



Determinants of capital structure on the Financing of Small Business start-ups. Case study: London School of Science & Technology (LSST)

By Authors

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Abstract

This article investigates the determinants of capital structure and types of financing used around business start-ups utilizing a survey that reduces the confounding effects of survivorship bias. In particular, the influence of start-up size, asset structure, organization type, growth orientation, and owners' characteristics are examined both in the choice and in the magnitude of finance use. The results are consistent with the theoretical models incorporating issues, such as information asymmetries, agency theory, and transaction costs. The results also demonstrate linkages among providers of finance, maturity of assets, and the capital structure of start-ups. While the results provide insights into business finances near the time of creation, some recommendations for future research are discussed.

Keywords: Capital structure; Financing; Start-ups

1. Introduction

How business start-ups are financed is one of the most fundamental questions of enterprise research. Financial capital is one of the necessary resources required for enterprises to form and subsequently operate. The importance of the financing decision of new businesses consequentially has important implications for the economy, given the role that new enterprise plays in employment growth, competition, innovation, and export potential. Additionally, capital decisions and the use of debt and equity at start-up have been shown to have important implications for the operations of the business, risk of failure, firm performance, and the potential of business expansion in the future. While research examining the financing of start-ups has been increasing, we still have limited understanding of this area, particularly in comparison to our understanding of financing choice for large and existing firms. A likely cause of the paucity of research for new firms is the relative lack of available data sets and access to respondents willing to disclose their financial information.

This article investigates the determinants of capital structure and the use of financing around business start-up. In doing so, this study addresses three deficiencies of existing empirical research

examining start-up financing. First, due to the reduced time between start-up and surveying, the potential for survivorship bias confounding the study's findings is lowered. Second, this study goes beyond merely being descriptive in nature by providing testable implications developed from financial theory, including the rarely tested impact of asset structure upon capital structure. Third, by using a nationwide survey in multiple industries this study overcomes generalization problems associated with samples of limited geographic or industry scope.

To empirically investigate aspects of start-up financing, four different but related financing and capital structure measures are utilized: leverage, long-term leverage, outside financing, and bank financing. By using multiple measures, insight into the financing behaviours of different capital providers can be achieved. In addition, the use of multiple measures overcomes problems associated with classifying quasi-equity. The start-up setting also has the advantage of representing the benchmark case for problems of lending or investing under asymmetric information, given these firms lack of a track record (Cressy, 1996).

Section 3 provides a review of the relevant theoretical explanations for financing and capital structure choice and a critique of existing empirical evidence investigating new firm financing. Section 4 provides the rationale underlying the empirical tests. Section 5 details the data and variables employed for the study. Section 6 discusses the results of the empirical analysis. Section 7 discusses the implications of the research. Section 8 reviews the limitations of the study and provides some recommendations for future research

2. Literature

2.1. Theories of capital structure and debt finance of start-ups

The theoretical principles underlying the capital structure and financing choices can be generally described either in terms of a static trade-off choice or pecking-order framework. Both frameworks predict differences in explicit and implicit financing costs, and consequently, the use of financing for different firms. Static trade-off choice encompasses several aspects including the exposure of the firm to bankruptcy and agency costs against the tax benefits associated with debt use.

Bankruptcy costs are the costs incurred when the perceived probability that the firm will default on financing is greater than zero. These bankruptcy costs can be direct, affecting liquidation returns (Harris

and Raviv, 1991), or indirect, in the form of stakeholders losing confidence in the business' survival or through less discretion on operating decisions (Titman and Wessels, 1988). Agency costs arise when firms utilize debt and other external financing (Myers, 1977). One commonly cited example of agency costs within firms is the incentive to benefit the equity holders at the expense of the debtholders. Consequently, debtholders incorporate costly monitoring devices or contractual covenants into debt agreements to restrict and monitor the firms' behavior. All these contracting mechanisms effectively increase the cost of capital offered to the firm. Contrary to bankruptcy and agency costs, many tax regimes provide an incentive for debt use due to the tax deductibility of interest and nondeductibility of dividends. More debt increases the after tax proceeds to the owners (DeAngelo and Masulis, 1980).

Myers and Majluf (1984) provide a pecking-order theory of capital structure choice created by the presence of information asymmetries between the firm and its potential financiers. For example, given the presence of information asymmetries about the firms' current operations and future prospects, new equity holders will require a higher rate of return on capital invested than using existing internal funds. The greater the exposure to the risk associated with the

information asymmetries due to duration of the financing and the seniority of contractual rights to the assets of the firm, the higher the return of capital demanded by each financing source. These exposures will lead to the firm preferring inside finance to debt, short-term debt over long-term debt, and any debt over outside equity.

However, there are also several aspects of financing that are unique to new venture financing choice. Start-ups can be affected by market access, in that their newness and scale make some financing options unavailable. New firms are also more likely to be subject to idiosyncratic forces, in particular, the influence of the entrepreneur upon the financing and capital structure choice. Such influences can include the entrepreneur's traits that can be used as signals associated with firm viability, the entrepreneur's preferences towards risk and control desire, and the entrepreneur's potential exposure to finance discrimination or network resources (Bates, 1991, 1997; Haynes and Haynes, 1999; Coleman, 2000). These individual or context-specific issues are not considered when examining large, public firms as the influence of one individual on the preferences and outcomes of the capital structure is substantially reduced.

Given their limited operating history, start-ups are arguably the most informationally opaque firms in the economy. Consequently, it is generally believed that start-ups, due to potential difficulties in obtaining intermediated external finance, are heavily dependent on initial insider finance (Berger and Udell, 1998; Huyghebaert, 2001). These arguments are consistent with the financing life cycle, which suggests that type of financing alternatives available to firms varies throughout the life of the business as a result of information asymmetries, scale, demand for finance, and asset structure. Unique characteristics of new firms, such as low-scale potential and early reliance on internal capital, may lead to limited venture capital use. Conversely, these circumstances potentially create a greater role for bank financing within the firm (Berger and Udell, 1998; Scholtens, 1999). Both entrepreneurs and their potential outside financiers have to enact methods to reduce the information asymmetries and agency costs. However, many of the mechanisms available to both parties for existing firms are not available to new firms. For example, financiers cannot observe the firms' track record as a signal of quality, and the ability to forecast the future performance of the firm is also reduced. However, potential options available to lenders include adjusting interest rates, requiring collateral, including covenants, or using signals, such

as the ownership held by the entrepreneur and reputation of the entrepreneur (Coleman, 1998; Scholtens, 1999).

2.2. Critique of empirical research examining start-up financing

There are three deficiencies that are associated with the majority of research specifically examining start-up financing: (1) survivorship bias, (2) lack of empirical testing of finance theories, and (3) limited geographic or industry focus. Survivorship bias is the bias caused by sample firms not being representative of the population of firms at the time of start-up. The surviving firms may have different characteristics including financing to the firms that have since “died,” that may have influenced firm survival and failure between the period of start-up and the point of survey. For example, Manigart and Struyf (1997, p. 127) in their survey of 18 high-technology Belgian start-ups selected firms “who were founded at most 10 years ago,” and consequently, “only surviving companies are represented in the sample.” This limitation has been noted by several researchers, with all examining new venture finance suffering from this bias. The longer the temporal period between surveying respondents and the actual start-up, the greater the influence of this bias on results. In addition, there are recall problems associated with a longer time frame, reducing the reliability of results.

This study, by sampling firms closer to the period of formation, reduces the problems associated with this potentially sampling-bias issue.

While not true for every study in this field, the majority of studies that have empirically investigated start-up financing have tended to be descriptive and shied away from testable implications.¹ This is not a criticism of previous research, given the limited understanding of new venture financing such descriptive studies aided in developing a knowledge of new firm capital structure. However, finance has provided several theoretical explanations for the capital structure of the firm. It is important to test these theories, particularly in settings outside their more rigorously investigated settings to determine their generalizability across all firms. For example, there is scant research that has examined the direct influence of asset structure upon the capital structure of the firm at start-up, although theoretical arguments for such a relationship have been developed and tests rigorously performed for existing firms.

The majority of empirical investigations into financing and capital structure of new firms have been of limited geographic or industry focus. For example, several published studies are based upon samples from individual Midwest U.S. states (Shaffer and Pulver, 1985; Van

1 Given the information asymmetries, risk, and access to finance, these descriptive studies basically show that personal savings and “inside” finance are important sources of capital for new ventures (e.g., Shaffer and Pulver, 1985; Van Auken and Carter, 1989; Carter and Van Auken, 1990).

Auken and Carter, 1989; Carter and Van Auken, 1990; Van Auken and Neeley, 1996). Therefore, whether these results found are unique to this region and its financing system is unclear. In addition, several studies have focused specifically on the financing of high-tech firms. The general conclusion from this research is that personal savings remain the most important source of start-up funding, with venture capital playing a greater role in the early growth phase rather than start-up phase (Bruno and Tyebjee, 1985; Freear and Wetzel, 1990; Manigart and Struyf, 1997).

Research that has considered broader issues and sample frames in regard to new firm financing include Scherr et al.’s (1993) work, which examined the influence of owner’s risk

–return preferences, costs of financing, and the firms’ business characteristics on the proportion of debt used by the firms. Using the 41,000 firms from the 1982

Characteristics of Business Owners (CBO) survey that were founded after 1980 (surveying was undertaken in 1986), they found capital structure to be related to owners’ characteristics, industry, and the profitability and size of the firm as of 1986. The independent variables examined in that study tended to focus on a wider range of variables associated with the owners’ characteristics than the present study, however, their analysis did not consider several firm-specific variables, such as size around start-up, asset structure, and legal organization of the firm.

2. Firm characteristics and financing

2.1. Size

Theoretical reasons why firm size would be related to the capital structure of the firm include economies of scale in lowering information asymmetries, scale in transaction costs, market access, and risk exposure. First, smaller firms may find it relatively more costly to resolve informational asymmetries with lenders and financiers. This will lead to smaller firms being offered less capital or offered capital at higher rates to larger firms, consequently discouraging the use of outside financing. Such effects should be more prevalent around start-up as new firms are more informationally opaque than existing firms (Berger and Udell, 1998).

Financing choices may also be affected by the transaction costs associated with financing. This is because transaction costs are most likely a function of scale, with smaller scale financing resulting in relatively higher transaction costs (Titman and Wessels, 1988; Wald, 1999). In addition, relatively high transaction costs can effectively put some financing options outside the available set of financing choices of the firm. More directly, barriers to market access exist where some financing options are not within the relevant range that financiers would consider to be issuable finance. For example, the scale required to issue equity funds publicly effectively excludes smaller firms from this type of finance. Bankruptcy costs can influence the relationship between size and the level of outside financing if the relative costs of bankruptcy are an inverse function of firm size. This should predispose smaller firms to having less outside financing or lower debt. Finally, if operating risk is inversely related to firm size, this should also result in smaller firms using relatively less debt and outside financing (Cosh and Hughes, 1994).

The empirical evidence for similar scaled firms to those examined in this study generally supports a positive relationship between firm size and leverage, long-term leverage, outside financing, and bank financing. There is also evidence

suggesting a negative relationship between firm size and short-term liabilities (Osteryoung et al., 1992; Scherr et al., 1993; Chittenden et al., 1996; Coleman, 1998; Michaelas et al., 1999; Fluck et al., 2000).

Hypothesis 1: Firm start-up size is positively related to leverage, long-term leverage, outside financing, and bank financing.

2.2. Asset structure

Asset structure should also be related to capital structure, particularly for new firms. The more tangible and generic the firms' assets are, the greater the firms' liquidation value, thereby reducing the financial loss incurred by financiers should the company default and the firms' assets realized (Harris and Raviv, 1991; Titman and Wessels, 1988). Firms can also reduce adverse selection and moral hazard costs by pledging their assets as collateral or contracting for fixed charges to be placed on particular tangible assets. This will result in firms with assets of greater liquidation value getting easier access to finance, and lower costs of financing, leading in turn to these firms acquiring a higher level of debt or outside financing in their capital structure. Due to preferred contracting mechanisms of banks, several authors suggest that bank financing will depend upon whether the lending can be secured by tangible assets (Storey, 1994;

Berger and Udell, 1998). Given the increased information opaqueness in the initial stages of the venture and the lack of other available options for financiers to reduce financial risk through examining current and future profitability and the use of relationship financing, asset structure should be a significant effect on firm financing in the early stages of the business.

Consistent with theoretical arguments, the empirical evidence suggests a positive relationship between asset structure and leverage for large firms. The limited empirical research investigating smaller firms shows some evidence of a positive relationship between asset structure and leverage, long-term debt, and possibly a negative relationship with short-term debt (Van der Wijst and Thurik, 1993; Chittenden et al., 1996; Jordan et al., 1998; Michaelas et al., 1999). As previously mentioned, there has been sparse research examining start-up financing and asset structure relationships directly.²

Hypothesis 2: Start-up asset structure is positively related to leverage, long-term leverage, outside financing, and bank financing.

² Van Auken and Neeley (1996) examined the use of “bootstrap” financing in new small ventures. In particular, they argued that manufacturing and construction firms use less bootstrap financing due to the high cost of asset acquisition and the strong collateral base to obtain debt financing.

However, they did not test or control for size or asset structure effects directly.

2.3. Legal organization

The hypothesized effect of legal organization on financing is related to the extent that it affects the availability of particular forms of financing. Storey (1994) argues that while some may consider the benefits of limited liability the critical factor in the choice of legal form for the business, the limited liability gain is fictional in actuality. Alternatively, the choice of legal form involves weighing up credibility and taxation variation versus statutory audit costs and public information. Given the above, banks may perceive incorporation as a good signal that portrays credibility and formality of operations or represent an indicator of future growth or growth potential. For example, Coleman and Cohn (2000) found evidence suggesting a positive relationship between leverage and incorporation but not between incorporation and the level of external loans, while Storey (1994) and Freedman and Godwin (1994) suggest that incorporation leads to a greater use (or supply) of bank financing.

Hypothesis 3: Start-up incorporation is positively related to outside and bank financing.

2.4. Intention to grow and growth opportunities

Growth opportunities and intention to grow should influence the agency costs associated with financing. Myers (1977) argues that conflicts between debt and equity holders are exacerbated for assets that provide the firm with the option to undertake growth opportunities in the future. Additionally, if some start-ups are more likely to experience future growth due to opportunity or intention, this should increase the potential for conflict between outside financiers and the entrepreneur. However, Michaelas et al. (1999) argue that the agency problem and consequentially the costs of financing are reduced if the firm issues short- rather than long-term debt, leading to a positive relationship between future growth opportunities and short-term leverage. In addition, the use of outside or bank financing may be related to intended growth as the business may choose financing based on their beliefs for future use of financing. In particular, if the firm is more likely to need capital in the future, it has greater incentives to establish credit relationships with outside financiers, such as banks. By establishing these relationships as early as possible, there is greater potential benefit for the firm both in terms of access and cost of future outside financing.

The empirical evidence investigating growth and financing linkages is inconclusive with Michaelas et al. (1999) who found future growth to be positively related to leverage and long-term debt while Chittenden et al. (1996) and Jordan et al. (1998) found mixed evidence. All these studies used measures of growth ex-post rather than obtaining growth intentions from the major decision maker as in this study.

Hypothesis 4a: Start-up growth intentions significantly influence the leverage and long-term leverage of firm start-ups.

Hypothesis 4b: Start-up growth intentions are positively related to outside and bank financing.

2.5. Owners' characteristics

Owners' characteristics may provide some additional predictive power in explaining the capital structure and financing characteristics of new firms. In fact, given the relative importance of the major decision maker during the early operations of a new business, one would suspect that detection of significant effects on financing decisions would be most likely near start-up. To test for this influence, variables representing experience, education, and gender were examined and are briefly discussed below.

Experience and education level obtained may provide signals of better human capital. The better the human capital, the greater the firm viability of the start-up; consequentially, access to debt capital should be greater for these firms (Storey, 1994; Bates, 1997). Gender of the major decision maker may influence capital structure and financing due to differences in credit discrimination, risk aversion, or the fact that the enterprises undertaken by a particular gender may require different levels of capital (Coleman and Cohn, 2000). Scherr et al. (1993) found leverage was negatively related to owners' age and experience and positively related to ownership experience. Leverage was also found to be influenced by gender. Coleman and Cohn (2000) examining education, gender, and years of experience found no support for significant effect upon leverage, but did find some evidence of education being positively related to external loans. Storey (1994), Coleman (1998), and Verheul and Thurik (2001) found no evidence of gender influencing the likelihood of getting type of loan. For this study, major decision makers' characteristics for gender and the obtaining of a tertiary education are represented by dichotomous variables, while experience is measured by the number of years experience within the same industry.

Hypothesis 5: The major decision maker's characteristics significantly influence the

capital structure and financing of firm start-ups.

3. Methodology

3.1. Sample

The initial sample for this study is obtained from the Business Longitudinal Survey (BLS)

developed by the Australian Bureau of Statistics (ABS).³ While monitoring businesses over time was the main objective of the survey, each year new businesses were added to the BLS (in 1996, 1997, and 1998). These new businesses were obtained through a random sample of all new registrants for employer tax during the year. For firms under 200 employees, this

The Australian financial environment consists of similar institutions to most developed economies. Firms have potential access to finance from banks and other financial institutions, venture capital, and public equity, in addition to trade credit from other firms and investments from informal investors. Consequently, empirical evidence from an Australian setting is most likely transferable across other developed economies with similar sources of finance.

sample constituted approximately 1 in every 300 firms added to the register.⁴ Instead of surveying founders about the types and amounts of finances used at start-up retrospectively as in the majority of previous studies, this study required information about the composition of the debt and equity in the balance sheet at a point in time during the start-up phase (within months after appearing on tax registers). The surveying of the businesses took place in the November after the fiscal year (from July to June) that the company appeared on the tax register. Therefore, the time between tax registration and survey completion for the sample firms is anywhere between 5 and 18 months. However, the point at which the financial position and finances are reported relates to the end of June in the respective surveyed year. Consequently, between 0 and 12 months had passed between the start-up and response.

Simplistically, it might be assumed that such firms are new firms, however, inclusion to the register can be initiated by several methods, such as a change of legal form, which has little to do with whether a new venture has been initiated. Therefore, as a further specification test to ensure that only new businesses were obtained, the age of the business was examined, all businesses not in the youngest age bracket available (under 2 years) when surveyed were eliminated.

As the focus of this study is examining new venture start-ups financed independently rather than examining businesses that were spin-offs of existing corporations, all firms that had any financing from “parent companies” were excluded. All firms with financing from “shareholders” were also excluded, as the ambiguous nature of the shareholders classification in the BLS creates the potential for noise if these firms are included in the final analyses. The exclusion of these firms also avoids problems associated with the classification of inside and outside financing.⁵ In addition, all mining firms (12) were deleted due to their unusual operating nature. Finally, all firms with over 100% leverage were eliminated, to avoid problems with negative values and negative-equity firms.⁶ After the selection criteria were employed, a final sample of 292 firms was available for analysis.

3.2. Variables

Four different dependent variables were used to represent the study’s capital structure and financing measures: leverage, long-term leverage, outside financing, and bank financing.

All firms with over 200 employees were included in the BLS sample, although financial details relating to these firms

were not included. Hence, these firms are excluded from the analysis.

The shareholders classification in the BLS does not necessarily mean that these firms obtained outside equity publicly, and potentially shareholders equity can represent several types of capital. The omission of firms with shareholders as a component of their capital structure resulted in 28 firms being excluded from the analysis. The majority of these firms had less than 25% of their capital structure comprised of shareholders equity. All tests were rerun without the exclusion of these firms; none of the findings were significantly affected.

Eliminating firms with over 100% leverage is consistent with previous capital structure related research, and allows for another filter to control for data entry errors from the survey and ensures a few outlying firms are not driving the results obtained. The main analysis was performed after increasing the threshold of firm leverage to 150%. This resulted in over two-thirds of the firms excluded being reintroduced into the sample. The results are robust to increasing this threshold.

These dependent variables were either created using the sum of different financing options listed in the study or taken directly from the survey. Appendix

A provides a summary of the different financing choices available on the survey and the variables developed from them.

Consistent with the literature, leverage is calculated as the total debt of the firm divided by the total assets. Total debt encompasses all debt components on the firms' balance sheet. Previous studies have been able to incorporate market values of debt or equity into their capital structure measures, however, given the scale of the firms in the sample and the financial information available, such values could not be considered. In recognition that not all components of leverage are homogenous, long-term leverage is also included. Apart from the obvious maturity and duration differences, long-term leverage is arguably more deliberate as it requires greater contractual obligations and screening processes. For this study, long-term leverage was operationalized as all debt that had duration longer than 12 months. The proportion of leverage that had duration longer than 12 months was explicitly requested in the survey.

An outside financing variable was applied to provide an alternative dependent financing measure from an agency perspective and is consistent with recent research examining small firm financing (Fluck et al., 2000; Ayers et al., 2001). For example, the two leverage measures do not distinguish between the leverage holders

who may be insiders and outsiders of the firm. Yet, both these holders have considerably different agency implications. In particular, insiders may have substantial knowledge of the firm or have strong ties to the entrepreneur, consequently making them less likely to be subject to the entrepreneurs' opportunistic behavior. Therefore, the use of outside finance captures these differences and allows for a clearer investigation of issues relating to moral hazard and information asymmetry. For this study, outside financing was operationalised by including all finance sourced from unrelated individuals and businesses, trade credit, venture capitalists, and banks.

Several studies have looked specifically at the issuance and level of bank financing at both start-up and relatively small firm stages (Freedman and Godwin, 1994; Storey, 1994; Cressy, 1996; Huyghebaert, 2001). Potential differences that might be found between banks and other outside financiers include the issuance of more financing for firms that are incorporated, and potentially greater reliance of assets in place for securing debt. Under both the outside and bank financing measures adopted by this study, whether capital is provided as a loan or as equity is not considered relevant. Thereby, these variables overcome potential problems associated with the identification of debt

and equity or the use of quasi-equity by new firms (Ang, 1992).

For this study, size is measured as the log of total assets. Asset structure is represented as noncurrent assets divided by total assets.⁷ Legal organization is represented by a dichotomous variable: "1" if the firm is incorporated and "0" otherwise. This study dichotomously classifies a firm as having growth intentions if the firm answered "yes" to either of the

Information concerning the tangibility of fixed assets was only available for around 50% of the sample firms. Given this, all tests were redone with an adjusted asset structure variable where tangibility of fixed assets was used if it was known; otherwise, the proportion of fixed assets to total assets was used. In addition, only firms that had tangibility data available were used in separate regressions. All of these tests produced results similar to those reported. The mean, and median proportions of fixed tangible assets to total fixed assets for the sample of firms where tangibility was known were 73.2% and 97.6%, respectively.

following: During the next 3 years, does the business intend to (1) significantly increase

production levels, (2) open new locations, and (3) introduce new goods or services?⁸ For industry controls, six broad industry groupings based on two-digit ANZSIC (Australian and New Zealand Standard Industrial Classification) codes were created, and these were manufacturing; construction; wholesale, retail, accommodation, cafes, and restaurants; transportation and storage; financial and property services; cultural, personal and other services.

Tests for the continuous variables, represented by the proportion of the dependent variables to total assets, were undertaken using tobit regression. The tobit specification was utilized because the dependent financing variables examined were censored, with the observations being either continuous or equal to zero. Such a model simultaneously incorporates the effects of both the decision to use a

4. Results

4.1. Descriptive statistics

The descriptive statistics of the dependent and independent variables are provided in Table 1. The mean (median) leverage of the sample firms was .6057 (.7500). However, it is

⁸ For growth intention, an alternative measure that could have been used was actual growth, however, there were three

particular type of finance and the proportion of finance used. Consequentially, the tobit model forces the independent variables to have the same sign with respect to both the use and proportion of finance, given the decision to make use of the finance. Whether this is a valid assumption is an empirical question. To address this simultaneity issue and to provide a thorough understanding of the determinants of business start-up financing, a series of logit and

OLS regressions were also undertaken.¹⁰ Whereby the logit model determines the influence of the independent variables upon the choice to use a particular type of financing, while the OLS model explains the proportion of financing, given the firms' decision to use a particular type of finance.

problems with this measure: (1) the relationship between growth intention and actual growth is not clear for the sample; (2) the growth measure could be capturing many other effects that are unrelated to intentional growth, such as whether inclusion on the tax register was undertaken before sales had taken place or it may be capturing the variability in lag times before the firms were completely operational; and (3) there are limited data

available tracking the growth of these firms over time. In fact, the longest period available is a 2-year period for the firms that were included in the BLS in 1996, with no data available for the firms appearing for the first time in the BLS in 1998.

All analyses were repeated using alternative industry categories with no difference in the findings.

An alternative to undertaking logit and OLS regressions is to use a sample selection approach, such as a Heckman

estimation procedure. This approach requires the development of two separate and independent models to explain (1) the decision to use a type of finance and (2) how much of that type of finance is utilized. However, in the analyses undertaken in this study it is unclear ex ante which independent variables should be excluded, if any, from either of the two models. In addition, logit and OLS regressions are more commonly applied allowing greater comparability of results with previous research.

Given these arguments, simple logit and OLS regressions were considered more appropriate.

Table 1
 Dependent variables (N=292)

	Mean	S.D.	25%	Median	75%	% of firms=0
Leverage	.6057	.3624	.2722	.7500	.9510	9.9
Outside financing	.4024	.3446	.0667	.3240	.7394	18.5
Long-term leverage	.1961	.2846	.0000	.0049	.3553	49.7
Bank financing	.1685	.2731	.0000	.0000	.2867	56.5

Important when examining these descriptive statistics to recognize that these means and medians are calculated after the exclusion of firms beyond the bounds of “technical” solvency. Inclusion of such firms would increase the magnitude of the dependent variables. Long-term leverage appears to constitute around 20% of the capital of new firms; however, this distribution is positively skewed. The relatively low long-term leverage observed

is consistent with evidence that entrepreneurs use short-term financing and personal savings for start-up.

Table 1 also shows that outsider financing represents 40.2% of the capital of new firms. This level is constant with empirical evidence of outsider financing use in the early years of operation (Fluck et al., 2000), however, it is inconsistent with the conclusions made by Berger and Udell (1998) when they examined data from a

nationwide U.S. sample. Applying a self-constructed insider finance measure suggests that insider sources comprise 50.9% of the capital of the sample start-up firms, with the remaining proportion (8.9%) being represented through provisions for liabilities, deposits, and outstanding claims. These provisions and other items were classified as neither outside or inside financing. Insider financing was a larger component of the capital of firms for 55% of the sample (161 out of 292).

4.2. Multivariate analysis

Table 2 provides the results of the tobit regressions between the four dependent variables and firm characteristics without industry controls. The use of industry controls had no effect on the inferences and was not found to be incrementally useful in explaining capital structure and financing level in start-up firms and are consequently not reported. Focusing upon the statistical significance of the

For the sample, 16.9% of the financing of new firms is provided through bank financing. Generally, most firms had some form of debt financing (90.1%), however, as Table 1 shows, only roughly half the sample were currently using some form of long-term and bank financing. The mean (median) total assets of the firms was AUS\$1,140,000 (AUS\$157,000), with 25% of the firms having under AUS\$40,000 in total assets, while the mean (median) asset structure of the sample firms was .4787 (.4922).

coefficients, three principal observations can be made. First, size appears to have a significant influence upon the capital structure and financing of start-ups, with all four variables being positively related to size, consistent with Hypothesis 1. Second, asset structure is also a significant influence upon business start-up financing. However, the direction of influence is dependent upon the financing

Tobit regressions without industry controls

Table 2
 Tobit regressions without industry controls

	Leverage	Outside financing	Long-term leverage	Bank financing
Log assets	.1012*** (.0286)	.1786*** (.0268)	.1595*** (.0358)	.1487*** (.0389)
Noncurrent assets	.2066** (.0765)	.1478* (.0714)	.3358*** (.0941)	.3926*** (.1010)
Legal organization	.0059 (.0517)	.0715 (.0480)	.0534 (.0616)	.1490* (.0665)
Intent for growth	.0456 (.0523)	.0162 (.0486)	.0197 (.0622)	.1744* (.0692)
Constant	.2143 (.1819)	.6191*** (.1714)	.9396*** (.2337)	1.3820*** (.2641)
N	292	292	292	292
Log likelihood	202.18	178.15	188.77	184.89
Log ₂	.049	.122	.078	.092

Pseudo R

2

20.65***

49.36***

32.06***

37.36***

Standard errors are in parentheses.

- * Significant at .05.
- ** Significant at .01.
- *** Significant at .001.

variables investigated, with leverage and outside financing both being positively related to the proportion of noncurrent assets of the firm, while long-term leverage and bank financing were found to be negatively related. Third, it appears that both legal organization and intent for growth appear to have little effect upon debt use, however, both these variables do appear to positively influence the use of bank financing. This suggests that there may be unique differences between bank financing and other outside financing sources.¹¹

Table 3 provides the results of the logit and OLS analyses that separate the use and magnitude of financing for start-ups. For all the four financing options, the influence of size upon the decision to use a particular type of financing is strong, with all logit coefficients significant at $P < .001$. For example, a 10-fold increase in firm size around the mean increases the likelihood of using bank finance from 30.7% to 41.9%. In addition, the OLS coefficients are all positive for the financing variables except for long-term leverage. For example, a 10-fold increase in the size of the firm corresponds with an 8.8% increase in the outside finance of the firm,

while it also corresponds with a 5.9% decrease in long-term leverage for firms that utilize that type of financing. Overall, the influence of size upon start-up financing appears to be more influential for the decision to use a particular type of financing rather than explaining the magnitude of use.

The effects of asset structure generally appear to be stable across both the decision to use and the proportion of use of financing choices, consistent with the tobit specification. For

Previous research has shown differing relationships between capital structure and the other characteristics of the firm when the sample is based on large listed firms and relatively smaller firms, respectively. To test for potential-size interaction effects, the sample was partitioned into two equal groups: above and below the sample median for total assets. Comparisons between the restricted and unrestricted models suggested that the unrestricted-size interaction models do not significantly provide incremental information beyond the simple models. Consequentially, they are not reported in the article

Logit and OLS regressions explaining the use and proportion of financing

Table 3
Logit and OLS regressions explaining the use and proportion of financing

	Leverage		Outside financing		Long-term leverage		Bank financing	
	Logit	OLS	Logit	OLS	Logit	OLS	Logit	OLS
Log assets	1.697*** (.332)	.0243 (.0225)	1.231*** (.225)	.0875*** (.0232)	.939*** (.159)	.0589* (.0280)	.487*** (.145)	.0644 (.0330)
Noncurrent assets	1.100** (.611)	.1562** (.0588)	1.066* (.483)	.0654 (.0621)	.720 (.386)	.2890*** (.0750)	1.236*** (.385)	.1808* (.0784)
Legal organization	.178 (.430)	.0183 (.0390)	.177 (.330)	.0837* (.0403)	.404 (.256)	.0311 (.0463)	.404 (.253)	.0840 (.0514)
Intent for growth	.250 (.444)	.0496 (.0395)	.234 (.333)	.0189 (.0409)	.200 (.261)	.0213 (.0463)	.877*** (.261)	.0662 (.0555)
Constant	4.972*** (1.585)	.6713*** (.1440)	3.970*** (1.122)	.0610 (.1503)	4.673*** (.925)	.5173 (.1852)	4.571*** (.838)	.1432 (.2175)
N	292	263	292	238	292	147	292	127
Log likelihood	74.16		116.80		178.83		183.07	
Pseudo R ²	.215		.165		.116		.084	
R ²	40.65***		46.01***		47.13***		33.69***	
Adjusted R ²		.038		.077		.149		.093
F statistic		.023		.062		.125		.063
		2.54*		4.89***		6.20***		3.13*

Standard errors are in parentheses.

* Significant at .05.

** Significant at .01.

*** Significant at .001.

Example, the influence of asset structure upon the use of bank financing suggests at the mean that a 10% increase in the noncurrent to total assets ratio leads to an increase in the probability of bank finance use from 32.2% to 34.9%. Of the firms that utilized bank financing, a 10% increase in the proportion of fixed assets

leads to an increase of bank finance of 1.8%.

The coefficients for legal organization suggest that whether a firm is incorporated has little effect on the use or magnitude of debt utilized by start-ups. Examining the results for financing and legal organization, they show that incorporation

of the firm is associated with an 8.4% increase in the proportion of outside and bank financing in the firm, respectively, although only outside financing has an observed relationship at conventional levels of significance. Interestingly, the observed significant effect of incorporation upon bank financing is not reflected significantly upon the decision to use bank financing or its magnitude, although both coefficients are positive.

Intent for growth arguments receives little support from the separate regressions, aside from strong effect upon the use of bank financing. For example, at the mean, intention for expansion increases the likelihood of using bank financing from 23.2% to 42.1%. However, this effect does

4.3. Owners' characteristics and start-up financing

As discussed earlier, owners' characteristics may provide some additional predictive power in explaining the capital structure and financing characteristics of new firms. To test for this influence, three owners' characteristic variables were included in the regression models above.

Table 4 provides the tobit regression results of including the major decision

Table 4

	Leverage	Outside financing	Long-term leverage	Bank financing
Log assets	.1471*** (.0407)	.2079*** (.0381)	.1953*** (.0514)	.2878*** (.0620)
Noncurrent assets	.3050*** (.0904)	.1634 (.0850)	.2950** (.1103)	.3322* (.1291)
Legal organization	.0391 (.0646)	.0466 (.0598)	.0778 (.0780)	.1155 (.0902)

not hold in explaining the proportion of financing: The coefficient of bank financing for firms that utilize this type of finance is not significant and is actually negative.

This suggests that the relationship between growth intention and the use of bank financing appears to be driving the overall positive relationship between bank financing and growth intention found in the tobit regression. All the logit and OLS regressions are significant, however, their predictive abilities are modest, with the logit models being able to predict between 8.4% and 21.5% of the variance in the financing of the sample firms, and the OLS models being able to predict between 3.8% and 14.9% of the variance in the financing of the sample firms.

maker with the other explanatory variables. Due to the extra data requirements and the optional nature of the question within the survey, the sample available for analysis of the influence of owners' characteristics is reduced to 193 firms. Importantly, in the regressions undertaken, industry is not excluded from any of these tests, as the major

Intent for growth	.0456 (.0693)	.0148 (.0646)	.0429 (.0816)	.0486 (.0978)
Gender	.1337 (.1052)	.1000 (.0996)	.1571 (.1321)	.0366 (.1518)
Tertiary education	.0107 (.0686)	.0643 (.0643)	.0149 (.0814)	.0463 (.0942)
Year of experience	.0018 (.0034)	.0025 (.0032)	.0046 (.0041)	.0090 (.0049)
Constant	.1276 (.2668)	.8151** (.2546)	.7773** (.3306)	2.1860*** (.4837)
Industry controls	yes	yes	yes	yes
N	193	193	193	193
Log likelihood	126.67	109.85	118.05	115.53
Pseudo R ²	.117	.164	.124	.137
	33.69***	43.12***	33.27***	36.59***
Log likelihood without owner characteristics	127.55	111.09	119.28	117.35
Likelihood ratio between models	1.76	2.49	2.45	3.64

Standard errors are in parentheses.

* Significant at .05.

** Significant at .01.

*** Significant at .001.

decision maker may also influence the industry sector of the new venture (Coleman, 2000). Examining the coefficients, two main points are noted. First, all the independent variables exhibit similar relationships with the financing and capital structure variables, aside from demonstrated by both the lack of significance of the owners' characteristics and the insignificance of the likelihood ratio between the models with and without owner's characteristics. A variable that may have some potential for providing financing information is the years-of-years of experience is positively correlated with entrepreneur wealth or risk aversion.

5. Conclusions

This section reviews the conclusions in light of the variables investigated. Size appears to be an important factor in the financing of new businesses. Consistent with the theoretical arguments developed

the decreased magnitude and significance of incorporation and growth intention upon bank financing. Second, the major decision maker's characteristics do not appear to affect the financing of the firm after firm characteristics are considered. This is experience variable that is always negatively related with the financing variables, although at no time is this relationship significant at conventional levels. The negative relationship between bank financing and years of experience can potentially be explained if

earlier, the larger the start-up, the greater the proportion of debt, long-term debt, outside financing, and bank financing. Distinguishing between the decision to use and the proportion of financing use revealed that size was consistently an important explanation in the decision to use debt and bank financing by start-ups.

This highlights the importance that scale and market access have upon the capital structure of start-ups. Given the empirical evidence, the interaction between outside/inside finance and size is important and should be controlled when examining such financing relationships.

The role of asset structure upon the start-up firms' finances demonstrates the importance of tangibility of assets and its impact upon financing opportunities. Firms with a relative lack of tangible assets appear to be financed through less formal means, where nonbank financing, such as loans from individuals unrelated to business, plays a more important role in the capital structure of start-ups. This highlights the importance of network resources in these types of ventures. The positive relationship observed between bank financing (and long-term financing) and asset structure reconciles with the matching of long-term debt (for which bank financing is a significant component) against the fixed assets that can be used as collateral. Therefore, these findings are consistent with agency cost arguments and suggest that banks rely upon these contracting mechanisms (fixed assets of the firm) in their financing of start-up firms to minimize such costs. However, this raises interesting questions: Why do not other "lenders" outside the scope of the banks appear to use such mechanisms? Are these debt amounts more like equity?

Such an argument is consistent with the classic definition problem of debt versus equity in unlisted business. Alternatively, are these lenders less interested in the commercial or "arms-length" transactions and have an interest in the entrepreneur undertaking their business? Such an explanation is consistent with the use of network resources.

Another explanation is the matching of maturities of the start-up firms' finances with the firms' assets. This risk-management practice may lead to short-term components of debt confounding the relationship between asset structure and leverage. Given that short-term debt generally constitutes a larger component of financing than long-term debt, firms matching the maturity of their debt with their assets may cause an inverse relationship between leverage and asset structure. Further research is needed to distinguish between these explanations underlying the relationship observed. Finally, given the observed effect of asset structure, studies that fail to include asset structure effects, suffer from an omitted variable problem, potentially biasing their results.

Organization type provided no explanatory power with regard to the proportion of leverage in the firm. However, both outside and bank finances appeared to increase as a result of the firm being

incorporated. This suggests that the signaling effects associated with incorporation may provide a nontrivial benefit for these firms. However, whether incorporation actually results in less risk or better performance cannot be addressed by this study.

The only significant influence of the intention of growth for start-ups and their choice of financing was upon bank financing. In particular, start-ups with the intent to grow appear to be more likely to use bank financing, a result consistent with the increased incentives in establishing credit relationships as early as possible for these type of firms. The failure of intention for growth to influence other capital structure or financing choices is inconsistent with the agency arguments that predict a lower use of outside and long-debt finance. How these agency conflicts interact with start-up strategic choices is an area for future inquiry.

The failure for the major decision makers characteristics being significant with start-up financing is consistent with (1) entrepreneurs with different education, experience, and gender not differing on financing preferences after taking other firm characteristics into consideration (demand side) and/or (2) suggestions that financiers weigh the characteristics of the firm, such as size and noncurrent assets,

more highly than those of the major decision maker (supply side).

Limitations and future research

This section discusses some of the limitations of the study and offers suggestions for improvement as well as other ideas for future research examining capital structure choices for start-ups. First, there are several factors that are unable to be controlled due to data constraints. For example, the potential influence of ethnic background upon start-up finance through both resource and motivation issues has been noted by several researchers (Ando, 1988; Chen and Cole, 1988; Bates, 1991,1997; Bond and Townsend, 1996). Additionally, financing choices have been argued to be influenced by earnings profiles, growth potential, and the personal wealth of the entrepreneur (Cosh and Hughes, 1994; Chaganti et al., 1995; Cressy and Olofsson, 1997; Avery et al., 1998; Berger and Udell, 1998). This study also cannot consider the role of personal collateral, varying interest rates, or the owners' previous relationships with financiers. All of these factors influence the demand and supply of outside financing (Storey, 1994; Cressy, 1996; Coleman, 1998). Unfortunately, the data set does not provide the detail necessary to undertake such investigations. However, investigations of this nature would be fruitful given the potential dominance of the major decision maker to influence the

behaviors of the firm, particularly during start-up. Obviously, the extent to which the influences do bias the coefficients is consequently a limitation of the study.

Another limitation is the possibility that operations or events that have occurred since start-up could be potentially confounding to the findings of the study. For example, the equity claims will be a greater (lower) proportion of total capital when the firm has returned positive (negative) earnings over the period between start-up and the point in time to which the survey information relates. For firms with positive earnings, this would result in lower leverage due to increased equity, or as a follow-on effect, it could lead to further debt financing opportunities due to good profitability. The potential to improve upon the timing of survey may be more difficult than probably initially assumed, given that the time when

the business actually starts can be arbitrary.¹² However, the heterogeneity of the start-up stages of the sample firms is a limitation of the study.

The ideal sample would consist of entrepreneurs in the process of starting a venture and tracking these entrepreneurs through the initial stages of business formation. However, it is acknowledged that such longitudinal opportunities may be relatively limited when compared to

larger, more established firms due to their longevity and more demanding reporting requirements. The second best option available to researchers is obtaining actual financial information of new firms or surveying entrepreneurs who have started business ventures, with the time between start-up and the collection of information as small as sample availability allows. Whether the researcher wants to inquire about the current capital structure or the initial capital structure of the firm is a compromise between the event bias mentioned above and potential reliability problems due to recall and the arbitrary definition of start-up.

Following firms in more detail, through interviews and surveys, may increase understanding of the motivations for searching for different types of finance and the nature of

12 Studies that have examined business start-ups define several points that could constitute business start-up (Reynolds and Miller, 1992; Gatewood et al., 1995; Carter et al., 1996; Alsos and Kolvereid, 1998). The literature also suggests that start-up should be considered more as a process over time rather than occurring at a distinct point of time.

such searches. A related issue is the refusal of credit and the notion of credit rationing. Given this study's research design, which

focuses on final outcomes, it is unable to determine the structure of the search for capital, the process by which the finances were obtained, and the degree to which the firms were credit rationed. However, all these questions are important in providing further insight on how financial intermediaries allocate funds to firms. Interviews and surveying techniques may provide an alternative approach to determine the role of finance matching within new and small firms. Competing explanations for the presence of matching include firms deliberately matching to reduce exposure to duration risks or a consequence of financiers only providing capital backed by securable assets or alternatively a natural function of the firms operating characteristics.

There is still potential for examining specific industries with unique characteristics or specific funding arrangements to provide a more complete picture of financing and capital structure. For example, the high-tech sector has been a focus for several empirical investigations. These investigations provided the opportunity to explore a set of firms that can be characterized by limited tangible assets, high risk, and high growth potential, consequentially, it provided contrasting evidence beyond the “average” new venture that most likely

consists of more tangible assets, lower risk, and limited probability of substantial growth. What other contextual circumstances offer unique opportunities to validate finance theories on capital structure? How do joint venture or angel investors overcome information asymmetries and moral hazard and how do these mechanisms change according to context? Understanding how particular sectors are funded and whether such sectors suffer or gain from unique funding arrangements, such as unique information asymmetries or increased discretion or environmental volatility, will assist in improving our understanding and provide guidance for other potential financiers and entrepreneurs forming new ventures.

Studying the funding of new innovative firms is also a fertile area of research given the apparent benefits of funding innovation within an economy. Targeting the small percentage of start-ups that are created with the potential to provide substantial employment growth may also be a fruitful exercise, similar to the approach adopted by some authors, such as Bhide (2000). However, careful consideration of how sampling bias problems can be avoided will need to take place to ensure that results inferred are not just from “the winners” but “the losers” as well.

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