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ABSTRACT

Using data from the Wisconsin Entrepreneurial Climate Study, we study the sources of firms' finance during the very early stages of their lives. Our focus is the evolution of the mix of financial capital from "insiders" and "outsiders" as firms age. We find that at the beginning of firms' life cycles, the proportion of funds from internal sources increases with age, while the proportion from banks, venture capitalists, and private investors declines. There is also evidence that these patterns eventually reverse themselves, with the proportion of insider finance ultimately declining and the proportion of outsider finance increasing with age. We argue that these findings are consistent with elements of both reputation-based and monopoly-lender theories of firm finance.

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1. Introduction

Obtaining enough capital to finance business growth and expansion is a perennial concern of entrepreneurs. In recent years the public and policymakers have also become increasingly interested in the financing of small businesses. For example, Hillary Rodham Clinton has helped put the problem of improving small firms' access to capital in the spotlight, observing that "Microcredit is an invaluable tool in alleviating poverty, promoting self-sufficiency, and stimulating economic activity."[1]

Financial economics has made significant progress in explaining the incentives that lead entrepreneurs and investors to enter into particular financing arrangements. There is a rich theoretical literature on the role of market imperfections in affecting the selection and financing of entrepreneurial firms' investment opportunities.[2] This literature identifies transaction costs, asymmetric information, and agency conflicts as the sources of market imperfections and seeks to explain how bank financing, venture capital and private equity facilitate the financing of positive net present value projects. It shows that banks and venture capitalists alleviate asymmetric information and agency problems by gathering and processing information (Diamond [1984, 1991], Ramakrishnan and Thakor [1984], Boyd and Prescott [1984]), by setting covenants and collaterals into loan contracts (Myers [1977], Boot and Thakor [1994]), and by staging venture capital financing (Chan [1983], Admati and Pfleiderer [1994]).

Most of the empirical work on the sources of firm finance has focused on relatively large enterprises. The ways in which large and small firms obtain funds differ significantly, and there have been only a few empirical studies investigating the financing of small entrepreneurial firms. These important studies focus primarily on how various financial arrangements are structured. Petersen and Rajan [1994, 1995] analyze the bank-creditor relationship, and report that the primary benefit to an entrepreneur of close ties with a single financial intermediary is an increase

in the availability of credit. Focusing on a particular type of bank arrangement, bank lines of credit, Berger and Udell [1995] find that borrowers with longer banking relationships pay lower interest rates and are less likely to pledge collateral. Gompers [1995] analyzes the arrangements between venture capitalists and small firms and finds that the frequency of monitoring by venture capitalists increases as assets become less tangible, growth options increase, and asset specificity rises.[3]

This paper abstracts from the details of particular financial arrangements, and seeks to augment our understanding of entrepreneurs' choices among these arrangements. Our starting point is an implication of much of the modern theorizing on the evolution of entrepreneurial finance—at some point in its life-cycle, a young enterprise "turns the corner" and is able to obtain external finance. Is there really such a turning point, and if so, why and at what age does it occur? Furthermore, from then onward, do we see a gradual increase in funds provided by banks, venture capitalists, and outside investors?

To answer these questions, we utilize a unique data set collected by Marquette University to analyze the life-cycle of the financial structure of small entrepreneurial firms. The survey provides us with valuable information about firm characteristics, personal attributes of the entrepreneur, the nature of product market competition, and the financial structure of the enterprise. The firms in this survey are substantially smaller and younger than those in the National Survey of Small Business Finances used by Petersen and Rajan [1993, 1994] and Berger and Udell [1995]. A distinctive feature of this data set is that it contains information that is typically unavailable to outside observers of small firms, including the entrepreneur's assessment of the growth opportunities of the firm, the financial constraints facing the firm, the funds needed for expansion, and the uniqueness of the product.

We find evidence of a nonmonotonic relationship between capital structure and the age of the firm. In the early years of operation the proportion of financing from insiders (the entrepreneur, friends and family, business associates) increases. After reaching a peak, the proportion of insider finance declines, and the fraction of external financing (bank, venture capital, private investors) rises. While it is difficult to estimate the precise age at which the proportion of insider finance begins to fall, it appears to take place relatively early in the life cycle—between two and nine years, depending on the specification of the statistical model.

Our evidence supports a combination of the monopoly-lender theory of Rajan [1992], and the reputation theory of Diamond [1991]. We consider and reject several other possible explanations for the observed life-cycle pattern of financing. In particular, we argue that the increase in the fraction of insider finance in the early years of the firm's operation is unlikely to be a consequence of the build-up of sweat equity. Neither can this phenomenon be attributed to a "portfolio" story, in which the entrepreneur invests more in his firm because as it ages the expected return of the project increases, and/or its perceived risk declines. Further, the pattern of the composition of finance in our data cannot be explained by appealing to Myers' [1984] pecking order theory of finance.

The paper is organized as follows. In Section 2 we discuss the theories related to our study. Section 3 contains a description of the data. Section 4 discusses our econometric methods and empirical findings. Section 5 presents our conclusions.

2. Theories

In a perfect capital market, funds are always available for projects that have a positive net present value. In the presence of market frictions, however, investors ration capital. The

underlying sources of these market imperfections and the mechanisms developed to overcome them form the bases of various theories on the financing choices of entrepreneurs.

Capital market frictions are induced when project choices and entrepreneurial ability are unobservable or costly to verify, or when entrepreneurs have the ability to misrepresent cash flows, to shirk or to follow suboptimal investment policies. In the presence of capital market frictions, profitable projects may be denied funding, or only be able to obtain certain types of funding.[4] To the extent that the firm can establish a mechanism for transmitting information to investors, it can attenuate some of the asymmetric information problems and obtain external financing (Stiglitz and Weiss [1981]).

One way of doing so is to build a relationship with an informed investor such as a bank or a venture capitalist. Banks and venture capitalists monitor the firm closely and learn about the entrepreneur's abilities. Indeed, a fundamental element of venture capital financing is the maintenance of close relationships with entrepreneurs. As the manager of one venture capital fund noted, "We are more likely to back a guy we've backed before or give him the benefit of the doubt because we know him" (Selz [1996]). The monopoly-lender theory associated with Rajan [1992] stresses the fact that the information obtained by the bank or venture capitalist is its private information. By virtue of this fact, over time these financiers acquire an informational monopoly over the firm, enabling them to earn substantial profits from their lending relationships with the entrepreneur (Greenbaum *et al.* [1989], Sharpe [1990], and Rajan [1992]).

In contrast, Diamond's [1991] reputation-based theory argues that even if the initial financier's information is private, outside investors can observe the firm's track record, examine its long-term interaction with its financiers, and assess its creditworthiness. This enables firms with good reputations to access cheaper financing from public debt holders and equity holders.

Diamond's analysis suggests a life-cycle pattern of the financing of small entrepreneurial enterprises. Initially, bank and venture capital financing increases while firms reduce their dependence on personal funds. As they develop a solid reputation, firms reduce their dependence on bank and venture capital financing and access the public debt and equity markets.

According to Myers' [1984] pecking order theory of finance, asymmetric information induces firms to sequence financing. Capital structure decisions may be driven by firms' desire to finance new investment first by retained earnings, then by low risk debt, and finally by equity. Since the firm's ability to generate more retained earnings increases as it grows, the entrepreneur will use these internally generated funds to finance the next project, turning to external finance only as retained earnings are exhausted. At the same time, firms with attractive growth prospects can employ more funds and exhaust their retained earnings faster. By virtue of this fact, these firms need more external finance. Thus, the pecking order theory implies that the proportion of financing from insiders increases with the size and decreases with the growth opportunities of the firm.

A common theme in all these theories is that the extent of uncertainty about the firm's cash flows affects both investors' willingness to finance the project and the entrepreneur's choice of how to finance it. Holding constant the expected rate of return, a rise in the variability of cash flows increases the likelihood of being denied certain types of financing (Myers [1977], Fluck [forthcoming, 1997]). In Myers [1977], stockholders have incentives to reject positive net present value projects when most of the benefits would accrue to bondholders. In Fluck [forthcoming], positive net present value projects may be denied debt financing due to agency conflicts between the entrepreneur-manager and potential claimholders. Alternatively, to the extent that investors have limited liability, increased uncertainty may actually enhance the

attractiveness of the project. With losses limited, the upside associated with increased uncertainty is not accompanied by a countervailing increase in risk. As *The Economist* [1997, p. 11] noted "Actively seeking risk makes sense for venture capitalists. Many of their gambles do not come off, but some of those that make it deliver huge rewards." Although the theories disagree with respect to how financing will be affected when uncertainty increases, they agree that variability of cash flows does have an impact on financial structure.

When thinking about pitting the various theories against each other, it is important to realize that certain key constructs are simply unobservable. For example, in the theories based on asymmetric information, the entrepreneur's reputation plays a critical role, but cannot be observed. What we can see is the age of the firm.[5] Our empirical strategy, outlined below, is to rely on observables such as the composition of firm financing and the age and various characteristics of the firm, to make inferences about which theories are more consistent with reality. In this context, it should be noted that our sample is particularly well suited for this purpose, because it contains a number of variables relating to the status of the enterprise that are not available in other surveys (see Section 3.3 below).

3. Data

3.1 General Description

Our empirical work is based upon data from the Wisconsin Entrepreneurial Climate Study, a Marquette University survey of active young firms in that state. Developing the sample involved three steps.[6] The first was to compile a list of all new entries into the Wisconsin unemployment insurance (UI) file between 1986 and 1991. (In Wisconsin, as in every state, all firms with employees must make payments into the state unemployment insurance system.)

About 27,000 firms entered Wisconsin's UI system during this period. An important consequence of drawing the sample in this fashion is that, by definition, it consists only of firms *with employees*—enterprises that are entirely owner-operated are excluded.[7] Second, a sample was selected and the principal of each firm was contacted to determine whether it was an autonomous startup (as opposed, for example, to a subsidiary of some other company), and whether the firm's first sales were made between one and six years prior to the interview.[8] On this basis, about half the firms qualified for the survey.[9] The survey writers did not exclude entrepreneurs who were no longer in business (active) at the time the survey was conducted. We do not know how many such firms were included in the survey. Third, of the firms that qualified, 541 were interviewed. These firms serve as our basic sample.[10] However, a substantial number of observations were missing data on variables that are central to this study; as noted below, a typical regression has about 200 observations.[11]

We have grouped the firms into six industrial categories. The largest number, 69, are in business services and health; the smallest, 10, are in finance, insurance, and real estate. Thirty-three percent of the entrepreneurs characterized their companies as being high-tech. (The relatively large fraction of our firms classifying themselves as "hi-tech" reflects the survey design, which deliberately oversampled firms among 57 4-digit SIC industries deemed to be hi-tech) With respect to organizational form, 35 percent are sole proprietorships, 9 percent partnerships and 54 percent corporations.[12]

Table 1 contains summary statistics by industry on total assets of each firm. Mean assets differ substantially, ranging from $86,000 in construction to $733,000 in manufacturing. Further, as evidenced by the large standard deviations, there is enormous heterogeneity within industry classes as well. The table also provides information on the ages of our firms, defined as the number of months since the initial legal form of the firm was established. The average age for

the sample as a whole is about 58 months. This does not vary substantially across industries, although, again as evidenced by large standard deviations, there is considerable variation within industries.

These data provide a unique opportunity to look at the early stages of businesses' lives as our firms are substantially smaller (as measured by total assets) and younger than those in other "small business" data sets. For example, in the National Survey of Small Business Finances (NSSBF) conducted by the Board of Governors of the Federal Reserve System, the mean assets for manufacturing firms are $2,839,000 and for construction firms $708,000, as compared to our figures of $733,000 and $86,000, respectively. Similarly, in the NSSBF data, there is no industrial category in which the mean age is less than 12 years (see Petersen and Rajan [1994]). These differences are not surprising. The NSSBF data are meant to be representative of all small businesses, while the Wisconsin data are based only on young firms.

3.2 Sources of Financing

Our data set provides detailed information about the firms' sources of finance. The key question asks how much of the firms's financing comes from (1) the respondent's own funds; (2) other start-up team members; (3) family members (spouses, parents, etc.); (4) friends or business associates; (5) banks or other lending institutions; (6) venture capitalists; (7) private investors; (8) government; (9) stockholders; and (10) bondholders.[13] A detailed summary of the financing for sources 1 through 7, by the age of the firm, is shown in Table 2.

To keep the analysis manageable, we grouped sources of finance into five categories: i) insiders: people with close relations to the owner (respondent, other members of the start-up team, family members, friends and business associates); ii) outside financiers who monitor the activities of the firm very closely (banks, venture capitalists, private investors); iii) stockholders;

iv) bondholders; and v) government and others. Note that these categories refer to the source of finance, not the contractual arrangement of the arrangement (e.g., debt versus equity).

Table 3 shows how the proportions of financing from each source are distributed across our firms. It is clear that hardly any firms in our sample rely on stockholders, bondholders, government, and "other." This is not surprising since most of our firms are small entrepreneurial companies, and typically small businesses do not get financing from stock and bond issues (see Fenn, Liang, and Prowse [1996]).[14] Since there is no point in trying to explain variables whose values are practically all zero, from here on, the focus of our attention will be on the first two categories, which we will refer to as "insider" and "outsider" sources of finance, respectively. Another observation from Table 3 is that the distributions of the proportions of both insider and outsider finance exhibit substantial pile-ups of density at one and zero, respectively. This fact will be important later when we are formulating an econometric strategy to analyze the variation in these proportions across firms.

3.3 Characteristics of the Firms

The survey contains information that allows us to generate a set of variables relating to characteristics of the firms. To begin, along the lines suggested in Table 1, we construct a set of dichotomous variables representing the industry in which the firm operates. (The omitted industrial category is consumer and business services.) As suggested by Shleifer and Vishny [1992] and others, investment opportunities within industries tend to move together, suggesting that a firm's industrial classification is a useful proxy for its investment prospects.

Our discussion in Section 2 indicated that the uncertainty associated with the firm's revenue stream affects its access to capital. The survey allows us to create several variables to characterize the riskiness of the enterprise. As noted above, the firms in our sample are asked to

describe themselves as being high-tech or not. Since the cash flows of high-tech firms typically vary more than those of others, we create a variable HITECH which takes a value of one if the entrepreneur has classified his or her firm as being high-tech.[15] As indicated in Table 4, 33 percent of our firms fall into this category. Second, having a unique product might expose a firm to higher business risk, since entering a new market without a well-defined customer base is inherently risky. Hence, we introduce a variable UNIQUE that takes a value of one if the entrepreneur answered yes when asked whether his or her firm has a "unique product, source of supply or method of distribution." Uniqueness, of course, is a subjective attribute. It is hard to know whether or not the 75 percent of our firms who characterize themselves this way are "truly" unique. Our inclination is to take advantage of this (and other) subjective measures in the survey, and let the data tell us whether or not they have any explanatory power.

Since stable firms are likely to face lower business risk, we are also interested in whether the entrepreneur views his or her business situation as being stable. The respondents were asked whether they thought their firms would "continue to operate pretty much as [they] have." We create a third variable, STABLE, which takes a value of 1 if the answer is affirmative. The survey also includes some useful information about the firm's market environment, in particular, how concentrated its customer base is. The variable TOP3% gives the percentage of 1991 sales that went to the firm's three largest customers. This variable may be another indicator of the degree of uncertainty facing the firm—the greater the value of TOP3%, the more danger it faces if a single customer or two decide to take their business elsewhere.

The scale of the enterprise is another relevant characteristic of the firm. On one hand, size is another potential proxy for the firm's investment opportunities. Small firms tend to have greater investment opportunities than their counterparts (Fenn, Liang, and Prowse [1996]). On the other hand, both theoretical and empirical work suggest that firm size exerts an independent

effect on financing choices , see e.g., Myers [1984]. (Large firms, for example, might have more retained earnings.) Our scale variable for this purpose is the firm's total employment (TOTEMP)—the sum of full-time and part-time employees.[16]

In addition to industrial classification and firm size, the survey provides another measure of investment opportunities. Entrepreneurs are asked a series of questions relating to the growth prospects of their firms. Rather than arbitrarily choosing one of these questions, we construct an expected growth variable that is a composite. Specifically, we created the variable GROWTH, a dichotomous variable that indicates whether the firm has attractive growth prospects, as follows: GROWTH is equal to one if the owner agrees with the statement that "right now our firm is growing so fast that it's almost impossible to plan and control the way we would like" *or* if the annual sales growth rate from 1990 to 1991 or 1991 to 1992 was greater than 15 percent *or* if the entrepreneur indicated that in the next two to three years, he or she planned to increase significantly the number of employees.[17] The firms' growth prospects are relevant to its financial structure because firms with attractive growth opportunities typically need to supplement retained earnings with outside funds in order to finance their expansions.

Expected returns are likely to be low for a firm that is struggling to survive. To measure economic distress, we create the variable SURVIVE that takes a value of one if the entrepreneur agrees with the statement "I'd have to say that business survival is our main goal at the moment."

The survey has several questions asking the entrepreneur whether he or she can obtain "necessary" funds. This information is valuable because a common implication of almost all theories of firm financing is that some projects may fail to receive financing, despite the fact that they have positive net present value. Two variables from the survey address directly the question of whether the entrepreneur faces capital constraints. In the first, the entrepreneur is asked to specify the additional funds needed in order to survive. The variable $AFN_{survive}$ is the response. In

contrast, the variable AFN_{expand} is the entrepreneur's estimate of the additional funds that the firm could invest and still provide a competitive return to investors. To be sure, there are difficulties in the interpretation of these variables. The question does not specify the time period over which the funds are not needed, and it is a possibility that the entrepreneurs are exaggerating their ability to employ capital. On the other hand, self-reported measures of liquidity constraints have been used in other studies (Kaplan and Zingales [1997]), and may potentially be more reliable than weakly related "objective" measures. Our view is that it is worth seeing whether or not these variables have any explanatory power. After all, if they are meaningless pronouncements of the entrepreneurs, then they will show up as insignificant in the equations.

3.4 Characteristics of the Entrepreneurs

Our sample has some potentially useful information about personal characteristics of the entrepreneurs that might affect their propensity to obtain and provide different types of financing. Older and better educated entrepreneurs may have greater wealth, enhancing both their ability to self-finance and their access to external sources of capital.[18] (Unfortunately, we do not have any direct measure of the entrepreneur's wealth in our data.) Hence, we include EAGE, the entrepreneur's age, and COLLEGE, a dichotomous variable that takes a value of one if the entrepreneur has a college (or greater) degree. Gender and race are also correlated with individual wealth (see Blau and Graham [1990]). Further, women and minorities may have limited access to capital lending networks, or certain kinds of lenders might discriminate against them. Hence, we include the variable FEMALE, which is equal to one if the entrepreneur is a woman, and zero otherwise. Twenty-three percent of our entrepreneurs are female. Finally, the variable MINORITY is equal to one if the individual is not white; because the survey oversamples nonwhites, about 15 percent of our sample falls into this category.[19] This contrasts

with the NSSBF data set described above, in which only 12 percent of the businesses are owned by women and 7 percent by minorities.

4. Econometric Specification and Results

4.1. Econometric Issues

Our goal is to see whether we can isolate any life-cycle pattern in the financing choices of our entrepreneurial firms. Hence, we investigate how the proportions of "insider" and "outsider" sources of funds vary with the age of the firm, holding constant the nature of the environment in which the firm operates and the characteristics of the entrepreneur. A natural strategy is to estimate regressions of the proportions of "insider" (INSIDER) and "outsider" (OUTSIDER) financing on some function of AGE, and the covariates listed in Table 4. We chose a quadratic in AGE because it is the simplest function that allows for the possibility of a nonmonotonic relationship. A complication arises because INSIDER and OUTSIDER are proportions, and as shown in Table 3, there is a substantial concentration of the densities of these variables at either zero or one. Under such circumstances, ordinary least squares regression does not generate consistent parameter estimates. Instead we use a two-limit Tobit estimator, which explicitly allows for the fact that the dependent variable is bounded above and below.[20]

4.2 Basic Results

The results are reported in Table 5, which shows the two-limit Tobit estimates and their standard errors. We begin our discussion of the results by considering the coefficients on AGE and AGE^2 in the equation for INSIDER sources of financing (column (1)). Both the linear and quadratic terms are significant at conventional levels; the linear term is positive and the quadratic term is negative. Hence, the relationship between the proportion of financing from insider

sources and age of the enterprise is nonmonotonic. The coefficients imply that INSIDER increases until the firm is 108 months old, at which point it decreases.[21] The qualitative results for OUTSIDER finance, in column (2), are just the opposite—the proportion decreases and then increases with age. The point at which OUTSIDER finance starts to increase is 142 months. Recall from our discussion in Section 3.3 that the sum of financing from insider sources (INSIDER) and from banks, venture capital and private investors (OUTSIDER) does not exhaust all the sources of finance, so there is no need for their life-cycle patterns to be mirror images of each other.

For purposes of easy reference, we graph the implied relations between AGE and sources of finance in Figure 1. Specifically, we graph the relationship between AGE and observed insider and outsider financing. To do so, for each value of AGE, we compute the expected value of INSIDER and OUTSIDER, evaluated at the means of the other right-hand side variables. Our graph thus takes into account the restriction that INSIDER and OUTSIDER may not fall outside of the [0,1] interval.[22] Figure 1 also shows standard error bands around the predicted values. Specifically, the bounds in the figure show the effect of adding or subtracting one standard deviation of the prediction variance from the expected value for each AGE.[23]

How does one explain the patterns in this figure? Our preferred explanation contains elements of both the reputation-based theory and monopoly-lender theory outlined in Section 2. Imagine a start-up firm that is entering into a relationship with a venture capitalist or a bank. That venture capitalist or bank monitors the firm. As time moves on, it obtains valuable private information about the firm. This information cannot be passed on to other potential lenders because of a potential conflict of interest. Without the information, such lenders may be hesitant to provide funds to the firm. Indeed, other lenders may believe that the main reason that the firm is approaching them is that their original lender has rejected them. As emphasized by Rajan

[1992], this reduces even further the likelihood that other lenders will be forthcoming with financing. All of this, in effect, gives some monopoly power to the current lender.

The monopoly lender may try to exploit his position by extracting rents from the entrepreneur. High interest payments may be an impediment to the entrepreneur's ability to obtain sufficient external financing for certain positive net present value projects. Unless insiders finance these projects, they will not be undertaken. Hence, the proportion of insider financing increases and the proportion of bank/venture capital financing falls. To the extent that the number of positive net present value projects increases with the age of the firm, so does the extent to which the constraint imposed by the monopoly lender is binding, and the proportion of financing from insiders grows commensurately.

Now, as time goes on, the firm develops a reputation among market participants. Indeed, the mere fact that the firm survives for a substantial number of years may serve as a signal that the firm is a good investment.[24] As Diamond [1991] stresses, at this point other financiers become willing to supply additional funds, breaking the monopoly of the initial lender and enabling the firm to obtain cheaper financing. In time, this can be expected to reverse the positive relationship between the proportion of insider finance and the age of the firm. As noted above, for the oldest firms in our data there is some evidence that this is the case. The focus of our data set, however, is on very young firms, so it is not ideally suited for exploring this reversal phenomenon. In this context, it is important to note that when Petersen and Rajan studied the NSSBF data, which is dominated by firms that are substantially older than ours, they found that the proportion of outside financing increased with age. Their results can thus be viewed as complementary to our own.

As noted in Section 2, there are several alternative explanations for the positive relationship between the fraction of insider financing and firm age. The first is that members of

the start-up team defer their compensation so that more funds can be plowed back into the firm (sweat equity). As the firm ages, so grows the proportion of insider financing, *ceteris paribus*. If this hypothesis is correct, then one would expect that the increase in financing from the respondent and other start-up team members would be driving the increase in the fraction of insider financing. To see whether this is the case, we decomposed INSIDER into two parts—one due to the respondent and other members of the start-up team; and the other due to relatives and friends. We then re-estimated the equation separately for each of the two components. On the basis of a Wald test comparing the coefficients of the two equations, we were unable to reject the hypothesis that the patterns with respect to age are the same. This makes it difficult to sustain the deferred compensation story.

A second alternative explanation is based on the portfolio behavior of a risk-averse entrepreneur. At the outset, a project may be very risky, so that insiders are willing to invest little in the firm. As time goes on, more becomes known about the project, the risk decreases, and the insiders are willing to invest more. Further, their funds may be cheaper than external funds for agency or informational reasons.[25] A shortcoming with the portfolio story is that it could also "explain" the opposite pattern. As the firm ages and becomes successful, the owner presumably draws more and more labor income from it, and may therefore seek to diversify his other wealth away from the source of his labor income.

In evaluating the portfolio explanation, a central issue is whether the age of the enterprise is systematically related to its risk. Recall that our data set includes several proxies for business risk—HITECH, UNIQUE, and STABLE. Each variable is statistically significant in at least one equation; we defer until section 4.3 a discussion of their coefficients. The key point in the present context is that the multiple correlation coefficient between these three variables and AGE

is only 0.03. Assuming that these variables are indeed reasonable indicators of the firm's business risk, this result suggests that AGE is reflecting something more than business risk.

Another implication of the portfolio story is that entrepreneurs invest more in firms with higher expected returns. One possible concern is that older firms have higher expected returns, so that the coefficient on AGE is merely a proxy for the effect of expected returns. However, the correlation between SURVIVE (our proxy for the expected returns of the firm) and AGE is quite low (-0.14). To the extent that SURVIVE provides information on expected returns, the coefficient on AGE reflects something other than expected returns. Thus, our finding of an insignificant coefficient on SURVIVE in the INSIDE equation does not support the portfolio hypothesis.[26]

Can the increase in INSIDER be entirely attributed to retained earnings? A third possible explanation for the financing patterns we observe arises from considerations related to Myers' pecking order theory of finance. An implication of this theory is that as the firm starts generating retained earnings, it uses them for investment, and the proportion of insider finance goes up and the proportion of outsider finance goes down. If this were the driving force behind the patterns that we observe in the data, then we would expect to see firms with high expected growth relying more on external finance than other firms, *ceteris paribus*. This is because such firms do not generate sufficient earnings to cover their investment requirements. However, to the contrary, we find that firms with high expected growth are *less* likely to rely on outsider finance. Hence, a retained earnings explanation based on Myers' pecking order theory does not explain the life-cycle pattern that we have isolated.

Indeed, the fact that firms with high growth prospects rely more on insider financing and less on outsider financing, *ceteris paribus*, provides further evidence that is consistent with the monopoly lender explanation. The negative coefficient on GROWTH in the outsider finance

equation is consistent with the presence of financial constraints. High expected-growth firms, even after mobilizing all available funds from insiders, will typically seek financing from outsiders. The negative coefficient suggests that firms are denied the external funds to match their needs. And the presence of financial constraints is one of the key elements of the monopoly-lender theory.

4.3 Other Right Hand Side Variables

While our main focus is on the effects of firm age on financing sources, the coefficients on a number of the other right hand side variables are also interesting. First, we observe that several of the industry indicator variables are significant in the equations for insider and outsider finance. That is, financing opportunities do vary significantly at the industry-wide level. Perhaps the most interesting finding in this context is that manufacturing has a positive and statistically significant coefficient in *both* the insider and outsider equations. Moreover, the quantitative impact is large; changing its value from 0 to 1 raises INSIDER by 0.19 and OUTSIDER by 0.25.[27] We conjecture that small manufacturing firms are particularly unlikely candidates for receiving financing from governmental entities, a source that is excluded from our definitions of both INSIDER and OUTSIDER. At the same time, these are the firms that may have physical assets to secure outside borrowing.

The coefficients on HI-TECH suggest that hi-tech firms receive a larger proportion of their financing from outsider sources and a smaller proportion from insider sources, *ceteris paribus*. Again, the effect is substantial—changing the value of HI-TECH from zero to one reduces the expected value of INSIDER by 0.08, and increases the expected value of OUTSIDER by 0.13. The importance of this variable is consistent with anecdotal evidence that venture capitalists and private investors find hi-tech firms particularly attractive. A recent article in the

Wall Street Journal noted that most of the "$10 billion that venture funds invested in 1996...went to high-tech or health-care companies that have fast growth potential" (Mehta [1996]). As suggested in Section 2, from the venture capitalist's point of view, such a preference may make sense if he or she is interested in high-variance projects that offer the possibility of obtaining very high returns. This observation might also explain the positive and significant coefficients on UNIQUE and TOP3%, as well as the negative, significant coefficient on STABLE, in the equation for outsider financing.[28] Firms with unique products offer the prospect of high returns, albeit with high variance as well. Firms with a high percentage of output going to their top customers may become very successful indeed if their customers stick with them, but are exposed to a high risk if they lose any of their customers. Stable entrepreneurial firms, almost by definition, are unlikely to yield extraordinary returns.[29] It is interesting to note that all of our uncertainty variables are consistent with the notion that financiers are attracted by the prospect of picking winners.

The coefficient on our measure of economic distress, SURVIVE, is not significant in the equation for insider finance. Hence, in our data, there is no statistically discernible relationship between this measure of expected returns and the proportion of financing from insiders. In the outsider finance equation the coefficient on SURVIVE is highly significant, however, and lowers the mean share by 0.09. As noted earlier, this suggests that the AGE variable is doing more than proxying for the fact that expected returns vary with the firm's age. Consistent with theoretical predictions, the negative sign of the coefficient on SURVIVE in the outsider finance equation implies that businesses that are struggling to survive face difficulty in obtaining external financing.

Turning now to the additional funds needed (AFN) variables, the only one that is statistically significant is $AFN_{survive}$, which has a positive coefficient in the OUTSIDER

equation.[30] That is, the more money that the entrepreneur believes is needed for the firm to survive, the larger the proportion of external finance. Perhaps when the entrepreneur knows that his business may fail due to insufficient funding, he pulls his own money out of the enterprise. To the extent that financiers are unable to assess the financial needs of the firm, they do not withdraw their support, so the proportion of external finance increases. This explanation can be reconciled with our finding of a negative coefficient on SURVIVE in the OUTSIDER equation. SURVIVE is related to the general economic distress of the firm, which may be easier for financiers to recognize than it is to estimate the likelihood of financial distress. This variable is particularly subject to agency problems (Bhide [1992]).

Of the variables relating to the entrepreneurs' personal characteristics, the only one that is significant in both equations is EAGE, the entrepreneur's age.[31] The older the entrepreneur the greater the proportion of insider financing; the pattern is just the opposite for outsider financing. As noted earlier, there is a well-documented link between an individual's age and his or her wealth. Given that older individuals have more resources, it is not surprising that they are able to invest more in their own enterprises. The MINORITY variable indicates that minorities have a higher proportion of outsider finance than whites, other things being the same. Perhaps this is a consequence of the fact that, as noted above, minority communities have relatively low levels of wealth and therefore a lower potential to provide insider financing (see Blau and Graham [1990]). Clearly, however, our data are not ideally suited for exploring racial differences in financing patterns.

4.4 Alternative Specifications

An important question is whether our substantive results are sensitive to changes in the basic model. To investigate this matter, we modified the specification in Table 5 in several ways. First, previous research suggests that some aspects of entrepreneurial decision-making depend on

the entrepreneur's age in a nonlinear fashion. For example, the probability that an entrepreneur hires labor or purchases capital is a quadratic function of his or her age (see Carroll, Holtz-Eakin, Rider, and Rosen [1996], and Holtz-Eakin, Joulfaian, and Rosen [1994]). This observation is important in our context because Table 5 indicates that the entrepreneur's age is the only individual characteristic significantly correlated with both INSIDER and OUTSIDER. One must therefore consider the possibility that our nonlinear relationship with firm's age is really picking up nonlinearities between financing sources and the entrepreneur's age (EAGE). Hence, we augmented our basic specification with the square of EAGE.

We found that, in the INSIDER equation, $EAGE^2$ is statistically insignificant (t = -0.629). In contrast, in the OUTSIDER equation, $EAGE^2$ is significant (t = 5.888), but both the age of the firm and its square remain jointly significant. (The chi-square test statistic, with two degrees of freedom, is 25.9, which is significant at the 0.01 level.) The coefficient on AGE is -0.00216 and on AGE^2 it is 0.00225. This implies the same curvature in the relation between OUTSIDER and AGE as depicted in Figure 1, but the proportion of outsider finance turns upward sooner—at about 48 months. Hence, allowing for a quadratic in the entrepreneur's age does not eliminate our nonmonotonicity result. Indeed, it strengthens the result in the sense that a greater proportion of the firms lie along the portion of the curve with a positive slope.

Another concern along the same lines is that the quadratic in AGE in Table 5 is really picking up a nonlinearity in the relationship between the financing structure and the scale variable, TOTEMP. When we augmented our basic equations with $TOTEMP^2$, we found that it is indeed statistically significant. In the INSIDER equation its t-statistic is 6.22; in the OUTSIDER equation it is -3.50. However, in both equations, the age of the firm and its square remain jointly significant (the chi-squared test in the INSIDER equation is 17.5 and in the OUTSIDER equation it is 20.3; both significant at the 0.01 level). Further, the life-cycle patterns

are qualitatively the same as those depicted in Figure 1. In the INSIDER equation, where the coefficient on AGE becomes 0.000827 and on AGE^2 -0.00147, the turning point is 28.1 months, which is quite a bit sooner than in Figure 1. In the OUTSIDER equation, the coefficient on AGE is -0.00847 and on AGE^2, 0.002863, which implies that the relation turns up at 148 months, a somewhat longer period of time than that in the basic specification.

Another concern is how well the GROWTH variable captures the enterprise's growth opportunities. As noted earlier, GROWTH is a composite of three dichotomous variables: it equals one if the entrepreneur agrees with the statement that "right now we are growing so fast that it is impossible to plan and control the way we would like," or if the entrepreneur suggests that he or she plans a significant increase in the number of employees in the next few years, or if the firm's 1991 or 1992 sales growth exceeded 15 percent. While in general past sales growth is probably a useful proxy for expected future growth, there might be some companies that grew rapidly in the past but whose opportunities for growth were then exhausted. To address this concern, we create an alternative measure of growth opportunities, GROWTH-OPPTY, which is obtained by replacing past sales growth by the interaction of past sales growth and STABLE.[32]

When we re-estimated the model replacing GROWTH with GROWTH-OPPTY, the basic results were unchanged. Specifically, the implied life-cycle of firm finance has the same general pattern as in Figure 1. Further, as was true of its counterpart in Table 5, the new growth variable is positive in the INSIDER equation and negative in the OUTSIDER equation, and in both cases the coefficients are statistically significant.[33]

Thus far we have maintained the hypothesis that AGE enters the model quadratically. This raises the possibility that our results are being driven by an imposed functional form. There are several ways one could investigate this issue. One tack is to estimate a piecewise linear specification, but this is quite cumbersome to implement in the context of a two-limit Tobit

analysis and some arbitrariness is involved in choosing the breakpoints. A simpler approach is to make the specification less restrictive through the addition of a cubic term, and see whether or not it is statistically significant. When we did so, we discovered that AGE-cubed was not significant in the OUTSIDER equation—the t-statistic was only -0.212—and its presence did not substantively affect the estimates of the linear and quadratic components.

In the equation for INSIDER finance, however, the cubic term was marginally significant (t=1.94). Again, however, the linear and quadratic terms were essentially unaffected as both remained significant and retained their characteristic sign pattern. Moreover, the implied life-cycle pattern was virtually identical to that of the quadratic specification. The turning points of the cubic occur at 128 months and 304 months. The former is quite close to the result in Figure 1, while the latter is so far out of the sample range of AGE as to be unimportant. In short, adopting a more flexible approach to the specification of AGE highlights that our results are not driven by the quadratic functional form.

Another specification issue relates to the fact that some of our right hand side variables might be simultaneously determined with the sources of financing. Firm characteristics such as growth prospects and additional funds needed to survive come to mind in this context. Further, as noted above, certain subjective assessments of the firms' attributes (e.g., the uniqueness of the product) may be difficult to interpret. We therefore reestimated the model including a smaller set of right hand side variables that could more convincingly be viewed as exogenous and well-measured: AGE, AGE-SQUARED, TOTEMP, EAGE, COLLEGE, FEMALE, and MINORITY, and the industry classification dichotomous variables. (See Table 4 for definitions.) The results, which are reported in Table 6, leave unchanged Table 5's basic implications with respect to the life-cycle pattern of firm finance. Specifically, the coefficients on AGE and AGE-squared have the same signs as in Table 5, and they are statistically significant. In the INSIDER equation, the

turning point is 95 months, and in the OUTSIDER equation it is 80 months. In both cases these are earlier than the turning points depicted in Figure 1. The implied life-cycle pattern of financial sources is graphed in Figure 2.

In a more extreme version of this exercise, we eliminated *all* the right hand side variables except AGE, AGE-squared, and the constant. We found that, while the age variables were not estimated precisely, they implied the same pattern of life-cycle finance that we have already seen. In this specification, the proportion of insider finance increases until 106 months, and the proportion of outsider finance decreases until 75 months. Our basic findings, then, do not appear to be sensitive to the inclusion of variables that might be correlated with the error term in the model.

Where does all this leave us? It is clear that our data do not allow us to pin down precisely the ages at which young firms start decreasing the proportion of their financing that comes from insider sources and increasing the proportion from outsider sources.[34] Importantly, in some of our variants, the turning points come earlier than in Figure 1, indicating that the nonmonotonicities are not associated with just a few outliers. In any case, the key finding is that our qualitative result appears to be quite robust—at the beginning of their lives, entrepreneurial enterprises increase the proportions of their insider funding as they age and decrease the proportions of outsider funding, but at some point, these relationships reverse. As noted earlier, this result is consistent with the notion that the evolution of firm finance is driven by the need to overcome informational asymmetries.

5. Conclusion

Policymakers have become increasingly conscious of issues associated with the capital needs of entrepreneurial enterprises, but there has been little analysis of the financing of firms at

the very early stages of their life cycles. Using data from the Wisconsin Entrepreneurial Climate Study, we examine the evolution of the mix of financial capital from "insiders" and "outsiders" as firms age. Our basic finding is that the proportion of funds from insiders rises during the early stages of the firms' life cycles, while the proportion from outsiders (banks, venture capitalists, private investors) declines. These patterns eventually reverse themselves; the proportion of insider finance ultimately declines and the proportion of outsider finance increases. We argue that these findings are consistent with theories that view capital market frictions as arising from information asymmetries. In particular, elements of both reputation-based and monopoly-lender theories of firm finance are consistent with the notion that at some stage in the young firm's life cycle, the firm develops enough of a reputation that it is able to obtain cheaper sources of external finance (or easier access to additional sources of external finance). Our evidence suggests that this turning point occurs relatively early in the firm's life, perhaps two to nine years after the time of first sale.

More generally, our finding that financing from insiders is critical to small entrepreneurial enterprises confirms and reinforces results that have been found in previous econometric work as well as historical accounts and numerous case studies (see Bhide [1992] and Rosenberg and Birdzell [1987]). It is hard to imagine that there will be any innovations in the structure of credit markets, or the instruments traded therein, that will change the dominant role of insider finance in the near or medium term future. In this context, it is interesting to note that most of the discussion of tax policy and its effects on entrepreneurship has focused on venture capitalists and their tax environments (see, e.g., Poterba [1989]). Surely venture capital is very important, but our results suggest that more attention should be focused on the tax situations of the entrepreneurs themselves.

Endnotes

1. "First Lady Talks of Mice and Men on 'Rosie' Show," by James Bennet, *New York Times*, February 4, 1997, pp. A14.

2. See, for example, Harris and Raviv [1991] and references therein.

3. Helwege and Liang [1996] study the debt-equity choices of post-IPO firms. These firms are at a much later stage in their life-cycles than those in our sample, and face different types of constraints.

4. See Myers [1977, 1984], Fluck [forthcoming, 1997], and Fluck and Lynch [1996].

5. One can imagine other observable variables that could be related to reputation: entrepreneur's position in a professional association, national advertising campaigns, entrepreneur's previous ventures, and so on. Such variables are not included in our data.

6. Reynolds and White [1993] provide details.

7. Among the self-employed, relatively few hire additional workers (see Carroll, Holtz-Eakin, Rider, and Rosen [1996]), a pattern common among OECD countries (see Lindh and Ohlsson [1994]). Because the level and growth of employment are observable, our focus on firms with employees may mean that these firms are easier to monitor than a random sample of small enterprises.

8. At the time of the construction of the sample, the firm had to be active. However, at the time of the actual interview, there was no restriction of this sort.

9. Presumably, a number of the excluded "firms" are individuals who employ outside help at home and never intend to make any sales.

10. Some entrepreneurs received written surveys, and others were interviewed by telephone. The response rate for the written questionnaires was about 50 percent, and that for the phone interviews about 80 percent. For further details, see Reynolds and White [1993].

11. We examined the source of the lost observations to check whether there appeared to be a systematic pattern in the missing data. None emerged. The number of observations "lost" because of missing data on a particular variable is inherently ambiguous since any given observation may have more than one missing variable. We note, however, that if we consider sources of financing, age of firm, industry category, and entrepreneur's age (in that order), we lose 105, 24, 4, and 17 observations, respectively.

12. A few franchises and "no answer" responses make up the remaining 2 percent of the firms.

13. See the Appendix for the exact wording of the question regarding financing.

14. This finding is also consistent with Bhide's [1992] interviews with the founders of 100 fast-growing private companies, which indicated that "For the great majority of would-be founders, the biggest challenge is not raising money but having the wits and hustle to do without it" (p. 110).

15. In our data, hi-tech firms appear to face more uncertain prospects than other firms in the sense that the average variance in their year-to-year sales growth is greater than for others.

16. We also considered total assets and total sales as scale variables; total employment provided the best fit to the data in the sense that it had the largest t-statistic.

17. The great majority of firms—87 percent—for whom GROWTH = 1 experienced sales growth of 15 percent or more during 1990-91 or 1991-92. As shown in Table 3, almost 90 percent of our firms characterize themselves as growth firms by these criteria. This is unsurprising, given that our sample consists largely of firms that recently made their first sales.

18. See Blau and Graham [1990] for evidence that wealth increases with age and education, *ceteris paribus*.

19. The survey included a breakdown of the non-white category, but there were not enough observations in any of these groups to allow meaningful analysis of ethnic differences.

20. For a description of the two-limit Tobit estimator, see Maddala [1983]. The standard errors are corrected for heteroskedasticity via a maximum likelihood procedure in which the logarithm of the variance is a linear function of the covariates. Note that we cannot investigate the ratio of INSIDER to OUTSIDER because of the presence of zeroes in both the numerator and denominator.

21. Only 6 percent of our sample firms are older than 108 months, which may raise concerns with respect to the economic significance of the quadratic term. For present purposes, the non-monotonic nature of the pattern is more important than the precise location of the turning point. As we will see later, under some variants of the model, the downward turn occurs substantially earlier in the firm's life.

22. Maddala [1983, p. 161] provides the transformation from the estimated coefficients to the expected value.

23. We compute the respective variances of the predicted values of INSIDER and OUTSIDER using a linear approximation to the expected value and the estimated covariance matrices of the parameters.

24. The failure rate among entrepreneurial enterprises is very high. Quadrini's [1996] tabulations from the Panel Study of Income Dynamics over the period 1973-92 indicate that the exit rate for new entrepreneurs is about 45 percent. Of those with two years of experience as entrepreneurs, the failure rate is 31 percent.

25. The financial market optimum may involve less than 100 percent ownership of the firm by the entrepreneur. This optimum is found by trading off the managerial entrenchment effect and the alignment of interest effect, as shown by Stulz [1988], Morck, Shleifer and Vishny [1988], and Fluck [1997b].

26. Growth may be another measure of expected returns. Again, however, the correlation between AGE and GROWTH is too low for AGE to be proxying for expected returns in this way.

27. We compute the quantitative effects of this and other coefficients on dichotomous variables as follows: First, we calculate the predicted values of INSIDER and OUTSIDER for each observation using the actual data, but with the manufacturing dichotomous variable set equal to zero. We then calculate the mean value of the predicted probabilities in the sample. Next, we repeat the procedure, except that this time each value of the manufacturing variable is set equal to 1.0. Our estimate of the quantitative impact is the change in the mean predicted proportion.

28. The quantitative impacts of UNIQUE and STABLE in the OUTSIDER equation are nearly identical in magnitude; 0.14 and -0.13, respectively. In contrast, the impact of UNIQUE (-0.01) is quite small in the INSIDER equation, while STABLE raises the mean share of INSIDER by 0.05.

29. The coefficients on STABLE are consistent with the pecking order story. STABLE firms have limited growth prospects, and hence, according to this theory, are able to meet a relatively high fraction of their investment targets using retained earnings.

30. A test of the joint significance of the AFN variables shows they are significant only in the OUTSIDER equation.

31. The fact that most of the indicators of the individual's demographic situation do not exert a statistically significant impact is consistent with earlier studies of the evolution of entrepreneurial enterprises (Carroll, Holtz-Eakin, Rider, and Rosen [1996], Holtz-Eakin, Joulfaian, and Rosen [1994], and von Praag [1994]). While most demographic variables do not seem to be strongly correlated with the evolution of various characteristics of small firms, these variables *are* correlated with the probability that a particular individual is an entrepreneur at a given point in time. See, e.g., Meyer [1990].

32. Hence, GROWTH-OPPTY takes the value of one if the entrepreneur agrees with the statement that "right now we are growing so fast that it is impossible to plan and control the way we would like," or if the entrepreneur suggests that he or she plans a significant increase in the number of employees in the next few years, or if the firm's 1991 or 1992 sales growth exceeded 15 percent, and STABLE equals one. Since STABLE equals one only if the entrepreneur believes that in the next few years the firm will continue to operate pretty much as in the past, GROWTH-OPPTY may reflect more precisely whether high growth is expected.

33. In the INSIDER equation, the coefficient on AGE is 0.0126 (s.e.=0.003356), on AGE-squared -0.00655 (s.e. = 0.00136), and on GROWTH-OPPTY 0.355 (s.e.=0.180). In the OUTSIDER equation, the corresponding coefficients are -0.00632 (s.e.=0.00274), 0.00377 (s.e.=0.00122), and -0.363 (s.e.=0.145).

34. For the same reason, we are unable to examine whether there exists a different life-cycle profile for firms with different characteristics.

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Appendix

Our information on the financial structure of the firms is drawn from the responses to the following question:

"What is the **current status of the financial support** for the firm. That is, what are the major sources of ownership investments and debt for this new firm?"

Source of Financing	Ownership (Equity) Investments	Debt (Loans) (Total Borrowed)
Respondent's own	$, ,000	$, ,000
Other start up team members	$, ,000	$, ,000
Any family members (spouses, parents, etc.)	$, ,000	$, ,000
Friends or business associates	$, ,000	$, ,000
Banks or other lending institutions	$, ,000	$, ,000
Venture capitalists	$, ,000	$, ,000
Private investors	$, ,000	$, ,000
Government agencies or government guaranteed loan funds (SBA, etc.)	$, ,000	$, ,000
Stockholders (share ownership)	$, ,000	
Bondholders or other formal sources of debt (must be paid back)		$, ,000
Other:	$, ,000	$, ,000
TOTALS	$, ,000	$, ,000

How much **more** of an investment does the firm now need, or did it need before it was discontinued, in order to survive? $__,__,000

Beyond what is needed for survival, how much money could the firm employ and provide a competitive return to investors? $__,__,000

Table 1. Total Assets and Enterprise Age: By Industry[a]

Industry	N	Variable	Mean	Standard Deviation
Construction	30	Total Assets	86.43	106.52
		Age	65.70	55.14
Manufacturing	23	Total Assets	733.13	2,423.65
		Age	59.39	25.78
Wholesale, Retail, Restaurant	33	Total Assets	343.36	892.85
		Age	53.42	24.89
Finance, Insurance, Real Estate	10	Total Assets	199.00	241.16
		Age	53.70	25.30
Consumer and Busines Services, Health	69	Total Assets	149.17	554.91
		Age	57.99	29.11
Mining, Agriculture, Transportation, "Other"	32	Total Assets	214.50	302.24
		Age	58.88	24.88

[a]Total assets is the sum of financing from all sources, measured in thousands of dollars. Enterprise age is the number of months since the initial legal form of the firm was established.

Table 2. Age of Enterprise and Sources of Finance

Age Group (months)	N	Number of Firms That Use a Particular Source of Insider Finance				Number of Firms That Use a Particular Source of Outsider Finance		
		Own	Team	Family	Friends	Banks	Venture Capitalists	Private Investors
11to 20	3	3	2	0	1	0	0	0
21 to 30	26	22	11	1	1	11	0	2
31 to 40	28	24	9	7	2	16	0	1
41 to 50	31	28	11	8	3	18	0	6
51 to 60	30	27	7	5	3	11	1	1
61 to 70	29	24	3	4	1	9	1	1
71 to 80	18	18	4	3	0	10	0	0
81 to 90	13	12	1	3	2	8	0	0
91 to 100	9	7	4	2	2	3	0	1
101 to 110	3	3	1	0	0	1	0	0
111 to 120	1	1	0	0	0	0	0	0
> 120	6	5	0	2	0	4	0	0

Table 3. Distribution of Financing Sources[a]

	Source 1		Source 2		Source 3	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
< 0.1	27	13.7	105	53.3	181	91.9
0.2	14	7.11	11	5.58	3	1.52
0.3	10	5.08	9	4.57	1	0.51
0.4	7	3.55	16	3.12	3	1.52
0.5	10	5.08	8	4.06	3	1.52
0.6	5	2.54	9	4.57	2	1.02
0.7	13	6.60	7	3.55	0	0.00
0.8	9	4.57	8	4.06	0	0.00
0.9	9	4.57	12	6.09	0	0.00
1.0 ≤	93	47.2	12	6.09	4	2.03

	Source 4		Source 5	
	Frequency	Percent	Frequency	Percent
< 0.1	195	99.0	184	93.4
0.2	2	1.02	0	0.00
0.3	0	0.00	3	1.52
0.4	0	0.00	2	1.02
0.5	0	0.00	3	1.52
0.6	0	0.00	4	2.03
0.7	0	0.00	1	0.51
0.8	0	0.00	0	0.00
0.9	0	0.00	0	0.00
1.0 ≤	0	0.00	0	0.00

[a]This table shows how the proportion of total financing attributable to each source is distributed across the firms in our sample.

Source 1: respondent, other members of start-up team, family members.

Source 2: banks, venture capitalists, private investors.

Source3: stockholders.

Source 4: bond holders.

Source 5: government and other.

Table 4. Means and Standard Deviations

	Mean	Standard Deviation
AGE (months since initial legal form established)	58.49	32.57
AGE^2 (age -squared/100)	44.75	72.72
CONSTRUCTION (=1 if construction)	0.1522	0.3602
MFG (=1 if manufacturing)	0.1168	0.3219
WHOLESALE (=1 if wholesale, retail, restaurants)	0.1675	0.3744
FINANCE (=1 if finance insurance real estate)	0.05076	0.2201
MISC (=1 if mining, agriculture, other)	0.1624	0.3698
HITECH (=1 if a high-tech firm)	0.3350	0.4732
STABLE (=1 if firm continues to operate pretty much as it has)	0.7970	0.4033
SURVIVE (=1 if business survival is the main concern of the firm)	0.6396	0.4813
UNIQUE (=1 if firm has a unique product)	0.7513	0.4334
TOP3 % (percentage of 1991 sales to 3 largest customers)	44.35	34.21
TOTEMP (number of employees)	6.203	8.5720
GROWTH (=1 if firm was growing)	0.8883	0.3158
$AFN_{survive}$ (additional funds needed to survive (thousands))	46.71	219.4
AFN_{expand} (beyond survival, additional funds firm could invest and provide a competitive return (thousands))	174.9	826.6
EAGE (entrepreneur's age)	40.55	9.779
COLLEGE (=1 if attended college)	0.4873	0.5011
FEMALE (=1 if female)	0.2284	0.4209
MINORITY (=1 if minority)	0.1472	0.3552
N	197	

Table 5. Parameter Estimates

	Insider (1)		Outsider (2)	
Variable	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**
AGE	0.01154	0.002549	-0.00449	0.001882
AGE-squared/100	-0.005322	0.001086	0.001573	0.0006385
CONSTRUCTION	0.03640	0.1407	0.8083	0.09999
MFG	0.7729	0.2629	0.4873	0.07927
WHOLESALE	-0.5207	0.1084	1.061	0.1468
FINANCE	-0.0007194	0.1450	0.6627	0.1459
MISC	-0.3864	0.1072	0.7171	0.1071
HITECH	-0.2947	0.06281	0.2789	0.05850
STABLE	0.18168	0.07698	-0.2657	0.07251
SURVIVE	-0.04163	0.1314	-0.1943	0.06638
UNIQUE	-0.02578	0.06921	0.3166	0.1124
TOP3%	-0.0006998	0.001037	0.004137	0.0008596
TOTEMP	-0.03657	0.004046	0.01129	0.002259
GROWTH	0.3911	0.08331	-0.1422	0.06967
$AFN_{survive}$ /100	-0.02463	0.04955	0.08037	0.04085
AFN_{expand} /100	-0.6413	1.240	-0.00851	0.1543
EAGE	0.02861	0.003766	-0.01653	0.003065
COLLEGE	0.1018	0.0910	-0.01173	0.05907
FEMALE	0.1054	0.09244	-0.01303	0.0962
MINORITY	0.1635	0.1089	0.1652	0.10902
Constant	-0.6139	0.2717	0.2398	0.1843
Observations	197		197	
Loglikelihood	-122.6		-68.5	

*The parameter estimates in this table give the effect of each variable on the latent variable in a two-limit Tobit model. In column (1), the left hand side variable is the proportion of financing from "insider" sources: respondent, team members, family members, and friends. In column (2), it is the proportion from "outsiders": banks, venture capitalists, and private investors. Variables are defined in Table 4.

Table 6. Parameter Estimates
(Reduced Set of Right Hand Side Variables)

	Insider (1)		Outsider (2)	
Variable	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**
AGE	0.008167	0.003962	-0.007829	0.003426
AGE-squared/100	-0.004277	0.001633	0.004922	0.001596
CONSTRUCTION	0.1759	0.2379	-0.03510	0.2264
MFG	0.1281	0.1984	0.1577	0.1155
WHOLESALE	0.09180	0.2027	0.02887	0.1775
FINANCE	-0.3137	0.2106	0.4068	0.1596
MISC	-0.1207	0.1670	0.1504	0.1178
TOTEMP	-0.03390	0.01154	0.02337	0.006567
EAGE	0.01746	0.005745	-0.009717	0.004356
COLLEGE	0.07137	0.1152	0.07157	0.09349
FEMALE	0.3223	0.1981	-0.2464	0.1269
MINORITY	0.1842	0.1815	-0.8849	0.3566
Constant	-0.03509	0.2977	0.5313	0.2378
Observations	197		197	
Loglikelihood	-164.4		-136.8	

*The parameter estimates in this table give the effect of each variable on the latent variable in a two-limit Tobit model. In column (1), the left hand side variable is the proportion of financing from "insider" sources: respondent, team members, family members, and friends. In column (2), it is the proportion from "outsiders": banks, venture capitalists, and private investors. Variables are defined in Table 4.

Figure 1
Projected Insider and Outsider Financing by Age of Firm

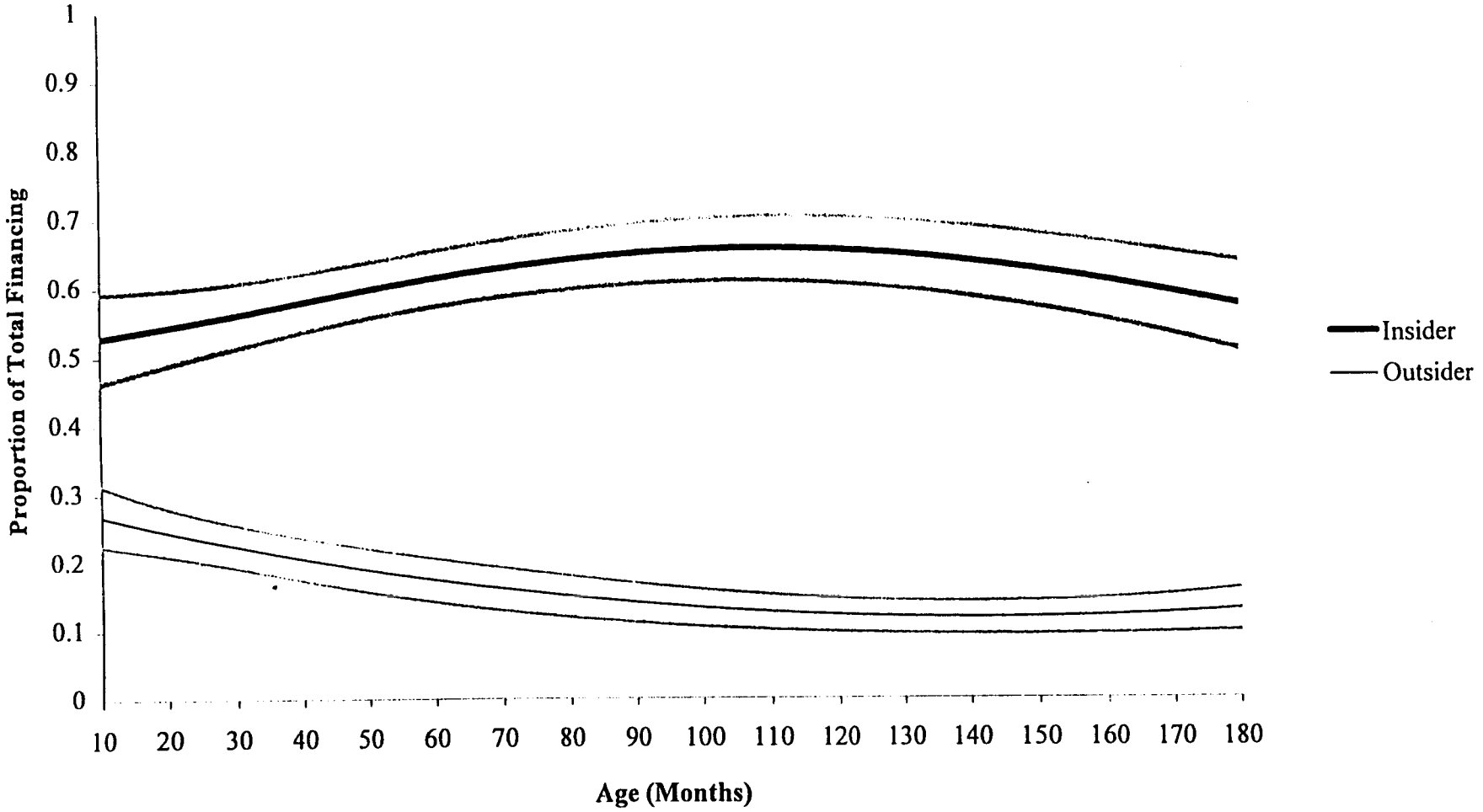

Figure 2
Projected Insider and Outsider Financing by Age of Firm
Reduced Specification