110.40*	46.85*	63.54*
1970	168.21*	116.68*	60.82*	70.23*
1971	123.89*	97.44*	55.35*	35.20*
1972	135.78*	13.02*	106.24*	88.84*
1973	147.93*	14.97*	131.90*	81.35*
1974	45.74*	19.59*	45.64*	10.51*
1975	69.69*	8.31*	55.60*	29.91*
1976	45.15*	26.32*	39.88*	6.29
1977	46.91*	25.49*	38.56*	8.29*
1978	32.65*	29.02*	15.93*	3.85
1979	37.28*	26.38*	24.38*	1.23
1980	37.00*	27.10*	25.97*	2.95
1981	37.19*	36.91*	13.65*	11.26*
1982	31.91*	32.04*	5.73	19.93*
DOF	4	3	3	3

* Indicates a significant difference at the 5 per cent level.

Chart 1-1

Frequency Distributions of TAP, by Type of Control, 1970

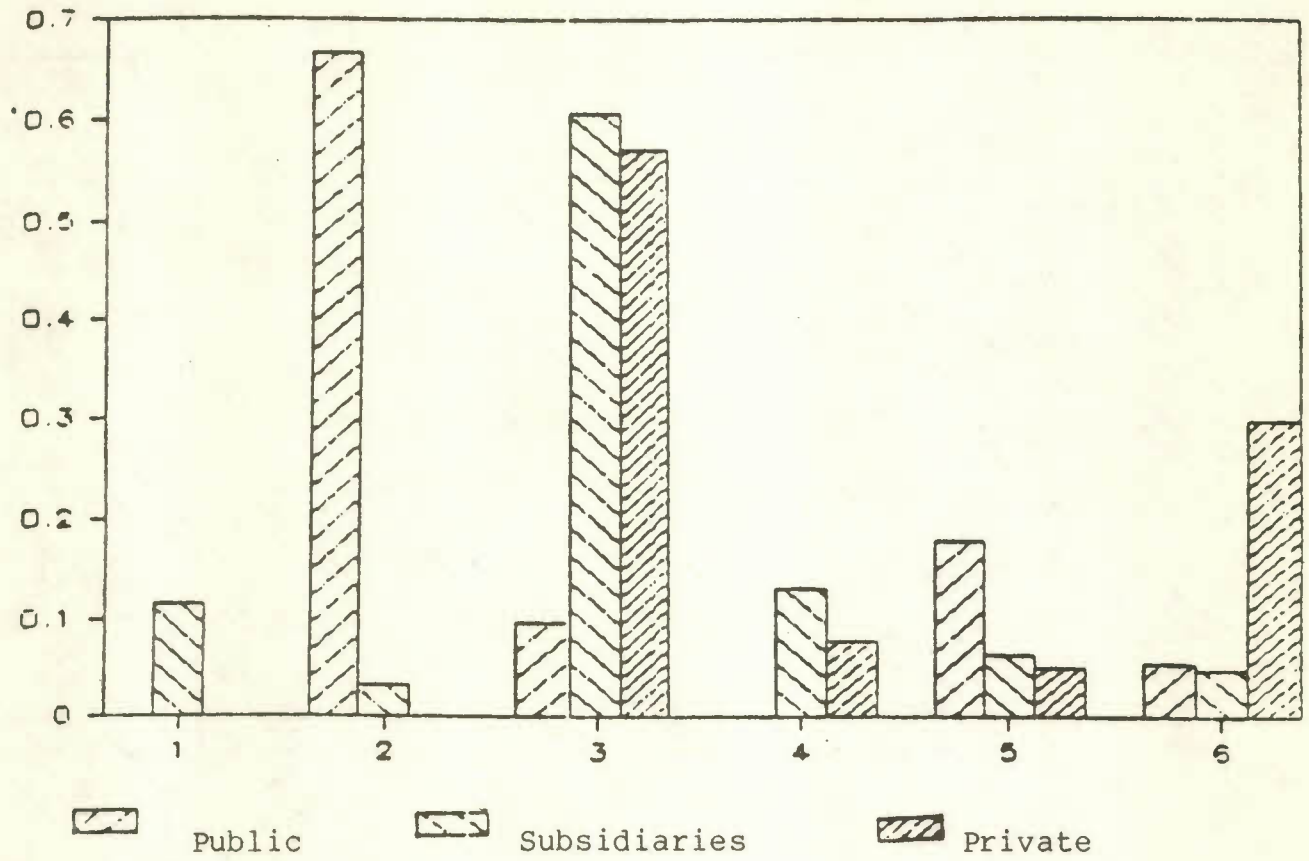


Class Intervals

1		TAP	≤	-.25
2	-.250	≤ TAP	<	-.125
3	-.125	≤ TAP	<	.000
4	.000	≤ TAP	<	.125
5	.125	≤ TAP	<	.250
6	.250	≤ TAP		

Chart 1-2

Frequency Distributions of TAP, by Type of Control, 1980



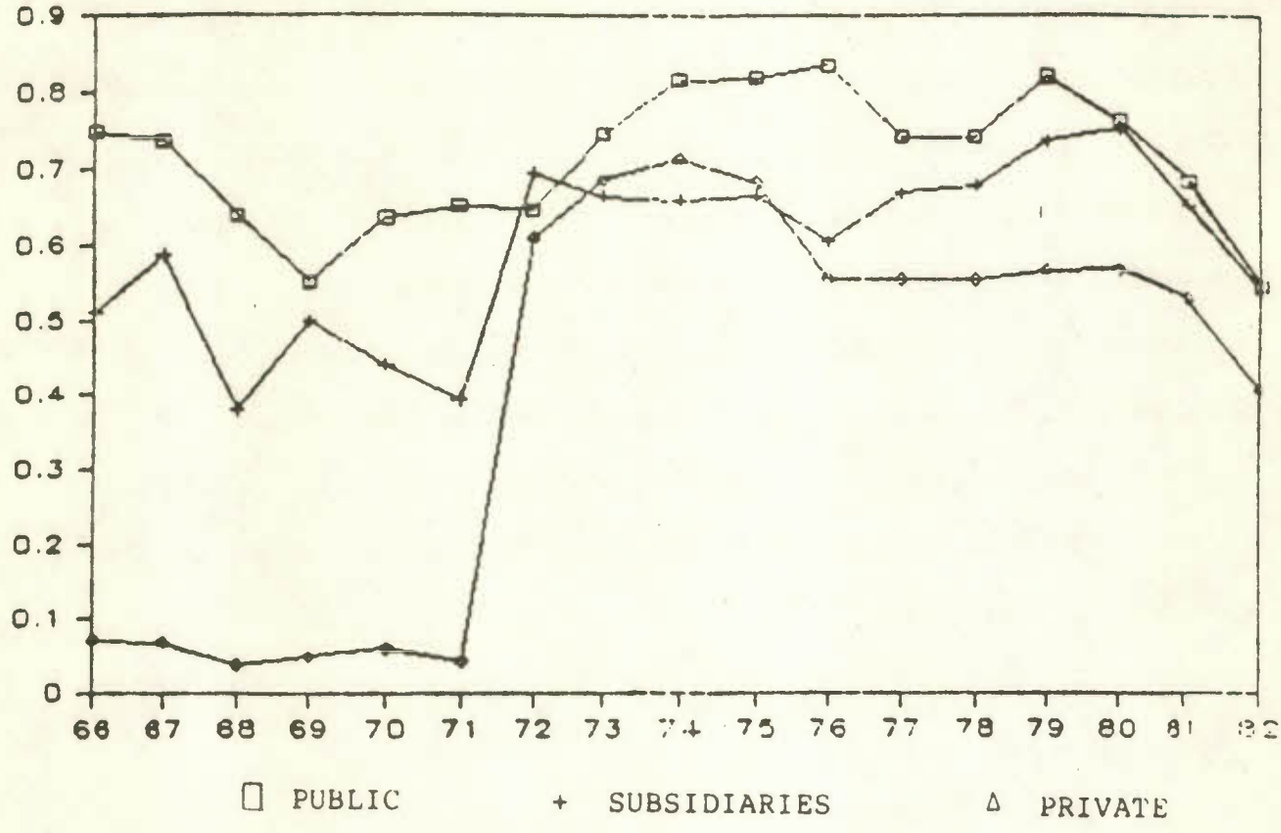
Class Intervals

1		TAP	<	-.25
2	-.250	< TAP	<	-.125
3	-.125	< TAP	<	.000
4	.000	< TAP	<	.125
5	.125	< TAP	<	.250
6	.250	< TAP		

Subsidiaries and their parent companies generally face the same tax rates; this explains why distributions of TAP for these categories are clustered around zero. Thus the results of the simulation were largely predictable. Furthermore, it can be observed from Chart 1-3 and Appendix 1-1 that the distributions of TAP shifted towards negative values from 1971 onward. This trend was especially clear for the private corporations and led to a close degree of similarity in the percentage of negative observations in the three groups. Two factors may explain these results: dividend policy and changes in tax parameters. It is important to determine their relative importance and relationship to one another. Those questions are examined in the next section.

Chart 1-3

Proportion of Corporations with Negative TAPs, 1966-82



3 CONTROL AND DIVIDENDS

3.1 Types of Control and Dividend Policy

The hypothesis that the distributions of payout ratios in the three control groups would be similar was tested for all years, using chi-square tests. Table 1-6 shows that those pertaining to public were statistically different from those pertaining to private corporations from 1966 to 1972. All such differences disappeared after the Tax Reform and there were no significant differences between the other distributions.

Distributions of payout ratios are given in Appendix 1-2. They indicate that prior to the Tax Reform a significant proportion of private corporations adopted relatively low ratios ($d < .15$). This proportion was around 40 per cent for private but under 20 per cent for public corporations. For instance, in 1971, the means were 25 and 49 per cent for private and public corporations respectively. This situation changed following the Tax Reform, as shown in Chart 1-4.

These results are in line with the hypothesis of tax minimization, at least for the private corporations group. Prior to 1972, there was an important difference between dividends and capital gains taxes: while the former provided a 20 per cent tax credit, the latter were completely taxfree.

Table 1-6

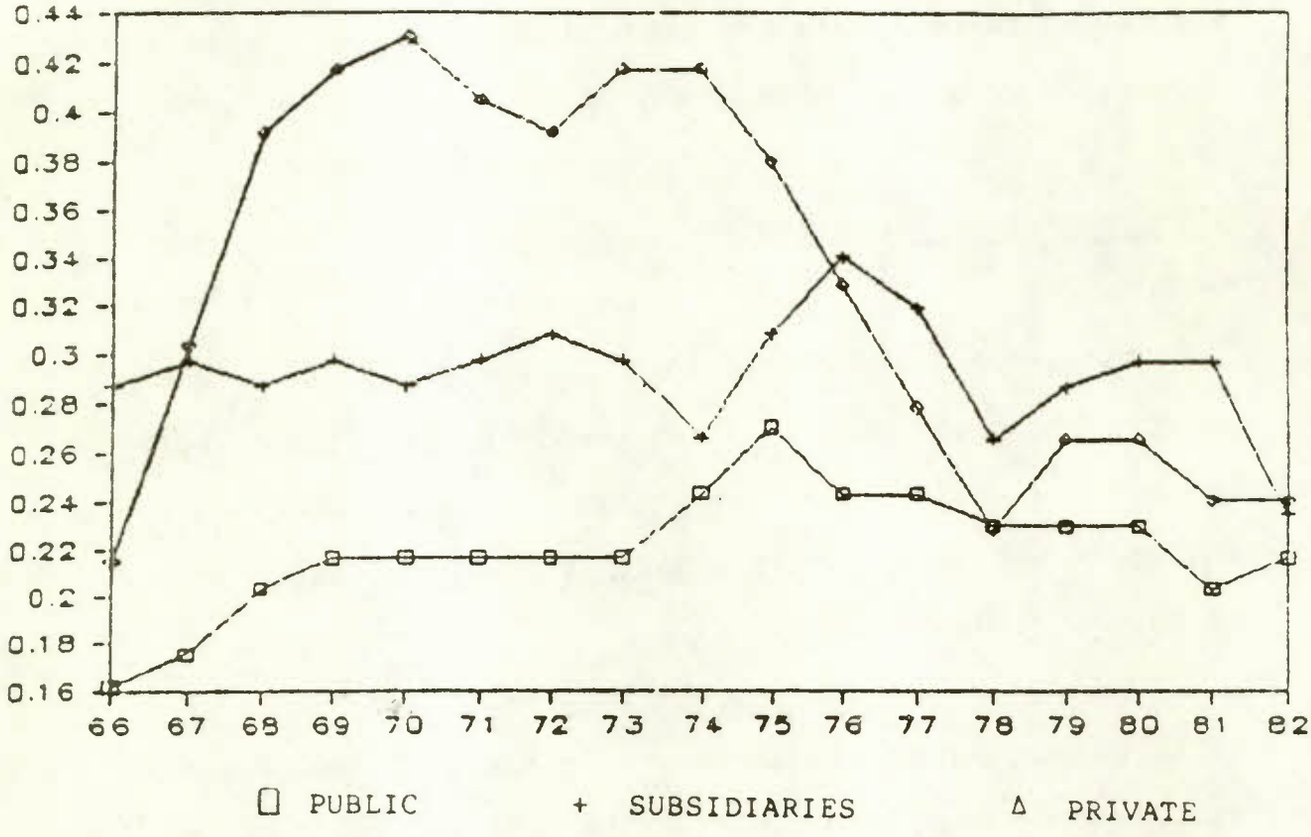
Comparison of Frequency Distributions of Payout Ratios (Chi-Square Tests)

Year	Groups compared			
	All 3 groups	Subsidiaries and private	Public and private	Public and subsidiaries
1966	12.44*	0.08	9.38*	8.75*
1967	9.49*	1.69	9.47*	3.83
1968	9.06	3.23	8.29*	2.52
1969	12.82*	4.92	10.83*	3.74
1970	13.77*	4.71	13.57*	3.07
1971	9.74*	4.51	9.02*	1.31
1972	10.02*	7.29	7.81*	0.08
1973	8.00	4.27	7.24	0.72
1974	5.32	2.32	4.90	0.97
1975	4.79	1.17	4.79	1.49
1976	3.95	0.40	3.59	2.09
1977	2.28	0.16	1.16	2.14
1978	3.71	0.91	0.99	3.56
1979	3.78	0.04	2.88	2.88
1980	1.17	0.36	0.81	0.56
1981	1.73	0.13	1.53	1.02
1982	7.03	0.58	6.07	4.22

* Indicates a significant difference at the 5 per cent level.

Chart 1-4

Proportion of Corporations with Payout Ratios Smaller Than 15 Per Cent, by Type of Control, 1966-82



Private corporation stockholders, subject as they were to high tax rates, were more affected by the partial repeal of that difference and were also in a better position than others to channel the policies of their companies towards the objective of minimizing taxes. This may explain why low payout ratios were relatively common in this group up until the early 1970s.

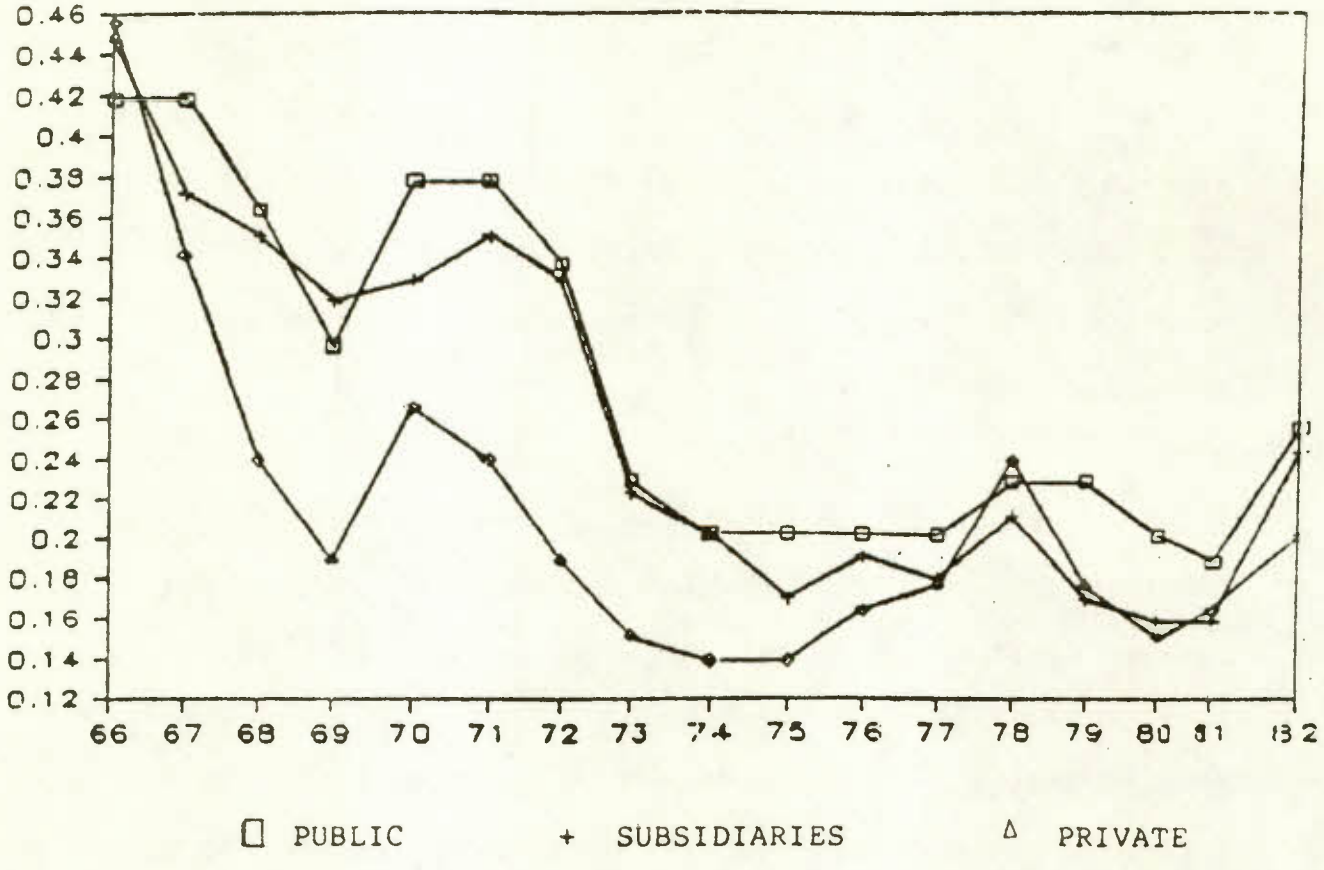
3.2 Tax Reform and Dividend Policy

Charts 1-4 and 1-5 reveal that the Reform had two effects on payout ratio distributions. It should be emphasized that these changes did not lead to statistically significant differences in the means and medians, since they impacted primarily on the tails of the distributions.

The proportion of private corporations with low payout ratios fell rapidly from 1975 onward. The time lag relative to the Reform date can be attributed to the use of moving averages to compute the ratios. At the same time, a slight increase was noted in the proportion of corporations in the other two groups paying out less than 15 per cent of their profits in dividends. The result was that the proportions in all three groups became very similar from 1975 onward. It is plausible that this is due to the narrower gap between taxes on dividends and capital gains brought about by the Tax Reform.

Chart 1-5

Proportion of Corporations with Payout Ratios Greater Than 60 Per Cent, by Type of Control, 1966-82



Thus it was to be expected that capital gains would become less attractive and that this would be accompanied by progressively greater similarity between company policies.

The other tail of the distributions was also affected, as shown in Chart 1-5. The proportion of corporations with relatively high payouts fell significantly. This decline was particularly noticeable in the group of private companies and by 1975 the proportion of "generous" corporations in all three groups was similar.

These results do not entirely agree with received opinions, according to which distribution ratios should have risen in 1972 because capital gains lost the advantage of being entirely non-taxable. But both reality and the Income Tax Act are considerably more complex than this interpretation would imply. Following the partial integration of corporate and individual taxes, dividends became more profitable than capital gains for low- and middle-income taxpayers, although not for those in higher income brackets. It has already been noted that it was policy located in the tails of the distributions that changed. The ratio of public corporations paying out large shares of their profits declined, while that of private corporations paying out low percentages grew.

All of these changes, however, represent but one aspect of general corporate trends and cannot be attributed solely to Tax

Reform. Many corporations seem to favour payout ratios between 15 and 45 per cent. The proportion of corporations following such a policy rose from 20 per cent in 1970 to almost 50 per cent in 1980. This situation is pictured in Chart 1-6.

The 1972 tax changes created two types of shareholders: some prefer dividends while others prefer capital gains. This might have given rise to a bimodal distribution of payout ratios. However, the opposite trend is observed. This phenomenon may be explained in two ways. First, currently popular dividend reinvestment plans and, formerly, taxable and tax-free dividend paying shares, actually allow the shareholder to choose between dividends and capital gain, whatever dividend policy has been picked up by the company. Second, as shown by Table 1-7, the Tax Reform has greatly reduced the gap between taxes on those two types of income. It is quite likely that the significant narrowing of these gaps led stockholders to pay less attention to dividend policy and led corporations to move away from policy extremes.

3.3 TAP and Dividend Policy

Frequency distributions of TAP changed after the 1972 Reform, particularly in the private corporations group. It would be useful to find out whether changes in dividend policies amplified or attenuated the effects of changes in tax parameters.

Chart 1-6

Proportion of Corporations With Payout Ratios Between 15 and 45 Per Cent, by Type of Control, 1966-82

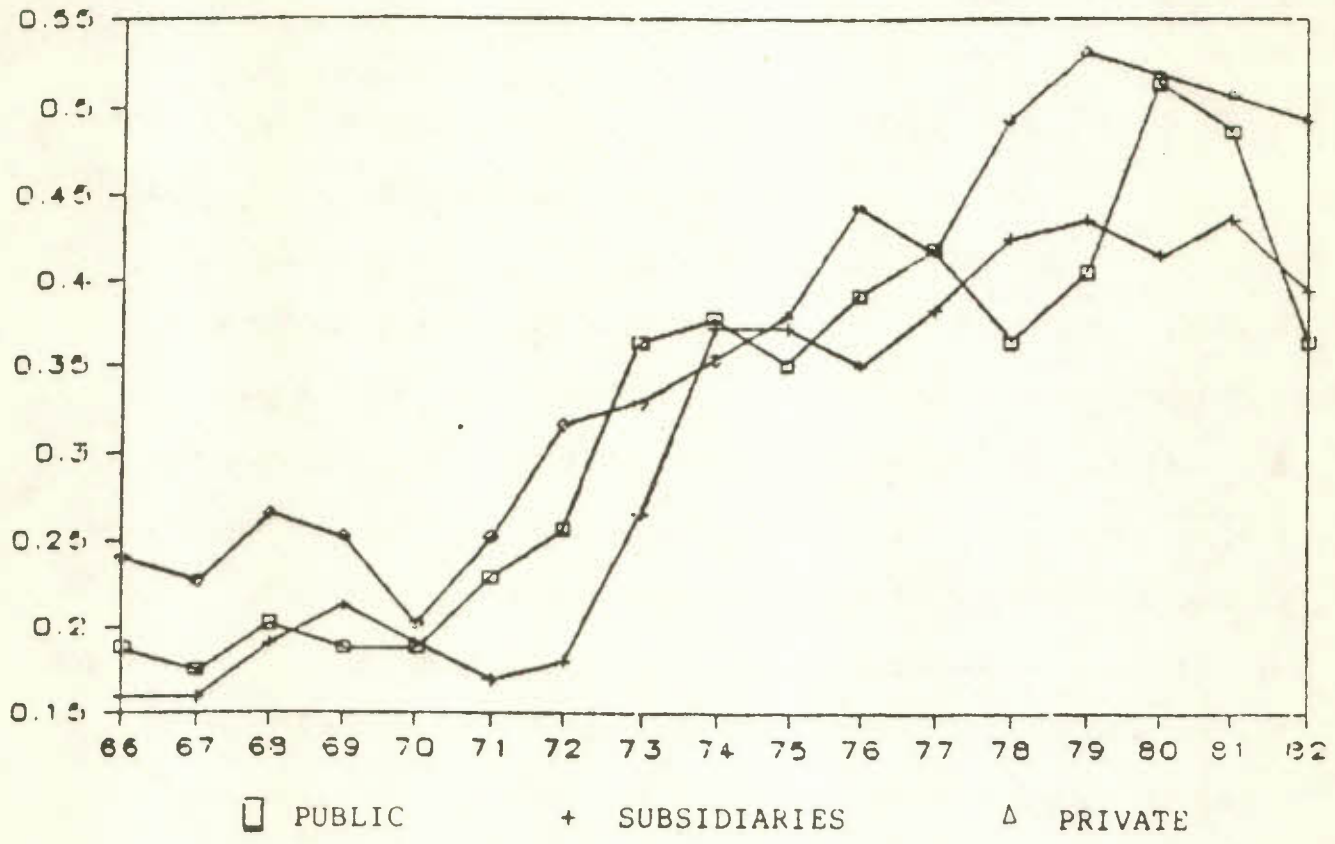


Table 1-7

Difference Between Tax Rates on Dividends (T_{pd}) and Capital Gains (T_{pg}) for Three Levels of Personal Tax Rates (T_p), 1966-82

	Value of T_p		
Year	0.40	0.50	0.60
1966	0.20	0.30	0.40
1967	0.20	0.30	0.40
1968	0.20	0.30	0.40
1969	0.20	0.30	0.40
1970	0.20	0.30	0.40
1971	0.20	0.30	0.40
1972	-0.02	0.07	0.15
1973	-0.02	0.07	0.15
1974	-0.02	0.07	0.15
1975	-0.02	0.07	0.15
1976	-0.02	0.07	0.15
1977	-0.02	0.07	0.15
1978	-0.03	0.06	0.14
1979	-0.14	-0.04	0.06
1980	-0.14	-0.04	0.06
1981	-0.15	-0.05	0.05
1982	-0.15	-0.05	0.05

The partial derivative of TAP with respect to L is negative: an increase in capital gains tax leads to a drop in TAP. In certain circumstances, this can be compensated by an increase in the payout ratio. For example:

$$\frac{\partial \text{ TAP}}{\partial d} = (1-T_c) \; [\alpha + T_p \; (L - \gamma)]$$

$$> 0 \text{ for } T_p < \frac{\alpha}{\gamma - L} \text{ , for } \gamma \neq L.$$

Thus TAP will rise as the payout ratio falls as long as T_p is above a certain level, which is determined by fiscal parameters. This threshold was 0.42 in 1972 compared to 0.56 in 1980.

This means that private corporations which increased their payout ratios contributed to a reduction in TAP, if it is taken for granted that the tax rates of stockholders in these companies were generally above the threshold discussed above. Thus, as measured by TAP, changes in tax laws were amplified by changes in payout ratios. This seems to indicate that maximizing TAP, at least in the short run, is not one of the objectives of corporate financial managers.

4 FINANCIAL STRUCTURES AND TAP

If TAP is accurately computed and if this factor does indeed enter into debt policy decisions, differences in the frequency distributions should entail differences in financial structures for the three control groups. In the same way, debt-to-asset ratios can be expected to change in response to the Tax Reform.

Specifically, the following hypotheses can be advanced:

- Debt-to-asset ratio distributions should vary among groups;

- Public corporations should carry a greater debt load than private corporations, since the proportion of negative TAPs is higher in the latter group;

- Those differences should have been more important prior to the Tax Reform which led to greater distributional similarity.

It is impossible to submit these hypotheses to statistical testing without first looking at the effect of a company's industrial sector on its debt-to-assets ratio. Previous studies (Gagnon and Papillon, 1984) have shown that frequency distributions of debt-to-assets ratios appear to be related to the industrial sector (primary, manufacturing, and services) in which

a corporation operates. On the other hand, Table 1-8 shows there exists a significant relationship between the industry and type of control variables. In particular, the over-representation of service-oriented industries among private corporations is noteworthy.

It was decided to use analysis of variance with two explanatory variables to make allowance for the fact that the number of observations was not the same in all cells. The explained variable is the ratio of total debt to total assets, both at book value. The results of these analyses are given in Table 1-9.

The effect of the industrial sector on the debt-to-assets ratio was significant in all years, and the model had a high level of significance.[6] On the other hand, at the 5 per cent level of significance, the type of control did not seem to be a factor except for a handful of years (1966, 1967, 1978, 1979, and 1981). Raising the level to 10 per cent adds the years 1975 and 1980 to this list. This is not consistent with the hypothesis that the type of control exerts a significant effect on debt policy.

In order to check this result, debt-to-assets ratio distributions for all three sectors in each of the 17 years were compared using non-parametric tests. Of the 51 tests performed, in only 8 was the type of control statistically related to the distributions of debt-to-assets ratios within an industrial

Table 1-8

Number and Proportion of Corporations, by Type of Control and Industrial Sector, 1980

Type of control	Sector			
	Primary	Secondary	Tertiary	Total
Public corporations	20 (27.04)	34 (45.95)	20 (27.03)	74 (100)
Subsidiaries	38 (39.93)	52 (46.43)	22 (19.64)	112 (100)
Private corporations	10 (12.66)	32 (40.51)	37 (46.84)	79 (100)
Total	68 (25.66)	118 (44.53)	79 (29.81)	265 (100)

Test of distributional similarity:
Chi-square: 20.411, with 4 DOF;
Probability: 0.0004

Table 1-9

Analysis of Variance of Debt-to-Assets Ratios

Year	Source of variance	Value of F	Probability
1966	Control	9.63	0.0001
	Sector	24.13	0.0001
	Model	14.13	0.0001
1967	Control	4.99	0.0076
	Sector	27.09	0.0001
	Model	12.84	0.0001
1968	Control	1.84	0.1600
	Sector	35.10	0.0001
	Model	13.44	0.0001
1969	Control	1.01	0.3700
	Sector	40.06	0.0001
	Model	14.00	0.0001
1970	Control	0.85	0.4300
	Sector	40.40	0.0001
	Model	13.67	0.0001
1971	Control	0.42	0.6600
	Sector	52.51	0.0001
	Model	16.57	0.0001
1972	Control	0.07	0.9300
	Sector	42.54	0.0001
	Model	12.47	0.0001
1973	Control	0.82	0.4400
	Sector	43.53	0.0001
	Model	13.82	0.0001
1974	Control	1.86	0.1600
	Sector	51.87	0.0001
	Model	18.37	0.0001
1975	Control	2.29	0.1000
	Sector	46.78	0.0001
	Model	16.86	0.0001
1976	Control	1.49	0.2400
	Sector	42.64	0.0001
	Model	14.40	0.0001
1977	Control	1.78	0.1700
	Sector	33.26	0.0001
	Model	11.73	0.0001
1978	Control	3.64	0.0300
	Sector	33.86	0.0001
	Model	13.06	0.0001
1979	Control	3.86	0.0200
	Sector	32.53	0.0001
	Model	13.03	0.0001
1980	Control	2.38	0.0900
	Sector	43.45	0.0001
	Model	14.62	0.0001
1981	Control	3.22	0.0400
	Sector	32.99	0.0001
	Model	12.05	0.0001
1982	Control	1.14	0.3200
	Sector	16.76	0.0001
	Model	5.64	0.0001

sector. This occurred in the primary sector in 1966 and in the manufacturing sector in 1978 and 1979. These tests, then, confirm the results of the analysis of variance; significant results appear for the same years in both cases. Thus the hypothesis of a statistical relationship between type of control and debt-to-assets ratio is not supported, at least when other variables are not held constant.

5 FURTHER RESEARCH

The results reported in this chapter can only be considered preliminary. For one thing, the tests were univariate. It is possible that multivariate analysis of financial structures would reveal relationships that did not appear in this chapter because other relevant variables have not been taken into account. It is also possible that the type of control categories were not an adequate representation of the various groups of taxpayers. For example, if it is true, as assumed by M. H. Miller (1977), that the personal tax rate on income from shares is negligible for all taxpayers, the three corporate control groups are in fact more similar than we have assumed (i.e., differences in TAP are smaller). In this case, the results obtained could hardly have been otherwise: none of the tests could be significant except through experimental error. However, a multivariate analysis of the impact of income taxes on financial structures, taking into account all relevant variables, might still detect a significant relationship.

6 CONCLUSION

The first objective of this chapter was to test whether the indicator TAP, introduced in a previous study, does capture the main characteristics and changes in tax policy, especially those enacted with the 1972 Tax Reform. The answer is affirmative. First, it is plausible that private companies were the most affected by the Reform. This is captured by TAP: its numerical values changed the most for those companies after 1972. Second, it is also plausible that private, public, and subsidiary companies are owned by shareholders in different tax brackets. This is also reflected in the frequency distributions of TAP.

The second objective was to assess the effects of the Tax Reform. It is found that dividend policies did change after 1972: differences between frequency distributions of payout ratios for public, private, and subsidiary companies disappeared. Changes occurred in the tails of the distributions.

Finally, differences in the numerical values of TAP do not entail differences in the debt-to-assets ratios. However, this test is not conclusive because other relevant variables were not included in the model. They shall be in the second chapter. At this point, we may only conclude that TAP could be used as one possible proxy for tax factors in an analysis of the capital structure decision.

NOTES

Chapter 1

1 Tax advantage factor: denoted "TAP" in Gagnon and Suret (1985). See equation (5), p. 10. The formula used from this point on takes into account the depletion allowance for taxpayers receiving dividends from corporations operating in the natural resources sector. This credit was dropped in 1972. Note that TAP represents an "arbitrage" operation between personal and corporate debt. That is why corporate profit, a random variable, is eliminated in the derivation and does not appear in equation (1).

2 Refer to the article cited above for a detailed study of the TAP variable, including its relation to tax rates.

3 It should be noted that the fees and royalties that must be paid by these corporations have no influence on the marginal tax rate involved in borrowing decisions (see Gagnon and Suret, 1985).

4 Revenue Canada, Taxation Statistics, Ottawa, various issues.

5 Results for financial periods shorter than 12 months were eliminated as non-comparable: such a problem occurs whenever the fiscal year-end date has been changed. Four companies were eliminated either because the data could not be properly controlled (Asamera Inc.), were presented twice (Strathcona Resources Inc.), or assets had already been sold (La Luz Mines Ltd. and Granduc Mines Ltd.). With very few exceptions, Statistics Canada's standard industrial classification (1980) was used as set out in InterCorporate Ownership (IO); this was judged more appropriate than Standard and Poor's classification. The exceptions were the assignment of certain corporations classified as "holdings" by Statistics Canada to specific industries (mainly breweries), as well as the reverse process (mainly involving construction and service-oriented companies).

6 The same procedure was also used to test whether the industrial sector had any impact on the payout ratio. The results were negative.

APPENDIX 1-1

Relative Frequency Distribution of TAP,[1] By Control Group,[2] 1966-82

Year	Type of control	Class interval[3] 1	2	3	4	5	6	Number of firms
1966	0	0.68	0.07	0.00	0.00	0.16	0.09	44
	1	0.10	0.10	0.31	0.38	0.05	0.05	39
	2	0.00	0.00	0.07	0.20	0.32	0.41	41
1967	0	0.65	0.09	0.00	0.02	0.15	0.09	46
	1	0.15	0.08	0.36	0.31	0.00	0.10	39
	2	0.00	0.00	0.07	0.21	0.16	0.56	43
1968	0	0.53	0.11	0.00	0.00	0.26	0.09	53
	1	0.10	0.07	0.21	0.33	0.10	0.19	42
	2	0.00	0.00	0.04	0.16	0.33	0.47	51
1969	0	0.45	0.11	0.00	0.02	0.29	0.14	65
	1	0.15	0.02	0.33	0.35	0.00	0.15	48
	2	0.00	0.00	0.05	0.17	0.37	0.42	60
1970	0	0.52	0.12	0.00	0.03	0.21	0.12	66
	1	0.08	0.10	0.26	0.38	0.02	0.16	50
	2	0.00	0.00	0.06	0.17	0.31	0.45	64
1971	0	0.18	0.47	0.00	0.03	0.20	0.12	66
	1	0.10	0.14	0.45	0.00	0.16	0.16	51
	2	0.00	0.00	0.04	0.18	0.18	0.60	68
1972	0	0.65	0.00	0.00	0.26	0.09	0.00	68
	1	0.11	0.09	0.50	0.20	0.02	0.09	56
	2	0.00	0.11	0.50	0.06	0.19	0.14	72
1973	0	0.31	0.44	0.00	0.00	0.25	0.00	71
	1	0.17	0.00	0.50	0.28	0.02	0.13	60
	2	0.00	0.15	0.54	0.03	0.12	0.16	74
1974	0	0.10	0.72	0.00	0.00	0.18	0.00	71
	1	0.15	0.02	0.50	0.23	0.02	0.10	62
	2	0.00	0.05	0.66	0.01	0.08	0.19	77
1975	0	0.00	0.82	0.00	0.00	0.18	0.00	72
	1	0.06	0.06	0.55	0.17	0.05	0.12	66
	2	0.00	0.01	0.67	0.03	0.11	0.18	79
1976	0	0.00	0.68	0.15	0.00	0.16	0.00	73
	1	0.21	0.03	0.36	0.27	0.08	0.05	66
	2	0.00	0.01	0.54	0.10	0.16	0.18	79
1977	0	0.00	0.58	0.16	0.00	0.26	0.00	74
	1	0.19	0.06	0.42	0.21	0.06	0.06	67
	2	0.00	0.00	0.56	0.05	0.23	0.16	79
1978	0	0.00	0.58	0.16	0.00	0.18	0.08	74
	1	0.06	0.03	0.59	0.20	0.09	0.03	66
	2	0.00	0.00	0.56	0.04	0.14	0.27	79

APPENDIX 1-1 (Continued)

Year	Type of control	Class interval[3] 1	2	3	4	5	6	Number of firms
1979	0	0.00	0.63	0.19	0.00	0.12	0.05	73
	1	0.09	0.08	0.57	0.18	0.03	0.05	65
	2	0.00	0.57	0.08	0.06	0.29	0.29	79
1980	0	0.00	0.67	0.10	0.00	0.18	0.06	72
	1	0.11	0.03	0.61	0.13	0.07	0.05	61
	2	0.00	0.57	0.08	0.05	0.30	0.30	77
1981	0	0.00	0.63	0.06	0.00	0.23	0.09	70
	1	0.24	0.05	0.36	0.22	0.07	0.05	55
	2	0.00	0.00	0.53	0.08	0.08	0.31	75
1982	0	0.03	0.45	0.06	0.00	0.34	0.11	64
	1	0.06	0.11	0.37	0.29	0.03	0.14	35
	2	0.00	0.20	0.20	0.00	0.46	0.13	54

1 Payout ratio is averaged over 5 years.

2 Type of control - Code

0 Public corporations
1 Subsidiary corporations
2 Private corporations

3 Class interval

1 TAP $\leq$ -.25
2 -.250 $\leq$ TAP $<$ -.125
3 -.125 $\leq$ TAP $<$ .000
4 .000 $\leq$ TAP $<$ .125
5 .125 $\leq$ TAP $<$ .250
6 .250 $\leq$ TAP

APPENDIX 1-2

Frequency Distribution of Payout Ratios,[1] By Control Group,[2] 1966-82

Year	Type of control	0.00≤D≤0.15	0.15≤D≤0.30	0.30≤D≤0.45	0.45≤D≤0.60	0.60≤D≤0.75	0.75≤D≤1.00	Number of firms
1966	0	0.16	0.05	0.14	0.23	0.12	0.30	74
	1	0.29	0.09	0.07	0.11	0.20	0.24	94
	2	0.22	0.16	0.08	0.09	0.08	0.38	79
1967	0	0.18	0.04	0.14	0.23	0.14	0.28	74
	1	0.30	0.05	0.11	0.17	0.15	0.22	94
	2	0.30	0.14	0.09	0.13	0.04	0.30	79
1968	0	0.20	0.05	0.15	0.23	0.15	0.22	74
	1	0.29	0.07	0.12	0.17	0.17	0.18	94
	2	0.39	0.09	0.18	0.10	0.03	0.22	79
1969	0	0.22	0.05	0.14	0.30	0.08	0.22	74
	1	0.30	0.09	0.13	0.17	0.16	0.16	94
	2	0.42	0.11	0.14	0.14	0.08	0.11	79
1970	0	0.22	0.04	0.15	0.22	0.16	0.22	74
	1	0.29	0.10	0.10	0.19	0.14	0.19	94
	2	0.43	0.11	0.09	0.10	0.09	0.18	79
1971	0	0.22	0.05	0.18	0.18	0.19	0.19	74
	1	0.30	0.05	0.12	0.18	0.17	0.18	94
	2	0.41	0.10	0.15	0.10	0.06	0.18	79
1972	0	0.22	0.14	0.12	0.19	0.20	0.14	74
	1	0.31	0.06	0.12	0.18	0.15	0.18	94
	2	0.39	0.18	0.14	0.10	0.04	0.15	79
1973	0	0.22	0.15	0.22	0.19	0.09	0.14	74
	1	0.30	0.13	0.14	0.21	0.11	0.12	94
	2	0.42	0.16	0.16	0.10	0.06	0.09	79
1974	0	0.24	0.14	0.24	0.18	0.08	0.12	74
	1	0.27	0.18	0.19	0.16	0.11	0.10	94
	2	0.42	0.14	0.22	0.09	0.03	0.11	79

APPENDIX 1-2 (Continued)

Year	Type of control	0.00<D<0.15	0.15<D<0.30	0.30<D<0.45	0.45<D<0.60	0.60<D<0.75	0.75<D<1.00	Number of firms
1975	0	0.27	0.14	0.22	0.18	0.09	0.11	74
	1	0.31	0.19	0.18	0.15	0.07	0.10	94
	2	0.38	0.20	0.18	0.10	0.04	0.10	79
1976	0	0.24	0.16	0.23	0.16	0.12	0.08	74
	1	0.34	0.17	0.18	0.12	0.10	0.10	94
	2	0.33	0.23	0.22	0.06	0.04	0.13	79
1977	0	0.24	0.19	0.23	0.14	0.09	0.11	74
	1	0.32	0.22	0.16	0.12	0.07	0.11	94
	2	0.28	0.24	0.18	0.13	0.05	0.13	79
1978	0	0.23	0.19	0.18	0.18	0.05	0.18	74
	1	0.27	0.29	0.14	0.10	0.09	0.13	94
	2	0.23	0.25	0.24	0.04	0.05	0.19	79
1979	0	0.23	0.20	0.20	0.14	0.05	0.18	74
	1	0.29	0.28	0.16	0.11	0.07	0.10	94
	2	0.27	0.30	0.23	0.03	0.03	0.15	79
1980	0	0.23	0.26	0.26	0.05	0.08	0.12	74
	1	0.30	0.20	0.21	0.13	0.06	0.10	94
	2	0.27	0.28	0.24	0.06	0.05	0.10	79
1981	0	0.20	0.23	0.26	0.12	0.11	0.08	74
	1	0.30	0.21	0.22	0.11	0.05	0.11	94
	2	0.24	0.29	0.22	0.09	0.04	0.13	79
1982	0	0.22	0.11	0.26	0.16	0.11	0.15	74
	1	0.23	0.23	0.16	0.13	0.06	0.18	94
	2	0.24	0.28	0.22	0.06	0.05	0.15	79

1 Payout ratio is averaged over 5 years.

2 Type of control - Code

0 Public corporations
1 Subsidiary corporations
2 Private corporations

CHAPTER 2

TAXES AND INDEBTEDNESS OF CANADIAN CORPORATIONS

INTRODUCTION

The role played by taxes in corporations' financial structure decisions remains an important subject, both for theoretical and empirical analysis. Some maintain that there is an optimum level of debt where any tax savings arising from the deductibility of interest are offset against rising bankruptcy and agency costs. Others argue that the role played by stockholders' personal taxes suggests that debt does not have a significant impact on the relative value of corporations. Both these hypotheses have resisted empirical confirmation; there are four possible reasons for this:

1 some models have been poorly specified;

2 the considerable problems involved in measuring tax variables may not have been solved correctly;

3 the interaction between tax and non-tax variables has tended to veil significant results; and

4 the many different credits, deductions, exemptions, and shelters available to individuals and corporations neutralize one another. Consequently, one cannot

establish a statistical relationship between taxes and the individual firm's behaviour.

We hope to contribute to this debate by analysing the Canadian experience in this area, taking into account the four factors mentioned above.

First, a financial structure model ("basic model") excluding all tax variables will be defined. This model will be based on theoretical propositions and empirical results that have appeared in earlier studies, and it will be tested using Canadian data.

This will be followed by a brief survey of the main approaches that draw a link between the tax system and financial structures. The appropriate variables will be computed and introduced one by one into the basic model. In this way it can be seen whether any tax variable improves the explanatory power of the model.

This process will lead us to conclude that it is possible to account for many of the differences that exist between the financial structures of Canadian corporations through the use of variables not directly related to the tax system and that incorporating tax variables does not lead to significant improvements in their significance levels. This is true no matter which proxy for taxes is resorted to.

1 FINANCIAL STRUCTURE MODELS

Since the seminal work by Modigliani and Miller (1958), the many researchers who have attempted to explain corporate financial structures have based their efforts on the same explanatory framework, baptized "The Static Tradeoff Theory of Capital Structure" (STT) by Myers (1984). As the results of empirical tests have been inconclusive, he suggested a new approach, called "The Pecking Order Theory" (POT), which takes into account the concept of information asymmetry. We examine them in turn.

1.1 The Pecking Order Theory

1.1.1 Theoretical Framework

This theory is intended to describe the behaviour of businessmen (as observed by Donaldson (1961), for example) for which Myers and Majluf (1984) proposed a theoretical description based on asymmetric information. The pattern of the assumed behaviour is as follows.

Let us assume that an amount N is required to finance a project with a net present value of $\tilde{y}$ by a corporation whose value, not counting the new project, is $\tilde{x}$. Information asymmetry exists, because the managers know the values of $\tilde{x}$ and $\tilde{y}$, while investors only know the joint probability distribution $(\tilde{x}, \tilde{y})$. There is

thus a potential discrepancy between N (the amount of the issue) and N1, the value of the issue if investors possessed information on both $\tilde{x}$ and $\tilde{y}$. So the gap will be $\Delta N = N1 - N$.

Assuming that the objective of managers is to maximize the market value of previously issued stock and that investors expect them to act in this way, it can be concluded that 1) investment will not take place unless $\tilde{y} > \Delta N$ and, 2) ΔN does not have to be null.

If the information available to the manager is unfavourable ($\Delta N < 0$), the securities issue will proceed, though not necessarily in order to finance the project. If the information is favourable, it is possible that the corporation will reject projects with positive net present values.

Let us examine the implications of this situation through a numerical example. Assume that N = \$10 and ΔN = \$2. The corporation must issue securities for N1 = \$12 in order to generate the amount required to finance the project. If y = \$1.5 the project will be abandoned. The value of the corporation is thus reduced by \$1.5, but there is not a \$0.5 reduction in the wealth of the original stockholders, as would have been the case if the project and securities issue had proceeded as planned. The project would not have been abandoned if the corporation could have resorted to internal financing. Thus,

> We usually think of the cost of external finance as administrative and underwriting costs, and in some cases underpricing of the new securities. Asymmetric information creates the possibility of a different sort of cost: the possibility that the firm will choose not to issue, and will therefore pass up a positive-NPV investment. This cost is avoided if the firm can retain enough internally-generated cash to cover its positive-NPV opportunities. (Myers, 1984, p. 584.)

Internal will be preferred to external financing. If the former is not sufficient, the latter will be used, while endeavouring to keep ΔN to a minimum. To achieve this, the manager will use the securities whose value is least sensitive to the release of inside information. This should induce a second effect in the behaviour of corporations:

> If the firm does seek external funds, it is better off issuing debt than equity securities. The general rule is "Issue safe securities before risky ones." (Myers, 1984, p. 584.)

The preceding example applies to a corporation that is undervalued. The situation is quite different if the information available to the manager is unfavourable, so that any issue will be overvalued. In these circumstances, the corporation should issue the most risky securities first in order to maximize ΔN and so derive maximum benefit from new investors. The rule might be as follows:

> Issue debt when investors undervalue the firm, and equity, or some other risky security, when they overvalue it. (Myers, 1984, p. 585.)

If investors anticipate this kind of behaviour, they will purchase stock only when the firm has reached the limits of its debt capacity, thus obliging the corporation to act in the manner described by the POT. Under this rule, issuing new equity would be quite difficult. To solve the problems associated with extreme debt-equity ratios, namely a high level of agency and bankruptcy costs, and to preserve its borrowing power, even though no immediate investment project is to be financed, the firm could sell stock. In addition, the more shares appear to insiders to be undervalued the easier it is to resort to a stock issue.

1.1.2 Implications

According to POT, profit rates, financing needs and under- or overvaluation of equity should explain financial structures.

- Profit rate

Since reinvested earnings are the preferred form of corporate financing, it should increase as a firm's profitability rises, while the relative share of other sources, primarily debt, should fall. Moreover, a bankruptcy or reorganization would have an

unfavourable impact on the value of the managers' human capital. Therefore, one would expect their compensation package to increase with the debt-assets ratio, thereby strengthening the relationship between debt and profit rate. Several authors have reported an inverse relationship between rate of profit and indebtedness: Titman (1982) in the United States; Gagnon and Papillon (1984) in Canada; Dubois (1984) in France; and Toy et al. (1974) in five different countries.

- Overvaluation of shares

According to POT, a corporation will issue stock when its managers feel that it is overvalued by investors. Such a relationship has been reported by Marsh (1982), Titman (1982), and Martin and Scott (1974).

- Financing needs

Given two corporations whose profit rates are similar but whose growth rates are different, the one with the highest growth rate should, according to POT, be found to carry the greater debt load. When financing requirements cannot be met through retained earnings alone, the first recourse is borrowing. There should thus be a direct relationship between growth rates and corporate debt levels.

1.2 The Static Tradeoff Theory

According to STT there exist optimal financial structures. The optimal debt level is reached when tax savings due to interest expenditures are offset by expected agency and bankruptcy costs. We shall discuss this approach briefly through the variables often used as proxies to represent it.

1.2.1 Size

Three types of costs, agency, bankruptcy, and financing costs are assumed to be related to firm size.

An increase in the debt-assets ratio implies an increase in the probability of bankruptcy. On the other hand, comparing the findings of Dipchand and George (1977) with those of Warner (1977) suggests bankruptcy costs are inversely related to firm size. Ceteris paribus, one would expect a positive relationship between size and indebtedness. As for agency costs, they increase with outside capital (i.e., capital supplied by non-managers). If outside capital increases with size and if agency costs associated with outside debt are less than those associated with outside capital stock, again one would expect a positive relationship between debt and size.

Note, however, that one would have to separate outside and inside debt, especially for small firms, in order to test that hypothesis. Finally, Héroux (1978) has shown that issuing new shares is more costly for small than for large firms, but Brigham and Archer (1976) have concluded this proposition also applies to the explicit cost of debt. In this respect, the relationship between debt and size would not be unambiguous. Over all, the three types of cost we have just examined would imply a positive relationship between debt and size. However, such a relationship cannot be detected empirically unless one can observe a relatively large range of sizes.

Agency costs increase with the proportion of total capital supplied by investors who are not managers. Such outside capital increases with size, but may be debt as well as equity. Therefore, agency theory does not suggest an unambiguous relationship between size and debt.[1]

1.2.2 Fixed Assets

Fixed assets are usually used as collateral for loans. Therefore, debt-to-assets ratios should increase with the relative importance of fixed assets. On the other hand, empirical studies[2] have used that variable as a proxy for fixed costs and, therefore, operating leverage. As the latter is assumed to be negatively

related to financial leverage, the expected relationship between fixed- and debt-to-assets ratios is also negative. A priori, fixed assets can only be expected to provide an equivocal signal.

1.2.3 Operating Risk

It is plausible that, ceteris paribus, managers will attempt to control the total risk of the firm they manage, that is the product of financial and operating risks. As the latter is increased, the acceptable level of financial risk should be lowered.[3] To take this factor into account, we have used the five-year average of the ratios of changes in operating profits to the ratios of changes in sales. As that variable has never been statistically significant, we have dropped it from the tables presented in the next section. It is likely that this aspect is captured by the industry variable discussed below.

1.2.4 Industry

Assuming that operating risk, importance of fixed relative to total assets and growth opportunities relative to assets-in-place are homogeneous within industry, financial structures should also be homogeneous, but should differ from one industry (or industrial sector) to the other. Several other factors are also related to both industry and financial structure. For instance, the more

specialized and intangible the fixed assets, the higher the potential bankruptcy costs. Growth opportunities (Myers, 1977) should be financed mostly through retained earnings. Finally, income taxes, as we shall see below, also have to a certain extent an industry component. Therefore, industry should be held as one of the explanatory variables for financial structures. There exists some empirical evidence to support this view: Belkaoui (1984), Gardner (1984), and Gagnon and Papillon (1984).

1.2.5 The Model

The model used here to explain financial structures statistically is based upon POT and includes profit rates, undervaluation of shares, and growth rates. Moreover, the industrial sector and size will be taken into account.[4] Sources of data, methods of estimation, and results are presented in the next section.

1.3 Tests of Model Without Taxes

1.3.1 Data and Variables

The source of our data is the Canadian Compustat data base (Standard and Poor's, 1982).[5] However, the number of observations was then cut down in two successive steps. First, observations

which disagreed sharply with Financial Post Corporation records were eliminated. Also omitted were corporations where the occurrence of certain major events such as mergers or sale of all assets had rendered the data meaningless. Next, unprofitable corporations were eliminated. When the debt-to-assets ratio is based on accounting figures, as a matter of arithmetic, for a corporation that consistently loses money, the relative share of equity in the financial structure falls even though no explicit decision may have been made about debt. In that case, the relationship between financial structure and profit rate is arithmetic, not behavioural, and, therefore, not interesting. In other words, unless a company is making profits, it has no actual choice between internally and externally generated funds, as the former do not exist. Therefore, one cannot learn from those companies how corporations make financial structure decisions. We have eliminated all firms whose five-year average ratio of operating profits before interest and taxes to total assets was not positive. As Compustat reports only on relatively large firms, all companies claiming the small business deduction were thereby eliminated also. In this respect, the subsample to be studied here differs from the one we examined in the first chapter.

This process reduced the number of observations as indicated below:

Year	Number of observations		
	Used	Omitted	Total
1967	224	40	264
1972	243	21	264
1977	250	14	264
1982	244	20	264

In most cases, the values assigned to the variables used in the empirical analysis were five-year averages. Spacing of the observation years reduces the dependence of data, but does not eliminate it, as most companies are present throughout the entire period.[6]

The dependent variables are debt-to-assets ratios, calculated in two different ways. The first was computed by taking the total of short-term liabilities and long-term debt, excluding the deferred tax credit, and dividing by the book value of assets. The second method requires an estimate of the market value of the corporation. Ours is only approximate because stockholders' equity alone was adjusted. The sum of stockholders' equity and deferred tax credits was replaced by the market value of shares. Total assets, adjusted in this manner, are then divided into total debt to arrive at the market value of the debt-to-assets ratio. Such a procedure may be acceptable if book and market values of debt are strongly correlated. Bowman (1980), has provided some empirical evidence in favour of that proposition.

The independent variables have been computed in the following manner.

1 Profitability of assets (RA)

For this variable to be unrelated to financial structure, profit should be computed before interest and taxes. For each corporation, the mean ratio of earnings before interest and taxes to total assets was measured.[7]

2 Growth rate of assets (CA)

The rate of growth of assets appears to be an acceptable proxy for financing needs. Consequently, we computed the five-year geometric average of growth rates. Four-year or even three-year computations were carried out, however, when data were missing. The frequency distribution of growth rates does not deviate significantly from the normal.

3 Overvaluation of shares

Under the POT, a company will issue shares when the managers feel it is overvalued in the stock market. We experimented with three proxies for this factor: a) the ratio of market to book value of common shares (VM/VC), b) the price-earnings ratio (PER),

and c) the ratio of subsequent price changes. Those are not direct estimates of the difference between market and intrinsic values, but should be related to the probability that shares are over- or undervalued at any given point in time.

a) The VM/VC ratio

This ratio is equal to the market value of common shares, as at the end of the calendar year, divided by their book value. As it is significantly correlated with both the rate of profits and the rate of growth of assets, it could not be included simultaneously in the regressions[8] as it causes multicollinearity.

b) The price-earnings ratio (PER)

There exists some empirical evidence that the price-earnings ratio may be an indicator of undervaluation of shares.[9] Unfortunately, two problems arise. First, the price-earnings is numerically related to the debt-assets ratio and, therefore, regression coefficients will be biased. Second, multicollinearity with (CA) and (RA) is also present in this case.[10] Resorting to profits before interest and taxes amplifies the problem. Although a logarithmic transformation reduces it and provides a distribution closer to the normal, the empirical results will not be reported here.

c) The subsequent price changes (PEV)

One can assume that insiders in general, and managers especially, can forecast more accurately than the market as a whole price changes for the shares of their own firm. We computed the relative difference between current and future prices in the following manner. Current are closing stock prices for the calendar year being studied and the previous one. Future are those for the following three years. The difference between average prices was computed after adjusting for changes in the relevant industry index as published by the Toronto Stock Exchange and the resulting figure was called PEV. Assuming that debt is issued when the shares are undervalued, the smaller PEV, the lower the debt-to-assets ratio.

4 The size variable (LOGVE)

Size can be measured in many different ways, all of which are highly correlated. Total assets would seem to be a natural proxy for size for our purposes. However, they are already part of the growth and profit rates. To minimize multicollinearity and normalize the distribution, we used the logarithm of sales (LOGVE).

1.3.2 Analysis of Results: Basic Model[11]

Tables 2-1 and 2-2 summarize the results and give an indication of their stability over time. Corporations were divided into three large industrial groups: 1 is the primary, 2 the secondary, and 3 the tertiary sector. Debt-to-assets ratios are estimated at market value (Table 2-1) and at book value (Table 2-2).

The models achieved relatively high levels of significance. The R^2 values, adjusted for degrees of freedom, were around 40 per cent, except for the secondary sector, where its level is closer to 25 per cent when it is based on book values. Only one model was non-significant at the 5 per cent level: the 1967 primary sector. The use of book-value debt-to-assets ratios also resulted in high significance levels, though still generally inferior to the results obtained by the market value models. Note that overvaluation of shares (explanatory variable PEV) is not significant. This result is not surprising, as undervaluation would have effects -- if any -- on the timing of stock and bond issues, rather than on the level of the debt-to-assets ratio. We would expect it to be significant in a study of changes in financial structures.

Table 2-1

Results of Regression Models (Basic Model, Market Values)

Year	Sector	Number of observations	Values	R^2	R^2 ajusted	Intercept	CA	RA	LOGVE	PEV
1967	1	28	2.80	0.32	0.20	0.19	0.538 10%	-0.700 2%	0.013 52%	0.121 8%
1972	1	43	7.02	0.42	0.36	0.06	0.173 31%	-0.708 1%	0.063 0%	0.008 74%
1977	1	49	16.88	0.60	0.57	0.18	0.108 59%	-0.119 0%	0.074 0%	0.031 51%
1982	1	39	13.33	0.53	0.49	0.33	0.039 83%	-1.600 0%	0.059 0%	
1967	2	74	17.88	0.51	0.48	0.72	0.342 6%	-0.250 0%	-0.025 3%	-0.011 78%
1972	2	107	19.10	0.43	0.40	0.74	0.104 28%	-2.042 0%	-0.026 1%	-0.050 21%
1977	2	114	22.78	0.45	0.43	0.81	0.829 0%	-2.312 0%	-0.016 10%	0.030 20%
1982	2	93	27.01	0.47	0.46	0.97	0.551 1%	-3.346 0%	-0.014 22%	
1967	3	31	4.64	0.41	0.32	0.48	0.183 36%	-1.404 0%	0.013 46%	0.057 40%
1972	3	71	19.94	0.54	0.52	0.42	0.389 0%	-1.839 0%	0.038 0%	0.000 100%
1977	3	66	14.07	0.48	0.44	0.52	0.485 2%	-1.682 0%	0.040 0%	0.042 23%
1982	3	57	17.64	0.50	0.47	0.64	0.166 35%	-2.188 0%	0.029 2%	

Note The percentages indicate the level of significance.

Table 2-2

Results of Regression Models (Basic Model, Book Values)

Year	Sector	Number of observations	Values	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	PEV
1967	1	46	3.72	0.26	0.19	0.10	0.537 1%	-0.339 22%	0.031 8%	0.021 62%
1972	1	48	18.01	0.62	0.59	0.02	0.371 1%	-0.632 0%	0.081 0%	0.004 83%
1977	1	49	13.22	0.54	0.50	0.18	0.471 2%	-0.96 0%	0.052 0%	0.014 76%
1982	1	40	9.83	0.44	0.40	0.18	0.242 16%	-0.870 0%	0.058 0%	
1967	2	82	6.94	0.26	0.23	0.57	0.481 1%	-0.151 0%	-0.022 6%	0.003 94%
1972	2	110	4.21	0.14	0.10	0.56	0.176 5%	-0.821 0%	-0.015 12%	-0.012 75%
1977	2	114	14.03	0.34	0.31	0.6	0.823 0%	-1.535 0%	-0.013 17%	-0.018 44%
1982	2	94	19.00	0.39	0.36	0.77	0.9 0%	-2.565 0%	-0.019 6%	
1967	3	41	2.53	0.21	0.13	0.35	0.387 6%	-0.675 7%	0.037 3%	-0.055 39%
1972	3	74	16.27	0.48	0.45	0.38	0.578 0%	-1.240 0%	0.038 0%	0.028 49%
1977	3	66	13.31	0.46	0.43	0.35	0.602 0%	-1.145 0%	0.044 0%	0.024 44%
1982	3	57	15.32	0.46	0.43	0.52	0.299 7%	-1.724 0%	0.032 1%	

Note The percentages indicate the level of significance.

As expected, a negative coefficient was associated with the profitability of assets in all cases, and this coefficient remained significant at the 5 per cent level with one exception: the 1967 primary sector. The growth rate also carried the expected sign; the direct relationship was significant in all cases with book values, but significance levels dropped when market values were used. Once again, it is natural for the correlation between book values to be higher than between book values and market values. Finally, size (LOGVE) is significant but the sign is not the same in all three sectors: it is negative in the secondary sector.

Thus empirical testing confirms some of our initial expectations, and our models seem to explain part of the observed differences between debt levels. An analysis of the matrix of correlation coefficients in Appendix 2-1 and the F-values indicates that these results cannot be attributed to multicollinearity. Only the variables CA and RA are significantly correlated.

Our results partially corroborate those of Titman (1982)[12] and Gagnon-Papillon (1984). In the first study, estimated profitability of assets (TA/OI) (the inverse of the profitability ratio used here) was directly related to indebtedness. This last result is the opposite of what Titman expected (p. 9), but is in line with our predictions. In the second one, size, as measured by total assets, is also statistically significant, but signs also

depend on the industrial sector. Finally, it should be noted that levels of significance are noticeably higher in our study, despite the smaller number of explanatory variables.

Our results also agree with those of researchers like Toy et al. (1974) and Dubois (1984), who have attempted to use estimates of profitability and growth to account for corporate financial structures in various countries.

Our financial structure model without taxes has now been constructed and tested; it remains to incorporate tax variables into the model. First, however, let us review the main theoretical approaches to the relationship between income taxes and financial structures.

2 TAXES AND FINANCIAL STRUCTURES

2.1 Theoretical Approaches

A recent paper by Hamada and Scholes (1984) summarizing developments in this area distinguishes two theories: the "After Tax Theory" and the "Before Tax Theory." We will also make use of this convenient classification. As the tax in question is that levied on individual incomes, we will label the theories "with personal taxes" and "without personal taxes."

2.1.1 The "With Personal Taxes" Theory

This approach was first presented by Miller (1977). Its basic idea is that corporate debt decisions must take into account the structures of personal as well as the corporate income taxes. The tax saving due to the firm's indebtedness is equal to G:

$$G = [1 - (1-T_c)(1-T_{ps}) / (1-T_{pd})] \text{ [amount of debt]}$$

where T_c = marginal corporate tax rate;

T_{ps} = marginal personal tax on income derived from shares;

T_{pd} = marginal personal tax on other sources of income.

According to this model, the equilibrium amount of debt outstanding is determined by relative personal and corporate tax rates. At the margin, there is no gain from leverage.

A stockholder for whom $(1-T_c)\ (1-T_{ps}) > (1-T_{pd})$ should buy shares in a levered company, rather than borrow personally to finance his investment. If the opposite is true, the stockholder should borrow and invest the proceeds, in addition to his own money, in shares of an unlevered company. Thus an optimum level of debt can exist for the economy as a whole, though not at the level of individual firms, as long as there coexist investors for whom borrowing on personal account is the most advantageous and others for whom taxes make debt on corporate account the best choice. A clientele effect may therefore arise, such that it will not be possible to detect a statistical relationship between tax variables and debt policies at the firm level. As shown in Chapter 1, we have adapted that model to Canadian tax legislation,[13] and developed an indicator called the "tax advantage factor of personal debt" (TAP). This figure measures the tax savings realized by a stockholder-corporation pair as a result of the debt and dividend policies selected. For example, a positive TAP indicates that the stockholder should borrow on personal account. Thus there should be a relationship between this figure and the corporation's debt level, as long as the many estimation problems can be solved.

2.1.2 The "Without Personal Taxes" Theory

This analysis is based on the assumption that tax rates on investment income are effectively zero. Miller and Scholes (1982)

pointed out that interest paid to finance investment is deductible from investment income. The amount borrowed can then be invested in securities such as municipal bonds that generate tax-free interest. While this type of security does not exist in Canada, it can be argued that:

1 since tax on capital gains can be deferred, the present value of the tax may be negligible;

2 investment income for individuals is tax-exempt up to $1,000;

3 some major investors, such as pension funds, are not subject to tax;

4 intercorporate dividends are tax-exempt;

5 tax shelters, such as RRSPs, enable one to defer taxes for relatively long periods.

Consequently, personal taxes on investment income may, for many investors, be fairly close to zero. Under that hypothesis, however, one is faced with the conclusion offered by Modigliani and Miller (1963): because interest is deductible, the total value of a corporation increases as it accumulates debt. Because of agency

and bankruptcy costs discussed earlier, most corporations will have self-imposed limits on their debt-to-assets ratios. However, these analyses have not so far been convincingly supported by the data. In this respect, one should note that the corporate tax rate relevant to the borrowing decision, T_c, is not necessarily estimated as easily as some have assumed. Frequently, this rate is not equal to the "normal" or maximum rate set by tax laws which is assumed to be constant, but instead varies with the amount of tax credits and deductible expenses other than interest. De Angelo and Masulis (1980), as well as Boquist and Moore (1984), have proposed proxies that will be tested here. It is assumed that tax deductions can be ranked in an order such that the corporation will first claim those that cannot be deferred indefinitely (e.g., losses carried forward), followed by those that can be carried over but are not transferable to stockholders (e.g., tax depreciation), and ending with interest on debt which can be transferred to stockholders or carried over through loss carry-over provisions.[14] In this way, the tax rate of a corporation facing accumulated losses or before-depreciation earnings smaller than the maximum capital cost allowance is zero as far as borrowing decisions are concerned. Consequently, some proxies are simply estimates of the amount of unused tax credits. There should be an inverse relationship between that amount and debt levels.

2.2 Estimation of Tax Variables

2.2.1 "With Personal Taxes" Approach

In Chapter 1 we have estimated TAP, an indicator of the tax incentive for a shareholder to borrow on personal account, for large Canadian companies included in the Compustat data base. Those are the numerical values we shall use to represent the "With Personal Taxes" model. As our estimation methods have already been explained in detail, we shall proceed immediately to proxies connected with the alternative theory "Without Personal Taxes."

2.2.2 "Without Personal Taxes" Approach

Three variables have been suggested in other empirical studies conducted in the United States, namely: the ratio of depreciation to earnings before interest and taxes (D/OI); the ratio of non-tax credits to earnings before interest and taxes (NONDEBT); and the ratio of tax credits to operating income (TSR). Those are indicators of the amount of expenses or tax deductions before interest; the higher their value, the lower the value of the deduction for interest. Therefore, they should be negatively related to the debt-to-assets ratio. Estimation methods are described below. In each case, five-year mean values as of the end of the fiscal year under study were calculated.

- Depreciation over operating income (D/OI)

This ratio is calculated by taking the five-year average of depreciation to earnings before interest and taxes. The latter figure is calculated by adding up earnings before extraordinary items, total tax, interest, and minority interest. The result thus includes investment income. A logarithmic transformation was used to normalize the distribution.

- Nondebt tax credits over operating income (ND/OI)

Given that OI = operating income,

I = amount of interest on debt,

T = amount of taxes paid,

t_c = corporate tax rate,

then: $T = t_c (OI - I - ND)$

which implies that: $ND = [OI - I - \frac{T}{t_c}]$.

- Tax credits over operating income (TSR)

The numerator of this ratio is equal to tax credits: tax depreciation, the investment tax credit, and tax losses carried

over. Since data on the investment tax credit were unavailable, however, we simply added together depreciation and reported operating losses. The denominator represents operating income before depreciation, and so does not include investment income. A five-year average was used.

2.3 Interaction of Tax and Non-Tax Variables

None of the variables described above are entirely independent of variables previously incorporated into the model, such as profitability, or of other figures which are themselves related to the firm's financial structure.

In general, a high rate of profit implies a large amount of taxable income and a relatively high corporate tax rate. Consequently, the numerical value of TAP will decrease. The same will be true for the other proxies (D/OI), (ND/OI), and (TSR). Moreover, the first one is related to fixed assets, through depreciation, which may themselves have an impact on the debt-to-assets ratio, as we have seen. We should expect our explanatory variables to be correlated. That proposition is supported by the matrix of correlation coefficients presented in Appendix 2-1.

2.4 Empirical Tests

It remains to test whether the addition of variables derived from various theories drawing a link between taxes and financial structures improves the basic model. For this a test based on the values of residual sums of squares is used. Given that SSR1 and SSR2 are the residual sums of squares of the basic model and the model with the additional tax variable, respectively, the quantity (SSR2 - SSR1)/(SSR2/m-k-1) follows an F-distribution with (1) and (m-k-1) degrees of freedom, where (m) represents the number of observations and (k) the number of explanatory variables. The quantity was calculated for each "basic model - augmented model" pair. The F-values that lead to a rejection of the null hypothesis (i.e., that the additional variable would not result in a significant marginal improvement in the model) are indicated by (*) in the appendices, and summarized in Tables 2-3 and 2-4. It should be emphasized that the cases where a significant contribution is observed are the same instances where the tax variable is associated with a significant coefficient, since the marginal F-value is equal to the square of the t-value computed for each coefficient.[15]

Table 2-3

Contribution of Variable TAP to Improvement of Basic Model

Sector	Number of tests	Number of significant F-values (5 per cent)	Number of significant regression coefficients	
			positive	negative
Market values				
Primary	4	1	1	0
Secondary	4	0	0	0
Tertiary	4	1	1	0
Total	12	2	2	0
Book values				
Primary	4	0	0	0
Secondary	4	2	2	0
Tertiary	4	0	0	0
Total	12	2	2	0

Table 2-4

Contribution of Tax Variables Other than TAP to Improvement of Basic Model

Sector	Number of tests	Number of significant F-values (5 per cent)	Number of significant regression coefficients	
			positive	negative
Market values				
Primary	12	3	3	0
Secondary	12	1	0	1
Tertiary	12	4	0	4
Total	36	8	3	5
Book values				
Primary	12	1	1	0
Secondary	12	2	1	1
Tertiary	12	3	0	3
Total	36	6	2	4

2.4.1 "With Personal Taxes" Theory

Table 2-3, based on Appendices 2-2 and 2-3, shows that introducing TAP only has a weak impact on the regression results. This is not changed by shifting from market to book values to estimate the dependent variable: in both cases the model is improved only twice. Moreover, the sign is positive, which is not the relationship we anticipated. It is possible that in financial structure decisions the tax structure plays a role that is not detectable by standard statistical instruments. But it could also be argued that TAP is not a good proxy for tax effects and that others should be examined.

2.4.2 "Without Personal Taxes" Theory

The tax variables were introduced one at a time into the basic model for each year of observation and for each of the two methods of estimating the debt-to-assets ratio. Detailed results are given in Appendices 2-4 through 2-9, while Table 2-4 presents a summary. It appears that in most cases the addition of a tax variable fails to improve the performance of the financial structure model. Regardless of whether market or book values are used for indebtedness, the addition of a tax variable improves the basic model in about 20 per cent of the cases. Such instances are divided approximately equally among the various sectors.

Examination of the signs and levels of significance of the regression coefficients (Table 2-5) suggests the theoretical relationship between these variables and indebtedness should be questioned. Those signs, including TAP, are positive in 53 per cent of the cases (10 out of 19). Remember that negative signs were predicted.

Thus the addition of tax variables to financial structure models based in part on "The Pecking Order Theory," whether these are derived from the theory that includes personal taxes or the approach that considers them as negligible, does not improve the models' performance in any way.

There are several possible reasons for these results. First, it is a difficult task to define the precise fiscal status of a corporation, subject as it is simultaneously to the laws of several different jurisdictions. The same problem arises with stockholders, who are many in number and widely diverse in fiscal status. Therefore, the probability that the statistical models may be misspecified is not negligible. Second, except for the important case of subsidiaries, the "open" character of the Canadian economy has not been taken into account. The relative importance of foreign stockholders may restrict the role played by Canadian taxes.[16] Taking them into account could only reinforce our conclusions.

Table 2-5

Signs of Regression Coefficients for Tax Variables

	LOGDOI	NONDEBT	TSR	TAP	Total
Number of significant coefficients	6	5	3	5	19
Positive	1	1	3	5	10
Negative	5	4	0	0	9
Expected	-	-	-	-	

Table 2-6

Number of Significant Regression Coefficients by Industrial Sector

	LOGDOI	NONDEBT	TSR	TAP	Total
Primary sector	1	1	2	2	6
Secondary sector	0	2	1	2	5
Tertiary sector	5	2	0	1	8

A similar proposition applies to "loss companies" which have been excluded from the regressions. As they have relatively high debt-to-assets ratios, introducing them would cause the profit rate variable to become more "significant" and would leave less room to tax variables. For reasons stated above, we believe there is little to be learned on debt policy from loss companies and, furthermore, including them would bias the results against the hypothesis of a "tax effect."

Unless these reservations invalidate our statistical results,[17] it must be concluded that the lack of correlation between financial structures and tax variables applies both to individual and corporate taxes.

It appears that the potential tax savings due to increased debt do not offset the perceived advantages of internal financing. If the negative relationship between profitability and indebtedness actually exists, it will be quite difficult to show the existence of a statistical positive link between indebtedness and corporate tax rates, as the latter increases with profits. These results call into question financial structure models based on STT, which predict a positive relationship between taxes and debt.

Miller's model (1977). Our results suggest that financial decisions are made as if the many tax laws and regulations offset each other. Under those circumstances, complexity of the tax laws serves no useful purpose. Simplifying would reduce the cost of adjustments and uncertainty imposed to taxpayers by the present system with no harmful effect on capital markets.

NOTES

Chapter 2

1 We tested the hypothesis that indebtedness is affected by tax rates, themselves related to type of control and, implicitly, to agency costs. The results were negative, the industry-sector effect having dominated that of the type of control (see Chapter 1).

2 See, for example, Ferri and Jones (1979).

3 This relationship between financial and business risks is taken as given, at least implicitly, in most empirical studies of financial structures (see for example, Ferri and Jones, 1979).

4 To quote Myers (p. 590) : "If this story is right, average debt ratios will vary from industry to industry, because asset risk, asset type, and requirement for external funds also vary by industry."

5 In some cases, Compustat data differ significantly from those of the Financial Post. We have eliminated those firms, as well as those which have been merged or liquidated. Also, we have not used income statements for periods shorter than a full financial year.

6 Note, however, that 1981 data deleted from the 1982 Compustat tape were reinstated. The survival bias of that data bank is thereby slightly attenuated.

7 The frequency distribution of this ratio is skewed. As already noted, negative values have been excluded. (See tables in Appendix.)

8 In an earlier study, Hindley (1970) used the (VM/VC) ratio as a measure of overvaluation.

9 See, for instance, Basu (1977). Although, interpretation of the results of that study may be controversial, the proposition that the PER may indicate undervalued shares is rather traditional in finance.

10 Titman (1982) discusses this problem at length. His regression equations do include the PER ratio as an explanatory variable.

11 The main characteristics of each variable, by sector, as well as the matrix of correlation coefficients, are given in the Appendix 2.

12 When the price-earnings ratio is included, it is also highly significant, as in Titman (1982).

13 See also Gagnon-Suret (1985).

14 Such a classification can be found in Gagnon-Suret (1985).

15 There is a practical reason for separating the tests of the two tax theories. The computation of TAP requires estimates of several variables, which are not available for some corporations, especially foreign subsidiaries. Therefore, the number of observations dwindles in regressions where TAP is included. In all cases, the basic and the augmented model being compared include the same observations.

16 For a discussion of this aspect, see Booth and Johnston (1984).

17 This study met with two important econometric problems: multicollinearity and heteroscedasticity. In the latter case, we observed that the variance of the regression residuals is inversely related with firm size. Therefore, we adjusted our estimates of the variance of the regression coefficients using the technique suggested by White (1980). We also controlled for multicollinearity using techniques suggested by Koustsoyiannis (1977, p. 234). Our results and conclusions remained unchanged.

APPENDIX 2-1

Characteristics of Frequency Distributions and Matrix of Correlation Coefficients by Sector, 1977

PRIMARY

	Number of firms	Mean	Standard deviation	Skewness	Kurtosis	Minimum	Maximum
DETTO	56	0.251	0.202	0.616	-0.517	0.001	0.777
DETVM	56	0.253	0.227	0.726	-0.633	0.001	0.834
LOGDOI	49	-1.189	1.717	-0.507	2.886	-6.782	3.186
CA	55	0.127	0.129	0.412	-0.422	-0.128	0.400
RA	56	0.136	0.105	1.000	0.815	0.000	0.463
PEV	56	-0.456	0.551	-0.892	1.412	-2.182	0.542
TAP	46	-0.028	0.202	-0.136	0.289	-0.490	0.480
TSR	56	0.480	1.601	2.630	20.893	-5.284	9.466
NONDET	56	-0.157	2.400	-4.548	26.208	-14.686	4.877
LOGVE	51	3.222	2.037	-0.532	0.148	-1.491	7.234

	RA	DETTO	DETVM	TAP	TSR	NONDET	LOGDOI	LOGVE
CA	0.297 2.80%	0.342 1.00%	0.143 29.80%	-0.281 6.10%	-0.08 56.10%	0.035 79.70%	-0.052 73.20%	0.346 1.40%
RA	1	-0.274 4.10%	-0.329 1.30%	-0.254 8.80%	-0.295 2.70%	0.006 96.30%	-0.313 2.80%	-0.212 13.50%
DETTO		1.000	0.868 0.00%	-0.055 71.60%	-0.055 68.90%	0.122 37.20%	0.197 17.50%	0.525 0.00%
DETVM			1.000	-0.105 48.90%	0.034 81.60%	0.163 23.10%	0.310 3.00%	0.589 0.00%
TAP				1.000	-0.018 90.80%	0.008 95.60%	0.073 65.20%	-0.290 6.20%
TSR					1.000	0.267 4.70%	-0.129 37.70%	-0.252 7.50%
NONDET						1.000	-0.524 0.00%	0.143 31.60%
LOGDOI							1.000	-0.084 58.00%

APPENDIX 2-1 (Continued)

SECONDARY

	Number of firms	Mean	Standard deviation	Skewness	Kurtosis	Minimum	Maximum
DETTO	116	0.454	0.161	0.167	-0.304	0.140	0.929
DETVM	116	0.535	0.186	-0.234	-0.372	0.067	0.935
LOGDOI	112	-1.197	0.746	0.118	3.406	-4.110	1.369
CA	118	0.138	0.096	0.803	1.206	-0.040	0.426
RA	118	0.130	0.059	1.532	6.288	0.022	0.449
PEV	115	-0.251	0.553	-1.687	3.996	-2.718	0.640
TAP	96	-0.048	0.157	0.122	1.262	-0.594	0.316
TSR	118	0.293	0.928	-3.622	49.025	-7.509	4.991
NONDET	118	0.317	2.783	10.076	105.426	-1.535	29.476
LOGVE	118	5.112	1.406	0.206	-0.445	2.108	8.652

	RA	DETTO	DETVM	TAP	TSR	NONDET	LOGDOI	LOGVE
CA	0.398 0.00%	0.265 0.40%	0.112 23.30%	0.006 95.20%	-0.030 74.30%	0.132 15.60%	-0.275 0.30%	0.059 52.20%
RA	1.000	-0.378 0.00%	-0.563 0.00%	-0.057 57.90%	-0.110 23.60%	-0.206 2.60%	-0.670 0.00%	0.023 80.20%
DETTO		1.000	0.832 0.00%	0.081 0.43%	0.064 0.49%	0.236 0.01%	0.152 0.11%	-0.103 0.27%
DETVM			1.000	0.055 59.60%	0.143 12.70%	0.230 1.30%	0.304 0.10%	-0.093 32.10%
TAP				1.000	0.133 19.50%	0.268 0.80%	0.048 64.80%	-0.153 13.60%
TSR					1.000	0.052 57.40%	0.673 0.00%	0.064 49.50%
NONDET						1.000	0.012 89.90%	-0.201 2.80%
LOGDOI							1.000	0.147 12.10%

APPENDIX 2-1 (Continued)

TERTIARY

	Number of firms	Mean	Standard deviation	Skewness	Kurtosis	Minimum	Maximum
DETTO	74	0.528	0.215	-0.801	-0.294	0.001	0.852
DETVM	73	0.573	0.240	-0.881	-0.185	0.002	0.877
LOGDOI	72	-1.606	0.963	-0.474	0.443	-4.408	0.526
CA	76	0.171	0.123	0.793	1.540	-0.131	0.543
RA	76	0.131	0.078	1.662	2.872	0.020	0.418
PEV	69	-0.224	0.759	-2.167	5.511	-3.281	0.667
TAP	64	-0.015	0.193	-0.097	-0.610	-0.480	0.286
TSR	76	0.304	0.469	3.446	18.621	-0.917	3.134
NONDET	76	0.088	0.190	3.133	11.297	-0.251	1.000
LOGVE	75	4.896	1.794	-0.154	0.746	-1.035	8.487

	RA	DETTO	DETVM	TAP	TSR	NONDET	LOGDOI	LOGVE
CA	0.099 39.20%	0.261 2.50%	0.164 16.50%	0.153 22.60%	0.291 1.00%	-0.172 13.70%	-0.275 1.90%	0.125 28.40%
RA	1.000	-0.459 0.00%	-0.567 0.00%	-0.195 12.30%	-0.297 0.90%	-0.189 10.20%	-0.307 0.80%	-0.096 41.00%
DETTO		1.000	0.936 0.00%	0.084 0.52%	0.200 0.09%	-0.215 0.07%	-0.144 0.23%	0.429 0.00%
DETVM			1.000	0.197 12.90%	0.241 4.00%	-0.172 14.60%	-0.043 72.30%	0.376 0.10%
TAP				1.000	-0.055 66.30%	-0.029 82.20%	-0.204 11.40%	-0.293 1.80%
TSR					1.000	0.031 79.10%	0.413 0.00%	0.208 7.30%
NONDET						1.000	-0.143 23.20%	-0.282 1.40%
LOGDOI							1.000	0.187 11.80%

Note The percentages indicate the level of significance.

APPENDIX 2-2

Impact of Introducing TAP (Market Values)

Year	Sector	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	TAP	F*
1967	1	18	0.81	0.20	-0.05	0.180	0.484 22%	-0.465 16%	-0.009 77%	-0.091 65%	0.21
1967	1	18	1.01	0.19	0.01	0.165	0.391 23%	-0.488 12%	0.000 99%		
1972	1	34	10.38	0.59	0.53	0.039	0.372 4%	-0.638 1%	0.065 0%	0.610 0%	14.43*
1972	1	34	6.24	0.38	0.32	0.058	0.243 24%	-0.644 3%	0.060 0%		
1977	1	41	12.20	0.58	0.53	0.151	0.065 74%	-0.880 0%	0.069 0%	0.071 58%	0.31
1977	1	41	16.47	0.57	0.54	0.156	0.062 75%	-0.890 0%	0.068 0%		
1982	1	29	7.31	0.55	0.47	0.236	-0.115 60%	-1.243 0%	0.070 0%	0.038 84%	0.04
1982	1	29	10.13	0.55	0.49	0.238	-0.130 52%	-1.254 0%	0.071 0%		
1967	2	59	22.73	0.63	0.60	0.706	0.522 0%	-2.330 0%	-0.022 6%	0.016 78%	0.09
1967	2	59	30.79	0.63	0.61	0.716	0.508 0%	-2.343 0%	-0.023 3%		
1972	2	89	14.55	0.41	0.38	0.702	-0.103 37%	-1.903 0%	-0.018 10%	0.091 25%	1.32
1972	2	89	18.89	0.40	0.38	0.712	-0.104 36%	-1.964 0%	-0.021 6%		
1977	2	95	18.06	0.45	0.42	0.761	0.726 0%	-2.168 0%	-0.008 41%	0.002 99%	0.00
1977	2	95	24.35	0.45	0.43	0.761	0.726 0%	-2.169 0%	-0.008 40%		
1982	2	63	16.30	0.53	0.50	0.869	0.489 4%	-3.133 0%	0.001 97%	0.127	1.89
1982	2	63	20.77	0.51	0.49	0.902	0.511 3%	-3.375 0%	0.000 99%		
1967	3	27	5.50	0.50	0.41	0.543	-0.114 66%	-1.406 0%	0.013 54%	0.571 1%	22.01*
1967	3	27	6.05	0.4408	0.37	0.553	0.141 50%	-1.542 0%	0.005 83%		
1972	3	56	18.08	0.59	0.55	0.540	0.338 1%	-1.947 0%	0.014 30%	-0.054 60%	0.28
1972	3	56	24.35	0.58	0.56	0.536	0.343 1%	-1.949 0%	0.016 25%		
1977	3	61	14.27	0.50	0.47	0.619	0.304 11%	-1.777 0%	0.030 3%	0.193 11%	2.59
1977	3	61	16.67	0.48	0.45	0.670	0.278 15%	-1.895 0%	0.024 7%		
1982	3	47	8.78	0.46	0.40	0.640	0.238 31%	-1.941 0%	0.024 10%	0.099 38%	0.80
1982	3	47	11.49	0.45	0.41	0.663	0.224 34%	-1.962 0%	0.021 13%		

APPENDIX 2-3

Impact of Introducing TAP (Book Values)

Year	Sector	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	TAP
1967	1	18	0.28	0.08	-0.20	0.251	0.553 34%	-0.254 59%	-0.020 65%	-0.127 67%
1967	1	18	0.33	0.07	-0.14	0.23	0.424 37%	-0.287 52%	-0.007 82%	
1967	2	63	12.58	0.46	0.43	0.665	0.242 5%	-1.294 0%	-0.032 0%	0.051 33%
1967	2	63	16.45	0.46	0.43	0.69	0.227 6%	-1.337 0%	-0.036 0%	
1967	3	30	3.23	0.34	0.24	0.439	0.229 29%	-0.748 5%	0.024 22%	0.154 12%
1967	3	30	3.30	0.28	0.19	0.47	0.380 6%	-0.837 3%	0.015 43%	
1972	1	34	23.28	0.76	0.73	0.019	0.617 0%	-0.546 1%	0.076 0%	0.397 0%
1972	1	34	16.90	0.63	0.59	0.04	0.514 0%	-0.551 2%	0.072 0%	
1972	2	90	4.37	0.17	0.13	0.54	0.199 6%	-0.551 4%	-0.012 25%	0.154 4%
1972	2	90	4.19	0.13	0.10	0.56	0.197 7%	-0.666 1%	-0.016 12%	
1972	3	56	13.00	0.50	0.47	0.454	0.523 0%	-1.304 0%	0.023 7%	-0.030 76%
1972	3	56	17.61	0.50	0.48	0.452	0.526 0%	-1.305 0%	0.025 6%	
1977	1	41	10.84	0.54	0.50	0.156	0.579 0%	-0.801 0%	0.048 0%	0.137 29%
1977	1	41	14.00	0.53	0.49	0.165	0.574 1%	-0.821 0%	0.045 0%	
1977	2	96	10.91	0.32	0.29	0.61	0.790 0%	-1.488 0%	-0.013 18%	0.028 75%
1977	2	96	14.66	0.32	0.30	0.612	0.692 0%	-1.494 0%	-0.014 16%	
1977	3	62	10.32	0.42	0.38	0.455	0.387 3%	-1.272 0%	0.036 1%	0.100 39%
1977	3	62	13.56	0.41	0.38	0.482	0.372 4%	-1.335 0%	0.033 1%	
1982	1	30	6.21	0.50	0.42	0.10	0.007 97%	-0.553 10%	0.071 0%	0.003 99%
1982	1	30	8.606	0.49	0.44	0.105	0.006 97%	-0.553 9%	0.072 0%	
1982	2	63	13.11	0.47	0.44	0.071	0.913 0%	-2.145 0%	-0.017 21%	0.274 0%
1982	2	63	12.6	0.39	0.36	0.788	0.962 0%	-2.665 0%	-0.018 22%	
1982	3	47	7.01	0.4	0.34	0.509	0.378 10%	-1.376 0%	0.027 4%	0.049 64%
1982	3	47	9.44	0.39	0.36	0.521	0.351 10%	-1.380 0%	0.025 5%	

APPENDIX 2-4

Impact of Introducing Tax Variables (Primary Sector, Book Values)

Year	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	LODGOI	NONDET	TSR	F*
1967	46	4.31	0.30	0.23	0.108	0.513 1%	-0.083 79%	0.027 11%	0.033 13%			2.39
1967	46	3.84	0.27	0.20	0.079	0.542 1%	-0.279 31%	0.031 7%		0.013 33%		0.99
1967	46	3.58	0.26	0.19	0.064	0.517 1%	-0.248 44%	0.032 7%			0.058 65%	0.20
1967	46	4.80	0.26	0.20	0.091	0.512 1%	-0.321 24%	0.033 6%				
1972	45	16.89	0.63	0.59	-0.003	0.430 0%	-0.426 8%	0.082 0%	0.017 32%			1.03
1972	45	18.19	0.65	0.61	0.042	0.350 1%	-0.534 1%	0.081 0%		-0.084 9%		3.02
1972	45	21.83	0.69	0.65	-0.144	0.528 0%	-0.172 45%	0.080 0%			1%	
1972	45	22.16	0.62	0.59	0.003	0.415 0%	-0.566 1%	0.082 0%				
1977	45	11.65	0.53	0.49	0.160	0.432 2%	-0.982 0%	0.055 0%	-0.002 91%			-0.68
1977	45	11.90	0.54	0.50	0.178	0.423 3%	-0.985 0%	0.053 0%		0.006 49%		0.48
1977	45	12.06	0.55	0.50	0.179	0.441 2%	-1.023 0%	0.055 0%			-0.203 38%	0.78
1977	45	15.91	0.54	0.50	0.165	0.434 2%	-0.971 0%	0.055 0%				
1982	34	6.61	0.48	0.40	0.071	0.036 83%	-0.701 4%	0.072 0%	-0.035 6%			3.86
1982	34	5.11	0.41	0.33	0.124	0.126 48%	-0.488 16%	0.061 0%		0.021 58%		0.32
1982	34	5.44	0.43	0.35	0.045	0.149 40%	-0.435 21%	0.069 0%			0.066 30%	1.11
1982	34	6.86	0.41	0.35	0.125	0.124 48%	-0.528 12%	0.062 0%				

APPENDIX 2-5

Impact of Introducing Tax Variables (Secondary Sector, Book Values)

Year	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	LODGOI	NONDET	TSR	F*
1967	86	5.91	0.23	0.19	0.583	0.283	-0.947	-0.024	0.029			0.12
						6%	1%	3%	74%			
1967	86	7.13	0.26	0.22	0.577	0.266	-1.029	-0.022		-0.024		3.90
						6%	0%	4%		5%		
1967	86	6.16	0.23	0.20	0.619	0.295	-1.168	-0.022			-0.105	0.89
						4%	0%	5%			35%	
1967	86	7.92	0.22	0.20	0.581	0.288	-1.024	-0.024				
						5%	0%	3%				
1972	109	6.29	0.19	0.16	0.601	0.195	-1.031	-0.019	-0.005			0.09
						3%	0%	5%	77%			
1972	109	8.27	0.24	0.21	0.593	0.193	-1.023	-0.014		-0.103		6.46*
						3%	0%	12%		1%		
1972	109	6.82	0.21	0.18	0.590	0.206	-0.950	-0.018			0.001	1.81
						2%	0%	5%			18%	
1972	109	8.43	0.19	0.17	0.602	0.200	-0.988	-0.019				
						3%	0%	4%				
1977	112	14.49	0.35	0.33	0.530	0.834	-1.521	-0.005	-0.018			0.76
						0%	0%	58%	38%			
1977	112	14.35	0.35	0.32	0.534	0.848	-1.390	-0.005		-0.036		0.39
						0%	0%	55%		52%		
1977	112	14.21	0.35	0.32	0.541	0.835	-1.379	-0.006			-0.009	0.02
						0%	0%	48%			86%	
1977	112	19.10	0.35	0.33	0.537	0.838	-1.365	-0.006				
						0%	0%	48%				
1982	88	14.83	0.42	0.39	0.764	0.852	-2.257	-0.016	0.030			3.15
						0%	0%	14%	8%			
1982	88	13.94	0.40	0.37	0.796	0.871	-2.597	-0.019		-0.026		0.97
						0%	0%	8%		33%		
1982	88	16.72	0.45	0.42	0.674	0.841	-2.144	-0.013			0.072	7.70*
						0%	0%	23%			1%	
1982	88	18.27	0.39	0.37	0.781	0.868	-2.580	-0.017				
						0%	0%	11%				

APPENDIX 2-6

Impact of Introducing Tax Variable (Tertiary Sector, Book Values)

Year	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	LODGOI	NONDET	TSR	F*
1967	42	4.38	0.32	0.25	0.516	0.326	-1.124	0.002	-0.055			2.40
						5%	0%	90%	13%			
1967	42	3.86	0.29	0.22	0.474	0.348	-0.903	0.014		0.140		0.91
						4%	1%	37%		35%		
1967	42	3.84	0.29	0.22	0.608	0.331	-1.148	0.004			-0.172	0.84
						5%	0%	82%			36%	
1967	42	4.85	0.28	0.22	0.515	0.349	-0.988	0.009				
						4%	0%	52%				
1972	71	22.63	0.58	0.55	0.317	0.457	-1.483	0.040	-0.072			15.78*
						0%	0%	0%	0%			
1972	71	23.83	0.59	0.57	0.433	0.585	-1.266	0.027		-0.202		18.28*
						0%	0%	1%		0%		
1972	71	15.16	0.48	0.45	0.349	0.616	-1.145	0.039			0.022	0.16
						0%	0%	0%			68%	
1972	71	20.42	0.48	0.45	0.361	0.603	-1.170	0.039				
						0%	0%	0%				
1977	69	15.49	0.49	0.46	0.355	0.337	-1.449	0.041	-0.067			9.07*
						5%	0%	0%	0%			
1977	69	12.24	0.43	0.40	0.448	0.512	-1.257	0.034		-0.172		1.51
						0%	0%	1%		22%		
1977	69	11.65	0.42	0.39	0.412	0.543	-1.188	0.035			0.020	0.14
						0%	0%	0%			70%	
1977	69	15.68	0.42	0.39	0.424	0.519	-1.219	0.035				
						0%	0%	0%				
1982	53	10.12	0.46	0.41	0.438	0.278	-1.622	0.038	-0.025			1.02
						14%	0%	1%	32%			
1982	53	10.90	0.48	0.43	0.503	0.315	-1.620	0.034		-0.110		2.73
						8%	0%	1%		10%		
1982	53	10.00	0.45	0.41	0.475	0.373	-1.520	0.032			0.047	0.77
						6%	0%	2%			39%	
1982	53	13.15	0.45	0.41	0.490	0.312	-1.606	0.034				
						9%	0%	1%				

APPENDIX 2-7

Impact of Introducing Tax Variables (Primary Sector, Market Values)

Year	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	LODGOI	NONDET	TSR	F*
1967	42	4.38	0.32	0.25	0.516	0.326	-1.124	0.002	-0.055			2.40
						5%	0%	90%	13%			
1967	42	3.86	0.29	0.22	0.474	0.348	-0.903	0.014		0.140		0.91
						4%	1%	37%		35%		
1967	42	3.84	0.29	0.22	0.608	0.331	-1.148	0.004			-0.172	0.84
						5%	0%	82%			36%	
1967	42	4.85	0.28	0.22	0.515	0.349	-0.988	0.009				
						4%	0%	52%				
1972	71	22.63	0.58	0.55	0.317	0.457	-1.483	0.040	-0.072			15.78*
						0%	0%	0%	0%			
1972	71	23.83	0.59	0.57	0.433	0.585	-1.266	0.027		-0.202		18.28*
						0%	0%	1%		0%		
1972	71	15.16	0.48	0.45	0.349	0.616	-1.145	0.039			0.022	0.16
						0%	0%	0%			68%	
1972	71	20.42	0.48	0.45	0.361	0.603	-1.170	0.039				
						0%	0%	0%				
1977	69	15.49	0.49	0.46	0.355	0.337	-1.449	0.041	-0.067			9.07*
						5%	0%	0%	0%			
1977	69	12.24	0.43	0.40	0.448	0.512	-1.257	0.034		-0.172		1.51
						0%	0%	1%		22%		
1977	69	11.65	0.42	0.39	0.412	0.543	-1.188	0.035			0.020	0.14
						0%	0%	0%			70%	
1977	69	15.68	0.42	0.39	0.424	0.519	-1.219	0.035				
						0%	0%	0%				
1982	53	10.12	0.46	0.41	0.438	0.278	-1.622	0.038	-0.025			1.02
						14%	0%	1%	32%			
1982	53	10.90	0.48	0.43	0.503	0.315	-1.620	0.034		-0.110		2.73
						8%	0%	1%		10%		
1982	53	10.00	0.45	0.41	0.475	0.373	-1.520	0.032			0.047	0.77
						6%	0%	2%			39%	
1982	53	13.15	0.45	0.41	0.490	0.312	-1.606	0.034				
						9%	0%	1%				

APPENDIX 2-8

Impact of Introducing Tax Variables (Secondary Sector, Market Values)

Year	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	LODGOI	NONDET	TSR	F*
1967	75	18.70	0.52	0.49	0.746	0.231	-1.808	-0.028	0.051			3.403
						20%	0%	1%	7%			
1967	75	19.66	0.53	0.50	0.801	0.214	-2.528	-0.026		-0.190		5.351*
						23%	0%	2%		2%		
1967	75	18.71	0.52	0.49	0.842	0.271	-2.571	-0.027			-0.227	3.418
						14%	0%	2%			7%	
1967	75	23.02	0.49	0.47	0.734	0.249	-2.224	-0.026				
						18%	0%	2%				
1972	104	20.52	0.45	0.43	0.763	-0.084	-2.216	-0.026	0.003			0.018
						41%	0%	1%	88%			
1972	104	21.05	0.46	0.44	0.759	-0.089	-2.259	-0.024		-0.049		1.172
						38%	0%	2%		28%		
1972	104	21.61	0.47	0.44	0.747	-0.078	-2.189	-0.024			0.001	2.411
						43%	0%	2%			12%	
1972	104	27.63	0.45	0.44	0.762	-0.086	-2.240	-0.026				
						39%	0%	1%				
1977	110	21.90	0.45	0.43	0.761	0.736	-2.499	-0.082	-0.031			1.714
						0%	0%	39%	19%			
1977	110	21.15	0.45	0.43	0.770	0.743	-2.240	-0.010		-0.011		0.038
						0%	0%	29%		86%		
1977	110	21.25	0.45	0.43	0.788	0.729	-2.280	-0.010			-0.030	0.266
						0%	0%	29%			61%	
1977	110	28.44	0.45	0.43	0.771	0.740	-2.232	-0.010				
						0%	0%	29%				
1982	87	21.26	0.51	0.49	0.964	0.495	-3.123	-0.011	0.033			3.190
						2%	0%	35%	8%			
1982	87	20.12	0.50	0.47	0.998	0.516	-3.498	-0.014		-0.026		0.861
						1%	0%	24%		36%		
1982	87	19.76	0.49	0.47	0.967	0.509	-3.419	-0.011			0.010	0.129
						2%	0%	34%			73%	
1982	87	26.58	0.49	0.47	0.982	0.513	-3.480	-0.012				
						1%	0%	30%				

APPENDIX 2-9

Impact of Introducing Tax Variables (Secondary Sector, Market Values)

Year	Number of observations	F-value	R^2	R^2 adjusted	Intercept	CA	RA	LOGVE	LODGOI	NONDET	TSR	F*
1967	31	9.76	0.60	0.54	0.607	0.180	-2.199	-0.019	-0.111			7.30*
						28%	0%	28%	1%			
1967	31	6.55	0.50	0.43	0.621	0.258	-1.758	-0.004		-0.247		0.74
						22%	0%	81%		40%		
1967	31	8.24	0.56	0.49	0.859	0.194	-2.152	-0.017			-0.515	4.18
						27%	0%	35%			5%	
1967	31	8.58	0.49	0.43	0.597	0.181	-1.669	-0.003				
						33%	0%	88%				
1972	68	22.21	0.59	0.56	0.375	0.300	-2.027	0.037	-0.056			7.09*
						3%	0%	0%	1%			
1972	68	25.83	0.62	0.60	0.478	0.397	-1.875	0.025		-0.194		13.79*
						0%	0%	3%		0%		
1972	68	18.45	0.54	0.51	0.393	0.433	-1.753	0.037			0.023	0.15
						0%	0%	0%			70%	
1972	68	24.87	0.54	0.52	0.404	0.420	-1.778	0.037				
						0%	0%	0%				
1977	69	15.92	0.50	0.47	0.544	0.179	-1.947	0.033	-0.063			6.50*
						34%	0%	1%	1%			
1977	69	13.26	0.45	0.42	0.626	0.345	-1.757	0.027		-0.119		0.61
						6%	0%	4%		44%		
1977	69	13.04	0.45	0.41	0.596	0.375	-1.699	0.028			0.020	0.13
						6%	0%	4%			72%	
1977	69	17.56	0.45	0.42	0.609	0.350	-1.730	0.028				
						6%	0%	3%				
1982	53	14.15	0.54	0.50	0.558	0.077	-2.319	0.039	-0.038			2.09
						69%	0%	1%	15%			
1982	53	13.80	0.53	0.50	0.645	0.130	-2.306	0.033		-0.084		1.42
						49%	0%	1%		24%		
1982	53	13.34	0.53	0.49	0.621	0.182	-2.218	0.031			0.042	0.55
						37%	0%	3%			46%	
1982	53	17.77	0.52	0.49	0.635	0.128	-2.295	-0.033				
						50%	0%	1%				

CHAPTER 3

THE CANADIAN TAX SYSTEM AND CAPITAL MARKETS

INTRODUCTION

The impact of tax laws on the relative value of corporations is an important subject for analysis. As long as their effect is significant, tax structures can affect the cost of capital, the profitability of investment projects, and the allocation of resources.[1] It is generally taken for granted that tax distortions are significant. However, a convincing argument running counter to this hypothesis[2] has given rise to a number of empirical studies in the United States. These studies are based on one of the two following hypotheses:

1 How investment income is taxed depends partly on its form: a dividend is not subject to the same tax rate as a capital gain. If the former is more heavily taxed than the latter, the rate of return before taxes required by an investor will be directly related to the size of dividend portion of the return.

2 Interest paid on borrowed capital is taxdeductible, while dividends, which are paid to equity holders, are not. This suggests that there is a direct and significant correlation between a corporation's marginal tax rate and its debt-to-assets ratio.

Assuming that these two propositions are true in the United States, are they also true for Canada? In order to answer this question, two series of empirical tests were performed. The first used observations from various periods to test the "predictions" that can be drawn from these hypotheses. The second series examined the 1972 Tax Reform, which can be looked at as a laboratory experiment.

Our analysis and results are summarized in this concluding chapter.

1 RATE OF RETURN ON COMMON STOCK

Theoretical Review

The return on a stock is composed of dividends and capital gains, the latter being larger than the former, on the average. It is assumed that these two components involve the same degree of risk.[3] Consequently, in a situation where they are taxed at the same rate, the payout ratio should leave investors indifferent as long as the market as a whole offers a sufficiently varied range of dividend policies that the tastes and preferences of all customers can be accommodated. But it is also generally assumed that the marginal tax rate on dividend income is higher than that on capital gains. In a state of equilibrium, this disadvantage must be capitalized by the capital market and compensated by higher yields for stocks with larger dividend components.

This last proposition is not universal in application since it depends on tax law. There are two reasons to believe this is not necessarily true of the Canadian economy. First, it has always been quite open to foreign investors who may be subject to taxes very different from the Canadian ones. The influence of their trading, as well as those of national organizations that do not pay taxes (such as pension funds), may be such that the Canadian individual is not the relevant marginal investor.

Second, up until 1972, capital gains were certainly more attractive since they were taxfree. This situation was changed by the Tax Reform. Following the integration of individual and corporate taxes, capital gains remained attractive only to those investors with relatively high marginal rates.[4] Moreover, a growing number of large corporations began to offer their stockholders a choice between cash dividends and stock dividends, so that between 1977 and 1985 the stockholder has been able to choose between the tax rates on dividends and capital gains.

Last, dividends received by Canadian parent companies from their subsidiaries are not considered as taxable income, although this exemption does not apply to capital gains. We conclude that it is not clear *a priori* whether the behaviour of stocks on the market and their rates of return can be directly related to tax variables; empirical verification is required.

Empirical Tests[5]

Elton-Gruber Model

Several researchers[6] have observed that the difference between the price of a stock "cum-dividend" and its price "ex-dividend" must be smaller than the dividend amount because of income taxes. It was assumed that the difference between these two prices could be used to measure the marginal investor's tax rate. Therefore,

it should reflect changes in the tax parameters and could reveal tax effects on yields.

The application of the Elton-Gruber model to Canadian data produces unsatisfactory results. Indeed, 50 per cent or more of the personal tax rates computed over the study period were negative or above the maximum rates set by the Canadian tax system. In some cases, the proportion of unacceptable rates reached 70 per cent. Mean rates computed from such data and which have been used in several studies are not representative of their frequency distributions and cannot provide tests of the hypothesis of a significant tax effect on rates of return. It must therefore be concluded that the Elton-Gruber model is of little value in a Canadian context.

Auerbach Model

A new and much more complex model has recently attracted the attention of analysts.[7] Unfortunately, the results obtained with Canadian data are not more realistic than those of the previous model. Scarcely 29 per cent of the estimates are plausible. In both the Elton-Gruber and Auerbach models, the estimates of tax rates are very sensitive even to small changes in stock prices. As the latter vary widely, tax effects -- if any -- are completely hidden.

Tax Reform

The 1972 Reform brought three changes to the Canadian tax system: a tax on capital gains was introduced, the maximum marginal rate for individuals was lowered, and the taxation of individuals and corporations was partially integrated. It is thus to be expected that the reaction of stock prices to a stock going ex-dividend would be different before and after 1972. Responses in Canada and the United States should also be different. Some researchers[8] claim to have detected this effect, but it is doubtful that these results are valid. Even though mean changes cannot be used to infer tax rates, entire frequency distributions can be compared. It is found that they are significantly different before and after 1972. However, one should note the analysis is conducted in two steps. First, ex-dividend day relative price changes are computed. Second, tax parameters (dividend gross-up, dividend tax credit, and taxable proportion of capital gains) are used to infer marginal tax rates. The second step is responsible for the differences between the frequency distributions. In other words, the Tax Reform has had no effect on the response of stock prices to dividends, but simply changed the values of the parameters used to estimate tax rates. We must conclude again that research has so far failed to draw convincing empirical evidence from the 1972 experiment.

2 FINANCIAL STRUCTURES AND DIVIDEND POLICY

Theoretical Review[9]

In finance it is traditionally taken for granted that the deductibility of interest from corporate income for tax purposes represents a powerful incentive for debt financing. This hypothesis has recently been refined.[10] While it is true that debt-to-assets ratios in the economy as a whole may be higher than would be the case if interest were not an eligible deduction, it does not necessarily follow that a similar effect will be detectable at the level of the corporation. A stockholder can always choose between personal borrowing and borrowing on account of the corporation he has invested in. If the personal marginal tax rate is higher than the corporate rate, personal loans will appear preferable since they will lead to greater tax savings. Consequently, a complete analysis of the fiscal aspects of financing decisions should take into account the marginal tax rate of the corporation, the marginal tax rate of the stockholder, and dividend policy, since dividends are not taxed at the same rate as capital gains arising from reinvested earnings. Our analysis of Canadian tax law led us to propose an indicator, called the Tax Advantage of Personal Borrowing (TAP), whose value changes according to these variables. An investor who succeeds in maximizing TAP derives the maximum net taxable income from his

investment. A positive sign indicates that personal debt is preferable to corporate debt.

It must be noted, however, that the use of TAP in a statistical study presents a major computational problem. This indicator assumes that the investor's personal tax rate is known. As we have seen, this information cannot be extracted from stock market data. Therefore, it can be estimated with some accuracy only when the number of stockholders in a corporation is very small. But, assuming that the major corporations attract homogeneous clientele groups, rough approximations can be made. Corporations can be divided into three categories. The first group is composed of subsidiaries partly owned by parent companies that have a major influence on their activities. In such cases, it can be assumed that the appropriate tax rate for stockholders is that of the parent company. The second group comprises "private" corporations, those controlled by a family or group of individuals owning over 10 per cent of voting shares; their marginal tax rates are relatively high. It can be reasonably supposed that these taxpayers are taxed at the maximum individual rates. The last group is composed of large "public" corporations whose stock is owned by investors who do not fit into either of the two preceding categories. We assumed their marginal stockholder is subject to the median tax rates for individuals declaring investment income. On the basis of this series of assumptions, a figure can be assigned to TAP variable for each corporation listed in the

Compustat data base,[11] and its effect on borrowing and dividend policies can be examined.

Empirical Results

Financial Structures of Major Canadian Corporations[12]

There were between 224 and 250 Canadian corporations with financial statements listed on Compustat that had positive five-year profits for the 1967, 1972, 1977, and 1982 fiscal years. Their debt-to-assets ratios,[13] the dependent variable, can be determined from book or from stock market values.[14] According to a cross-sectional study, these ratios are inversely related to profit rates, and directly to assets growth rates. Size, as measured by sales, is also significant, but the sign of its regression coefficient depends on the industrial sector being examined. The addition of explanatory tax variables, like TAP or other variables recently proposed by researchers, does not lead to any improvement in the model. In other words, the freedom of choice available to managers (represented by profit rates), financing requirements (represented by growth rates), and size provide a statistical "explanation" of financial structures. But such is not the case for tax variables, however, at least at the level of the firm and within industrial sectors. Not only are they rarely statistically significant, but their signs are not what was expected. Otherwise, the results are consistent: the

debt-to-assets ratio is inversely related to the profit rate and it is also inversely related to the corporate tax rate which rises as profits increase. This does not necessarily mean that income taxes have no bearing on borrowing decisions. In a cross-section study comparing only profitable firms in the same sector, it could also indicate that tax variables have the same relative importance for all corporations in that sector, as suggested by M. H. Miller, or, alternatively, that other variables in the model have already captured the effect of the tax savings represented by interest payments.

Tax Reform and Financial Structures[15]

The Tax Reform of 1972 represented an important event, and the sign and absolute value of the TAP variable were significantly altered. Estimates of TAP for Compustat corporations suggest that the average incentive to borrow on corporate account increased significantly in 1972. This effect was primarily felt by "private" corporations. But these companies did not actually increase their debt-to-assets ratios more than the others. As suggested by numerical estimates of TAP, debt-to-assets ratios tended to rise after 1972. This process had started as far back as 1966, however, long before the Reform. Therefore, the existence of a cause-effect relationship is questionable. Thus, until now, empirical research has not produced evidence that this

major change in tax legislation has been the source of detectable changes in financial structures. Another implication of this analysis is that capital structure decisions are determined by variables more basic than tax variables.

Tax Reform and Dividends

Conventional wisdom holds that the Reform conferred a relative advantage on dividends. As we have shown, this assumption is subject to important qualifications and it has not been confirmed by the data. The 1972 changes had significant effects only on extreme policies. In particular, "private corporations" that had adopted payout ratios lower than 15 per cent and greater than 45 per cent had a tendency to change their policies. Consequently, the proportion of corporations with ratios between 15 and 45 per cent grew substantially. The dividend policies of large corporations thus became more similar. This observation indicates that the most important aspects of the 1972 Reform were those that reduced the gaps between the rates applied to different income brackets and gaps between the rates applied to various sources of income.

3 CONSEQUENCES FOR FISCAL POLICY

What information can be gleaned from this research? There are three lessons that can be learned from the analysis. The first concerns corporate income taxes, the second the difference between dividends and capital gains from a fiscal point of view, and the third is a general observation.

We have observed that differences between debt-to-assets ratios cannot be "explained" statistically by tax factors. This result is inconsistent with the generally held belief that the deductibility of interest payments is a powerful incentive to debt financing that can be detected at the individual firm level.

Over the years, the difference between dividends and capital gains, fiscally speaking, has been considerably weakened by a decline in the maximum marginal rates applicable to individuals and by integration of corporate and personal income taxes. This seems to have had no repercussion on the structure of rates of return to investors. Moreover, we have been unable to relate the introduction of the capital gains tax to changes in financial structures. It would be surprising if changes in that tax had a significant impact on corporate and personal financial decisions.

The two propositions stated above run counter to conventional wisdom. How can they be explained? The number of variables and parameters that govern how investment and corporate income are taxed is relatively large. The marginal impact of each one is inversely related to their number. As the number of applicable sections of the law and regulations increases, both for the corporation and the investor, the number of possible offsetting reactions to new government policies also increases. A new corporate financial policy can even cancel out the effect of a new Income Tax Act provision. This situation has two consequences. First, it can easily lead to an overestimation of the fiscal distortions of debt and dividend policies. As long as these distortions are desired by policy makers, their absence is also a sign of fiscal policy inefficiency. Second, adjustments involve costs imposed upon taxpayers by governments. These are of two kinds: direct costs connected with fiscal management, and uncertainty stemming from the fiscal consequences of financial decisions. Uncertainty increases as legislation becomes more complicated and less stable.

The various research projects discussed in this paper lead to one conclusion: our complex tax legislation does not seem to produce effects that can be detected at the firm level; thus complexity serves no useful purpose. Adjustment costs represent a loss, pure and simple, and it would make sense to simplify the tax

system. Since what really counts is the effective tax rates and especially the difference between personal and corporate tax rates rather than the numerous specific sections of the tax laws and regulations, it would be better to free them from the burden of many clauses that serve only to obscure their role as an indicator of the resources that the State is prepared to withdraw from the private sector. The most efficient laws and regulations are those that are the most simple. This is the route we suggest.

NOTES

Chapter 3

1 For a summary of U.S. studies on this topic, see Hamada and Scholes (1984).

2 See M. H. Miller (1977).

3 This assumption, first put forward in Miller and Modiglani's famous and then controversial 1961 article, is now generally accepted. For further discussion, see Brealey and Myers (1984), pp. 341-342.

4 For example, rates of 42 per cent (Canadian and Ontario governments combined) from 1972 to 1976, and 54 per cent from 1978 to 1981.

5 Section 1.2 summarizes the results obtained by Gagnon, Suret and Morissette (1985).

6 See Elton and Gruber (1970) and Booth and Johnston (1984).

7 See Auerbach (1981).

8 See Lakonishok and Vermaelen (1983).

9 This section is taken from Gagnon and Suret (1985).

10 See Miller (1977).

11 See Standard and Poor's (1982).

12 This section gives the conclusions from Chapter 2.

13 Or the quotient of total debt, excluding the deferred tax credit, to assets.

14 In this case, the computation is hybrid, since only the market value of common equity is estimated. Other items of the liability side of the balance sheet are attributed their book values.

15 This section gives the conclusions from Chapter 1.

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