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While academic research concerning capital structure of large corporations has been abundant in the finance literature, studies of small firms have been somewhat less common, and investigation of capital structure at origin (start-up) has been virtually nil. In this paper we present empirical evidence concerning the start-up capital structures of small firms. We base this investigation upon characteristics of both owner and firm. We find the percent of the owner's income expected to be derived from the business to be positively associated with debt use and the owner's age to be negatively associated with debt use. We find that more debt is obtained if the business owner is married and less if he or she is black. Similarly, more debt is prevalent among start-up firms in transportation and utilities than those in other industries. When debt obtained from other than financial institutions is considered, factors such as gender, experience, education, and expected firm size also play a role in the structure of start-up capital.

I. INTRODUCTION

While the theoretical and empirical study of the capital structures of large firms has a long history, the capital structure decisions of small firms have received a good deal less attention. Pettit and Singer [31] suggest that the capital structure of the small firm is determined in part by the interaction of the owner's risk-return preferences, the characteristics of the firm, and the costs of various types of financing. They see agency problems and a high level of asymmetric information as major determinants of financing costs.

This paper presents an empirical investigation of the initial (start-up) capital structures of small firms. Section II discusses the owner's risk-return

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preferences, the costs of various types of financing, and the business's characteristics as determinants of these capital structures. Section III reviews prior empirical studies in the area. Section IV presents our research hypotheses and methodology. Section V presents our empirical results. Section VI summarizes our findings and suggests areas for future research.

II. DETERMINANTS OF CAPITAL STRUCTURE FOR SMALL FIRMS

The Owner's Risk-Return Preferences

Owners of small businesses can, to some extent, implement their own risk-return preferences in choosing the firm's capital structure. Whereas the small business literature frequently characterizes small business owners as being less risk averse than others [31], there may be portfolio considerations which encourage them to be more risk averse.[1] Specifically, the business usually comprises a relatively large fraction of the owner's wealth so that the owner is under-diversified, forcing relatively conservative decisions in asset selection and financial structure [3]. The net effects of risk aversion and diversification will, in part, determine the owner's preference with regard to financial and operating risk.

The Costs of Financing

There are several reasons why suppliers of capital may require higher returns from smaller firms. First, small firms may in fact be more risky than larger firms. There are several reasons for this. The small firm's owner/manager may be less risk-averse than managers of larger firms, and consequently may select more risky projects [31]. Also, the owner/manager is generally a specialist in one facet of the firm (often its products or services), with less interest and ability in other critical areas. Finally, small firms, particularly those in high-technology product lines, deal in a limited number of new products or services for which there may be no accepted market niche.

Second, even if a small firm's actual risk is the same as that of a larger firm, suppliers of capital may demand higher required returns because of the higher estimation risk in forecasting expected return and risk. The value of the human capital (a critical determinant of small business success) is not easily observed, particularly for the first-time business owner [20, 31].[2] Further, audited reports and data from commercial reporting agencies on smaller firms are frequently unavailable or limited.

Finally, there is substantial reason to believe that agency problems between suppliers of outside capital and the owner/manager are greater for small than for large firms. In general, small firms have more flexibility in altering their financial and operating structures and are more difficult to monitor [31]. Also, as majority owners, owner/managers face greater incentives to alter the structure of the firm in favor of themselves at the expense of outside suppliers of capital. Suppliers of outside capital must build all of these factors into their required returns.[3]

The Firm's Business Characteristics

As for large firms, the characteristics of the small firm's business line and its asset structure will, in part, determine capital structure. For example, firms with more securable assets and firms with lower investment in research and development will be able to obtain debt on more favorable terms, resulting in a tendency to use more debt [37].

III. PRIOR EMPIRICAL STUDIES OF SMALL FIRMS' CAPITAL STRUCTURES

Relatively little research has been done on the capital structures of small firms, particularly in a multivariate context. Most such research has concentrated on the characteristics of the small firm itself. Leeth and Scott [23] investigated the use of secured borrowing. Using data from two samples of loans to small business, they found that the use of secured debt is associated with the age of the firm (their proxy for default probability), loan size, loan maturity, legal environment, economic conditions, and industry.[4] Walker [40] generally found support for hypotheses relating firm characteristics to capital structure, but his small sample size (13 firms) precludes robust conclusions. Ou [29] divided his sample of small businesses into three categories: very small firms, traditional small businesses, and dynamic ventures. He found that financing differed among the categories.

Recent studies by Bates [7] and by Ando [2] incorporated not only characteristics of the firm but also characteristics of the owner. Using a sample taken from the Characteristics of Business Owners database, Bates examined the dollar amount of debt financing used by small business owners. He found that the owner's education, age, the dollar amount of equity capital, and whether the business was ongoing or a start-up affected dollar debt financing for whites. For blacks, education, the amount of equity capital, the owner's experience in a family-owned business, and whether the business was ongoing or a start-up affected dollar debt financing. He also

found that blacks used less dollar debt than whites with the same qualifications (either because they chose to use less debt or because of credit discrimination).

Using a sample of about 500 owners of established businesses in 1984, Ando performed regression analysis to test determinants of capital structure. At the 90% confidence level, she found the following to influence debt/equity position significantly for established small businesses: the owner's business education, the age of the firm, the firm's size, the firm's growth rate, the firm's credit rating, the firm's initial debt position, and whether the firm had obtained an SBA loan.

With respect to ethnicity, Ando found that minority men who are American Indians, Eskimos, and Asian Indians (persons from India and Pakistan) used less debt, as did Asian women. Not found to affect debt position were the amount of initial equity capital, minority status, and gender except as discussed above.

Bates' and Ando's studies are strong initial efforts in linking both business and personal characteristics to debt/equity mix. Our study advances their research in several respects. First, like Ando, we concentrate on financial leverage (debt/equity mix), but we employ much larger samples than she did. Second, we control for the effects of industry, an important business characteristic which has been found to be a significant factor affecting capital structure for large firms. Finally, we investigate in far more detail the relationship between the owner/manager's human capital and the firm's capital structure.

IV. RESEARCH HYPOTHESES AND METHODOLOGY

Research Hypotheses

In studies of the capital structures of large firms, the dependent variable usually studied is the ratio of debt to total capitalization (or its equivalent, debt/equity). This ratio is important for two reasons. First, debt/equity position represents an important choice in that it has substantial implications for the firm's level of risk and return. Second, while subject to constraints and costs imposed by the market, the firm has a reasonably wide choice of its debt/equity position; therefore, its debt/equity choice is important evidence regarding the incentives to which the firm's managers respond.

Our research hypotheses concern the relationship between the ratio of debt to total capitalization and three sets of explanatory variables:

1. variables which enable lenders to value the firm's human capital;
2. variables which represent the owner/manager's risk preferences and/or credit discrimination by lenders; and
3. variables which capture the firm's business and operating attributes.

Our hypotheses regarding the first two of these sets of variables are based on Myers' Pecking Order Hypothesis [25] (referred to hereafter as the POH), a theory of capital structure choice with important application to small firms.[5] In this view, firms finance their needs in hierarchical fashion, first using internal equity, followed by debt, and finally external equity. This ordering is caused by the effects of asymmetric information and agency problems on the returns required by providers of various sources of funds [19, 26]. For small businesses, asymmetry of information and agency problems between management and outside investors are more acute than for large firms, making differences in costs between internal equity, debt, and external equity consequently greater. Therefore, the hierarchical approach should have even more appeal to small firms than to large.

If Myers' POH holds for small firms, external equity will be extremely costly, and debt financing will be much preferred as a method of obtaining external funds. Given that the owner/manager's equity contribution is limited by his or her personal net worth, capital structure will depend to some extent on the amount of borrowing which lenders will grant on reasonable terms. This lending, in turn, will depend in part on how they value the firm's human capital, as this is a major determinant of the small firm's success.

Lenders will provide capital at lower required returns to firms where the perceived value of the owner's human capital is higher. Consequently, variables which reveal the value of the owner's human capital should be determinants of capital structure. Values for these variables which indicate a greater potential for success should lead to more debt as a proportion of initial capital since, under the POH, debt is preferred for outside financing.

In addition to measures of the value of the firm's human capital, the owner/manager's personal characteristics (such as the amount of the manager's other income, his or her gender, ethnicity, etc.) may influence capital structure choice. This influence may occur in two ways. First, personal characteristics may affect the owner/manager's risk preferences and therefore the amount of debt he or she is willing to incur. Second, personal characteristics of the loan applicant may influence the amount and/or cost of funds borrowed via gender or racial discrimination in lending.

Our final set of explanatory variables concerns the firm's business and operating attributes. There is substantial evidence in the large-firm litera-

ture that certain of these attributes, such as the available of securable assets, lead to greater debt use.

Sample

Our sample has been extracted from the 1982 Characteristics of Business Owners (CBO) database. This is a stratified sample of 125,000 small business owners collected in 1986 and reflective of business status as of 1982 [38].[6] The following firms were *excluded* from our sample:

a. *Firms reporting no equity capitalization.* There must be *some* equity capitalization to start a business. Removing these firms from the sample provides a reasonability check on the financial data reported by the firm.
b. *Firms whose owner is not the original founder.* This cutout centers around data reliability. We wanted data to be as reliable as possible, and suspect that founders are more likely to have accurate information on the business's start-up capitalization than are subsequent owners.
c. *Firms with yearly sales below $5,000.* This cutout is to purge the data of firms which are so small that serious consideration of funding has probably not been undertaken.
d. *Firms founded before 1980.* Given that the CBO questionnaire was administered in 1986, it seems reasonable to include only recently-founded businesses, as these probably have the most reliable start-up data. To a great extent, this restriction also holds constant interest rates and tax regimes.

Multiple-owner firms were randomly assigned to one of the owners and that owner's personal characteristics were used to characterize the firm's ownership; other owners of the same business are excluded from the sample. (There are several possible approaches to the problem of multiple owners when there may be differences in race, gender, education, etc., but this approach seemed least likely to induce systematic bias.)

One important question in investigating the small firm's capital structure concerns the treatment of debt obtained from insiders (the owner, the owner's family and friends, etc.). Ang [3] refers to such debt as "quasi-equity," stating that for such borrowings, the legal rights of debt will not be enforced (also see Ou [30] for discussion of this issue). To address this problem, two subsamples were developed; one containing all firms, regardless of the source of debt financing, and one where all the firms' borrowings were solely from financial institutions.[7] These cutouts and other data

requirements resulted in sample sizes of 41,665 for the first subsample and 7,588 for the second.

Measurement Issues

Data Encoding—The Characteristics of Business Owners (CBO) database is based on responses to a questionnaire. Our statistical analysis related a measure of debt/equity from this questionnaire to explanatory variables measuring the value of human capital, personal characteristics, and the firm's business/operating attributes. The CBO questionnaire required responses of three types: numerical responses, multiple-choice responses among alternative ranges of a numerical variable, and categorical responses. Responses of the first two types were treated as if data were continuous: for numerical responses, the actual numerical response was used, and for multiple-choice responses, the midpoint of each numerical range was used. (While a set of dummy variables could have been used to represent the later data, utilizing a single variable based on the midpoint of the range simplified estimation and interpretation.) For categorical data, dummy variables were used with a one indicating membership in the category.

Dependent Variable—Our dependent variable was the ratio of business start-up debt to total capital. Responses to a multiple-choice question with eleven ranges of debt to total capitalization (i.e, none, 1-10%, 11-20%, etc.) were encoded based on the midpoints of these ranges. Therefore, this variable can take on eleven values.

Measures of Human Capital—The following variables were used to measure the value of the owner's human capital:

a. *Owner's Age.* Lenders may be willing to lend to older, more experienced owner/managers at startup since there is likely to be less uncertainty about their performance. Responses to a multi-choice question with six ranges of the owner's age were encoded based on the midpoints of these ranges.[8]
b. *Owner's Education.* If education contributes to success in small business, lenders should be willing to lend more to better educated owner/managers.[9] This continuous variable was measured as total years of education.
c. *Owner's Business Education.* Ando found that this type of education was associated with greater debt. A dummy variable captured whether the owner had formal business education.

d. *Owner's Family Business Experience*. Coming from a family with small business experience may aid in small business success and increase loan availability. A dummy variable captured whether the owner's family had owned a small business.
e. *Owner's Managerial Experience*. Like other types of education and experience, managerial experience may cause lenders to place a higher value on the firm's human capital. Responses to a multi-choice question with seven ranges of years of managerial experience were encoded based on the midpoints of these ranges.
f. *Owner's Business Ownership Experience*. Owner/managers who have previously owned a small business have, via the performance of this prior business, revealed a good deal about their competence. A dummy captured whether the owner had prior business ownership experience.

Measures of Other Personal Characteristics—Our second set of explanatory variables is intended to capture differences among owners due to these factors:

a. *Percent of Owner's Income Expected from the Business*. The higher the percent of income that the owner expects to derive from the small business, the lower is the diversification of the owner/manager's income stream, and the less debt is likely to be used (since the owner will be more risk averse due to this lack of diversification; see Ang [3]). However, there is a counterhypothesis: banks may prefer to lend when the firm is expected to provide a larger share of the owner's income, since the owner is more likely to concentrate on the affairs of the firm. To proxy for the fraction of income expected (at startup) to be derived from the business, we use the actual percent of income which the owner derived from the business, measured after the fact. Responses to a multiple-choice question with seven ranges of actual percent of income from the business were encoded based on the midpoints of these ranges.
b. *Owner's Marital Status*. Married owners are more likely to have a separate income stream from their spouse, resulting in more financial diversification. Therefore, married owners are likely to use more debt.[10] A counterhypothesis is that married owners, because they may have two income streams, will have higher net worths and thus (under the POH) will substitute cheaper internal equity for debt. A set of three dummy variables captured whether the owner was mar-

ried, divorced or separated, or a widow or widower. Never married was the excluded category.

c. *Owner's Gender.* Research conducted prior to the 1960s found differences in risk preference between males and females with females being more risk averse. However, more recent investigations including studies using entrepreneurs as subjects [24] have found no such difference. Nonetheless, credit discrimination based on gender may exist, reducing the availability of borrowed funds to women.[11] A variable captured male/female. (One equals male.)

d. *Owner's Ethnicity.* Little research had been done on differences in risk-taking propensity by ethnicity; any such differences may influence the owner/manager's choice of capital structure. There also may also be credit discrimination based on ethnicity, and empirical evidence indicates that such discrimination in lending amounts and lending costs exists either because of owner's ethnicity or business location in a minority area [5, 12, 18]. This discrimination is primarily directed against black businesses and tends to decrease their debt ratios. However, the conventional wisdom is that minority firms may also have relatively little initial equity contribution because earnings and, consequently, savings from the owner/manager are less than for owner/managers of nonminority firms. This would tend to increase the debt ratio.[12] We address these issues by employing measures of Hispanic/nonhispanic and black/nonblack ethnicity. Two dummy variables captured Hispanic/nonhispanic and black/nonblack ethnicity. White was the excluded category.

Business and Operating Characteristics of the Firm—The following variables were employed to capture these effects:

a. *Industry.* In prior empirical research on large firms, industry membership has been associated with capital structure choice [10, 35, 37]. Industry membership can proxy for a number of factors, including the securability of assets. To a great extent, industry membership captures business characteristics, a factor which Pettit and Singer cite as important in small-firm capital structure. A set of nine dummy variables captured membership in ten industry groups. The excluded category was Agricultural Services.

b. *Expected Size.* For larger firms, more information is available, and they may obtain financing in markets which are foreclosed to or extremely costly for smaller firms. Firm size has been used in several studies of capital structure [9, 30, 37] to capture these effects of mar-

ket access.[13] As in our proxy representing the percent of income expected to be derived from the business, we use actual size to proxy for expected size. Responses to a multiple-choice question with 10 ranges of actual dollar sales were encoded based on the midpoints of these ranges.

c. *Expected Profitability.* Profitability has been used in prior studies of existing large and small firms and generally has been found to be negatively associated with debt use.[14] However, the usual test relates *past* profits to *present* capital structure, the premise being that firms have used accumulated profits in place of debt financing.[15] Our study concerns *start-up* capital structures; there are no accumulated profits to supplant debt. In such a situation, if there is a pecking order making debt more expensive than internal equity, firms will only use debt financing if there is sufficient expected profitability to warrant the costlier funds; hence profits and start-up debt should be *positively* related.[16] Our measure of expected profitability is actual net income before taxes divided by actual total capitalization. Both are measured as the midpoints of response ranges to multiple-choice questions (16 ranges for net income, nine ranges for total capitalization).

It is important to note that for the percent of income expected to be derived from the business, expected sales, and expected profitability, we have used *actual* outcomes to proxy for expectations at the time of startup; there are no expectational measures on the CBO database. Such a procedure introduces an element of measurement error since actual outcomes may differ from the expectations under which startup capital structure plans were made. However, we felt these variables to be of sufficient importance to make this tradeoff advantageous.[17]

V. RESULTS

Sources of Debt

Readers may be interested in the sources of debt used by the firms in the CBO database. Of the firms in this database, the majority used only the owner's savings as initial capital [29]. For those firms who employed debt capital financing, many utilized multiple sources of borrowing; the largest single source of debt was the firm's bank, with borrowing from other members of the family ("quasi-equity") being the second most important source. A summary of sources of debt for firms in the CBO database is presented in Table 1.[18]

Table 1
Percents of Debt Borrowed from Various Sources for Firms in the CBO Database that Utilized Debt Financing at Start-Up

	Borrowing Sources				
Owner's Ethnicity	*Family*	*Friends*	*Government*	*Seller*	*Bank*
White—Males	23.7%	6.7%	1.6%	7.7%	60.3%
White—Females	27.6%	6.6%	1.7%	7.2%	56.9%
Hispanic	30.4%	11.0%	3.0%	7.7%	47.8%
Black	22.8%	11.4%	5.5%	4.6%	55.7%
Other Minority	30.3%	16.8%	2.1%	12.5%	38.3%

Notes: Abstracted from Ou [29], Table 6.

All Firms

We related the explanatory variables to debt/capitalization via OLS regression. Because data on our dependent variable are categorical (11 levels), we also considered two alternative methodologies: Tobit and Probit. While Tobit has been applied in situations where the dependent variable is limited, Kmenta [21] and Amemiya [1] have argued that this method is most advantageous when values of the dependent variable outside a specific range are omitted or lost. Perhaps a more appropriate alternative for the situation at hand is ordered Probit analysis, recently demonstrated in a financial context by Hausman, Lo, and MacKinlay [17]. This computationally intensive technique entails the joint estimation of multiple Probit models. Hausman, Lo, and MacKinlay contrast estimates from this technique with those from OLS. They find that discreteness of the dependent variable does matter in that the standard errors of OLS estimates are generally larger, leading to fewer significant results. We chose OLS over Probit primarily for simplicity in computation and interpretation, accepting more-conservative hypothesis tests as a penalty for these advantages.

OLS results for the first subsample, which includes firms regardless of their source of borrowing, are presented in Table 2.

We expected that lenders would be more willing to lend to older business owners because they would have less uncertainty regarding the owner's competence. However, while owner's age is statistically significant, its estimated coefficient has an unexpected sign; it is negatively related to debt position. There are several possible explanations for this result:

Table 2
Results of Analysis via OLS Regression:
Dependent Variable is Debt/Total Capitalization
(Includes All Firms Regardless of Source of Debt)

Explanatory Variable	*Estimated Coefficient*	*t Statistic*
Intercept	0.1931	12.312***
Group 1: Variables Measuring Owner's Education or Experience		
Age	-0.0017	-10.936***
Years of Education	-0.0017	-2.855**
Business Education	0.0019	0.512
Business Ownership Experience	0.0260	5.955***
Managerial Experience	0.0001	0.448
Family Business Experience	0.0163	3.424***
Group 2: Variables Measuring Risk Preference or Discrimination		
Percent of Income Expected from Business	0.1201	28.858***
Marital Status (excluded class: Never Married)		
Married	0.0601	9.238***
Divorced or Separated	0.0378	4.433***
Widow/Widower	0.0432	3.222**
Gender (Male = 1, Female = 0)	0.0357	9.281***
Ethnicity		
Hispanic	-0.0041	-0.958
Black	-0.0323	-6.849***
Group 3: Variables Representing Business and Operating Attributes		
Industry Dummy Variables (excluded group: Agricultural Services)		
Mining	-0.0055	-0.300
Construction	-0.0836	-7.133***
Manufacturing	-0.0321	-2.690**
Transportation, Utilities	0.1354	11.097***
Wholesale Trade	-0.0193	-1.292
Retail Trade	0.0138	1.339
Finance, Insurance, Real Estate	-0.0646	-5.376***
Other Services	0.0012	0.194
All Other	-0.0324	-2.788**
Expected Sales Size	3.287×10^{-8}	8.480***
Expected Profitability	0.1078	12.229***

Notes: The sample size is 41,665. The adjusted R^2 is .0512. F for this equation is 94.774, which is significant at the 0.0001 level. An *, **, or *** next to a *t* statistic indicates that the estimated coefficient is statistically different from zero at the 0.05, 0.01, and 0.001 levels respectively.

1. Older owners may have larger net worths, and may substitute this internal equity for debt financing (the POH); there is no measure of the owner's net worth on the CBO database to control for this effect.
2. Older owners may be more risk averse since their investment time horizon is shorter.
3. Lenders may be reluctant to lend to older people, despite informational advantages, because of their shorter expected time of ownership.
4. The measure of age we used may not be the proper operationalization to capture the relationship.

The variables which measure other aspects of experience or education present a mixed picture. Estimated coefficients for business ownership experience and family business experience are statistically significant and have the expected sign, but the coefficient for years of education is significant and unexpectedly signed. Business education and management experience are not statistically significant. This is contrary to Ando's [2] result for established small businesses; she found that owners with business education had significantly more debt in their firms' capital structures. While lenders may consider education in lending to established business but not to startups, it is also possible that our measures simply do not capture the dimensions of education and experience which are considered by lenders in making such decisions. Multicollinearity among the education and experience variables may also play a part.

Coefficients for variables portraying risk preference and/or credit discrimination tell a different story. We find a very strong positive association between the expected percent of income derived from the firm and the proportion of debt financing. This finding supports the idea that lenders favor firms which are expected to be the primary sources of income for their owners, and thus probably their main occupations. The proportion of debt used is significantly higher for married owners than for never-marrieds. This result is consistent with prior empirical work [39] and with the hypothesis that lenders favor owners with diversified sources of income. Interestingly, we also find that significantly more debt is used by divorced or separated owners and by widows and widowers than by those owners who have never been married. This may indicate that lenders discriminate against the never-married. It is not due to differences in age since age is among the variables controlled in our research design.

We find that male owners utilize significantly more debt than female owners. There are at least two possible explanations for this result. Female owners may be more risk averse, and therefore choose to employ less finan-

cial leverage in the capital structures of their firms. The other possibility is that there may be discrimination in lending against female owners relative to otherwise-equivalent male owners. Lending discrimination would result in lower levels of debt in females' capital structures by either limiting the amount of debt financing available or making debt a less attractive financing alternative due to higher cost. A similar result occurs for black versus white owners (black owners use less debt than white owners), perhaps for the same reasons. There is no difference in debt use between Hispanic versus white owners. These results for ethnicity and gender contrast with Ando's research, which in general did not find ethnicity or gender to be important capital structure determinants, but are in keeping with other empirical research [5, 7, 12, 18, 39].

Similar to Leeth and Scott's [23] results regarding secured lending to small firms and results in the large-firm literature, we find industry to be an important factor in debt position. Of the nine industry dummies, the estimated coefficients of five are statistically significant relative to the excluded group (Agricultural Services). By far the highest proportion of debt occurs for firms in the "Transportation and Utilities" category which includes trucking, taxi, and similar companies with highly securable assets (vehicles). Small firms in the construction, manufacturing, finance, and "other" groups had significantly lower startup financial leverage than the excluded group.

Another factor which affects startup leverage in this sample is expected size (as measured by actual sales). Firms that are expected to be larger are able to raise significantly more debt as a proportion of total funding than are smaller firms. The positive relationship between debt position and firm size is in line with Ando's results.

Likewise, expected profitability is a powerful influence on debt position. Firms which are expected to have greater debt-servicing capacity utilize higher volumes of debt at startup either because they have more profitable projects available and borrow to finance these projects or because lenders will lend to them on more advantageous terms.

Firms Borrowing Only From Financial Institutions

These results are presented in Table 3. Differences between results for this sample and the first may illustrate differences in lending criteria employed by all lenders (including those providing quasi-equity) versus the criteria employed by financial institutions alone. An alternative explanation is that owners who borrow from insiders are in some ways different from those who borrow from financial institutions.

Table 3
Results of Analysis via OLS Regression:
Dependent Variable is Debt/Total Capitalization
(Includes Firms which Borrow Only from Financial Institutions)

Explanatory Variable	*Estimated Coefficient*	*t Statistic*
Intercept	0.6702	20.306***
Group 1: Variables Measuring Owner's Education or Experience		
Age	-0.0031	-9.032***
Years of Education	-0.0006	-0.476
Business Education	-0.0020	-0.253
Business Ownership Experience	0.0032	0.362
Managerial Experience	-0.0003	-0.726
Family Business Experience	-0.0183	-1.847
Group 2: Variables Measuring Risk Preference or Discrimination		
Percent of Income Expected from Business	0.0320	3.630***
Marital Status (excluded class: Never Married)		
Married	0.0353	2.149*
Divorced or Separated	0.0268	1.287
Widow/Widower	0.0401	1.275
Gender (Male = 1, Female = 0)	-0.0038	-0.450
Ethnicity		
Hispanic	0.0033	0.368
Black	-0.0343	-3.366***
Group 3: Variables Representing Business and Operating Attributes		
Industry Dummy Variables (excluded group: Agricultural Services)		
Mining	0.0634	1.865
Construction	-0.0100	-0.429
Manufacturing	0.0158	0.651
Transportation, Utilities	0.0885	4.032***
Wholesale Trade	0.0194	0.615
Retail Trade	0.0505	2.507*
Finance, Insurance, Real Estate	0.0268	1.063
Other Services	0.0732	3.679***
All Other	0.0396	1.691
Expected Sales Size	1.508×10^{-9}	0.128
Expected Profitability	0.2692	9.802***

Notes: The sample size is 7,588. The adjusted R^2 is 0.0336. F for this equation is 12.007, which is significant at the 0.0001 level. An *, **, or *** next to a t-statistic indicates that the estimated coefficient is statistically different from zero at the 0.05, 0.01, and 0.001 levels respectively.

We find far fewer statistically significant associations than for the prior sample. Age is again significant but again has an unexpected negative sign. Unlike the prior sample, none of the coefficients for education or experience variables are significant. Among the risk preference/discrimination variables, expected percent of income from the business is again significant and positively signed. In this regression, marrieds have higher startup debt than never marrieds but divorced or separated and widows and widowers do not. There is no difference between the startup debt/equity positions of firms owned by males and females. However, blacks still use significantly less debt at startup than do whites.

Among the industry classifications, transportation and utilities, retailers, and other services now have significantly different debt ratios than the excluded group; the later two groups were not significantly different from the excluded group in the prior sample. In this sample, higher expected sales volumes are not associated with more debt. However, as before, firms with higher expected profitability employ more debt at startup.

VI. SUMMARY AND AREAS FOR FUTURE RESEARCH

What characteristics of the firm and its owner/manager influence its startup capital structure? Age appears to be negatively associated with debt use, regardless of the source of borrowing. We do not find consistent support for the owner's other educational and experience-based characteristics as determinants of startup financial leverage, though some appear to be important to insider lenders (but not to financial institutions). However, we do find substantial support for the percent of income expected from the business, marital status, and ethnicity as factors affecting start-up capital structure for all types of lenders. The significance of these characteristics could arise from differences in owner's risk preference, differences in the owner's net worth, or discrimination in credit markets. We also find that several business and operating characteristics of the firm are important in obtaining initial debt financing. Firms in the transportation and utility industry category and firms with higher expected profits utilize more debt.

There is much left to do. While our tests of hypotheses produce several strongly significant results, our model explains only five or three percent (depending on the sample) of the cross-sectional variation in startup capital structure.[19] Idiosyncratic factors in the lender's decision regarding small business loan applications (such as the lender's assessment of the quality of the applicant's business plan) limit the ability of any model to capture small firms' startup debt positions. However, there are undoubtedly important factors which influence initial debt/capitalization and which we have not

included in our model because proxies are not available in the CBO database. Chief among these is the owner's net worth which is the dominant variable in determining the initial equity investment according to the Pecking Order Hypothesis. Investigation of these and other factors are areas for future research.

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NOTES

1. Empirical comparisons of risk aversion between small business owners and other groups have produced mixed results. See, for example, Brockhaus [11] and Sexton and Kent [34].
2. Indeed, the value of his or her own human capital may not even be known by the business owner; see Bates [6].
3. Instead of paying these higher required returns, the small firm may agree to conditions of investment or borrowing which tend to ameliorate these agency problems such as stringent restrictions on managerial decisions or secured borrowing [23, 31]. However, these conditions impose other costs on the firm.
4. Other less recent studies of secured borrowing include Glassman and Struck [16] and the National Federation of Independent Business [27].
5. For other approaches to modeling the capital structure choice of the small firm, see Evans and Jovanovic [14] and Fazzari, Hubbard, and Peterson [15].
6. The advantage of this database is its huge size. The major disadvantage is cost. This database is not publicly accessible. To use it, the researcher enters into a contract with the Bureau of Census and pays for access; our costs were several hundred dollars for each statistical procedure performed. These costs severely limit exploratory data analysis, preliminary checking of variable correlations and distributions, and experimentation with variable encodings and functional forms.
7. This procedure follows Bates [6, 7].
8. The age variable on the CBO database is the owner's age as of December 31, 1982. Combined with the criteria that firms must have been started during 1980-1982 to be included in the sample, this creates a small measurement error in the owner's age at start-up for some firms. For firms started in 1982, the reported age is correct, but the reported age is one year (on average) too high for businesses started in 1981 and two years two high for businesses started in 1980. The importance of this measurement error should be considered in light of the values of the age variable itself which range from 20 to 70.
9. See Bates [6] for discussion of the relationship between bank lending and education. Bates finds a positive relationship between owner education and small business longevity.

10. Partial support for this hypothesis comes from prior research on sources of start-up capitalization which indicated that married women utilize substantially more bank debt in their start-up capital structure than do unmarried women [39].
11. Many female small business owners believe that they are discriminated against by lending institutions [8, 33, 42]. Such discrimination may explain the prior empirical result that, in general, women employ slightly less bank borrowing as a proportion of their start-up capital structure [39].
12. It should be noted that this conventional view is not supported by recent empirical research [18], which did not find such differences in the net worths between black and white business owners at startup.
13. For discussion of changes in types of financing in the context of a growing firm, see Walker [41]. Also, as the firm grows, changes in managerial behavior, including increased risk aversion, may occur [36], which also influence capital structure choice.
14. See Baskin [4] for a literature review; this is evidence in support of the POH. In addition to these tests of association, survey evidence in support of the POH has been found in the capital structure policies employed by managers of large (Pinegar and Wilbricht [32]) and small (Norton [28]) firms.
15. See Krishnan, Ramanujam, and Rao [22] for discussion of this point.
16. In a recent paper, Keasey and McGuiness [20] discuss this argument in detail and find empirical evidence that small start-up firms require greater returns from initial debt financing than from internal equity financing. As an alternative explanation for their empirical results, they postulate that banks may lend only to firms whose potential profitability is greater.
17. We are grateful to an anonymous reviewer for comments which lead to our clarification of this issue.
18. See Ou [29] and Bates [7] for additional discussion of sources of debt financing for firms in the CBO database.
19. These R^2s are somewhat lower than those of other researchers. Ando's regression explaining debt/equity for ongoing firms has an R^2 of 0.31 [2, pp. 88-89]. However, by far the largest contribution to the equation's explanatory power comes from the firm's debt ratio at startup, a variable not appropriate when investigating start-up capital structure as we do. Elliehausen and Wolken [13], using two samples extracted from the National Survey of Small Business Finances, get R^2s of 0.15 and 0.05 for equations similar to ours.

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