# The Capital Structure Decisions of New Firms

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We study capital structure choices that entrepreneurs make in their firms' initial year of operation, using restricted-access data from the Kauffman Firm Survey. Firms in our data rely heavily on external debt sources, such as bank financing, and less extensively on friends-and-family-based funding sources. Many startups receive debt financed through the personal balance sheets of the entrepreneur, effectively resulting in the entrepreneur holding levered equity claims in their startups. This fact is robust to numerous controls, including credit quality. The reliance on external debt underscores the importance of credit markets for the success of nascent business activity. (*JEL* G21, G24, G32)

Understanding how capital markets affect the growth and survival of newly created firms is perhaps the central question of entrepreneurial finance. Yet, much of what we know about entrepreneurial finance comes from firms that are already established, have already received venture capital funding, or are on the verge of going public—the dearth of data on very-early-stage firms makes it difficult for researchers to look further back in firms' life histories.[1] Even data sets that are oriented toward small businesses do not allow us to measure systematically the decisions that firms make at their founding. This article uses a novel data set, the Kauffman Firm Survey (KFS), to study the behavior and decision-making of newly founded firms. As such, it provides a first-time glimpse into the capital structure decisions of nascent firms.

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The authors are grateful to the Kauffman Foundation for generous financial support. Malcolm Baker, Thomas Hellmann, Manju Puri, Antoinette Schoar, and Ivo Welch, as well as seminar participants at the Kauffman/Cleveland Federal Reserve Bank Entrepreneurial Finance Conference, the University of Michigan, the Stockholm School of Economics, the Atlanta Fed, and the NBER Summer Institute Entrepreneurship Meetings and the Kauffman/RFS conference on entrepreneurial finance provided helpful comments on previous drafts. Juan Carlos Suarez Serrato provided expert research assistance. Any errors are solely our responsibility. Please send correspondence to David Robinson, Fuqua School of Business, 100 Fuqua Drive, Durham, NC 27708; telephone: 919-660-8023. E-mail: davidr@duke.edu.

[1] Some noteworthy exceptions are Kaplan, Sensoy, and Stromberg (2009), who follow a small sample of firms beginning at the business plan stage; Reynolds (2008), who uses data from individuals who are contemplating starting businesses; and Cumming (2005), who examines the prevalence of nonconvertible preferred equity in startups.


doi:10.1093/rfs/hhs072 Advance Access publication July 8, 2012

In this article, we use the confidential, restricted-access version of the KFS, which tracks nearly 5,000 firms from their birth in 2004 through their early years of operation. Because the survey identifies firms at their founding and follows the cohort over time, recording growth, death, and any later funding events, it provides a rich picture of firms' early fund-raising decisions. In Section 2, we discuss the data in greater detail.

Rather than attempt to test specific theories of capital structure, our main goal is a more modest, descriptive one. We aim to examine the financing outcomes that entrepreneurs experience when they launch firms, explore the patterns that emerge from the data, and draw conclusions from these patterns that are useful to both theory and policy. In Section 3, we offer an analytical framework for thinking about entrepreneurial financing decisions. This allows us to develop a classification scheme that distinguishes funding sources both in terms of their security type (debt vs. equity) as well as their source (personal accounts of the business owner(s) vs. friends and family vs. arm's-length formal financial channels). This two-way classification scheme in turn allows us to separate the issue of risk-bearing from that of liquidity provision. For example, if an entrepreneur uses a home equity line of credit from a bank to finance a startup, the entrepreneur is bearing the risk of failure through a levered equity stake in the business, but the bank is providing liquidity to the business through a debt instrument to the entrepreneur. Because many startups are sole proprietorships, and many that are not are financed with personal guarantees and personal wealth as collateral, distinguishing risk-bearing from liquidity provision is important for understanding how startups are financed. The distinction between risk-bearing and liquidity provision is a direct consequence of the bank's ability to contractually sidestep limited liability through the use of personal assets as collateral or guarantees.

Section 4 presents our main results. Our central finding is that newly founded firms rely heavily on formal debt financing: owner-backed bank loans, business bank loans, and business credit lines. Funding from formal debt dwarfs funding from friends and family. The average amount of bank financing is seven times greater than the average amount of insider-financed debt; three times as many firms rely on outside debt as they do inside debt. Even among firms that rely on inside debt, the average amount of outside debt is nearly twice that of inside debt.

Again, it is important to highlight the distinction between liquidity provision and risk-bearing. The fact that formal credit channels provide about 40% of a firm's initial startup capital implies in many cases that the entrepreneur effectively holds a highly levered equity claim on their business, because their own personal assets stand as collateral or guarantees for the bank financing.

The reliance on formal credit channels over personal credit cards and informal lending holds true even for the smallest firms at the earliest stages of founding. The average pre-revenue firm in our sample has twice as much capital from bank loans as from insider sources. And, when we look at only

those firms that access outside equity sources, such as venture capital or angel financing, we still see a heavy reliance on debt; the average firm that accesses external private equity markets still has around 25% of its capital structure in the form of outside debt.

We also examine trade credit as a potential source of capital, since it may be especially important in scenarios in which trade creditors possess information (or stand to forge relationships through supply channels) that banks might not be able to obtain (Peterson and Rajan 1997). Although our data show that trade credit is undoubtedly important, the average firm uses less than half as much trade credit as it does outside debt, and almost twice as many firms rely on outside debt as they do on trade credit. In fact, if trade credit were counted as a source of financial capital (instead of operating capital), it would rank third, behind outside debt and owner equity, but ahead of outside equity and inside debt or equity.

Of course, these statements only speak to the equilibrium amount of borrowing from inside and outside sources; the quantities are determined by both the supply and the demand of different types of capital. Indeed, to couch startup decisions as choices suggests that entrepreneurs can freely choose between alternative capital providers: the pronounced information asymmetries that characterize startup firms' search for capital may in fact imply that startups simply seek capital where it is most plentiful. Evidence from Cosh, Cumming, and Hughes (2009) suggests that this indeed may be the case. They find that rejection rates are lower in credit markets than from other sources of capital, which suggests that the variation in financing decisions owes to supply considerations as well as demand considerations.[2] Ultimately, it is challenging to separate supply and demand in the absence of some quasi-experiment. We nevertheless take some small steps in this direction in Section 5.

To control for the fact that differences in firm quality or creditworthiness may be driving the patterns we see in the data, we identify plausibly exogenous variation in access to capital by using housing price elasticity data calculated by Saiz (2010). Using sophisticated GIS techniques to measure geographical constraints on local land supply, as well as factors that account for endogenous restrictions on land use through zoning, he estimates price elasticities of the housing stock at the MSA level. These estimates partially allow us to capture the effect of the housing boom on access to capital, by taking advantage of the fact that high-elasticity areas saw housing inventories increase as the housing bubble expanded, whereas low-elasticity areas saw home prices increase instead. In areas with high elasticity of supply, homes provide better loan collateral, because the underlying home equity is less sensitive to local pricing conditions.

Indeed, we find that entrepreneurs in areas with high supply elasticity were more reliant on bank loans as a source of capital. Because our data do not map

[2] Our data do not allow us to study rejection rates as in Cosh et al. (2009).

the entrepreneurs' actual home prices onto bank financing choices, we must remain cautious; nevertheless, we find evidence that high price stability acts as a catalyst for bank loans.

This of course raises the concern that credit conditions at the time of our survey were so unique that they do not necessarily reflect broader patterns from other time periods. Although ultimately we are limited to the data that are available, we speak to this possibility by considering the correlation between capital structure decisions and outcome variables like employment, size, and profitability growth. In Section 6, we find that having a capital structure that is more heavily tilted toward formal credit channels results in a greater likelihood of success. This fact holds even when we include the credit score as a measure of firm quality to guard against the possibility that unobserved factors drive both success and credit access. Our findings indicate that, even if credit conditions in 2004 were unique, credit market access had an important impact on firm success.

This article is related to a number of articles in the banking, capital structure, and entrepreneurship literature. Given the emphasis in the current work on the role of formal banking channels and trade credit, our article is also related to the literature on the role of banks and other sources of financing for small firms (see, e.g., Peterson and Rajan 1994, 1997, 2000, or Berger and Udell 1998). Cosh, Cumming, and Hughes (2009) find a similarly important role for bank capital using British data.

Our findings speak to a debate in the literature surrounding the role of financing constraints as impediments to startup activity. It is widely observed that the wealthy are more likely to be entrepreneurs (Gentry and Hubbard 2004), which has led many to conclude that financing constraints are important impediments to business startup activity. On the other hand, Hurst and Lusardi (2004) and Nanda (2011) show that the relation between wealth and entrepreneurship is flat throughout most of the wealth distribution, suggesting that financing constraints are less important. Our evidence indicates that indeed formal credit channels are important for startups, which in turn suggests that credit markets alleviate many financing constraints for startups. Yet, at the same time, we see pronounced differences in the overall size of startup businesses based on measures of access to credit. We discuss these issues in greater detail in Section 7, which concludes the article.

## 1. The Kauffman Firm Survey

The KFS is a longitudinal survey of new businesses in the United States. This survey collected information on 4,928 firms that started in 2004 and surveys them annually. These data contain detailed information on both the firm and up to ten business owners per firm. Ultimately, the KFS will be an eight-year panel, spanning from 2004 to 2011. Detailed information on the firm

includes industry, physical location, employment, profits, intellectual property, and financial capital (equity and debt) used at startup and over time.

Robb et al. (2009) and Ballou et al. (2007) provide thorough descriptions of the sampling process used to construct the initial sample. They report that the target population for the survey was all new businesses that were started in the 2004 calendar year in the United States (representing activity in each of the fifty states plus the District of Columbia). A business started in 2004 was defined as a new, independent business that was created by a single person or a team of people, the purchase of an existing business, or the purchase of a franchise. Businesses were excluded if they had an EIN, had Schedule C income, or had paid state unemployment insurance or federal Social Security taxes prior to or after 2004. One challenge with developing a sample of startups in the United States is that there is no national registry of startups. The sampling frame for the KFS is therefore based on the Dun & Bradstreet (D&B) database and restricted to businesses (or enterprises) that are reported by D&B as starting in 2004. This database is a compilation of data from various sources, including credit bureaus, state offices that register some new businesses, and companies (e.g., credit card and shipping companies) that are likely to be used by all businesses. Importantly, this is not the same database as the D&B business registry available on the Internet; the sample from which our data are drawn contains vastly greater coverage of firms in the United States. The KFS data include an oversample of high-tech firms; thus, all of our analyses use sampling weights that adjust the sample to be representative of the frame from which the sample was drawn.

Information on up to ten owners includes age, gender, race, ethnicity, education, previous industry experience, and previous startup experience. A public-use data set is available for download from the Kauffman Foundation's website, and a more detailed confidential data set is available to researchers through a secure, remote access data enclave provided by the National Opinion Research Center (NORC). For more details about how to access these data, please see http://www.kauffman.org/kfs/.

A subset of the confidential data set is used in this research—those firms that either have data for all four survey years or have been verified as going out of business over the 2004–2007 period. This reduces the sample size to 3,972 businesses. To ensure that our findings are not driven by this sampling criterion, we compare the capital structure information for the full sample of 4,928 firms with the sample used in our analyses. We show the full sample in Column (1) of Table 4.

The method we used for assigning owner demographics at the firm level was to define a primary owner. For firms with multiple owners (35% of the sample), the primary owner was designated by the largest equity share. In cases in which two or more owners owned equal shares, hours worked and a series of other variables were used to create a rank ordering of owners in order to define a primary owner. (For more information on this methodology, see Robb et al. 2009.)

**Table 1**
**Business characteristics**

| | | Weighted Percentage |
|---|---|---|
| Business Legal Status | | |
| | Sole proprietorship | 0.360 |
| | Partnership | 0.057 |
| | Corporation | 0.277 |
| | Limited liability corporation | 0.306 |
| Business Location | | |
| | Home-based | 0.500 |
| | Leased space | 0.396 |
| | Other | 0.104 |
| | Urban/MSA | 0.84 |
| Business Product/Service Offerings | | |
| | Service offered | 0.858 |
| | Product offered | 0.516 |
| | Business offers both service(s)/product(s) | 0.378 |
| Intellectual Property | | |
| | Patents | 0.022 |
| | Copyrights | 0.086 |
| | Trademarks | 0.137 |
| Employment Size | | |
| | Zero | 59.2 |
| | 1 | 14.0 |
| | 2 | 9.1 |
| | 3 | 4.6 |
| | 4–5 | 5.8 |
| | 6–10 | 3.9 |
| | 11+ | 3.6 |
| Credit score | | |
| | High credit score | 0.115 |
| | Medium credit score | 0.553 |
| | Low credit score | 0.332 |

Sample includes 3,972 firms that either survived over the 2004–2007 period or were verified as going out of business over the same period. Corporation includes C or S corporations. Limited liability corporation includes LLC or LLP designations. Home-based business means that the primary business location was the same as the owner's home. The variable "Urban/MSA" is a dummy variable that takes on the value 1 if the business location was in a metropolitan statistical area and is 0 otherwise. Credit score is a quintile score of the credit quality of the business.

Tables 1 and 2 provide details on business characteristics. In Table 1, we report key features of the business—its legal form, location, and other features of operations. Roughly 36% of all businesses in the data are sole proprietorships, and about 58% are structured to provide some form of limited liability to owners. About 28% are organized as S or C corporations.

Half of the businesses in the survey are operated from the respondent's home or garage, and only a quarter of the firms in the survey have any form of intellectual property (patents, copyrights, and/or trademarks). We measure the urban/rural status of a startup by whether it is located in a metropolitan statistical area (MSA). Eighty-four percent of startups in our data are located in MSAs.

Reflecting the fact that they are being measured at their inception, the firms are also tiny by almost any conceivable measure. Nearly 60% of the firms have

**Table 2**
**Cash-flow characteristics of startups in the KFS**

Panel A: Percent of Businesses by Revenues and Expenses

| Revenues | Weighted Percentage | Expenses | Weighted Percentage |
|---|---|---|---|
| Zero | 35.3% | Zero | 6.7% |
| $1,000 or less | 5.1% | $1,000 or less | 8.5% |
| $1,001– $5,000 | 7.7% | $1,001– $5,000 | 16.0% |
| $5,001– $10,000 | 6.1% | $5,001– $10,000 | 11.3% |
| $10,001– $25,000 | 10.5% | $10,001– $25,000 | 16.2% |
| $25,001– $100,000 | 18.6% | $25,001– $100,000 | 25.3% |
| $100,001 or more | 16.8% | $100,001 or more | 15.8% |

Panel B: Percent of Businesses by Amount of Profits or Losses

| Profit (44.5%) | Weighted Percentage | Loss (55.5%) | Weighted Percentage |
|---|---|---|---|
| Zero | 19.4% | Zero | 3.4% |
| $1,000 or less | 10.2% | $1,000 or less | 13.2% |
| $1,001– $5,000 | 16.4% | $1,001– $5,000 | 27.3% |
| $5,001– $10,000 | 12.5% | $5,001– $10,000 | 17.0% |
| $10,001– $25,000 | 17.4% | $10,001– $25,000 | 17.9% |
| $25,001– $100,000 | 20.0% | $25,001– $100,000 | 16.9% |
| $100,001 or more | 4.1% | $100,001 or more | 4.2% |

Sample includes 3,972 firms that either survived over the 2004–2007 period or were verified as going out of business over the same period. Panel A refers to the distribution of revenues and expenses, whereas Panel B refers to the distribution of profits and losses. In Panel B, 44.5% of the sample reported earning profits, of which 19.4% indicated approximately zero profits; likewise, 55.5% reported losses, of which around 3.4% reported zero loss.

no employees other than the founder, and less than 8% of firms in the sample have more than five employees in their first year of operations.

Table 2 considers the cash-flow characteristics of these nascent businesses. Even though these firms are small, nearly 20% of firms (16.8%) have over $100,000 in revenue in their first year. Indeed, 45% of the firms in the sample have more than $10,000 in annual revenue in their first year. Of course, over 57% of firms have more than $10,000 in expenses, and almost one in four firms reports zero profit or loss.

Table 3 examines owner characteristics in more detail. In spite of the fact that most of the businesses in our data begin at home, in people's garages, with fewer than five employees, the overwhelming majority of business owners have at least some industry experience. Less than 10% of owners have no previous industry experience, whereas more than half have more than five years of industry experience. Likewise, more than 40% of business owners have started a business before. More than 80% of respondents are over the age of thirty-five when they start their business, and roughly half of the sample is aged forty-five or older.

The entrepreneurs in our sample are relatively well educated. Less than 20% of respondents have less than a high school degree, whereas well over half of the respondents have completed some form of a college degree. Finally, nearly a quarter of all respondents have received some form of advanced or postgraduate education. In broad terms, these demographics match those reported in other

**Table 3**
**Business owner demographics**

| Characteristics | Weighted Percentage | Characteristics: | Weighted Percentage |
|---|---|---|---|
| Male | 69.2 | | |
| Female | 30.8 | Industry Exp. (Yrs.) | |
| | | 0 | 9.8 |
| White | 79.3 | 1–2 | 13.9 |
| Black | 8.6 | 3–5 | 15.6 |
| Asian | 4.2 | 6–9 | 9.9 |
| Others | 2.3 | 10–14 | 13.6 |
| | | 15–19 | 11.3 |
| Non-Hispanic | 94.5 | 20–24 | 9.3 |
| Hispanic | 5.5 | 25–29 | 7.5 |
| | | 30+ | 9.3 |
| Owner Age | | | |
| 24 or younger | 1.3 | | |
| 25–34 | 16.5 | Previous Start-ups | |
| 35–44 | 33.6 | 0 | 57.5 |
| 45–54 | 29.0 | 1 | 21.5 |
| 55 or older | 19.6 | 2 | 10.2 |
| | | 3 | 5.0 |
| Owner Education | | 4 or more | 5.8 |
| HS grad or less | 13.9 | | |
| Tech/trade/voc. Deg. | 6.4 | | |
| Some coll., no deg. | 21.8 | Hours Worked | |
| Associate's | 8.6 | <20 | 18.5 |
| Bachelor's | 25.3 | 20–35 | 19.5 |
| Some grad, no deg. | 5.9 | 36–45 | 14.3 |
| Master's degree | 13.4 | 46–55 | 15.2 |
| Professional/doctorate | 4.7 | 56 or more | 32.5 |

Sample includes 3,972 firms that either survived over the 2004–2007 period or were verified as going out of business over the same period.

data sources. For example, these demographics are similar to those reported in Puri and Robinson (2008), using the Survey of Consumer Finances, and Fairlie and Krashinsky (2007), using the Characteristics of Business Owners Survey.

## 2. Theoretical Framework

Although our purpose is neither to propose nor to test a specific theory of how startups are financed, it is nonetheless useful to set out a theoretical framework for understanding the forces that are likely to shape patterns that we see in the data. In the first subsection, we review some theoretical arguments related to our exercise. In Subsection 2.2, we highlight the distinction between risk-bearing and liquidity provision. Then, in Subsection 2.3, we use this theoretical motivation to provide a classification scheme for the data we analyze.

### 2.1 Theories of startup capital

Stiglitz and Weiss (1981) model how rationing can occur when observationally equivalent borrowers of heterogeneous quality attempt to raise capital in debt markets. This model illustrates how informational asymmetry can lead to limited access to debt. Taken at face value, the Stiglitz/Weiss model would

predict low explanatory power in capital structure regressions on small firms. This is because the model predicts that, among a pool of observationally equivalent borrowers, some borrowers would receive funding, whereas some would not. Since, in effect, low $R^2$ values indicate that the total variation in capital structure choice is poorly explained by observable factors, low $R^2$ values in the regressions we report are at least consistent with the Stiglitz/Weiss credit rationing model.

The Stiglitz/Weiss model has led many scholars to assert that frictions in capital markets prevent startups from accessing formal debt markets. In the presence of such acute frictions, startups are assumed to pursue financing from informal channels, or through the heavy reliance on trade credit (see, e.g., Peterson and Rajan 1994, 2000). Likewise, Berger and Udell (1998) postulate a life-cycle theory of small firm finance wherein "financial needs and options change as the business grows, gains further experience, and becomes less informationally opaque" (Berger and Udell 1998, p. 622).

According to this logic, one prediction from this literature is that more informationally opaque firms rely more on informal capital and less on formal credit channels, because their greater degree of information asymmetry screens them out of credit markets to a greater degree. This is, in essence, the central prediction from the life-cycle view of small firm finance, since that view posits that small firms rely first on insider finance, then on angel finance and trade credit, and only later on intermediated external finance (Berger and Udell 1998; Sahlman 1990). In contrast, firms with less informational opaqueness should face fewer financing constraints and in general should have larger amounts of total financing and greater reliance on outside financing as the main source of capital.

Of course, testing this prediction is complicated by the fact that informationally opaque firms may be founded by those whose social networks have more limited access to capital, in which case the supply of informal capital would simply be insufficient to make up for the lack of access to formal capital. Therefore, even if informationally opaque borrowers are partially screened from credit markets, they may face such a short supply of capital in informal markets that they simply access lower amounts of capital of all types, without the proportions differing across types of financing.

### 2.2 Distinguishing liquidity provision and risk-taking

Most theoretical treatments of capital structure explicitly or implicitly assume that limited liability implies that a borrower cannot claim more than the value of the business in question—that an entrepreneur's wealth outside the business is either entirely invested or else is not available.[3] However, empirical

[3] That is, many models start with the assumption that a wealth-constrained borrower needs access to capital to fund a project and can borrow at most the difference between the project's initial cost and the amount of capital available to the entrepreneur from private sources.

research on small business lending has shown that personal guarantees and personal collateral must often be posted to secure financing for startups (Moon 2009; Avery, Bostisc, and Samolyk 1998; Mann 1998). In essence, this means that limited liability constraints can be contractually circumvented in the borrower/lender agreement with a bank by requiring the borrower to pledge personal assets that may exceed the value of the business if it fails.

The fact that limited liability constraints can be circumvented in small-business lending relationships implies that there is a critical distinction between liquidity provision and risk-bearing in financing relationships. For example, consider a simple two-period economy in which an entrepreneur with home equity wishes to borrow against the home in order to finance a startup of unknown value. The entrepreneur wishes to borrow $K$ to finance the startup at an interest rate $r$ and can pledge as much as $\gamma K(1+r)$ in collateral in the event that the business fails. Clearly, the entrepreneur bears the risk of business failure (and stands to enjoy the benefits of success if the business does not fail) but the entrepreneur's home equity is not liquid and therefore cannot finance the business directly.

Figure 1 sketches this logic in a slightly more rigorous way. In Figure 1, the value of the business in the good state of nature (success) is $X_H$, whereas the value in the bad state is $X_L$. The parameter $\gamma$ measures the degree to which a lender can recapture the face value of the loan in the event that firm value is low. Parameterizations where $X_L < \gamma K(1+r)$ represent situations in which the borrower pledges capital outside the project, such as personal guarantees or collateral, to secure the loan.

Whenever $\gamma > 0$, the loan contract with the bank essentially means that the entrepreneur is holding a *levered* equity claim in the business; she has pledged an amount $X_L - \gamma K(1+r)$ in the event that the business fails. Thus,

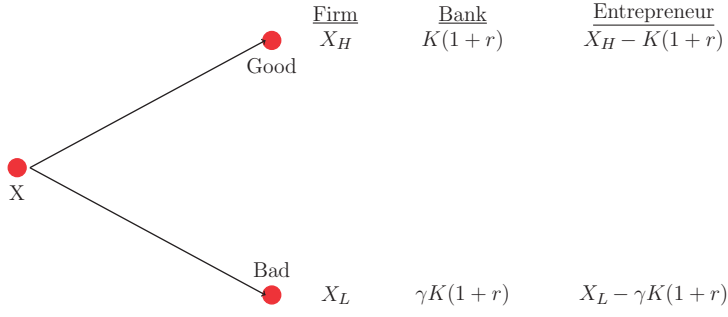


**Figure 1**
**Liquidity provision and risk-bearing**
This figure depicts a firm that is worth \$X at time 0, when it raises \$K from a bank in the form of a loan. At time 1, the outcome is either good or bad and the firm is worth $X_H$ or $X_L$, respectively. The lender is fully repaid in the good state, and in the bad state can reclaim a fraction $\gamma$ of the loan's value. Whenever $\gamma > 0$, the entrepreneur holds a levered equity claim.

the entrepreneur uses leverage to access liquidity from a bank, but in turn holds a levered equity claim in the business that is being started.

### 2.3 A classification scheme for startup capital

The logic of the previous section suggests that a natural way to classify financing decisions is first to distinguish between type of security (i.e., equity vs. debt) and then also to distinguish capital according to its source (i.e., formal vs. informal). The justification for this stems from the fact that different providers of capital may have access to different enforcement technologies, leading in turn to different values of $\gamma$ in the framework above. For example, informal lenders, such as friends and family, may have little ability to seize collateral (i.e., their enforcement technology corresponds to low values of $\gamma$), and therefore the expected return to debt for them is low; this may lead them to prefer equity over debt.

Capital can be provided by owners, by insiders, or by outsiders. The KFS is careful to distinguish owner equity from cash that a business owner obtained through, say, a home equity line, which in our classification scheme would be a source of outside debt, since it was provided through a formal contract with a lending institution. Informal financing channels include debt or equity from family members and personal affiliates of the firm, whereas formal financing channels include debt accessed through formal credit markets (banks, credit cards, and lines of credit) as well as venture capital and angel financing.

Following the logic of the previous section, our classification scheme groups together personal debt on the business owner's household balance sheet with business bank loans, and places these under the "outside debt" category. For around 40% of our sample, the distinction between personal and business debt is meaningless because the business is structured as a sole proprietorship. For the roughly 60% that remain, we do not have data about which firms relied on personal guarantees and the use of personal assets as collateral, but the work of Moon (2009), Avery, Bostisc, and Samolyk (1998), Mann (1998), and others suggests that these channels are important. As such, our primary distinction is not whether the debt is a claim on the business owner's household assets or her business assets but rather whether this debt was issued by an institution or friends and family.

To summarize, the simple theoretical framework that we have presented here allows us to classify funding into one of six categories. First, we can distinguish between whether the source of capital is the owner, insiders, or outsiders. Although owners may use personal assets as collateral to obtain bank loans, we classify loans from banks as originating from outsiders—the fact that personal collateral may have secured the loan highlights the fact that the entrepreneur may be holding a levered equity claim in the firm. Second, for each of these sources of capital, we can further distinguish between whether the capital is provided in the form of debt or equity. In the next section, we use this classification scheme to describe the sources of capital for startups.

## 3. Where Do Startups Go for Capital?

### 3.1 A detailed look at capital structure

In Table 4, we use this classification scheme to provide a detailed look at the capital structure choices that nascent firms make. The thirty different sources of capital for startup businesses are grouped into the six categories described previously (owner/insider/outsider × debt/equity).

**Table 4**
**Sources of financing for 2004 startups**

| Category | Funding Source | Full KFS | Analysis Sample | Mean if >0 | Count |
|---|---|---|---|---|---|
| Owner Equity | | 33,640 | 31,734 | 40,536 | 3,093 |
| Owner Debt | | 4,952 | 5,037 | 15,765 | 1,241 |
| | Personal CC balance, resp. | 2,812 | 2,811 | 9,375 | 1,158 |
| | Personal CC balance, others | 1,906 | 238 | 7,415 | 132 |
| | Personal loan, other owners | 235 | 1,989 | 124,124 | 67 |
| Insider Equity | | 2,221 | 2,102 | 44,956 | 177 |
| | Spouse equity | 524 | 646 | 40,436 | 62 |
| | Parent equity | 1,697 | 1,456 | 42,509 | 126 |
| Insider Debt | | 7,257 | 6,362 | 47,873 | 480 |
| | Family loan | 2,760 | 2,749 | 29,232 | 327 |
| | Family loan to other owners | 1,719 | 284 | 34,509 | 29 |
| | Personal loan to other owners | 272 | 550 | 28,988 | 73 |
| | Other personal loans | 649 | 924 | 81,452 | 45 |
| | Business loan by family | 1,156 | 1,760 | 57,207 | 115 |
| | Business loan by owner | 635 | 15 | 9,411 | 5 |
| | Business loan by emp. | 52 | 79 | 22,198 | 9 |
| Outsider Equity | | 19,257 | 15,935 | 354,540 | 205 |
| | Other informal investors | 5,148 | 6,350 | 244,707 | 110 |
| | Business equity | 6,621 | 3,645 | 321,351 | 56 |
| | Govt. equity | 5,242 | 798 | 146,624 | 27 |
| | VC equity | 701 | 4,804 | 1,162,898 | 26 |
| | Other equity | 1,546 | 337 | 187,046 | 8 |
| Outsider Debt | | 50,130 | 47,847 | 128,706 | 1,439 |
| | Personal bank loan | 18,031 | 15,859 | 92,433 | 641 |
| | Owner bus. CC balance | 16,213 | 1,009 | 7,107 | 543 |
| | Personal bank loan by other owners | 5,017 | 1,859 | 80,650 | 92 |
| | Bus. CC balance | 4,227 | 812 | 6,976 | 452 |
| | Other Bus. CC balance | 2,275 | 135 | 7,852 | 62 |
| | Bus. bank loan | 1,591 | 17,075 | 261,358 | 243 |
| | Credit line balance | 1,030 | 5,057 | 95,058 | 210 |
| | Nonbank bus. loan | 133 | 3,627 | 214,920 | 72 |
| | Govt. bus. loan | 857 | 1,331 | 154,743 | 34 |
| | Other bus. loan | 241 | 231 | 78,281 | 19 |
| | Other individual loan | 206 | 226 | 43,202 | 22 |
| | Other debt | 308 | 626 | 119,493 | 22 |
| Total Financial Capital | | 117,458 | 109,016 | 121,981 | 3,536 |
| Trade Credit | | 21,628 | 21,793 | 93,536 | 838 |

The first column, labeled "Full KFS," includes all 4,928 firms in the Kauffman Firm Survey. For some of these firms, it cannot be verified that they either went out of business or remain in operations; therefore, in the remaining columns we include 3,972 firms that either survived over the 2004–2007 period or were verified as going out of business over the same period. This column is labeled "Analysis Sample." These two columns report means that include firms with $0 amounts of a particular source of capital. The third column, labeled "Mean if >0," reports the mean, in dollars, for only firms with positive amounts of that source of funding. The sample size for that source of funding is reported in the final column.

Although our primary focus is on the 3,972 firms for which we can verify that the firm is either operating or else has gone out of business by 2007, we want to make sure that our conclusions are not skewed by this sampling criterion. Therefore, in the first column of Table 4, we report averages taken over all 4,928 firms in the full sample. This column is labeled "Full KFS" because it imposes no sampling restrictions. Then, in the second column, we report the grand mean calculated over the 3,972 firms. This column is labeled "Analysis Sample." Finally, in Columns 3 and 4, we recalculate the mean over the 3,972 firms in our primary sample, but exclude observations for which there was no measured financial activity from that source. Column 3 reports this restricted mean, whereas Column 4 reports the number of observations over which Column 3 is calculated.

Turning to the first row of Columns 3 and 4, over 75% of firms have at least some owner equity; of these, the mean amount is just over $40,500. If we include the quarter of firms with no reported owner's equity, the average owner equity amount drops to $31,734 (Column 2).

Owner debt plays a much smaller role. Only about one quarter of firms in the sample have some form of owner personal debt, and the vast majority of this is mostly in the form of debt carried on an owner's personal credit card. The overall average amount of credit card debt used to finance startups is a modest $5,037, but this includes the roughly 75% of owners who do not use personal credit cards to start their businesses. Among those who do, the balance is considerably larger—$15,765, or about one-third of the size of owner equity. But in general, personal credit card balances make up a relatively small fraction of startups' overall capital structure at inception—only about 4% to 5% of the firm's total capitalization is in the form of personal credit card balances held by firm owners.

Whereas owner-provided capital is heavily tilted toward equity, the capital from other sources is heavily tilted toward debt. If we include the firms with zero values, firms use about five times as much debt as they do equity. This holds for both inside debt ($6,362) to equity ($2,102), as well as outside debt ($47,847) to equity ($15,935). But, seven times as many firms report outside debt as report outside equity. Yet, among those who do receive outside equity, there is no question that it is important. The average amount of outside equity among the 205 firms that access this source of financing is over $350,000, roughly twice as large as the total financial capital for the average firm in the survey.

Turning first to insiders, we see that equity is uncommon. Only about 5% of the sample relies on equity from a spouse or other family members, and the overall average amount (including the 95% with no family equity) is only about 2% of the average funding. Yet, among the group who uses family equity, the source is important; the magnitude of insider equity is roughly the same as that of owner equity and many times larger than the magnitude of owner debt.

Insider debt is more common, but is still a small source of funding relative to outside debt and equity. The mean value of inside debt for all firms is $6,362, and this primarily comes from personal loans received by the respondent from family and other owners. Loans directly to the business from owners or other family members are also important, but the fact that less than 10% of surveyed firms rely on any one type of inside debt suggests that this funding source is not commonly relied upon by new firms.

When we turn to outsider debt, we see that on average it is the largest single financing category for startups during their first year of operation. Though this no doubt reflects the relative supply of outside debt to other funding sources, it is noteworthy that only a relatively small fraction of this comes from credit card balances issued to the business. Of the $47,847 average debt level, less than $2,500 on average comes from business credit cards.

One widely held view about entrepreneurial finance is that startups lack access to formal capital markets, and thus are forced to rely on an informal network of family, friends, and other financing sources, like credit cards, to bootstrap their initial financing. Table 4 speaks against this idea. First, outside capital is extremely important, even at the earliest stages of a firm's life. The average new firm has approximately $109,000 of financial capital. Of that, roughly half comes from outside sources.

To be clear, however, informal investors do play an important role for those firms that obtain external equity funding. Looking solely at the external equity funding, of the 205 firms that received some form of external equity funding, over half received funding from outside informal investors. The average amount, around $245,000, is roughly one-fourth of the average for the handful of firms that report obtaining venture capital.[4]

Second, the vast majority of this outside capital comes in the form of credit, either through personal loans made directly to the owner or through business credit cards. Moreover, credit cards play a relatively small role for the average startup. If we total the average credit card holdings on all personal and business accounts associated with the business, the amount sums to less than half the average personal bank loan. If we tally the average personal bank loan and the average business bank loan, this amount is roughly four times the size of the average total credit card balances outstanding.

Trade credit is also widely recognized to be an important source of funding for informationally opaque firms (Peterson and Rajan 1994, 1997, 2000). In the final row of Table 4, we report the average amounts of trade credit for the firms in our sample. Clearly, the average firm relies heavily on trade credit. But, on average, trade credit comes in behind outsider debt and personal equity as the third most common source of capital. It is well ahead of both credit cards and

[4] Some firms may indeed misclassify angel investors as venture capital, as the average amounts are quite low.

friends and family in terms of the average amount used, but it represents only about half of the amount of formal debt used by startups.

Column 1, labeled "Full KFS," provides a check against the possibility that our sample restrictions, which require us to verify whether a firm is operating or has ceased operations, skew the conclusions we draw from this table. It repeats the analysis but includes the 956 firms whose viability or closure cannot be determined in the data. Although the average amounts for any given subcategory differ, the average amounts for the six categories closely match that of the analysis sample. In addition, the levels of trade credit are also quite similar. Therefore, there is no evidence from Column 1 that we systematically bias our conclusions by focusing on firms that can be verified either to have exited or be in continued operations.

### 3.2 Capital structure and firm type

Perhaps the most surprising finding in Table 4 is that formal credit channels—business and personal bank loans—are the most important sources of funding for startups. To push this observation further, we segment the data in Table 5 to report capital structure patterns for different types of startup firms.

The idea behind Table 5 is to isolate those firms that are in their very earliest stages of starting up, to see if the overall capital structure patterns hold there as well. This can be done according to a number of criteria. In the first column of Table 5, we examine the 2,425 firms that have no employees other than the founder. These firms are small relative to the average reported for all firms in Table 4—their total capital is only around $45,000 as compared to the roughly $110,000 in Table 4. But proportionately, outside debt plays a quite similar role: the average nonemployer firm has $19,353, or about 43% of its total capital, in outside debt compared to approximately $48,000, or about 44% of total capital on average, for firms overall. Of the outside debt, we again see that business bank loans and personal bank loans make up the bulk of the $19,353. Only about $2,500 comes from other sources on average.

The second column examines the 2,168 businesses that do not operate any office or warehouse space outside of owners' homes. These too are small, presumably including the proverbial "garage business" as well as businesses of a professional nature that operate out of a home office. The capital structure patterns for these businesses are remarkably similar to the nonemployer businesses; about 40% of their total capital is financed through outside debt, and the lion's share of that comes from personal and business bank loans, rather than credit card balances.

Another way to pinpoint firms at their earliest stages is to focus only on prerevenue or preprofit firms. We examine these firms in Columns (3) and (4), respectively. These firms are considerably larger than the previous two categories, presumably because these include many firms that have secured inventories in advance of sales or require external building space to operate.

**Table 5**
**Sources of financing for 2004 startups by firm type**

| | Average ($) by type of firm: | | | | | |
|---|---|---|---|---|---|---|
| Funding Source | No Employees | Home-Based | Pre-Revenue | Pre-Profits | Survived thru 2006 | Closed by 2006 |
| Owner Equity | 17,269 | 20,035 | 31,201 | 35,433 | 31,784 | 31,609 |
| Owner Debt | 2,318 | 2,624 | 3,720 | 5,445 | 4,896 | 5,392 |
| Personal credit card (Owner) | 1,896 | 2,093 | 1,937 | 3,499 | 2,634 | 3,256 |
| Personal credit card (Other owners) | 159 | 218 | 133 | 305 | 217 | 291 |
| Insider Equity | 698 | 1,024 | 2,271 | 2,553 | 1,705 | 3,101 |
| Spouse equity | 270 | 215 | 612 | 638 | 468 | 1,094 |
| Parent equity | 428 | 809 | 1,659 | 1,915 | 1,237 | 2,007 |
| Insider Debt | 2,381 | 3,074 | 6,456 | 7,852 | 5,856 | 7,635 |
| Personal Family Loan | 1,051 | 1,683 | 2,451 | 3,342 | 2,437 | 3,535 |
| Business Loan from family | 350 | 580 | 2,114 | 2,335 | 1,481 | 2,464 |
| Other Personal Loan | 475 | 302 | 1,233 | 1,177 | 1,191 | 252 |
| Outsider Equity | 2,774 | 4,731 | 16,268 | 21,530 | 18,753 | 8,841 |
| Other Informal Investors | 785 | 2,489 | 7,006 | 9,704 | 7,992 | 2,218 |
| Other Business equity | 1,529 | 1,568 | 4,539 | 4,727 | 3,840 | 3,155 |
| Government equity | 10 | 226 | 550 | 945 | 1,083 | 81 |
| Venture Capital equity | 441 | 443 | 4,164 | 5,618 | 5,373 | 3,373 |
| Outsider Debt | 19,353 | 26,960 | 44,839 | 54,536 | 50,087 | 42,208 |
| Personal bank loan | 11,453 | 12,898 | 12,962 | 17,738 | 17,416 | 11,941 |
| Bank business loan | 5,231 | 9,180 | 18,474 | 21,160 | 18,653 | 13,103 |
| Credit line | 341 | 656 | 2,986 | 4,823 | 5,061 | 5,047 |
| Total Financial Capital | 44,793 | 58,448 | 104,755 | 127,349 | 113,080 | 98,787 |
| Trade Credit | 6,883 | 5,537 | 4,825 | 14,640 | 22,684 | 16,642 |
| Observations | 2,425 | 2,168 | 1,615 | 2,144 | 3,390 | 773 |

This sample includes the 3,972 firms that either survived over the 2004–2007 period or were verified as going out of business over the same period. Home-based means that the firm did not have a place of business outside the owner's home.

Indeed, these columns look quite similar to the averages reported in Table 4 for the whole sample.

Because the first four columns of Table 5 monotonically expand the size and scope of firms under consideration, they offer an alternative—albeit descriptive—way to examine capital choice. Moving from the first column of data to the fourth column of data more than doubles the firm's size by adding an additional $80,000 of total capital to the firm. By far, the bulk of this comes from outside debt and equity, which together make about half the increase in firm capital. Since Columns (3) and (4) also contain some nonemployer and home-based firms, this comparison understates the magnitude of the shift in capital structure. Thus, the comparisons across the columns of Table 5 indicate that friends and family are probably an earlier source of financing than is outside debt, as previous accounts have indicated. However, it is just not terribly important in terms of total size.

The final two columns of Table 5 split the data according to whether the firm continued to operate throughout the first four waves of the KFS or whether the firm ceased operations. Firms that survive look very much like the overall

average reported in Table 4. On the other hand, firms that ceased operations sometime before 2007 not only began smaller but also had considerably smaller proportions of outside debt to total capital.

Rather than focus on the firms least likely to access debt markets from a size perspective, in Table 6 we focus on firms that demonstrated an ability to access outside equity. Since here we are conditioning the sample on the presence of outside equity, we would naturally expect outside equity to play an important role for these firms. It does. For example, angel-backed firms have about 50% outside equity, and they are considerably larger than the average firm on the KFS. The ratio of outside equity to total capital is even higher for VC-backed and corporate equity–backed firms. Notwithstanding the reliance on outside equity, these firms have large amounts of outside debt. Outside debt is the second largest source of capital for these firms, behind outside equity, for all

**Table 6**
**Do equity-backed firms embrace or eschew debt?**

| | Average (in $) by type of firm: | | | |
|---|---|---|---|---|
| Source | Angel | VC | Corporate | Govt-Other |
| Owner Equity | 116,792 | 119,459 | 105,062 | 47,062 |
| Insider Equity | 12,948 | 4,278 | 5,346 | 5,521 |
| Spouse equity | 1,080 | 0 | 3,507 | 58 |
| Parent equity | 11,868 | 4,278 | 1,839 | 5,463 |
| Outsider Equity | 328,999 | 1,499,644 | 515,051 | 171,145 |
| Other informal investors | 244,707 | 126,811 | 183,110 | 9,901 |
| Other business equity | 60,568 | 209,130 | 321,351 | 4,335 |
| Government equity | 6,488 | 804 | 443 | 110,147 |
| Venture Capital equity | 17,084 | 1,162,898 | 10,148 | 229 |
| Other equity | 151 | 0 | 0 | 46,533 |
| Owner Debt | 19,558 | 9,949 | 13,041 | 5,450 |
| Insider Debt | 15,997 | 32,365 | 9,033 | 3,109 |
| Personal family loan | 8,196 | 4,051 | 4,008 | 190 |
| Personal family loan (Other owners) | 651 | 0 | 2,098 | 257 |
| Other personal loan | 1,033 | 15,862 | 878 | 0 |
| Other personal funding | 4,567 | 12,452 | 860 | 0 |
| Other personal owner loan | 14,139 | 6,176 | 4,668 | 0 |
| Outsider Debt | 164,891 | 628,398 | 75,156 | 96,030 |
| Personal bank loan | 21,629 | 286,853 | 23,295 | 8,046 |
| Bank business loan | 67,728 | 299,169 | 28,882 | 56,094 |
| Credit line | 25,590 | 1,216 | 5,855 | 1,918 |
| Other nonbank loan | 17,359 | 19,005 | 2,752 | 0 |
| Other bank loan | 10,416 | 128 | 6,513 | 2,080 |
| Government business loan | 352 | 402 | 0 | 22,219 |
| Other individual loan | 3,402 | 12,170 | 73 | 420 |
| Other business debt | 14,491 | 0 | 0 | 4,049 |
| Total Financial Capital | 659,184 | 2,294,093 | 722,690 | 328,316 |
| Trade Credit | 73,272 | 161,417 | 129,815 | 168,277 |

Each column in this table reports capital structure decisions for firms with different types of outside equity. Thus, the sample size of each column is reported in the third row of Table 4, in the "Outside Equity" section. Amounts are averages over all firms that had the type of funding in the Column header in 2004. Some subcategories are suppressed for brevity, but they are included in the totals reported in each category.

**Table 7**
**Prior startup experience and capital availability**

| | All | Experienced Entrepreneur | Serial Entrepreneur |
|---|---|---|---|
| Panel A: Dollar Values | | | |
| Owner equity | 31,734 | 36,480 *** | 44,683 *** |
| Insider equity | 2,102 | 1,974 * | 1,253 |
| Outsider equity | 15,935 | 25,693 ** | 34,969 *** |
| Owner debt | 5,037 | 5,266 | 6,345 |
| Insider debt | 6,362 | 7,120 | 7,934 |
| Outsider debt | 47,847 | 71,592 *** | 91,030 *** |
| Total financial capital | 109,016 | 148,124 *** | 186,215 *** |
| Panel B: Proportions | | | |
| Owner equity | 29.1 | 24.6 | 24.0 |
| Insider equity | 1.9 | 1.3 | 0.7 |
| Outsider equity | 14.6 | 17.3 *** | 18.8 *** |
| Owner debt | 4.6 | 3.6 | 3.4 |
| Insider debt | 5.8 | 4.8 | 4.3 |
| Outsider debt | 43.9 | 48.3 | 48.9 |
| Total financial capital | 100.0 | 100.0 | 100.0 |

This table reports means and proportions of each of the six categories of startup capital based on whether the entrepreneur has prior startup experience. The column labeled "All" reports the same values as in the column labeled "Analysis Sample" in Table 4. "Experienced Entrepreneurs" are those who have started one business before this one. From Table 3, this group comprises 21.5% of the sample on a weighted basis. "Serial Entrepreneurs" have started two or more businesses, and comprise 20% of the sample on a weighted basis. *, **, and *** denote statistically significant differences at the 10%, 5%, and 1% levels, respectively, between each experience category and the full sample.

types except corporate-backed firms. Outside debt dwarfs trade credit for these firm types, again, with the exception of corporate equity–backed firms.

Table 7 instead examines variation in entrepreneurial experience as a potential source of variation in level and type of startup capital.[5] In this table, we report the six categories of startup capital for the full sample, for those entrepreneurs with one prior startup (Experienced Entrepreneurs) and for those with two or more prior startups (Serial Entrepreneurs). The column labeled "All" simply reports for convenience the aggregated values from the analysis sample reported in Table 4. In Panel A, we report mean dollar values of each of the six categories and test whether Experienced or Serial Entrepreneurs obtain more or less capital than the full analysis sample. From this panel, we see that both types of repeat entrepreneurs use statistically larger amounts of owner's equity and outside equity, as well as outside debt. As a result, businesses started by seasoned entrepreneurs are statistically larger than the average business in the KFS analysis sample. In Panel B, we test whether these differences translate into a different capital structure by comparing the proportions of startup capital coming from each of the six categories. Here, the only difference that we find between seasoned entrepreneurs and the full sample is the reliance on outside equity. Seasoned entrepreneurs rely on more outside equity than the average KFS firm.

[5] We are grateful to an anonymous referee for suggesting this analysis.

## 4. Housing Markets, Bankruptcy Exemptions, and Access to Debt

In this section, we explore two potential strategies for decoupling supply and demand for capital. The first is to examine housing price appreciation as a potentially exogenous source of variation in collateral that drives the availability of credit. Since housing prices are likely to be endogenous to the expected future profitability of the business ventures, we instead link housing-supply elasticity to bank credit. This variable is obtained from Saiz (2010) and is based on exogenous geographical factors that affect the amount of developable land, as well as factors like zoning restrictions. Because the housing price elasticity is largely predetermined prior to 2004, it provides an exogenous source of variation in collateral values.

The data provided by Saiz (2010) contain housing-supply elasticity estimates for 269 metropolitan statistical areas (MSAs) in the United States. This includes all the major metropolitan areas in the United States and a great many smaller regions. For example, the first percentile of the population distribution (using the population in 2000) is less than 80,000 residents. The size of the twenty-fifth percentile is around 163,000 residents. Nevertheless, this variable does not measure the actual home price appreciation (or homeownership status) of the respondents of the KFS; it contains only a regional measure of land developability.

If housing supply were perfectly inelastic, then demand shocks would translate directly into price shocks and home equity values would be highly sensitive to underlying changes in housing demand. In such a world, home equity would provide poor collateral for business loans, because the value of the collateral would be sensitive to factors that were outside the borrower's control. In contrast, a region with a perfectly elastic supply of housing would experience no price change whatsoever as housing demand changed. In such a world, home equity would be unaffected by fluctuations in housing demand. Thus, in regions in which housing supply is elastic, we should expect to see a greater reliance on outside debt, since the underlying home equity is more pledgeable.[6]

Table 8 tests this prediction by regressing the fraction of bank capital on the housing supply elasticity, controlling for a variety of owner and business characteristics. All columns in Table 8, except Column (5), restrict attention to only those firms located in the 269 MSAs identified in Saiz (2010). Across the various specifications reported, increasing supply elasticity *raises* the fraction of bank debt by about 2%. To translate this into economic magnitudes, moving from the twenty-fifth to seventy-fifth percentile, which is approximately like moving from Reno, Nevada, to Peoria, Illinois, is associated with a 3% increase

[6] The KFS survey instrument explicitly instructs respondents to exclude from owner's equity any cash they put into the business from home equity loans or lines of credit. The survey instrument allocates these funding sources to personal bank debt.

**Table 8**
**Elasticity of housing supply and reliance on bank debt**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Home supply elasticity | 0.0163*** | 0.0156*** | 0.0153*** | 0.0149** | | 0.0150*** | 0.0163*** |
| | (0.0058) | (0.0058) | (0.0059) | (0.0058) | | (0.0058) | (0.0058) |
| State bankruptcy exemption | | | | | −1.92 | | −2.52* |
| | | | | | (1.33) | | (1.48) |
| Industry dummies | No | Yes | No | Yes | Yes | Yes | Yes |
| Owner characteristics | No | No | Yes | Yes | Yes | Yes | Yes |
| Credit score dummies | No | No | No | No | No | Yes | Yes |
| Observations | 2,564 | 2,564 | 2,466 | 2,466 | 3,389 | 2,466 | 2,466 |
| $R^2$ | 0.004 | 0.029 | 0.040 | 0.058 | 0.048 | 0.061 | 0.062 |

The dependent variable in each column is the ratio of bank debt to total financial capital. The key independent variable is the elasticity of housing supply, taken from Saiz (2010). This variable measures the availability of land in an MSA as a function of both exogenous geographical barriers to growth, and endogenous barriers to development. High supply elasticities mean that the supply of housing has a large response to a change in the price of housing, which in turn means that areas with high elasticity saw rapid growth in housing stock during the housing bubble. The state exemption variable is the level of the homestead exemption in the state of each respondent's residence, in tens of thousands of dollars. Each of the seven alternative specifications includes different control variables, as indicated below. All columns except Column (5) exclude firms not located within one of the 269 MSAs identified in the Saiz (2010) article, resulting in 2,564 firms.

in bank debt. Since the average startup is about 40% bank financed, this effect seems economically large.

The second potential channel for decoupling supply and demand is to examine state-level bankruptcy exemptions. All else equal, borrowers in states with higher bankruptcy exemption levels should expect to receive less total outside capital in the form of bank debt, since increased bankruptcy protection impairs the collateral value of the assets they own.[7] Since state-level bankruptcy laws are unlikely to be determined by local variation in entrepreneurial opportunity, the inclusion of an exemption measure gives us another opportunity to separate credit supply from credit demand.

Column (5) of Table 8 includes a bankruptcy exemption variable, which is the bankruptcy homestead exemption in the respondent's state of residence, in tens of thousands of dollars. Taken by itself, the variable has the expected sign, but is statistically insignificant.

To see how variation in borrower quality affects this relation, we obtained commercial credit scores for each firm.[8] One caveat is that the data source does not allow us to verify that the credit scores were assigned before the loans were obtained. Indeed, we may be observing credit scores that were assigned shortly *after* the loans we observe in the data. These results should be interpreted with this important caveat in mind.

When we include credit score information, as in Column (7), we see that the loading on the bankruptcy exemption is both negative and statistically significant. This indicates that borrowers in states with higher bankruptcy exemptions indeed obtained a lower ratio of outside bank debt to total capital (see also Cerquiero and Penas 2010).

## 5. The Link Between Initial Financial Access and Later Performance

One possible explanation for our findings, which certainly merits consideration, is that the fact that startups rely extensively on external credit markets to fund their early life is being driven by peculiarities in the credit market in 2004.

We address this possibility in two ways. First, in Table 9, we examine the importance of debt for later-stage fund-raising decisions. Is the reliance on debt only a feature of the business' starting conditions? Do businesses wean themselves off outside debt as they grow? Table 9 suggests not. It suggests that they continue to rely on debt in the years after the firm's founding.

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[7] This argument is consistent with Berkowitz and White (2004), who show that higher personal bankruptcy exemption levels are associated with more credit denials among small businesses.

[8] In tabulations available from the authors, we have explored how variation in credit score is associated with the levels and composition of the funding that startups receive. We find that whereas high creditworthy firms have access to much more financial capital, they access capital in roughly the same proportions as low creditworthy firms. Thus, a firm's credit score induces a first-order shift in the level of financing it obtains, but only a second-order shift in capital structure choice it makes.

**Table 9**
**Time-series evidence on the importance of formal debt**

| | All Firms | Firm Has Outside Equity | Inc./Employees/ Asset-backed | Home-based Nonemployers |
|---|---|---|---|---|
| Panel A: Initial (2004) Baseline | | | | |
| Owner equity | 31,734 | 92,806 | 72,170 | 14,652 |
| Insider equity | 2,102 | 9,205 | 6,733 | 658 |
| Outsider equity | 15,935 | 354,540 | 57,428 | 3,086 |
| Owner debt | 5,037 | 14,320 | 12,730 | 2,045 |
| Insider debt | 6,362 | 12,825 | 15,781 | 2,129 |
| Outsider debt | 47,847 | 179,710 | 120,843 | 21,802 |
| Total financial capital | 109,016 | 663,407 | 285,686 | 44,371 |
| Panel B: First (2005) Capital Injection | | | | |
| Owner equity | 15,352 | 41,040 | 33,855 | 4,795 |
| Insider equity | 1,782 | 1,426 | 4,992 | 420 |
| Outsider equity | 19,718 | 275,713 | 70,438 | 658 |
| Owner debt | 4,447 | 7,712 | 6,107 | 1,849 |
| Insider debt | 5,423 | 11,792 | 11,494 | 913 |
| Outsider debt | 45,237 | 137,049 | 102,092 | 19,003 |
| Total injection | 91,959 | 474,732 | 228,978 | 27,637 |
| Panel C: Second (2006) Capital Injection | | | | |
| Owner equity | 10,540 | 38,720 | 27,599 | 4,848 |
| Insider equity | 585 | 770 | 2,182 | 34 |
| Outsider equity | 10,033 | 79,265 | 38,656 | 2,284 |
| Owner debt | 3,159 | 7,075 | 7,519 | 1,942 |
| Insider debt | 4,241 | 12,103 | 10,345 | 584 |
| Outsider debt | 42,326 | 309,176 | 135,750 | 16,055 |
| Total injection | 70,884 | 447,109 | 222,051 | 25,746 |
| Panel D: Third (2007) Capital Injection | | | | |
| Owner equity | 8,210 | 23,817 | 19,224 | 4,674 |
| Insider equity | 1,029 | 8,513 | 4,710 | 148 |
| Outsider equity | 7,801 | 92,488 | 38,496 | 433 |
| Owner debt | 3,155 | 10,370 | 7,776 | 1,852 |
| Insider debt | 3,394 | 20,990 | 12,908 | 535 |
| Outsider debt | 35,706 | 90,086 | 105,758 | 18,930 |
| Total injection | 59,295 | 246,264 | 188,873 | 26,571 |

Each column in this table reports the average for the subset of firms with the characteristics described in the column header. Column classifications are based on 2004. Column 3 is the set of firms that are incorporated, have at least one employee other than the founder, and have assets such as inventories. Home-based businesses are those that report operating out of the founder's home.

Table 9 shows that, for the average firm, the fraction of new capital coming into the firm that is made up of outside debt is actually increasing as the firm matures. If anything, the fraction of owner equity falls as the firm ages. This supports life-cycle theories, such as Berger and Udell (1998), in favor of the idea that startups used personal loans to kick-start the business and then moved away from debt as the firm matured.

The columns of Table 9 consider different types of firms to see if the increased reliance on outside debt is particularly important for certain kinds of firms. Column (2) reports firms that have some form of outside equity at startup. These firms typically receive a large equity injection in the first year after founding, but in the following years, they rely much more heavily on outside debt. This is

consistent with outside equity being staged to coincide with milestones, but at the same time, the reliance on outside debt in 2006 and 2007 suggests that these firms continue to rely on outside debt.

The final two columns of Table 9 look at opposite ends of the spectrum. Column (3) only considers the set of firms that are incorporated, have employees, and have assets, such as inventories, in the year of their founding. These firms typically have about 40% of their initial capital coming from outside debt, and this ratio grows over time. By the time of the third year (2007), the total capital coming into the firm is over 55% outside debt. Although the absolute levels of financing are considerably smaller for home-based firms (Column 4), the story is very much the same: These firms rely on outside debt to an increasing degree as they age.

If our findings simply reflect the fact that credit was readily available in 2004, then there is no reason to believe that access to external credit should affect firm success. On the other hand, if access to formal capital reflects underlying operating conditions, or if it promotes stability and growth, then access to capital in 2004 should be associated with better 2007 outcomes.

To test this, we report OLS regressions of 2007-dated performance metrics on 2004-dated firm characteristics. Our performance metrics of interest are Revenues, Profits, Employment, and Assets (size). Our key explanatory variable is the ratio of outside debt to total capital. Our hypothesis is that firms with greater levels of external capital grew more and therefore had higher values of these performance metrics.

Table 10 presents the findings. It includes the same basic set of owner and firm characteristics, plus the ratio of outside debt to total capital and the level of 2004 sales. All of the right-hand-side variables are measured in 2004, and the dependent variable is measured in 2007. Therefore, there is one observation per firm.

The outside debt ratio has a positive and highly significant effect on revenues, employees, and assets but a statistically insignificant positive effect on profits measured in 2007. The estimated magnitudes are also economically significant. For example, a one-standard-deviation increase in the 2004 ratio of outside debt to total assets is associated with $155,278 more in 2007 revenues. Given that the average 2007 revenues are $530,000, this amounts to about a 30% increase over the mean firm. The effect on 2007 assets is virtually identical in magnitude, but the average assets in 2007 are only around $259,000. Therefore, increasing outside debt by one standard deviation increases assets by more than half the average value. Increasing outside debt by one standard deviation is associated with almost two additional employees by 2007; this is again a nearly 50% increase, as the average firm in 2007 had 3.6 employees. The magnitudes of these estimated coefficients indicate that access to outside debt is economically, not just statistically, significant.

These findings are related to Cumming (2008), who relates the nature of initial VC contracts to firms' exits, since we are relating initial capital structures

**Table 10**
**Capital structure choices and firm outcomes**

| | DV is 2007 value of: | | | |
|---|---|---|---|---|
| 2004-dated RHS Variables | Revenue | Profits | Employment | Assets |
| ln(2004 revenue) | 14,496* | 710.9 | 0.135*** | –687.1 |
| | (7,459) | (594.1) | (0.0472) | (3,272) |
| 2004 outside debt ratio | 155,278* | 4,521 | 1.882*** | 155,684*** |
| | (90,895) | (8,259) | (0.630) | (47,159) |
| Female | –188,657*** | –9,176* | –0.760** | –79,869*** |
| | (57,724) | (4,808) | (0.387) | (23,090) |
| Hours worked | 4,194*** | 206.2* | 0.0154* | 292.0 |
| | (1,364) | (115.2) | (0.00893) | (618.3) |
| Work experience | 14,104*** | 470.8* | 0.0587*** | 4,546*** |
| | (3,614) | (263.9) | (0.0188) | (1,495) |
| Prior startup experience | –43,637 | –13,390*** | 1.019** | 66,131*** |
| | (59,095) | (4,817) | (0.398) | (22,771) |
| Multiple owners | 350,712*** | 12,234** | 2.206*** | 138,501*** |
| | (68,486) | (5,462) | (0.437) | (26,490) |
| Credit score | 5,157*** | 386.5*** | 0.0239*** | 2,442*** |
| | (1,464) | (115.7) | (0.00803) | (602.6) |
| Intellectual property | –49,473 | –23,881*** | 1.373** | 607.7 |
| | (73,869) | (6,453) | (0.628) | (32,659) |
| Comparative adv. | –61,280 | 7,486 | 0.0163 | 21,343 |
| | (64,598) | (4,794) | (0.391) | (27,223) |
| Sells product | 105,845 | –10,656 | –0.0267 | 16,689 |
| | (119,868) | (9,122) | (0.681) | (45,476) |
| Sells prod. & serv. | –54,121 | –1,373 | –0.332 | –7,402 |
| | (115,714) | (8,244) | (0.624) | (40,496) |
| Urban/MSA | 97,628 | 7,945 | 0.501 | –13,141 |
| | (63,821) | (5,135) | (0.405) | (33,026) |
| Industry controls | Yes | Yes | Yes | Yes |
| Demographic controls | Yes | Yes | Yes | Yes |
| Observations | 1974 | 2482 | 2490 | 3418 |
| $R^2$ | 0.144 | 0.067 | 0.102 | 0.087 |

This table reports OLS regressions of 2007 firm outcomes on 2004 firm characteristics. Two-digit industry dummies, owner age, age$^2$, race, and education dummies are included but suppressed for brevity. The right-hand-side variables are all measured in 2004. There is one observation per firm. Robust standard errors are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. The $R^2$ values are goodness-of-fit statistics from unweighted regressions.

to later-stage success measures.[9] Using international data, Cumming (2008) breaks the endogeneity of contract terms and later exit with variation across legal environments that is presumed exogenous to the choice of exit. We hesitate to attach a causal interpretation to our findings, given the difficulty in controlling for all the unobserved characteristics that might affect both access to debt and success, especially given the lack of suitable instruments (the early-stage nature of our firms coupled with U.S.-only data means we cannot develop instruments similar to Cumming 2008). Nevertheless, we do include credit score and other firm characteristics, including initial revenues, which helps control for differences in initial size. At the very least, Table 10 suggests that initial capital structure decisions are indeed important for firm success.

[9] We are grateful to the referee for pointing out this connection.

## 6. Conclusions

This article uses a novel data set to explore the capital structure decisions that firms make in their initial year of operation. In the vast majority of cases, this is when the firms in question are still being incubated in their founders' homes or garages, before outside employees have joined the firm in any significant number, and certainly well before the firms in question would be attractive to the types of funding sources that are the focus of most discussions of early-stage financing.

In spite of the fact that these firms are at their very beginning of life, they rely to a surprising degree on bank debt. Partly, this is a function of the availability of bank debt. In regions that experienced an increase in the supply of home loans, startups relied to a larger extent on bank debt. Higher-quality firms operate at a larger scale in part because they can access larger amounts of bank financing.

If there is an entrepreneurial capital structure that can be gleaned from our analysis, it would put the debt/value ratio of a typical startup at around 40%. Given that in many cases the startup is a sole proprietorship or somehow involves personal assets as collateral for the loans in question, this implies that many entrepreneurs hold highly levered equity claims in their startups. The bank is providing liquidity for the startup, while the entrepreneur is bearing the risk associated with default through the liens on their personal assets.

This number seems high given the commonly held view that the informational opaqueness of startups makes them poor candidates for lending. The top three sources of financing for most startups are, in order of average prevalence, bank debt, personal equity, and trade credit. However, we hasten against using this as the basis of a new "entrepreneurial pecking order," because these levels reflect the equilibrium supply and demand of capital of different forms more than entrepreneurial preferences per se.

Nevertheless, the notion that startups commonly rely on the beneficence of a loose coalition of family and friends seems misleading given our findings. Although the data suggest that informal investors are important for the handful of firms that rely on outside equity at their startup, the data also indicate that most firms turn elsewhere for their initial capital. Indeed, roughly 80%–90% of most firms' startup capital is made up in equal parts of owner equity and bank debt.

To be sure, our findings underscore the importance of liquid credit markets for the formation and success of young firms. Because startups rely so extensively on outside debt as a source of startup capital, they are especially sensitive to changes in bank lending conditions, perhaps more sensitive than would be suggested based on accounts of entrepreneurial finance that focus on the importance of informal capital. The evidence from Lemmon, Roberts, and Zender (2008), indicating the persistence of capital structure, suggests that this reliance on formal bank capital is likely to be important for startups as they continue to grow.

These findings speak to both sides of a long-standing debate surrounding the role of capital market frictions as impediments to startup activity. The fact that firms in their earliest stages of life access capital from banks speaks to the ready availability of bank credit to even the smallest firms, which in turn suggests that liquid credit markets for startup activity are likely to be an important reason behind the low correlation between wealth and entrepreneurship throughout much of the wealth distribution (Hurst and Lusardi 2004). The fact that the average amount of bank debt is roughly proportional to the amount of personal equity supplied by the entrepreneur indicates that the scale of operations simply scales with the entrepreneurs' net worth, without the net worth providing a per se barrier to entry. At the same time, the fact that startups return to credit markets in roughly the same proportions as their initial capital stock in the first years after launch as evidence speaks to the fact that, perhaps, entrepreneurial ventures started by individuals with low net worth are forced to operate at lower levels of scale than might be optimal. Exploring these issues in greater detail is an important challenge for future work.

**References**

Avery, R. B., R. W. Bostic, and K. A. Samolyk. 1998. The Role of Personal Wealth in Small Business Finance. *Journal of Banking and Finance* 22:1019–61.

Ballou, J., T. Barton, D. DesRoches, F. Potter, Z. Zhao, B. Santos, and J. Sebastian. Kauffman Firm Survey (KFS) Baseline Methodology Report (January 23, 2007). Available at SSRN: http://ssrn.com/abstract=1024045.

Berger, A., and G. F. Udell. 1998. The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle. *Journal of Banking and Finance* 22:613–73.

Berkowitz, J., and M. J. White. 2004. Bankruptcy and Small Firms' Access to Credit. *RAND Journal of Economics* 35:69–84.

Cerquiero, G., and M. F. Penas. 2010. How does bankruptchy law affect startups? Working Paper, Universidad Catolica Portugeusa.

Cosh, A., D. Cumming, and A. Hughes. 2009. Outside Entrepreneurial Capital. *Economic Journal* 119:1494–533.

Cumming, D. J. 2005. Capital Structure in Venture Finance. *Journal of Corporate Finance* 11:550–85.

———. 2008. Contracts and Exits in Venture Capital Finance. *Review of Financial Studies* 21:1947–82.

Fairlie, R., and H. Krashinsky. 2007. Liquidity constraints, household wealth, and entrepreneurship revisited. Working Paper, University of California–Santa Cruz.

Gentry, W., and G. Hubbard. 2004. Entrepreneurship and Household Saving. *Advances in Economic Analysis and Policy* 4:1053–1073.

Hurst, E., and A. Lusardi. 2004. Liquidity Constraints, Household Wealth, and Entrepreneurship. *Journal of Political Economy* 112:319–24.

Kaplan, S., B. Sensoy, and P. Stromberg. 2009, Should Investors Bet on the Jockey or the Horse? Evidence from the Evolution of Firms from Early Business Plans to Public Companies. *Journal of Finance* 64:75–115.

Lemmon, M. L., M. R. Roberts, and J. F. Zender. 2008. Back to the Beginning: Persistence and the Cross-section of Corporate Capital Structure. *Journal of Finance* 63:1575–603.

Mann, R. J. 1998. Comment on Avery, Bostic, and Samolyk. *Journal of Banking and Finance* 22:1062–66.

Moon, J. 2009/2010. Small Business Finance and Personal Assets. *Community Investments* 21:9–10.

Nanda, R. 2011. Entrepreneurship and the Discipline of External Fiance. *Harvard Business School Working Paper* 11-098.

Peterson, M., and R. Rajan. 1994. The Benefits of Lending Relationships: Evidence from Small Business Lending. *Journal of Finance* 49:3–37.

———. 1997. Trade Credit: Theories and Evidence. *Review of Financial Studies* 10:661–91.

———. 2000. Does distance still matter? The information revolution in small business lending. Working Paper, NBER.

Puri, M., and D. T. Robinson. 2008. Optimism and Economic Choice. *Journal of Financial Economics* 86:71–99.

Reynolds, P. D., and R. T. Curtin. 2008. Business Creation in the United States: Panel Study of Entrepreneurial Dynamics II Initial Assessment. *Foundations and Trends in Entrepreneurship* 4:155–307.

Robb, A., J. Ballou, T. Barton, D. DesRoches, F. Potter, E. J. Reedy, and Z. Zhao. 2009a. *An Overview of the Kauffman Firm Survey: Results from the 2004–2007 Data*. Kansas City, MO: Kauffman Foundation.

Sahlman, W. 1990. The Structure and Governance of Venture-capital Organizations. *Journal of Financial Economics* 27:473–521.

Saiz, A. 2010. The Geographic Determinants of Housing Supply. *Quarterly Journal of Economics* 125:1253–96.

Stiglitz, J. E., and A. Weiss. 1981. Credit Rationing in Markets with Imperfect Information. *American Economic Review* 71:393–410.