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Growth history, knowledge intensity and capital structure in small firms

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Aussi disponible en français

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Abstract

This paper explores the financial characteristics of successful Canadian small- and medium-sized enterprises (SMEs). It asks whether industry membership and early growth history play a role in shaping these financial characteristics. Industry comparisons are based on production activity and knowledge intensity. Growth distinctions are based on the firm's employment and sales history. We evaluate our hypotheses with survey data from a stratified random sample of 2,775 Canadian firms. Proportional weighting techniques are utilized in all analyses. Our study reveals a strong correlation between capital structure and knowledge intensity. In contrast, growth histories are not obvious determinants of financial structure. Results also suggest that leverage strategies are more apparent in low-knowledge industries, in firms with higher expectations of future performance, and in businesses with more balanced financial structures.

Keywords: capital structure, SMEs, firm growth, knowledge-based industries

Executive Summary

Small firms are often said to face considerable challenges when attempting to secure external financing. This study attempts to learn more about how successful small- and medium-sized enterprises (SMEs) are financed. It examines whether growth and knowledge-intensity are significant predictors of financial structure. The analysis is based on survey data from an elite business population—successful entrants that have survived their first decade of operation. Only 20% of new firms in Canada reach this milestone.

Growth and knowledge-intensity are two factors that are often posited to affect patterns of small-firm financing. The study evaluates whether SME growth characteristics—their past track records on growth, along with their projections of future growth—play a role in shaping their financial makeup. It also investigates whether SMEs that operate in high-knowledge industries—industries where R&D and skilled workers are relatively more important—develop different financial characteristics than their counterparts in other sectors of the economy.

The analysis finds a strong relationship between capital structure and knowledge intensity. Firms that operate in high-knowledge industries are less likely to maintain debt-intensive financial structures. On average, debt instruments account for 38% of financing in the high-knowledge sector, compared to 56% of financing in other industries. Significant differences in capital structure are not apparent when examining firm-level differences in growth history. Faster-growing firms are no more likely than slower-growers to exhibit debt-intensive capital structures. There is some evidence, however, that faster-growing SMEs draw on more sources of capital to finance their operations.

While growth histories reveal little about the extent to which successful SMEs use debt instruments in relation to equity, projections of future growth performance are significant predictors of financial structure. Leverage strategies, the shifting of the capital mix towards debt, are more apparent in firms that expect to grow rapidly than among those with more modest growth forecasts. This suggests that many firms look to debt to support their short-run growth objectives.


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1. Introduction

Financing is widely regarded as a major challenge for small businesses. Small-firm investment strategies, particularly those that center on soft, intangible assets such as R&D, are often described as constrained by the operations of debt and equity markets. And yet it is these intangible investments in knowledge that can serve as major catalysts for innovation and growth. In this paper, we attempt to learn more about how knowledge-intensity, growth history and financial structure interact.

Previous research has established that small-firm finance differs from large-firm finance and that optimal capital structure rules are often not applicable to SMEs (Uzzi and Gillespie, 1999; Van der Wijst, 1989; Welsh and White, 1981). We extend the research into small-firm finance by providing a rigorous empirical examination of SME capital structures. We ask whether differences in capital structure are related to industry membership and growth history. Both are posited to affect the financial development of small firms. The industry in which a firm competes will strongly influence its level of investment, the range of profitability it may expect, and its optimal level of leverage. Across industries, one should then expect to encounter systematic differences in financial characteristics. The data support our hypothesis that firms in high-knowledge industries—those with a greater reliance on knowledge-based or "soft" assets—have lower leverage ratios than firms in other sectors. While relationships between financial structure and growth histories are not apparent, we are able to establish a tentative correlation between firm growth and the amount of diversification within a firm's capital mix. As a final exercise, we extend our analysis of financial structure to incorporate other possible determinants. We find that leverage strategies are more common in firms with high performance expectations, and in businesses with more complex capital structures.

The present study focuses on a population of successful new SMEs—successful in that they have survived the vicissitudes of infancy, emerging into their second decade of operation. This is a highly exclusive group; only one in five new Canadian firms survives beyond a decade (Baldwin et al., 2000a). The importance of SMEs should not be underestimated. Carty (1994) reports that 98% of manufacturing firms in the U.S. employ less than 500 employees and that these firms account for nearly two-thirds of manufacturing output.

The present analysis contributes to the literature on SME financing in several ways. First, our focus on longer-term survivors allows us to explore the characteristics of firms with more "developed" capital structures. Reid (1996) observed that, given the rarity of high-growth micro-firms, it is important to learn more about those that have achieved some level of maturity. While financing constraints are said to bind tightly on start-ups, it is less apparent, in our view, that suboptimal financing arrangements should persist in firms that have established a market presence. Older high-technology small firms are less likely to face severe financing constraints

than their younger counterparts (Moore, 1994). Our sample consists of firms that have had sufficient time to 'grow' or 'adapt' their financial structures to reflect a more suitable balance of financing instruments.[1]

Second, financial theory has often been criticized for its oversimplification of assumptions and rigid adherence to mathematical modeling techniques (Barton and Gordon, 1987; Hempel, 1983). Thus, while this paper is anchored in financial theory, our empirical approach provides an opportunity to validate and/or challenge extant theoretical models and paradigms. Another advantage of the present analysis rests with its comprehensiveness. Our profile is based on a special survey, conducted by Statistics Canada, which allows for detailed, proportionally-weighted comparisons across specific subpopulations. This removes the spectre of bias that often emerges when comparisons are based on small and/or unrepresentative samples.

2. Theoretical Foundations

Firms with growth ambitions require capital to fuel their growth. Regardless of size or age, access to capital is a matter of paramount importance. According to Touche Ross, every $100 increase in sales revenue can require an additional $25 in working capital, before accounting for the costs of capacity expansion (Carty, 1994). Following the seminal work of Modigliani and Miller (1958), firms can be expected to meet their capital requirements by pursuing an optimal mix of financing instruments—one that maximizes the value of the firm and minimizes its overall cost of capital. Much of the early work on capital structure focused on financing strategies within large firms. An emerging body of research has begun to emphasize relationships between firm size and capital structure. Small firms are no longer viewed strictly as "small versions" of large firms (Welsh and White, 1981). Uzzi and Gillespie (1999) argue that social capital and the inseparability of entrepreneurs from their businesses makes the matter of obtaining financing for SMEs a much different proposition than the act of securing capital for major corporations. Van der Wijst (1989), in his review, concluded that smaller firms generally use less debt than larger firms, although there were exceptions (e.g., Brigham, 1967; Walker and Petty, 1979). However, in studies that were able to evaluate covariates, the size-leverage relationship was found to vary with both industry and country of origin. Timmons (1994) argues that capital requirements differ at different points in the firm's evolution. According to Timmons, small, young firms tend to draw capital from internal sources, personal sources, and informal investment. As firms grow, they face additional capital requirements and must turn to external sources such as banks and public debt and equity markets. This is consistent with Myers and Majluf's (1984) assertion that SMEs have a "pecking order" of preferred capital sources in which retained earnings will be the first source accessed, followed by bank debt, private external equity and then public debt or equity.

[1] We are not suggesting that, by virtue of their relative longevity, these firms are immune from financing constraints. In the main, small firms are often said to face tightly binding constraints (see Hubbard, 1998). Much of the following examines whether observable differences in capital structure are consistent with the existence of such constraints.

Although financial theory predicts that capital markets should ensure that funds flow to investment opportunities with positive net present value, the practical reality is often quite different (Petersen and Rajan, 1994). One explanation for this lack of congruence is that market frictions, such as information asymmetries and agency costs, impede the free flow of capital (Stiglitz and Weiss, 1981). On this view, the efficiency of a given capital market can be described as a function of the level of friction within the market. Since information asymmetries are likely to be greatest in the case of small privately-held firms, they may be among the most heavily penalized by market frictions. Manifestations of this include a high cost of capital and/or credit rationing.

Information opacity is a significant obstacle to the free flow of capital. Berger and Udell (1998) suggest that access to debt and equity by small firms will be influenced by three aspects of informational opacity: high verification costs, adverse selection, and moral hazard. The industry in which a firm competes should have a bearing on the range of financing options available to young firms. Firms with generic physical inputs and standard equipment—that is, securitizable collateral assets—should have greater access to bank funding (Zider, 1998). Traditionally, lenders assess firms based on the level of tangible assets. Typically, an asset-based lending formula is employed, which takes account of a firm's physical assets, inventory, and accounts receivable. Firms in goods-producing industries can be expected to possess more hard assets that offer secure collateral to lenders than their counterparts in services. This, in turn, can be expected to engender differences in capital structure.

> *Hypothesis 1: Firms in goods-producing industries will have a higher debt-to-equity mix than will firms in service industries.*

There is an emerging body of research linking innovation to the success of small- and medium-sized enterprises (SMEs). Investments in so-called "soft" or "knowledge" assets—such as R&D—are often strongly correlated with performance. Investments in R&D often serve as the cornerstone of complex innovation strategies. Research from Canadian innovation surveys demonstrates that innovative firms perform better than non-innovators based on a variety of performance metrics (c.f., Baldwin et al., 1994; Baldwin and Johnson, 1995). Studies on innovation and firm size in the U.S. have found that small firms contribute 2.5 times more innovations per employee than do large businesses (Baron, 1993). New small firms, however, are often said to face substantial difficulties when attempting to secure capital in support of innovative activities. Knowledge assets—such as R&D and advanced technology—are often characterized as comparatively risky, in that they are less tangible, and hold less collateral value.

Firms competing in more uncertain domains, with a relatively greater knowledge component to their value-added processes, may have less access to debt financing. Both knowledge assets and R&D-intensive physical assets are highly firm- and industry-specific, thus lowering liquidity value (Brewer et al., 1996). Garnsey (1995) notes that high-technology firms are generally viewed as high-risk by the investment community. However, her research suggests that, on the basis of relative failure rates, these firms are less risky than low-tech start-ups. Again, however, we expect to find systematic differences between industry sectors, with greater leverage in low-knowledge industries than in high-knowledge sectors.

Hypothesis 2: Firms in high-knowledge industries will have a lower debt-to-equity mix than will firms in low-knowledge industries.

Variation in post-entry performance can also be expected to engender differences in financial structure. The high costs of loans to small firms are often attributed to the lack of a track record against which a meaningful risk profile can be constructed (Binks and Ennew, 1996; Haron, 1996; Kotey, 1999; Levitsky and Prasad, 1988). Irrespective of industry membership, firms with a proven track record may face fewer barriers to external capital, even when financing risky ventures. While longevity (and hence, market experience) contributes directly to this track record, a firm's growth history provides creditors with an additional performance signal—an observable indicator on which to base expectations of credit worthiness. Small firms can be described as having a "financial growth cycle in which financial needs and options change as the business grows, gains further experience, and becomes less informationally opaque" (Berger and Udell, 1998: 622). If growth diminishes opacity, faster-growing firms may be in a better position to secure external financing than their slower-growing counterparts. This said, even if growth history does provide a clear competency signal to external creditors, relationships between growth and financial structure are potentially ambiguous. Faster-growing firms may exhibit a higher mix of debt-to-equity because of better access to external capital. However, low-growth firms may also exhibit a high mix of debt-to-equity because they are unable to generate retained earnings.

Relationships between firm growth and the breadth of its capitalization are less ambiguous. If growth reduces opacity, firms can be expected to utilize a wider range of financing options as they experience growth over time. In parallel with their diminishing opacity, faster-growing firms may require ever-increasing amounts of capital to support their growth, thus prompting them to seek financing from a broader array of sources.

Hypothesis 3: Faster-growing firms will utilize a wider range of financing instruments than will slower-growing firms.

3. Data

Our analysis is based on data collected from Statistics Canada's Survey of Operating and Financing Practices (SOFP). In what follows, we draw on a representative stratified sample of 2,775 firms with employees that entered the economy between 1983 and 1986 and were still operating in 1996.[2] The vast majority of these firms are small; 75% of surviving entrants had less than 10 workers in 1996.

The SOPF sample was stratified using SIC classifications for goods and services (Hypothesis 1) and an industry-level index of knowledge intensity (Hypothesis 2). For the goods sector, this index was based on five different criteria: a multi-factor productivity score, the proportion of workers within the industry with post-secondary education, the percentage of industry sales devoted to R&D, the percentage of firms in the industry using advanced technologies, and an innovation index. For services, three criteria were used: GDP per hour worked, the proportion of workers with post-secondary education, and the industry average wage. Principal components were then used to score industries, and classify them as high- or low-knowledge on the basis of whether they fell above or below the median score.

To examine relationships between growth and capital structure, two facets of a firm's growth history are used to stratify the SOPF sample into dichotomous high-growth and low-growth clusters: (1) changes in employment from birth year to 1993, and (2) compound sales growth from year two of operation through to 1993. On the former, firms were classified as faster-growers if their rate of employment growth exceeded 5%. Alternatively, when the sales-based metric was used, firms were stratified to high- and low-growth clusters depending upon whether they fell above or below the weighted sample median. We have elected to use both measures in order to provide a more complete analysis of the growth history/capital structure relationship. Employment is an input measure, while sales capture differences in firm output. These two aspects of a firm's growth history are related, but imperfectly. Our binary high/low growth classifications have a correlation coefficient of 0.26. Thus, each captures a different aspect of firm performance. A brief overview of the population is presented in Table 1.

Table 1. Overview of Successful Entrants—Select Dimensions (firm-weighted)

	Goods Industries	***Service Industries***
Number of firms	4,736	25,976
Knowledge intensity:		
% of firms classified to high knowledge sector	21.2	43.8
Growth Profile:		
% of firms classified to faster-growing stratum (based on employment)	33.6	28.2
% of firms classified to faster-growing stratum (based on sales)	53.6	49.2

[2] For an extensive overview of SOFP, see Johnson, Baldwin and Hinchley (1997) and Baldwin and Johnson (1999). Note that the response rate to the survey was 80%. At the time of writing, we have omitted a small group of records from our sample due to data limitations. The loss of coverage due to this omission is exceedingly minor—representing about 5% of the target population under study.

Our exploration of capital structure is based on the firm's proportional use of financial instruments. Individual instruments are classified into four major groupings: equity (retained earnings and share capital), short-term debt (secured and unsecured loans, trade credit, and contract financing), long-term debt (secured and unsecured loans), and a residual group (convertible debentures, investment tax credits, grants and other instruments).

4. Analysis and Results

Average capital structures within each of our industry and performance strata are presented in Table 2. While the overall debt-to-equity mix does not differ substantially between goods and services (Hypothesis 1), there is a strong relationship between capital structure and knowledge intensity (Hypothesis 2). Firms in high-knowledge industries place greater weight on equity, and concomitantly less emphasis on debt. Tradeoffs between equity and debt across high/low knowledge industries are apparent in both the goods and service sectors. In contrast, differences in average capital structure are not correlated with either of our growth metrics. Faster- and slower-growing firms, whether in terms of employment or sales, exhibit no significant difference in their average financing profile.

An alternative means of exploring differences in average capital structure is to focus on standard risk ratios. Two related metrics are examined in Table 3. Column (1) reports the average long-term debt-to-capital ratio—the share of long-term debt within the capital mix (defined here as the sum of long-term debt and equity). Column (2) reports the percentage distribution of firms that fall within certain debt-to-equity ranges. Range 1 is the share of firms with a debt-to-equity ratio less than or equal to 0.33—firms with a maximum of 25% debt in their long-term capital structure. Range 3 is the opposite case, firms for which at least 75% of long-term capital is comprised of debt (a debt-to-equity ratio of 3 or greater). Intermediate cases fall in Range 2.[3]

Differences in debt-intensity are strongly correlated with knowledge. On average, firms in high-knowledge industries, both generally and within the goods and services subpopulations, have significantly lower debt ratios than firms in other industries. An examination of debt-to-equity ranges reveals sharp differences at the extremes—in terms of the share of firms that maintain predominately debt- or equity-intensive long-term capital structures. Seventy-three percent of firms in high-knowledge industries are equity-intensive, compared to 56% of firms in low-knowledge sectors. Only 10% of firms in high-knowledge industries maintain debt-intensive long-term structures, apparent in 23% of firms in low-knowledge industries. This suggests that many firms may exhibit highly specialized financial structures. As before, debt ratios are extremely similar across high and low growth strata.

[3] Note that these ratios are calculated solely for firms that maintain either long-term debt or equity in their capital structure. This reduces our sample from 2,775 units to 2,450 units. We also made comparisons based on an alternative debt ratio—one defined for all units in the sample based on the amount of all debt (short and long-term) in the capital mix. The results are qualitatively identical to those presented above.

Table 2. Average Capital Structure (firm-weighted)

	Percentage of instrument mix comprised of:			
	Equity	*Short-term debt*	*Long-term debt*	*Other*
Goods industries	45.8	24.6	25.1	4.5
Service industries	46.7	30.1	18.2	5.0
High knowledge industries	57.1	23.7	13.9	5.3
Low knowledge industries	39.5	33.0	22.8	4.7
Knowledge intensity by sector:				
High knowledge goods	55.8	24.2	15.4	4.6
Low knowledge goods	43.2	24.7	27.7	4.5
High knowledge services	57.2	23.6	13.8	5.4
Low knowledge services	38.6	35.2	21.5	4.7
Growth Profile:				
Faster-growing firms (employment)	46.4	28.7	19.9	5.0
Slower-growing firms (employment)	46.7	29.5	18.9	4.9
Faster-growing firms (sales)	44.8	29.9	20.3	4.9
Slower-growing firms (sales)	48.4	28.6	18.1	4.9

Differences in shaded pairs are significant at $p < 0.05$.

Table 3. Financial Ratios (firm-weighted)

	Long-term debt-to-capital ratio (1)	***Debt to Equity Mix*** (Ratio of long-term debt to long-term equity) ***(2)***		
		Range 1 0-25%	Range 2 26%-74%	Range 3 75+%
Goods industries	0.33	56.5	19.7	23.7
Service industries	0.27	64.1	19.6	16.3
High knowledge industries	0.19	73.0	17.4	9.6
Low knowledge industries	0.35	55.6	21.2	23.3
Knowledge intensity by sector:				
High knowledge goods	0.23	67.5	19.4	13.1
Low knowledge goods	0.36	53.6	19.8	26.5
High knowledge services	0.19	73.5	17.3	9.2
Low knowledge services	0.35	56.1	21.6	22.3
Growth Profile:				
Faster-growing firms (employment)	0.28	64.2	18.4	17.4
Slower-growing firms (employment)	0.29	62.2	20.2	17.6
Faster-growing firms (sales)	0.29	61.8	19.9	18.3
Slower-growing firms (sales)	0.27	64.0	19.3	16.8

Differences in shaded pairs are significant at $p < 0.05$.

In Table 4, we examine the issue of specialization more fully, first, by reporting a simple specialization rate, and second, by examining the amount of diversification within the overall instrument mix. The former is the percentage of firms that base their entire financial structure on a single group of instruments (e.g., equity, long-term debt). Rates of specialization are not significantly correlated with knowledge intensity. There is some evidence that firms in service industries are more likely to adopt specialized capital structures than those in the goods sector—though these are not supported by our statistical tests. Stronger evidence emerges when examining growth history. Firms with higher rates of employment growth exhibit significantly lower rates of specialization than their slower-growing counterparts.[4]

Entropy statistics provide a quantitative measure of *how* diversified capital structures actually are across the range of potential financing instruments.[5] Mathematically, entropy takes the general form:

$$E(s) = \sum_{i=1}^{N} s_i \log(1/s_i) \qquad (1)$$

where s_i is the share of the capital structure represented by instrument i. This expression is typically described as a "log-entropy" measure. The antilog of this expression converts log entropy into its "numbers-equivalent" counterpart. A numbers-equivalent value of 2.0 indicates that a firm is about as diversified as one that distributes its financing equally between two instruments (e.g., long-term secured debt and retained earnings).[6]

Differences in average entropy suggest that firms with more robust growth histories develop more diversified (i.e. less specialized) capital structures, consistent with the expectation of Hypothesis 3. This said, these distinctions are qualitatively slight. Even the average firm within our high growth clusters is only about as diversified as one that allocates its capital mix evenly across two instruments. It should be noted that this can occur entirely within a single instrument group. To illustrate, a firm can have a financial structure comprised entirely of equity (and thus be specialized) and yet exhibit a 'numbers equivalent' of 2.0 if its capital mix is evenly distributed between two equity instruments: retained earnings and share capital. One advantage of entropy statistics is that they can readily be decomposed into two component parts—the share of entropy stemming from diversification *between* instrument groups (e.g., equity versus long-term debt) and the share stemming from diversification *within* instrument groups (e.g., retained earnings equity versus share capital equity). Shares of between-group entropy are reported in Column 3.[7] In all cases, the vast majority of diversification (i.e., 75%-80%) results from capital structures that pool instruments from across different groups (e.g., by combining equity with

[4] When evaluated on the basis of sales history, differences in specialization rates between faster-growing firms and slower-growing firms are weakly significant (a p-value of 0.059).

[5] For background on entropy measures, see Jacquemin and Berry (1979). For an example of a recent study that makes extensive use of entropy calculations, see Baldwin et al. (2000b).

[6] Note that entropy statistics are based on the distribution of financing across the full range of individual instruments (as opposed to our four instrument groups: equity, short-term debt, long-term debt, and others), and can thus in the present case take a maximum value of 12. This would occur if a firm distributes its capital equally across all individual instruments.

[7] These shares are estimated from the log-entropy formulation, as this allows between-group and within-group entropy to be expressed as additive components.

long-term debt). On balance, however, financing strategies tend to be highly concentrated around a small number of individual instruments.

We also use regression analysis to explore variation in the financial characteristics of small firms. Our operational measures of capital structure focus on the prevalence of debt in the instrument mix. Firms with substantial debt holdings are presumably less prone to the information and signaling problems that increase the relative price of external funds in many new businesses.

Table 4. Specialization and Entropy (firm-weighted)

	Specialization Rate ***(1)***	***Avg. Numbers-Equivalent Entropy*** ***(2)***	***Between Group Share*** ***(3)***
Goods industries	41.8	2.05	78.5
Service industries	52.2	1.74	77.8
High knowledge industries	53.7	1.67	78.0
Low knowledge industries	48.5	1.86	77.9
Knowledge intensity:			
High knowledge goods	37.8	2.02	76.9
Low knowledge goods	42.8	2.06	79.0
High knowledge services	55.1	1.64	78.1
Low knowledge services	49.9	1.81	77.6
Growth Profile:			
Faster-growing firms (employment)	36.5	1.98	77.9
Slower-growing firms (employment)	56.4	1.70	78.0
Faster-growing firms (sales)	44.8	1.90	76.1
Slower-growing firms (sales)	56.3	1.67	80.3

Differences in shaded pairs are significant at $p < 0.05$.

Three dependent variables are constructed. The first, LTMIX, is a (0,1) binary variable that takes a value of unity if the firm exhibits a (long-term) debt-to-equity ratio greater than one. The second, LTCAP, is the long term debt-to-capital ratio, a continuous measure of debt-intensity bounded by 0 and 1. Both of these variables are defined only for firms that maintain either long-term debt or equity in their financial structure. This reduces the unweighted regression sample from 2,775 to 2,450 units. The final dependent variable, DR, is an alternative debt ratio—the share of all debt, short and long term, in the capital structure. This variable is defined for all units in our sample.

Our regression framework draws on, and extends, our earlier focus on industry membership and growth history. We model industry effects using two binary (0,1) variables that distinguish between production activity and knowledge intensity. The first takes a value of 1 if the firm is located in the goods sector; the second a value of 1 if the firm operates in a high-knowledge industry. Past growth performance is measured in a similar vein. A binary (0,1) variable separates fast-growers from other firms, evaluated on the basis of their sales history.[8]

[8] We have not included an employment growth variable in our regression analysis, focusing instead on the impact of employment-size differentials in the survey year.

We also introduce a new performance dimension—expected revenue growth. The SOPF survey asked respondents to predict annual revenue growth over the two-year period following data collection. Responses were coded as a categorical variable with the following ranges: 0% or decline, 1%-4%, 5%-9%, 10%-14%, 15%-24%, and 25%+. We define firms as having high growth ambitions if they responded in the upper two ranges, representing predicted annual growth rates of 15% or better. This is again modeled as a (0,1) binary variable. While a firm's early growth history may not be a strong predictor of its current financial structure, it may be the case that firms with high growth ambitions—and thus high expectations of future performance—are more likely to rely on external debt to finance their growth strategies.

While small firms comprise the vast majority of our target population, size effects may nonetheless be correlated with differences in financial structure. We control for firm size using 3 binary variables, representing, in turn, firms with less than 10 employees, firms with 10-24 employees, and those with 25 or more employees.

A final variable explores the relationship between debt-intensity and capital structure diversification. Firms that opt for leveraged financing strategies may incur high levels of risk if debt-intensity is strictly an outgrowth of specialization (i.e., strategies where firms forego other instruments in favour of debt). Conversely, gearing may be less risky if it occurs within more balanced, flexible financial structures, that is, as a part of a more diversified instrument mix. We investigate the relationship between debt financing and specialization by including our measure of between-group entropy in the regression analysis. This entropy variable provides us with a quantitative measure of the level of diversification that occurs between instrument groups. If gearing occurs within more diversified capital structures, an increase in between-group entropy will be positively associated with increased debt.

Results are presented in Table 5. Regression (1) investigates the probability of having a debt-equity ratio greater than one and is estimated using a probit model.[9] Regressions (2) and (3), based on continuous debt ratios, are estimated via least-squares.[10] The reference group consists of slower-growing firms with less than 10 employees, low growth projections, and that operate in low-knowledge service industries.

All three models yield comparable results. Industry membership, when evaluated on the basis of production activity (i.e., goods vs. services), has no direct bearing on financial structure. In contrast, firms that operate in relatively high-knowledge sectors are less likely than other firms to exhibit debt-intensive capital structures. This is consistent with the prevailing orthodoxy on SME financing and provides further support for Hypothesis (2).

[9] In our view, this dichotomous representation is sensible in light of the highly polarized debt-equity distributions observed in Table 3.

[10] Least squares regressions are potentially problematic given that our continuous debt ratios—LTDCAP and DR—are bounded by 0 and 1. To evaluate this, we compared our results to a standard non-linear model, the logistic (while making slight data adjustments in order to respect the boundary conditions). Aside from the emergence of a weak nonmonotonic size effect in the case of the logistic DR model, the results are qualitatively identical to those presented herein.

As before, we find no evidence of any relationship between early growth history and capital structure. This said, gearing strategies are more apparent in firms with high growth ambitions than in those with more modest performance expectations. This suggests that many firms look to debt in order to support short-term growth objectives. Debt-strategies, however, are not synonymous with financial specialization. In each of our models, an increase in between-group entropy—indicative of a movement towards more flexible, diversified financial structures—leads to a more debt-intensive capital mix (or the likelihood thereof). This, in turn, may reflect the presence of more sophisticated financing strategies in older, more successful entrants.

Table 5. Regression Analysis (firm-weighted)

	(1) ***Dependent Variable: LTMIX***	***(2)*** ***Dependent Variable: LTCAP***	***(3)*** ***Dependent Variable: DR***
Intercept	-0.637 ***	0.254 ***	0.473 ***
Industry:			
Goods sector	-0.189	-0.007	-0.060
High knowledge industries	-.533 ***	-0.153 ***	-0.197 ***
Growth Profile:			
Fast growers (sales)	0.064	0.014	0.030
Higher expected growth (revenue)	0.516 **	0.149 **	0.200 **
Firm size:			
10-24 employees	-0.193	-0.044	-0.070
25+ employees	-0.349	-0.053	-0.050
Between-group entropy	0.689 ***	0.204 ***	0.214 ***
Pr>F	0.0006	0.0000	0.0000
R2	--	0.10	0.11
Number of observations	2,450	2,450	2,775

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Finally, firm-size differentials are not associated with variation in capital structures. This said, size distinctions in the present context are reasonably slight. Given the preponderance of smaller firms within this entrant population, broad-based comparisons associated with scale advantages are not captured here.

5. Conclusion

The objective of this paper is to explore how firm growth and industry membership influence the development of capital structures in successful SMEs. Our hypothesis that financial structures are conditioned by industry effects is supported in the context of knowledge-intensity (Hypothesis 2) but not in terms of production activity (Hypothesis 1).

The strong correlation between knowledge-base and capital structure is consistent with the market friction hypothesis. Small firms in high-knowledge sectors, on average, make less use of debt and greater use of reinvested profits than those in low-knowledge sectors. This is consistent with the general proposition that firms operating in more uncertain domains may face greater barriers to external finance. This said, our results do not preclude the possibility of demand-side rationing if these firms are less willing to take on external debt, as per the "pecking-order" hypothesis. Our results thus fit the general pattern outlined by Hughes (1993:217) in which explanations of differences in financial structure are "consistent with a chronic market failure constraining small firms to a sub-optimal positions, or with a structure reflecting an optimal choice, or some combination of both".

The absence of significant differences in capital structure between goods-producers and service-providers runs counter to our expectations. There may be lifecycle effects at work here—as characterizations regarding the presence/absence of securitizable assets, of the sort typically attributed to goods versus services distinctions, may be more apt predictors of financial structure in very young firms, and our sample consists of more mature entrants. Successful SMEs in service industries—businesses that have survived where many have failed—may look very different than conventional views suggest; alternatively, their continued market presence (itself an important signal to potential creditors) may aid in reducing the 'higher costs' of external finance attributable to relative shortages of hard, collateral assets—if in fact information opacity decreases with age. Our findings here take on greater significance in light of the dominance of service firms within the successful SME population. In this group, service-providers outnumber goods-producers by a ratio of five to one.

We did not develop a prediction regarding the relationship between growth and debt-intensity due to the potential ambiguity of this relationship. A dynamic firm with a proven growth record may take on high levels of debt to fund ongoing expansion, while a low-performance firm may be burdened with excessive debt. One intriguing result to emerge herein is that our high- and low-growth strata exhibit virtually no qualitative differences in their average capital structure. Growth history, whether measured in terms of inputs (employment) or outputs (sales) is thus not a strong predictor of financial structure in older entrants. Our regression analysis, however, does suggest that *expected* growth, a measure of future, as opposed to past, performance, will have some bearing on the instrument mix. Firms opt for leverage strategies as a means of supporting high growth objectives. This is consistent with the proposition that entrepreneurs' personal preferences are key determinants in the financial arrangement of SMEs (Barton and Gordon, 1987; Levin and Travis, 1987).

Our formal growth hypothesis—that higher rates of past growth will bring about a more balanced use of financing instruments—was supported in our data, although, as noted, these findings are qualitatively modest. Faster-growing firms tend to be less specialized than their slower-growing counterparts. Firms with stronger growth histories do utilize a (slightly) more diversified set of financial instruments than those with more modest growth trajectories.

One of the interesting findings to emerge from our regression analysis concerns the relationship between debt-intensity and capital structure diversification. Our rationale for exploring this issue was to ascertain whether debt-intensity was, in effect, a form of specialization. To the contrary, leverage strategies are positively associated with the amount of between-group entropy in the capital mix. That is, more balanced capital structures are more likely to be debt-intensive. In and of itself, a more diversified use of financial instruments will not dictate whether debt or equity receives a greater weighting in the capital mix. Our results indicate that higher entropy, other things equal, is associated with greater leverage.

Our analysis to this point is preliminary in nature. Extensions of this research will attempt to examine more detailed sectors of the economy. This will allow for more substantive comparisons across groups of firms with more highly differentiated production processes (e.g., manufacturing vs. business services).

In summary, we find that differences in the financial structure of successful SMEs are correlated with cross-sectoral variation in knowledge intensity. Leveraging is more prevalent among firms in low-knowledge industries. We also find neither size, growth history nor production activity to be a useful predictor of financial structure. Growth expectations are positively associated with increased debt-intensity, suggesting that SMEs take on debt as a means of investing in future performance. Debt strategies, however, should not been seen as an outgrowth of specialization, as debt-intensity increases with the amount of diversification in the capital mix.

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