ARE CANADIAN ENTREPRENEURS FINANCIALLY CONSTRAINED?

By

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Prepared for:

Industry Canada, Ottawa

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1. Introduction

This paper empirically investigates the common claim that small, young businesses are financially more constrained then large, mature businesses. Using data on employer businesses that operated in Canada during the period 1984 to 1994, we examine the behavior of the growth-size relation and the growth-age relation over the business cycle for evidence of this claim. In particular, we test the prediction that financially constrained firms are likely to grow faster than unconstrained firms during the upswing of the business cycle when cash flows are high and credit conditions slack. We find that during the study period, the growth-size relation was invariant for firms of the same age. Hence, there is no evidence that small firms are more constrained than large firms of the same age. However, the growth-age relation did vary considerably over the business cycle. Young firms grew more rapidly than older firms of the same size in boom times than in recessions. This finding is consistent with the hypothesis that young firms are more financially constrained than older firms.

This paper also investigates the equally common claim that small firms grow faster than larger firms. The key issue in examining this claim is to take into account the effects of sample selection on estimates of the growth-size relation. Small firms that survive typically grow faster than large firms, but small firms are also more likely to fail. We find that taking exits into account always reverses the sign of the growth-size relation from negative to positive – i.e., large firms have higher growth rates than small firms when we consider all small firms, including those that fail. The relationship is highly nonlinear, with most of the positive effect of size on growth rates concentrated on firms with fewer than 10-20 employees.

This paper connects two strands of empirical literature on firm growth. There is a large finance and macroeconomics literature that studies the relation between corporate investment and cash flow to test for the presence and importance of financing constraints. (See Kaplan and

Zingales [1997] for a critique of this literature.) The seminal article in this literature is by Fazzari, Hubbard, and Petersen [1988]. They divide a selected sample of manufacturing firms into classes based on dividend payout policies and argue on *a priori* grounds that firms with the lowest dividend payout ratio over a fifteen-year period are the ones that are most financially constrained. Hoshhi, Kashyap, and Scharfstein [1991] divide Japanese firms on the basis of whether they belong to a keiretsu, which is a corporate group with a main bank. In each case, the authors find higher investment-cash flow sensitivities for firms that were *a priori* classified as financially constrained. Our approach is similar to that taken by these authors. We use the business cycle as a proxy for cash flow conditions and classify firms on *a priori* grounds as financially constrained based upon their age and size.

The growth rate-size relationship has been the focus of a great deal of empirical research in industrial organization. Much of the early interest focused on Gibrat's Law, which states that growth rates are independent of size. The more recent work is based upon the learning model of industry evolution developed by Jovanovic [1982]. This model provides a number of predictions concerning survival rates, the growth-size, and growth-age relations. Survival rates should increase with size and age, and growth rates of survivors should decrease with size at every age. However, because smaller, younger firms are also more likely to fail, the effects of size and age on the expected growth rate of firms are ambiguous. The consensus of the empirical studies, notably Evans [1987] and Dunne, Roberts, and Samuelson [1989], is that survival rates exhibit the predicted patterns and that growth rates decrease with age and size, even after taking exit into account. We obtain similar results for survival rates and growth-age relation, but obtain a positive growth-size relation after taking exits into account.

The paper is organized as follows. Section 2 describes the data used to test the hypotheses that young firms are more financially constrained than older firms and that small firms grow faster than larger firms. The theoretical framework is discussed in Section 3. The econometric model is presented in Section 3 and the estimation results are discussed in Section 4. Section 5 provides concluding remarks.

2. The Data

The data used for this study are drawn from the Emerging Business Data Base (EBD), a longitudinal data base prepared by Statistics Canada in collaboration with, and with the support of, the *W. Maurice Young Entrepreneurship and Venture Capital Research Centre* at the University of British Columbia. The data base provides information on all ***employer*** businesses that operated in Canada during the period 1984 to 1994. A detailed description of the data base and how it was constructed is provided in an appendix available from the authors. This section briefly reviews the main features of the data that are relevant for this paper.

The EBD distinguishes between unincorporated and incorporated firms. An employer enterprise is classified as "incorporated" in any year for which it files a T2 form with Revenue Canada. For years in which an enterprise was incorporated, selected T2 information on the enterprise is available. However, this study does not use any of this information except to distinguish between incorporated and unincorporated firms. (In later work, we hope to exploit the financial information.) Throughout this report, the term ***enterprise*** will be used to refer to an employer business. It includes both unincorporated and incorporated firms.

An enterprise enters EBD in the year that it hires its first employees. This year is defined to be the ***birth year*** of the enterprise, although it may have previously existed, without employees, as an owner-operated enterprise or partnership. A ***cohort*** of enterprises consists of all enterprises that are born in a given calendar year. The data are comprised of 11 cohorts, which are labeled by the year of their birth, and the set of firms born prior to 1984 that operated in 1984, which is labeled the '83 stock. The ages of the enterprises comprising the '83 stock are not known.

Table 1 gives the number of employer enterprises of different ages that operated in Canada in each of the years 1984 through to 1993 and the fraction of these enterprises that were incorporated. The totals at the bottom of the table reveal a clear trend towards relatively more incorporated firms. The percentage of incorporated enterprises increased each year from 38% in 1984 to 45% in 1993. The cohort decomposition shows that the trend holds at every age level. Finally, in each cohort, the fraction of incorporated firms increases monotonically with age. As we shall see later, this increase is due mainly to higher exit rates among unincorporated enterprises than incorporated firms. The net transition rate between unincorporation to incorporation is positive but small (see data appendix for details).

An enterprise in EBD is defined primarily as a set of employees. When an enterprise changes its name or breaks up into smaller units, the enterprise is classified as a continuing enterprise if there is no substantive change in the set of employees. This procedure eliminates "false" deaths and births. Mergers and acquisitions are treated differently. If enterprise A, a member of the '88 cohort, is purchased in 1990 by another enterprise B, a member of the '85 cohort, then a new enterprise called C is identified and given a synthetic "history" prior to 1990 that is constructed from the histories of enterprises A and B. The "new" enterprise is assigned to cohort '85, and the '88 cohort loses an enterprise. The history of enterprise C is recorded in EBD but not the individual histories of enterprises A and C. This retrospective reconstruction of cohorts creates a potential problem for studying cohort dynamics. Fortunately, the incidence of mergers and acquisitions appears to be negligible.

The EBD provides the following information on each enterprise: location by province, industry by 3-digit SIC code, and a measure of annual employment called "average labour units" or ALUs. These ALUs are computed by dividing the total annual payroll of the enterprise by the average annual income for workers in the relevant province, size class, and industry at the 3-digit SIC level (see Appendix 1 of Picot and Dupuy, 1996). Thus, ALUs measure what might be thought of as the number of "standardized workers" employed by an enterprise over any year in which it operates the entire year.

The ALU size of the enterprise in its birth year is an underestimate of the number of workers employed by the enterprise, since the enterprise is unlikely to have operated the entire year. To correct this downward bias in birth size, and subsequent upward bias in the enterprise's growth rate as a one-year old, the birth year size of every enterprise was scaled up by a factor of 2. The implicit assumption is that the number and characteristics of enterprises born before July 1 in any given year are similar to those born after July 1. (See Brander et al. [1996], for more details on the effects of this measurement issue on the treatment of entrants and their growth rates.) The same measurement issue arises for the *exit* year of an enterprise, which is defined as the final year in which the enterprise records positive ALUs. However, in this case, a correction is not necessary since exits are treated separately from survivors.

Table 2 gives the number and average ALU of unincorporated enterprises of different ages for each year between 1984 to 1994 using annual cross-sections. The total number of unincorporated enterprises fluctuated with the business cycle but was roughly the same in 1993 as it was in 1984. The average size of an unincorporated enterprise was between 8 to 9 ALUs throughout the ten-year period. Multiplying the number and average ALU of unincorporated enterprises to obtain annual total employment in the unincorporated sector reveals that it was essentially constant from 1984 to 1993 at approximately 4.5 million ALUs. Thus, employment in the unincorporated sector of employers has not grown since 1984.

The cohort decomposition of the unincorporated sector reveals several patterns. The cross-sectional decline rate in each cohort is high. For example, the number of unincorporated enterprises in the '84 cohort in 1993 is only 13% of the number in 1984, the birth year. Most of this attrition is due to exit since the number of transitions to incorporation was relatively small. The average size of unincorporated enterprises in a cohort increases monotonically with its age.

For example, the average size of unincorporated enterprises in the '84 cohort rises from 2.44 ALUs in 1985 to 5.85 ALUs in 1993. This pattern reflects two forces at work within each cohort: smaller enterprises are more likely to exit and survivors tend to grow. The net effect of these two forces on employment is negative since total employment in each cohort declines with age. For example, employment in unincorporated enterprises of the '84 cohort measured 184,510 ALUs in 1985 but only 78,600 ALUs in 1993.

Table 3 gives the number and average ALU size of incorporated firms of different ages for each year in the sample period. The totals at the bottom of the table establish that the corporate sector has grown substantially over the period, both in terms of the number of enterprises and employment. The number of corporations increased by 111,458 (36%) and employment measured by ALUs increased by 1.4 million ALUs (27%). The mean ALU size was marginally lower in 1993 than in 1984.

The cohort decomposition of the incorporated sector provides a number of interesting comparisons to the unincorporated sector. The cross-sectional decline rate in the number of incorporated enterprises is significantly lower than that of unincorporated enterprises. For example, the number of incorporated enterprises in the '84 cohort in 1993 is 57% of the number in 1984; the corresponding number for unincorporated enterprises is 12%. The average size of incorporated firms in a cohort tends to increase with age and is usually at least twice that of unincorporated firms of the same age. Total employment in the cohorts fluctuates with the business cycle but, in contrast to unincorporated firms, did not decline over the period. For example, for the '84 cohort, employment in incorporated enterprises was 200,181 ALUs in 1985 and 216,380 ALUs in 1993. In summary, at every age, cohorts of incorporated firms are on average larger than cohorts of unincorporated firms, have lower failure rates, and higher growth rates conditional on size.

Selection Criteria

Given our focus on financial constraints, we exclude enterprises in SIC Divisions N, O, and P, which represent government, education, and health services respectively. We do this because these enterprises, which are mostly unincorporated, public-sector enterprises such as hospitals and universities, are not subject to the same economic forces that prevail in the private-sector economy. It is worth noting that removing these divisions lowers the average ALU size of unincorporated enterprises in the '83 stock and the average ALU size of the population of unincorporated enterprises by 50% (see Hendricks et al. [1997]). Thus, the mean size of an unincorporated enterprise in the private sector is only 4.5 ALUs, which is roughly 25% of the mean size of an incorporated enterprise.

Table 4 gives the survival and growth pattern of employer enterprises that begin life as incorporated enterprises in the private sector. Table 5 provides similar data on the set of unincorporated-enterprise births. An enterprise in a cohort is classified as incorporated if it files a T2 tax return for its birth year or the following year. Enterprises that become incorporated in later years are included in the sample of unincorporated firms. Survival rates for unincorporated firms increase with age and are lower at every age than the survival rates for incorporated firms. Surprisingly, incorporated survival rates do not vary with age. The annual growth rates of survivors are similar for the two types of firms and decline with age. However, conditional on size, an incorporated firm has a higher growth rate than an unincorporated firm.

The growth rates in Tables 4 and 5 are computed as simple averages of the individual firm growth rates. A comparison with the employment changes given in Tables 2 and 3 reveals that the average growth rate of a cohort at different ages is much higher than the corresponding growth rate in total employment. This is because most of the enterprises in a cohort in its early years are very small enterprises. These firms can have astronomically high growth rates. For example, a relative small increase in employment from, say, 0.05 ALUs to 1.05 ALUs, represents a growth rate of 2000%. The same growth rate applied to a firm with 10 employees would imply an increase in size to 210 ALUs.

In an econometric analysis of growth rates, the presence of very small firms with very large growth rates means that, as outliers, they have a disproportionate effect on coefficient estimates. To mitigate this problem, we exclude firms that had fewer than 2 ALUs in their birth year and redefine the exit year of an enterprise as the first year in which its number of ALUs falls below 1. These criteria are admittedly ad hoc, and introduce some degree of selection bias, especially for the one-year olds. More work needs to be done on testing the robustness of the estimates to changes in these criteria.

We impose a number of additional criteria in selecting the (random) samples for analysis. Because of measurement problems with birth-year size, enterprises that did not survive to age 2 were dropped. Enterprises with more than 75 ALUs in their birth year or 200 ALUs in their first full operating year were excluded on the grounds that they were unlikely to be facing financial constraints. Also excluded were enterprises with employment histories that exhibited "gaps" (i.e., years in which no ALU was recorded bracketed by years with positive ALUs) or extremely large "discontinuities" (i.e., a year in which the number of ALUs is much larger or smaller than the other years in the employment history). The presumption is that these gaps and discontinuities reflect recording or coding errors. Enterprises in Division K, the finance and insurance industries, were excluded due to classification problems in this sector.

3. Theoretical Framework

Before discussing the hypothesis that entrepreneurs are financially constrained, we need to define our terms more precisely. By an entrepreneur, we mean a small, typically young, business that needs funds to finance new investment. The entrepreneur is defined as financially constrained if she is unable to finance the new investment out of internal funds and she faces a wedge between the internal and external costs of funds. By this definition, most firms are likely to be financially constrained since even a small transaction cost in raising external funds is enough to create a wedge between the internal and external costs of funds. Therefore, the real issue is the magnitude of the wedge and whether it is significantly larger for entrepreneurs than established enterprises. To address this issue, we need to understand the sources of the wedge.

Economists argue that the wedge is caused primarily by informational asymmetries between the entrepreneur and outside investors. Jensen and Meckling [1976], Grossman and Hart [1982], Jensen [1986], Stulz [1990] and Hart and Moore [1995] develop models in which the manager cannot commit to act in the interests of shareholders because the manager's actions are not observable. Investors anticipate the entrepreneur's opportunistic behavior and account for it by discounting the price of equity and charging a premium on debt. Thus, internal finance is cheaper than external finance. Myers and Majluf [1984] and Greenwald, Stiglitz, and Weiss [1984] develop models in which entrepreneurs who know they have good projects cannot distinguish themselves from entrepreneurs with "lemons." Outside investors are forced to include a "lemons" discount on the price of equity and charge a "lemons" premium on debt. Once again, the result is that the cost of internal finance is lower than external finance.

Neumann [1997] develops a model with both types of asymmetric information. Outside investors have to screen out entrepreneurs with "lemons" and then, having identified an entrepreneur with a good project, ensure that she has an incentive to work hard to make the project a success. In contrast to the literature, Neumann gives the entrepreneurial firm an additional financing option: it can wait, accumulate internal funds, and seek outside financing at later date. He shows that most entrepreneurs with good projects will use this option as long as the time cost of delay is not too high. By accumulating more internal funds, entrepreneurs with good projects can increase their stake in the project that allows them to distinguish themselves from the "lemons" in the market. The portion that is not funded internally is funded by debt. His results are broadly consistent with the facts: most new investment is financed internally and the remainder is financed mostly by debt (see Mayer [1990] and Mackie-Mason [1990]).

Firms of all ages and sizes are likely to suffer from the effects of informational asymmetries. However, large established firms have two advantages that suggest that the wedge between the internal and external costs of funds is smaller for them than for small, younger firms. First, investors can examine their track record. If the firm has been successful in the past, it is more likely to be successful in the future and hence the risk of financing a "lemon" is reduced. Second, large firms have assets that can be pledged as collateral against debt. When the entrepreneur has a larger stake in a venture, she has a stronger incentive to behave in ways that are consistent with the outside investors' interests and, as a result, the wedge is smaller. By contrast, young firms often have no track record of success, little internal funds, and not much collateral.

We focus primarily on the hypothesis that the wedge between internal and external costs of finance is greater for new firms than for old firms, independent of size. We test the implication that, *ceteris paribus*, young firms grow faster than older firms in the upswing of the business cycle. In boom times, returns to new investment rise, making investment more attractive for firms of all ages. Also, cash flows are higher, giving firms more internal funds to finance new investment. Thus, all firms are likely to grow faster in boom times. However, if young firms are financially more constrained than older firms, their return to new investment is higher than that faced by older firms. Hence, young firms are more likely to invest the additional internal funds and, given the same size and rate of increase in profits, have higher growth rates than older firms.

The hypothesis that young firms are more financially constrained than older firms also has a testable implication for recessions. In the downswing of the business cycle, most firms are not investing in new projects. Young firms may be forced to disinvest more than older firms since the latter may be in a better position to borrow to offset negative cash flows. However, there is no "lemons" problem in financing old investment. Furthermore, given the irreversibility (and indivisibility) of most types of investment, firms cannot disinvest as easily as they invest. Thus, the nonnegativity constraint on new investment implies an asymmetry between the upswing and the downswing of the business cycle. Young firms may have a harder time surviving recessions than do older firms but their growth rates are unlikely to differ (i.e., be more negative) significantly from the growth rates of older firms in the downswing of the business cycle.

A similar empirical strategy can be used to test the hypothesis that small firms are more financially constrained than large firms independently of age.

4. The Empirical Model

The main issue that needs be to addressed in developing an empirical model for estimating the impact of the business cycle on the growth rates of firms of different ages and size is the treatment of exits. The growth and failure of an enterprise should not treated as independent events but instead be viewed as the outcome of a single economic process. If the enterprise is unprofitable, it fails; if it is profitable, it survives and grows depending upon its prospects.

Let π^*_{it} be a measure of the profitability of enterprise i in year t, and let y^*_{it} denote its potential growth rate in year t. The observed growth rate of firm i in year t is denoted by y_{it}. Let X_{it} denote the (transposed) vector of observable characteristics of enterprise i in year t that determines its profitability and growth rate. The empirical model is defined as follows:

$$(1) \qquad \pi^*_{it} = X_{it}\beta_t + u_{it}$$

$$(2) \qquad y^*_{it} = X_{it}\alpha_t + v_{it}$$

$$(3) \qquad y_{it} = \begin{cases} y^*_{it} & \text{if } \pi^*_{it} \geq 0 \\ -1 & \text{if } \pi^*_{it} < 0. \end{cases}$$

The idiosyncratic errors (u_{it}, v_{it}) are independently and identically distributed drawings from a bivariate normal distribution with zero mean, standard deviations σ_1 and σ_2, and covariance σ_{12}. The parameter vectors (β_t,α_t) measure the impact of the firm's characteristics on its profitability and growth rate respectively. A firm is assumed to exit if it is no longer profitable. Hence, the sign of π^*_{it} is observed even though its value is not observed. A firm's potential growth rate is observed only if it is profitable; if it exits, its growth rate is defined as -1.

The above model is often called the Tobit model. It is well-known (see Amemiya [1985]) that if σ_{12} is not zero, then the least squares estimator of α_t is biased. To correct for this bias, we adopt Heckman's two-step estimator (hereafter referred to as "Heckit"). In step 1, equation (1) is estimated by a probit regression in which the dependent variable is equal to 1 if the firm survives year t and 0 otherwise. We then use the estimate of β_t obtained from the probit regression to compute the Inverse Mill's Ratio:

$$\lambda(X_{it}\beta_t/\sigma_1) = E[u_{it} \mid u_{it} > -X_{it}\beta_t]$$

for each enterprise i that survives year t. The Inverse Mill's Ratio is then included as a regressor in the growth rate equation, which is estimated by ordinary least squares (OLS).

The vector X_{it} includes the log of the employment size of the enterprise in its birth year and in year t-1, the age of the enterprise, and dummy variables for industry (two-digit SIC code). These factors are assumed to determine the profitability of the enterprise in year t, which in turn determines its survival rate, and if it survives, its growth rate in year t. A different constant is estimated for each year. Its variation across the sample period measures the impact of the business cycle on the survival and growth rates of the enterprises. We also allow the coefficient on the size variables to vary across years to see if the business cycle affected the growth-size relationship.

Dunne, Roberts and Samuelson [1989] have criticized the above model on the grounds that the assumption of normally distributed errors is inappropriate for the study of firm growth rates when the population distribution is highly skewed and truncated at -1. To address this issue, we estimated a probit model for growth rates in which the dependent variable is 1 if the firm experienced a positive growth rate and 0 if the growth rate was negative. Exits can be classified either as firms with negative growth rates or analyzed separately from survivors.

5. Estimation Results

This section reports results of the estimation of the survival and growth rate equations for young and "established" incorporated and unincorporated enterprises. In our context, young refers to enterprises that became employers after 1983 (their ages run from 2 to 9) and "established" refers to enterprises that were born prior to 1984 (i.e., stock '83). In each table, the variable, LSizeT, is the logarithm of the firm's current ALU size and the variable, LSize0, is the logarithm of the firm's "initial" size. It is equal to the enterprise's adjusted birth year size when it is two years old; otherwise it is equal to the enterprise's ALU size in its first full year of operation. For enterprises in the '83 stock, LSize0 is the logarithm of their sizes in 1983. The age coefficients measure the effects of age relative to two-year old firms. The year coefficients measure year effects relative to 1993.

Incorporated Enterprises

Table 6 reports the probit results for the survival of young and established incorporated enterprises. For incorporated enterprises, three patterns are present. First, as expected, the probability of survival increases with current size. The magnitude of the effect is larger for established firms than young firms. Second, the probability of survival for young firms decrease slightly with age. Third, the probability of survival for young and established firms was significantly higher in the upswing of the business cycle than in the downswing. However, boom times affected the probability of survival of young firms substantially more than they affected the probability of survival of established firms, and the magnitudes of the response in the recession years were similar across the two age groups.

Table 7 reports the OLS and Heckit estimates of the growth equation for young and established incorporated enterprises. The OLS estimates are reported to emphasize the importance of taking exits into account when estimating the growth-size relation of survivors and measuring the effects of the business cycle. The results indicate that empirical studies that restrict their analysis to survivors are likely to yield misleading conclusions. In the OLS regression, current size has a strong negative effect on growth for both young and established corporations. In the Heckit regression, current size has a strong positive effect for both age groups. Thus, the OLS estimates lead to the conclusion that small firms grow faster than large firms whereas the Heckit estimates yield the opposite conclusion. The difference is not surprising given the probit estimates of the previous table which show that small firms are more likely to exit.

A comparison of the OLS year coefficients for young and established firms would lead to the erroneous conclusion that the affects of the business cycle on the growth rates of young and established enterprises relative to 1993 are similar. The difference in growth rates for a young firm between the peak and trough years (1988 and 1991 respectively) of the business cycle is only 17.3% for young incorporated firms and 12.4% for established incorporated firms. However, the failure to account for exits biases the year coefficients in the OLS regressions towards zero and the bias is particularly important for young firms. The Heckit estimates for young firms for years 1986, 1987, and 1988 are three times the values of the corresponding OLS estimates. For young firms, the amplitude of the induced cycle in growth rates increases to 37.6%; for established firms, it increases also but only marginally to 16%. These estimates yield the conclusion that, in the upswing of the business cycle, the deviation in growth rates relative to 1993 was much greater for young firms than established firms. In recession years, the deviations were relatively similar for the two age groups. These results are consistent with the hypothesis that young firms are more financially constrained than established firms.

Although not reported in the tables, we also examined the hypothesis that small firms are more constrained than large firms by including a complete set of year-size interaction terms as regressors. For each age group, the coefficients were virtually the same in each year and equal to the coefficient reported in Table 7. Thus, we did not find any support in the data that small firms are more constrained financially than large firms.

Table 8 presents the estimates of a regression of the probability of positive growth rate equation for young and established corporations. Once again, we report estimates with and without the sample selection correction. The table confirms the story conveyed by Table 7. When exits are taken into account, the coefficient for current size switches sign from negative to positive, and the year coefficients in boom time increase, particularly for young firms. The upswing of the business cycle has a relatively larger impact on the probability of growth among young corporations than on established firms whereas the impact of recession years is similar for the two age groups. The similarity of the results to those presented in Table 7 suggests that the normality assumption is not crucial. The results also imply that the exit and growth decisions need to be treated differently.

The models estimated for young firms in Tables 6-8 impose the restriction that the growth-size relation and the year effects are independent of age. This restriction is relaxed in Tables 9 and 10 which report estimates obtained from regressing the survival and growth rate equations separately for 2-, 3-, and 4-year olds. The tables reveal that the patterns observed for the young firms taken as a group also hold at the individual age levels. The relationship between growth and size always reverses sign from negative to positive when exits are taken into account. The effects of size on growth do exhibit variation, increasing with age. The effects of the business cycle on growth rates are largely independent of age.

Unincorporated Enterprises

Table 11 reports the probit results for the survival of young and established unincorporated enterprises. As in the case of incorporated firms, the probability of survival for unincorporated firms was positively correlated with current size for both age groups, although the magnitudes are smaller than for incorporated firms. The probability of survival of young unincorporated firms increases with age, which is not surprising given the results presented in Table 2. The surprise is the effect of the business cycle on unincorporated firms. The probability of survival of young unincorporated firms was virtually unaffected by the business cycle during the sample period and moved countercyclically for established unincorporated firms. These results differ markedly from those obtained for incorporated firms.

Table 12 reports the OLS and Heckit estimates of the growth equation for young and established unincorporated enterprises. The behavior of the growth-size relation is qualitatively similar to that of incorporated enterprises. But the impact of the business cycle on growth rates of unincorporated firms is once again quite different than its impact on incorporated firms. The coefficients are mostly small and often not significantly different from zero in both the OLS and Heckit regressions, and for both young and established firms. Correcting for sample selection has a large impact on the interpretation of the effects of age on the growth of young unincorporated firms. In the OLS regression, the age coefficients are negative and not significantly different from zero. In the Heckit estimates, the coefficients are significantly positive and increasing in age.

Table 13 gives a different view of the unincorporated sector by focusing on whether the firm's growth rate is positive or negative rather than on the magnitude of the growth rates. After taking account of the exits, the probability of positive growth by a young firm is an increasing function of its current size. However, size has no effect on the likelihood of positive growth by an established unincorporated firm. The business cycle has a significant impact on the incidence of positive growth for young and established firms. The probability of positive growth was substantially higher in the boom years than in the recession years. Finally, the probability of positive growth for young unincorporated firms was strongly increasing with age.

The differences between the unincorporated and incorporated sector are somewhat puzzling and require further exploration. We need to examine more carefully the characteristics of unincorporated firms and how they differ from those of incorporated firms. Based upon the evidence presented in this paper, it appears as if investment, growth, and longevity are not the primary objectives of unincorporated enterprises.

6. Concluding Remarks

The issue of whether enterpreneurs in Canada face financing constraints that hinder their contribution to the Canadian economy has been the focus of a number of policy initiatives. The target of most of these initiatives is small firms. The empirical evidence presented in this paper suggests that young, incorporated firms should be the target group. They appear to be financially more constrained than established firms. There is no evidence to support the hypothesis that small firms are financially more constrained than large firms.

There are other explanations for the empirical findings in this paper. For example, we have implicitly assumed that the arrival rate of profitable investments is independent of age and size. If it decreases with age, then young firms are more likely to invest and grow than established firms. Certain types of learning models with no asymmetry in information between entrepreneur and financiers are also capable of explaining several of the patterns observed in the data. We intend to use the financial data to discriminate more carefully among the alternative explanations.

Finally, a note of caution needs to be sounded given the preliminary nature of the results. The issue of heteroscadasticity that results from the Heckman two-stage model needs to be addressed, for it can have important effects in Tobit models. Further experimentation with the sample selection criteria also needs to be done to ensure that the results are robust.

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Table 1

Number of Employer Enterprises and Share of Incorporated Firms

	YEAR									
COHORT	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**
'83	662,807	596,758	545,683	499,803	456,509	416,774	381,724	350,291	325,605	303,590
Stock	0.42	0.45	0.47	0.49	0.51	0.52	0.54	0.55	0.56	0.56
84	153,933	109,434	88,429	74,950	64,243	55,387	47,704	41,598	37,190	33,592
	0.2	0.26	0.32	0.36	0.39	0.42	0.45	0.48	0.5	0.52
85		146,881	105,235	83,901	70,041	59,365	50,382	43,376	38,582	34,699
		0.17	0.24	0.31	0.36	0.4	0.44	0.47	0.5	0.51
86			140,596	105,820	83,492	68,646	57,153	48,328	42,315	37,644
			0.19	0.27	0.34	0.39	0.43	0.47	0.5	0.52
87				145,451	108,923	84,601	67,531	55,873	48,292	42,529
				0.22	0.3	0.35	0.4	0.45	0.49	0.51
88					143,045	108,040	80,384	64,030	54,170	47,069
					0.24	0.3	0.37	0.42	0.47	0.49
89						137,004	96,652	71,663	58,617	49,707
						0.22	0.3	0.37	0.42	0.45
90							153,079	107,771	82,185	66,768
							0.22	0.31	0.37	0.41
91								144,547	105,300	79,860
								0.24	0.32	0.38
92									137,086	99,048
									0.27	0.35
93										137,288
										0.27
Total Number	816,740	853,073	879,943	909,925	926,253	929,817	934,609	927,477	929,342	931,794
Mean Share	0.38	0.38	0.38	0.39	0.41	0.41	0.42	0.43	0.45	0.45

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Table 2

Number and Average ALU of Unincorporated Employer Enterprises

Cohort	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
'83	383,209	328,750	288,737	255,838	225,494	198,585	176,835	158,168	144,311	133,421
Stock	11.3	12.55	13.23	14.33	15.66	17.85	20.42	22.51	24.51	24.76
84	123,597	80,506	60,464	48,321	38,909	31,918	26,048	21,505	18,418	16,226
	1.61	2.44	2.89	3.26	3.66	4.16	4.73	5.07	5.5	5.85
85		122,310	79,690	58,268	44,615	35,623	28,434	22,863	19,301	16,861
		1.56	2.53	2.92	3.3	4.11	4.56	5.06	5.35	5.95
86			113.680	77,627	54,934	42,121	32,660	25,666	21,153	18,085
			1.74	2.69	3.22	3.98	4.47	4.84	5.14	5.43
87				114,165	76,241	54,582	40,243	30,707	24,859	20,906
				1.66	2.88	3.59	4.76	5.14	5.53	6.02
88					109,322	75,539	50,790	36,838	28,928	23,876
					1.55	2.78	3.48	3.85	4.23	4.66
89						107,391	67,903	44,957	33,812	27,140
						1.53	2.64	2.86	3.11	3.16
90							119,279	74,764	51,565	39,281
							1.47	2.17	2.44	3.14
91								109,777	71,655	49,857
								1.36	2.13	2.58
92									100,670	64,591
									1.39	2.3
93										100,158
										1.6

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total Number	506,806	31,566	542,571	554,219	549,515	545,759	542,192	525,245	514,672	510,402
Mean ALU	8.94	8.49	8.1	7.93	7.98	8.36	8.73	8.85	9	8.78

Table 3

Number and Average ALU of Incorporated Employer Enterprises

	YEAR									
Cohort	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
'83	279,598	268,008	256,946	243,965	231,015	218,189	204,889	192,123	181,294	170,169
Stock	18.42	19.97	21.74	23.79	26.06	27.7	28.01	27.67	27.76	28.21
84	30,336	28,928	27,965	26,629	25,334	23,469	21,656	20,093	18,772	17,366
	4.3	6.92	8.03	9.37	10.72	11.74	12.09	12.14	12.21	12.46
85		24,571	25,545	25,633	25,426	23,742	21,948	20,513	19,281	17,838
		5.28	8.78	10.28	11.5	12.31	12.66	12.25	11.78	11.99
86			26,916	28,193	28,558	26,525	24,493	22,662	21,162	19,559
			5.44	8.42	9.84	10.88	11.33	11.22	11.24	11.57
87				31,286	32,682	30,019	27,288	25,166	23,433	21,623
				4.77	8.05	9.49	9.59	9.39	9.56	9.81
88					33,723	32,501	29,594	27,192	25,242	23,193
					4.07	6.83	7.76	7.74	7.97	8.1
89						29,613	28,749	26,706	24,805	22,567
						3.27	5.71	6.16	6.5	6.99
90							33,800	33,007	30,620	27,487
							3.85	5.82	6.33	6.7
91								34,770	33,645	30,003
								3.73	5.7	6.15
92									36,416	34,457
									3.34	5.37
93										37,130
										3.36
Total Number	309,934	321,507	337,372	355,706	376,738	384,058	392,417	402,232	414,670	421,392
Mean ALU	17.04	17.67	18.32	18.85	19.29	19.54	18.71	17.4	16.45	15.88

Table 4

Annual Survival Rates and ALU Growth Rates for Incorporated Births

	YEAR									
Cohort	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
Stock '83	0.95	0.95 0.26	0.94 0.20	0.94 0.22	0.94 0.17	0.94 0.18	0.94 0.12	0.94 0.00	0.94 0.03	0.94 0.03
84	0.91	0.94 1.62	0.93 0.52	0.93 0.41	0.92 0.35	0.91 0.25	0.92 0.14	0.93 0.05	0.93 0.09	0.93 0.07
85		0.97	0.97 1.86	0.97 0.61	0.93 0.40	0.92 0.29	0.92 0.18	0.93 0.05	0.93 0.07	0.93 0.06
86			0.99	0.99 1.97	0.93 0.66	0.92 0.34	0.92 0.20	0.93 0.09	0.93 0.09	0.93 0.08
87				0.92	0.92 2.01	0.90 0.45	0.91 0.28	0.92 0.10	0.92 0.11	0.93 0.09
88					0.90	0.90 1.76	0.90 0.32	0.92 0.12	0.92 0.18	0.92 0.11
89						0.92	0.92 1.41	0.91 0.19	0.91 0.22	0.91 0.25
90							0.92	0.92 1.27	0.90 0.30	0.90 0.25
91								0.90	0.90 1.50	0.89 0.34
92									0.88	0.88 1.49
93										0.88
Mean Survival Rate	0.95	0.95	0.94	0.95	0.93	0.93	0.92	0.93	0.93	0.92
Mean Growth Rate		0.43	0.41	0.47	0.47	0.41	0.29	0.18	0.25	0.25

<u>**Table 5**</u>

Annual Survival Rates and ALU Growth Rates for Unincorporated Births

	YEAR									
Cohort	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
Stock '83	0.85	0.89 0.25	0.89 0.23	0.89 0.24	0.89 0.18	0.90 0.21	0.90 0.10	0.92 0.02	0.92 0.08	0.92 0.04
84	0.64	0.75 1.40	0.80 0.59	0.81 0.48	0.82 0.35	0.82 0.31	0.83 0.20	0.86 0.07	0.88 0.15	0.88 0.09
85		0.64	0.74 1.62	0.77 0.56	0.79 0.41	0.80 0.31	0.81 0.24	0.85 0.08	0.87 0.12	0.87 0.09
86			0.67	0.71 1.68	0.76 0.51	0.77 0.37	0.79 0.27	0.82 0.09	0.85 0.17	0.85 0.10
87				0.66	0.71 1.50	0.73 0.49	0.77 0.26	0.81 0.11	0.83 0.19	0.84 0.13
88					0.68	0.67 1.51	0.73 0.34	0.79 0.19	0.82 0.18	0.83 0.19
89						0.62	0.66 1.22	0.75 0.21	0.79 0.28	0.81 0.18
90							0.62	0.69 1.02	0.75 0.31	0.78 0.22
91								0.64	0.67 1.29	0.74 0.30
92									0.57	0.66 1.28
93										0.66
Mean Survival Rate	0.80	0.81	0.82	0.80	0.80	0.78	0.79	0.80	0.78	0.80
Mean Growth Rate		0.43	0.48	0.50	0.43	0.44	0.30	0.20	0.29	0.25

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<u>Table 6</u>

Probit Estimates of Survival for Incorporated Enterprises[1]

	Incorporated Enterprises	
Variable	**Ages 2-9**	**Stock '83**
Constant	1.210 (.038)	1.240 (.033)
LSize 0	-.170 (.011)	-.354 (.012)
LSize T	.321 (.011)	.547 (.010)
Yr86	.228 (.053)	.046 (.027)
Yr87	.380 (.043)	.091 (.027)
Yr88	.249 (.034)	.098 (.028)
Yr89	.052 (.028)	.050 (.028)
Yr90	.013 (.026)	.021 (.029)
Yr91	.038 (.025)	-.018 (.029)
Yr92	.020 (.023)	.022 (.029)
A3	-.051 (.014)	n.a.
A4	-.051 (.016)	n.a.
A5	-.101 (.017)	n.a.
A6	-.081 (.020)	n.a.
A7	-.141 (.023)	n.a.
A8	-.139 (.029)	n.a.
A9	-.107 (.041)	n.a.
LL	-43712	-22322

[1] The numbers in parentheses are standard errors. Industry dummies not reported.

Table 7

OLS and Heckit Results for Incorporated Enterprises[1]

Variable	Ages 2-9 OLS Estimates	Ages 2-9 Heckit Estimates	Stock '83 OLS Estimates	Stock '83 Heckit Estimates
Constant	.182 (.012)	-.423 (.041)	.038 (.006)	-.242 (.013)
LSize 0	.006 (.003)	-.102 (.008)	.055 (.002)	-.043 (.005)
LSize T	-.057 (.003)	.147 (.014)	-.075 (.002)	.069 (.006)
Yr86	.066 (.015)	.219 (.018)	.080 (.006)	.104 (.006)
Yr87	.114 (.011)	.348 (.019)	.091 (.006)	.124 (.006)
Yr88	.073 (.009)	.238 (.014)	.081 (.006)	.114 (.006)
Yr89	.067 (.009)	.109 (.009)	.063 (.006)	.081 (.006)
Yr90	.020 (.008)	.034 (.008)	.040 (.006)	.048 (.006)
Yr91	-.059 (.008)	-.028 (.008)	-.033 (.006)	-.036 (.006)
Yr92	.006 (.007)	.021 (.007)	.003 (.006)	.010 (.006)
A3	-.032 (.007)	-.076 (.007)	n.a.	n.a.
A4	-.046 (.007)	-.084 (.008)	n.a.	n.a.
A5	-.060 (.008)	-.053 (.008)	n.a.	n.a.
A6	-.056 (.009)	-.035 (.009)	n.a.	n.a.
A7	-.064 (.010)	-.056 (.011)	n.a.	n.a.
A8	-.083 (.013)	-.084 (.013)	n.a.	n.a.
A9	-.068 (.018)	-.064 (.018)	n.a.	n.a.
Lambda	n.a	2.881 (.184)	n.a	1.440 (.056)
R^2	0.022	0.026	0.022	.028

[1] The numbers in parentheses are standard errors. Industry dummies not reported.

Table 8

Probit Results for Growth Rates of Incorporated Enterprises[1]

Variable	Ages 2-9	Ages 2-9 Heckit Estimates	Stock '83	Stock '83 Heckit Estimates
Constant	-.022 (.025)	-.643 (.093)	-.309 (.019)	-.482 (.038)
LSize 0	-.049 (.007)	-.158 (.017)	.034 (.007)	-.006 (.014)
LSize T	-.003 (.007)	.195 (.014)	-.029 (.006)	.034 (.018)
Yr86	.274 (.033)	.446 (.041)	.296 (.016)	.323 (.017)
Yr87	.352 (.025)	.608 (.043)	.339 (.016)	.375 (.017)
Yr88	.262 (.021)	.446 (.041)	.276 (.017)	.308 (.017)
Yr89	.223 (.019)	.285 (.021)	.240 (.017)	.264 (.018)
Yr90	.123 (.017)	.147 (.018)	.152 (.017)	.165 (.018)
Yr91	-.138 (.017)	-.116 (.018)	-.143 (.018)	-.148 (.018)
Yr92	.057 (.016)	.078 (.017)	.022 (.018)	.028 (.018)
A3	-.051 (.015)	-.095 (.017)	n.a.	n.a.
A4	-.051 (.016)	-.089 (.017)	n.a.	n.a.
A5	-.101 (.017)	-.098 (.018)	n.a.	n.a.
A6	-.081 (.020)	-.061 (.021)	n.a.	n.a.
A7	-.141 (.023)	-.139 (.024)	n.a.	n.a.
A8	-.139 (.028)	-.144 (.030)	n.a.	n.a.
A9	-.107 (.041)	-.108 (.042)	n.a.	n.a.
Lambda	n.a	3.664 (.421)	n.a	1.527 (.168)
LL	43712	40436	78082	73914

[1] The numbers in parentheses are standard errors. Industry dummies not reported.

Table 9

Probit Estimates of Survival for Young Incorporated Enterprises

	Incorporated Enterprises		
Variable	**2 Years**	**3 Years**	**4 Years**
Constant	1.08 (.071)	1.20 (.077)	1.25 (.086)
LSize 0	-.106 (.027)	-.200 (.025)	-.162 (.027)
LSize T	.229 (.028)	.365 (.025)	.332 (.025)
Yr86	.358 (.060)		
Yr87	.715 (.073)	.257 (.062)	
Yr88	.327 (.057)	.358 (.065)	.159 (.068)
Yr89	.176 (.053)	.082 (.056)	-.002 (.065)
Yr90	.228 (.053)	.014 (.054)	-.086 (.062)
Yr91	.210 (.055)	.129 (.054)	-.088 (.060)
Yr92	.138 (.053)	.070 (.056)	-.087 (.058)
LL	4220	3696	2936

Table 10

OLS and Heckit Results for Growth Rates of Young Incorporated Enterprises

	2 Year Olds		3 Year Olds		4 Year Olds	
Variable	**OLS**	**Heckit**	**OLS**	**Heckit**	**OLS**	**Heckit**
Constant	.222 (.031)	-.113 (.190)	.163 (.020)	-.262 (.061)	.118 (.021)	-.616 (.068)
LSize 0	-.043 (.109)	-.075 (.021)	.012 (.006)	-.076 (.014)	.022 (.006)	-.112 (.014)
LSize T	-.149 (.012)	.053 (.040)	-.066 (.006)	.093 (.022)	-.068 (.006)	.206 (.025)
Yr86	.037 (.026)	.160 (.074)				
Yr87	.083 (.026)	.283 (.115)	.124 (.016)	.245 (.023)		
Yr88	.036 (.025)	.151 (.068)	.077 (.016)	.234 (.026)	.081 (.016)	.203 (.019)
Yr89	.024 (.025)	.091 (.045)	.094 (.016)	.141 (.017)	.065 (.016)	.067 (.016)
Yr90	-.019 (.024)	.064 (.053)	.033 (.016)	.045 (.016)	.007 (.016)	-.063 (.016)
Yr91	-.101 (.025)	-.023 (.051)	-.054 (.015)	.014 (.018)	-.064 (.015)	-.139 (.016)
Yr92	-.002 (.025)	.049 (.038)	.008 (.016)	.044 (.017)	-.007 (.015)	-.087 (.016)
Lambda	n.a.	1.39 (.777)	n.a.	1.93 (.262)		3.57 (.317)
R^2	.012	.012	.027	.031	.028	.040

Table 11

Probit Estimates of Survival for Unincorporated Enterprises[1]

	Unincorporated Enterprises	
Variable	**Ages 2-9**	**Stock '83**
Constant	.666 (.028)	1.615 (.024)
LSize 0	-.131 (.010)	-.320 (.010)
LSize T	.246 (.009)	.416 (.009)
Yr86	.053 (.034)	-.240 (.023)
Yr87	-.037 (.027)	-.266 (.023)
Yr88	.002 (.025)	-.297 (.023)
Yr89	.035 (.023)	-.057 (.026)
Yr90	-.006 (.022)	-.129 (.025)
Yr91	-.070 (.021)	-.066 (.026)
Yr92	.004 (.021)	-.018 (.027)
A3	.072 (.016)	n.a.
A4	.153 (.019)	n.a.
A5	.178 (.022)	n.a.
A6	.262 (.027)	n.a.
A7	.301 (.034)	n.a.
A8	.384 (.046)	n.a.
A9	.416 (.070)	n.a.
LL	28526	-44126

[1] The numbers in parentheses are standard errors. Industry dummies not reported.

Table 12

OLS and Heckit Results for Growth Rates of Unincorporated Enterprises[1]

Variable	Ages 2-9 OLS	Ages 2-9 Heckit Estimates	Stock '83 OLS	Stock '83 Heckit Estimates
Constant	.116 (.039)	-.407 (.302)	.025 (.005)	-.129 (.009)
LSize 0	.008 (.014)	-.054 (.037)	.064 (.003)	-.042 (.006)
LSize T	-.055 (.013)	.061 (.068)	-.076 (.002)	.059 (.006)
Yr86	.270 (.051)	.301 (.053)	.044 (.005)	-.023 (.007)
Yr87	.096 (.040)	.077 (.041)	.079 (.006)	.002 (.007)
Yr88	.071 (.036)	.077 (.036)	.058 (.006)	-.031 (.007)
Yr89	.083 (.034)	.102 (.035)	.066 (.006)	.056 (.005)
Yr90	.018 (.032)	.015 (.032)	.023 (.006)	-.010 (.006)
Yr91	-.033 (.031)	-.069 (.038)	-.152 (.006)	-.031 (.006)
Yr92	.027 (.030)	.029 (.030)	.040 (.006)	.037 (.006)
A3	-.004 (.024)	.035 (.032)	n.a.	n.a.
A4	-.010 (.027)	.069 (.054)	n.a.	n.a.
A5	-.030 (.032)	.063 (.062)	n.a.	n.a.
A6	-.025 (.037)	.105 (.084)	n.a.	n.a.
A7	-.039 (.045)	.108 (.095)	n.a.	n.a.
A8	-.038 (.058)	.139 (.116)	n.a.	n.a.
A9	-.019 (.084)	.166 (.135)	n.a.	n.a.
Lambda	n.a	1.22 (.698)	n.a	1.22 (.056)
R^2	.003	.003	.015	.0185

[1] The numbers in parentheses are standard errors. Industry dummies not reported.

Table 13

Probit Results of Growth for Unincorporated Enterprises[1]

Variable	Ages 2-9	Ages 2-9 Heckit Estimates	Stock '83	Stock '83 Heckit Estimates
Constant	-.319 (.025)	-.967 (.207)	-.256 (.015)	-.317 (.027)
LSize 0	-.054 (.009)	-.126 (.026)	.021 (.007)	.027 (.017)
LSize T	.038 (.008)	.161 (.047)	-.003 (.006)	-.003 (.020)
Yr86	.187 (.031)	.257 (.037)	.147 (.015)	.138 (.018)
Yr87	.179 (.024)	.209 (.028)	.285 (.016)	.296 (.020)
Yr88	.179 (.022)	.223 (.025)	.169 (.016)	.165 (.021)
Yr89	.217 (.021)	.286 (.024)	.295 (.017)	.314 (.017)
Yr90	.025 (.022)	.028 (.022)	.148 (.017)	.149 (.018)
Yr91	-.161 (.019)	-.229 (.026)	-.062 (.017)	-.070 (.018)
Yr92	.090 (.019)	.109 (.021)	.259 (.017)	.276 (.018)
A3	.030 (.015)	.076 (.023)	n.a.	n.a.
A4	.054 (.017)	.147 (.037)	n.a.	n.a.
A5	.027 (.020)	.127 (.042)	n.a.	n.a.
A6	.042 (.024)	.193 (.057)	n.a.	n.a.
A7	.037 (.028)	.208 (.065)	n.a.	n.a.
A8	.093 (.057)	.302 (.080)	n.a.	n.a.
A9	.046 (.055)	.267 (.093)	n.a.	n.a.
Lambda	n.a	2.279 (.481)	n.a	1.048 (.171)
LL	37010	30046	92265	82847

[1] The numbers in parentheses are standard errors. Industry dummies not reported.