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Implications of Demand for and Access to Financial Capital by Young Firms in the Current Economic Crisis

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Abstract:

In the aftermath of the financial crisis of 2008, policy-makers at all levels are concerned about the impact of the crisis on access to financial resources by young firms, particularly as major changes occur in bank-lending practices and uncertainties surround the implementation of financial reform legislation. In this paper, we analyze the types and sources of financing used in young firms during the years 2007 and 2008. We find differential outcomes for firms who applied for loans and received them, those who applied and were denied, and those which did not apply for fear of denial. We explore the factors that mitigate the decision to apply for a loan and the subsequent outcomes of firm survival and growth. Our work provides insights into the relative importance of supply and demand for financing both prior to and subsequent to the financial shocks. We leverage various measures and perceptions to disentangle the decision to seek bank loans from the likelihood of receiving a loan based on credit scores and other objective measures. We find that both tangible and intangible assets, particularly intellectual property, play a significant role in receipt of bank loans in the firms' early years of operation.

Keywords: Entrepreneurial finance, bank loans, financial crisis, credit scoring

1 Introduction

The economics and finance literature provide strong evidence that sufficient starting capital is a binding constraint for new firms. Entry into entrepreneurship increases with sudden increase in personal wealth, e.g. via bequest (Cagetti and De Nardi (2006)) or external change in taxation rate (Nanda (2008)), and with increased access to bank financing through deregulation and loosening of branching restrictions (Black and Strahan (2002)). Likewise, absence of funds inhibits entry. For example, Evans and Jovanovic (1989) find that borrowing capacity limits entrepreneurial entry; using the National Longitudinal Survey they estimate that new entrepreneurs are limited by 1.5 times the size of their initial assets in starting a new business. In this paper, we analyze the use of bank loans in young firms during their early years of existence, and how these are altered in the wake of the financial shocks of 2008. We focus on the role of 1) tangible and intangible assets and 2) financial performance prior to the crisis in securing a bank loan both prior to and subsequent to the financial crisis. We further differentiate between business bank loans and personal bank loans, and the relative impact of the crisis on these distinct types of debt.

This paper exploits rich information regarding the types and sources of financing used in new firms over the first five years of life in the confidential Kauffman Firm Survey (KFS) microdata, a longitudinal panel study of 4,928 businesses that began operations in 2004. The baseline survey of new businesses has been followed up with four subsequent annual surveys to date in an ongoing effort to track the new business trajectories (Ballou, Barton, Desroches, Potter, Reedy, Robb, Shane and Zhao (2008); Reedy and Robb (2009)). Importantly, the most recent survey spanned the financial shocks of 2008, which occurred in the fourth year of operations for the firms in this survey. In previous work using the KFS data, Winston Smith (2010) provided evidence that banks increase lending to high-technology firms as information asymmetry and inherent uncertainty surrounding the firm are lessened. While high-tech firms account for a relatively small percent of the sample, they are disproportionately likely to survive and contribute to economic growth through employment, revenue,

and assets. In this paper, we also address the impact on high-tech firms relative to firms in low-tech industries.

The findings in this paper provide important insights for the growing policy debate concerning the constrained credit and lending for small businesses, as well as assessing the relative significance of constrained supply and dampened demand. The paper concludes with a discussion of the factors that contribute to young firm survival and growth, including the relative importance of intangible assets, such as intellectual property, and its role in in mitigating the consequences of the financial crisis and facilitating economic recovery, which have important implications for economic recovery.

2 Theoretical Framework

2.1 Banks and New Firm Finance

In practice, entrepreneurs rely on a mixture of financing options for new companies, often employing both informal and formal sources of capital for early financing, including bank loans and venture capital (Bhide (2000); Parker (2009); Shane (2008)). In the aggregate, the financing of small businesses in the United States has been a roughly equal mixture debt and equity (Berger and Udell (1998); Haynes and Brown (2009); Robb and Robinson (2010).

Banks are the largest source of external debt and insiders the largest source of equity for small firms in the United States (Haynes and Brown (2009); Robb, Reedy, Ballou, DesRoches, Potter and Zhao (2010). Similar patterns hold in the United Kingdom (Parker (2009)). Chemmanur, He, and Nandy (2009) find that having outside financing prior to IPO increases the likelihood of going public, and that this result holds for both venture capital and bank financing. Banks overall play a substantial role in new firm formation and growth (Ayyagari, Demirguc-Kunt and Maksimovic (2010); Beck, Demirgüç-Kunt and Maksimovic (2008); Kerr and Nanda (2009)). Black and Strahan (2002) show that deregulation of interstate banking and loosening of branching restrictions fostered increased entrepreneurial activity. In a sample of Italian firms, Benfratello, Schiantarelli, and Sembenelli (2008)

find that bank loans facilitate innovation. In a sample of French firms, (Landier and Thesmar (2009)) find that banks provide entrepreneurs with short-term and long-term debt.

Importantly, debt financing places the risk associated with the new firm squarely with the entrepreneur, who must repay regardless of outcome; equity financing spreads the risk between the entrepreneur and the investor but also dilutes the owners' control (Jensen and Meckling (1976)). Equity financing smoothes the financial cost of potential failure, while debt financing amplifies it. However, the entrepreneur may be averse to giving up an equity stake and control, preferring instead to obtain non-dilutive debt financing. For example, recent evidence suggests a growing use of external debt by very young firms, with significant differences among firms in high-technology industries compared with other industries

2.2 Information asymmetry and uncertainty in new firm financing

Significant principal-agent conundrums arise in financing new ventures due to information asymmetry, moral hazard, and adverse selection. The literature on entrepreneurial finance identifies specific features of contracting and allocation of rights as a crucial mechanism for aligning interests under circumstances of information asymmetry and uncertainty. Adverse selection arises when the entrepreneur knows her own ability while the outside investor does not. Amit, Glosten, and Muller model the relationship between information asymmetry and outside financing (1990). Their model suggests that under conditions of information asymmetry outside investors are more likely to be presented with lower quality entrepreneurs, as higher quality entrepreneurs will choose to proceed alone. Analyzing contracts between venture capitalists and portfolio companies, Kaplan and Stromberg (Kaplan and Stromberg (2003)) find that cash flow rights and control rights are allocated separately, and are made contingent upon observable performance measures. Contingencies are included for financial performance, non-financial performance, and milestones. Allocation of different types of rights and specification of contingencies are used as complements. They also find a strong preference for convertible preferred stock amongst the contracts studied. In a separate paper, the same

authors further associated specific risks with particular contractual terms (Kaplan and Stromberg (2004)). Specifically, they find that venture capitalists are given greater control rights under conditions of greatest information uncertainty between the entrepreneur and the investor. Moral hazard is introduced both when the entrepreneur's effort cannot be monitored and when the investor's commitment cannot be assured. Schmidt (2003) finds that such double moral hazard situations are ameliorated through the use of convertible securities in venture capital contracts. Casamatta (2003) likewise models the use of convertible bonds and preferred equity in aligning interests in VC contracts. She models an entrepreneur who seeks money and advice and a VC who can provide both, compared to "consultants" able to provide advice but not funding. In this circumstance, both entrepreneur and VC must exert effort, which is unobservable, and incentives are aligned through commensurate allocation of cash flow rights. Hellman (2006) models the role of convertible preferred securities in allocating cash flow rights contingent upon exit strategy, i.e. acquisition or IPO.

One key strand within the literature on entrepreneurial finance addresses the preference for debt versus equity financing. In broad terms, the entrepreneur prefers to maintain control rights but generally faces capital constraints, while the investor seeks the highest return for a given level of risk. Importantly, debt financing and equity financing (bank loans compared to venture capital) have different implications for entrepreneurs (Schmidt (2003); Ueda (2004)). Plausible theoretical arguments can be made in favor of the entrepreneur preferring debt financing in order to secure adequate funds while retaining full control rights (Berger and Udell (1998)). However, economic theory also suggests the entrepreneur will prefer to smooth risk by avoiding the necessity to make fixed payments if the firm does not do well, suggesting preference of equity over debt financing.

Inherent information asymmetry makes it difficult for banks to evaluate young firms, particularly in high-technology industries due to the lack of tangible assets and concurrent reliance on knowledge assets, as well as technical and market uncertainty. Banks face greater liquidity constraints than VC firm, leading to preference for collateral, transparent valuation, and other lower risk sectors

(Berger and Udell (1998); Ueda (2004); Winton and Yerramilli (2008)). The information asymmetries associated with new, high tech firms make traditional bank lenders less likely to lend to these firms. Empirical studies support this finding broadly (Cole (2008); Cosh, Cumming and Hughes (2009)). Hellman, Lindsey, and Puri (2008) find that banks use strategic equity investing, i.e. venture capital, to build subsequent banking relationships. Banks use relationship building and the gathering of "soft" information to mitigate information asymmetry.

3 Empirical Evidence

3.1 Kauffman Firm Survey (KFS)

A new panel microdataset is used to explore the types and sources of financing used in new firms at the start and over the first five years of existence. The Kauffman Firm Survey (KFS) is a longitudinal panel study of 4,928 businesses founded in 2004 and tracked over their early years of operation. The panel structure of the data covers the first five years of operation of the firm, and thus the results provide critical insights into how firms are financed in the earliest years of life, and the relationship to subsequent outcomes. Detailed data are gleaned on the nature of new business formation activity including internal and external sources of financing, firm size and focus, and data related to the characteristics, experience and human capital and of the entrepreneur (Ballou, Barton, Desroches, Potter, Reedy, Robb, Shane and Zhao (2008); Reedy and Robb (2009)). Data were collected in the baseline survey of new businesses started in 2004, and subsequent annual surveys. The businesses in this sample all came into existence in 2004, with business start defined in terms of state unemployment insurance paid, FICA, Schedule C income reported on personal income tax, EIN, or the presence of legal status. Some of the key variables are summarized in Table 1 and discussed in greater detail below.

Sample and summary statistics

The KFS data are based on a large sample of a wide spectrum of industries, oversampled on

high-technology to insure inclusion in sampling frame. Firms are oversampled with known weights, allowing econometric approaches to account for clustered errors arising from stratified sampling (Wooldridge (2002)). The breadth of industry inclusion and flexibility in measuring high-technology industries enable us to gather insights into the dynamic relationship between financing and innovation in industries where innovation is most likely.

These data offer additional advantages for examining new firm financing and testing the relationship between initial financing choice and the subsequent innovation trajectory of the firm. First, many studies of new firms are innately subject to survivor bias when studies are limited to firms that receive particular forms of financing, such as venture capital or even angel financing, in which not all firms survive long enough to reach that point, or studies of firms that go public, which must by necessity have survived long enough to issue public securities. In the KFS data firms all began operations in 2004, and thus the sample does not suffer from inherent survivor bias. The inclusion of a range of industries facilitates comparison between and among distinct types of sectors. Multiple levels of sensitivity to industry differences are considered here. The U.S. Bureau of Labor Statistics and the National Science Foundation provide guidelines for categorizing technology-generating and technology-employing industries (Hecker (2005)).

4 Model and Empirical Approach

Our model draws on standard assumptions in the banking literature (Gorton and Winton (2003)). We model the decision to apply for a bank loan in year *t* as a function of growth prospects and degree of credit/liquidity constraint as well as control variables for industry, firm size, and owner characteristics (Chava and Purnanandam); Edelstein (1975)). We are further interested in the role of information asymmetry in mediating the loan application and approval process. We proxy for information asymmetry in several ways. Particularly for a new firm, having a credit rating inherently reduces the information asymmetry between loan applicant and lender(Gorton and Winton (2003)).

We use the actual information contained in the Dun & Bradstreet credit score to create dummies for high creditworthiness, medium creditworthiness, and low creditworthiness and include these as a predictor of applying for a loan as well as the loan application outcome. The credit score provides significant information to the lender about the creditworthiness of the applicant, thereby reducing the information asymmetry dramatically. Asset tangibility plays a significant role in bank lending decisions. As well, we follow a growing interest in the role of intellectual property in bank lending decisions (Winston Smith (2010)).

Following a large literature, we include controls for firm and owner characteristics that have been shown to affect likelihood of bank borrowing. Firm characteristics include industry, legal form of ownership, and team ownership. Owner characteristics include race, ethnicity, gender, and age. We also include measures of the owners' human capital, including education, years of prior industry experience, and prior startup experience.

Finally, we are interested in trying to dissect financial and behavioral aspects of the loan process. To this purpose we characterize *loan demand* as a function of observable financial and performance measures (extent of credit constraint primarily, profit/revenue in previous year) and a function of behavioral characteristics (optimism, risk, fear of denial).

The equation for who applies for a loan, *S*, can be expressed as a function of the following characteristics:

$$S = \beta_0 + \beta_j growth + \beta_k constrained + \beta_l behavioral + \beta_x firm + \beta_y entrepreneur + \varepsilon \quad (1)$$

The second stage equation for likelihood of the loan being approved, *A,* can be expressed as a function of the following characteristics:

$$A = \delta_0 + \delta_1 growth + \delta_2 asymmetry + \delta_3 growth + \delta_4 entrepreneur + \mu \quad (2)$$

Comparing equation 1 and equation 2 above we see that the decision to apply for a loan can be identified through the measures of credit or liquidity constraint and the likelihood of approval can be

identified through the degree of information asymmetry between the entrepreneur and the lender.

In our empirical approach we first estimate separate maximum likelihood probit regressions on the probability of applying for a loan and the probability of receiving a loan. We then carry out two-stage analysis taking into account that individuals first decide whether or not to apply for a loan and then estiamte the likelihood of approval, conditional on the decision to apply. Results are described below and summarized in Tables 2-4.

5 Results

5.1 Univariate analysis

Variable means are shown in Table 1. Comparing high-tech firms with non-high-tech firms, the table shows that high-tech firms have a lower representation of female owners and have more educated owners with greater industry and startup experience. Relative to to other firms, high-tech firms are more often organized as corporations, and are more likely to be located in metropolitan areas rather than rural areas. Not surprisingly, high tech firms also are more likely to have intellectual property (patents, trademarks, or copyrights) and to have a larger share of employees working in R&D.

The variables describing behavioral characteristics are of particular interest in this study, as these might be important determinants of demand for and access to credit. However, most of these variables were only collected in the latest round of the KFS survey. The first variable takes a value of 1 when firm owners decided not to seek a new loan at some point when they needed credit for fear of having their loan application turned down. High-tech firms have a slightly lower average for this variable. The next variable takes the value of 1 whenever the firm did not meet the owner's growth expectation during the first five years. A higher share of high-tech entrepreneurs had expectations that were not realized than non-high-tech entrepreneurs. Both high-tech and non-high-tech firms have similar expectations for future revenue growth, received similar help from outside sources (universities, governments, or non-for-profits), and attributed a similar level of importance to the

impact of the economic crisis on their business operations. Owners of high-tech firms, however, were more likely to be pessimistic in the face of uncertainty than owners of non-high-tech firms.

5.2 Multivariate analysis

Table 2 presents the results of a probit model estimating the determinants of the choice to apply for a new loan. The first column presents the results on both years of analysis. This baseline specification shows that those firms that had negative expectations of receiving a loan were more likely to apply for a new loan. When comparing the impact for high-tech and non-high-tech firms, the interaction suggests that this “fear” variable had the most impact for high-tech firms in deciding whether to seek a new loan. Firms whose owners felt the economic crisis had a large impact on their business and those that received help from outside entities were also significantly more likely to seek a new loan.

The demographic characteristics that have the largest impact of the choice to apply for a new loan are whether the owner had a college degree and the presence of multiple owners. Previous startup experience is also positively related to loan demand. Regarding firm characteristics, the features that have the largest impacts on the decision to seek a new loan are whether the firm is incorporated and whether the firm is located in a rural area. Larger values of the PPE/Assets ratio are also positively associated with loan demand. Previous access to financing, through business credit cards, lines of credit, and trade credit, is also a significant determinant of loan demand. Interestingly, credit score does not seem to play a role in most specifications. The exception is in the last specification where it is shown that a high-credit rating is a positive determinant for non-high-tech firms, while high-tech firms with high credit scores are actually less likely to seek a new loan.

Table 3 presents the results from a similar set of analyses looking at whether the firm's application for loan was denied or approved. Unfortunately the number of respondents for this variable is significantly lower than that of the rest of the survey. For this reason the specifications in the models presented are more parsimonious than the models for loan demand. Across all

specifications we see that fear of being rejected is a strong predictor of being denied a loan. When examining this impact by high-tech status we see that high-tech firms were more likely to be rejected if they were afraid this might happen. Similar comparisons by high-tech status show that high-tech firms were punished more severely when they did not meet their own past growth expectations, when they had low growth expectations for the future, and when their owners had a negative attitude when facing uncertainty. On the contrary, the impact of outside help and a negative shock due to a bad economy were indicators of loan approval. One can interpret these results in a learning context where high-tech firms face higher initial uncertainty of survival. In such a context, poor initial results will restrict access to credit more quickly for high-tech firms relative to non-high-tech firms. Interestingly, as well, the impact of policies to help young businesses seem to have a larger impact on high-tech firms.

Demographic characteristics of the owners, firm characteristics, and previous performance play a large role in determining who gets their loan approved, compared with their relatively low predictive power for who seeks a loan in the first place. Black, female, and older owners seem to fare worse when seeking a loan than their non-black, male, and younger counterparts. Having a college degree was only significant in one specification, but seemed to play a large role. Incorporation is a good predictor of loan approval, as is high previous profits. This last result is in contrast to the results in Table 2, where previous profits did not play a significant role.

5.3 Two-stage analysis

In the two-stage analysis we predict the likelihood of loans being approved, condtional on selection into applying for a loan. We estimate a maximum likelihood probit model with a Heckman sample selection correction in the first stage. In all models our first stage selection equation includes a subjective (behavioral) and an objective measure. Both the behavioral variable, *fear of denial*, and the existing loan ratio, *bankloan_ratio*, are significant in the first stage selection equation, indicating the appropriateness of these choices.

Controlling for this selection bias reveals additional nuances in our results along several

dimensions. We concentrate our discussion on the models in Column 4 and Column 5 of Table 4, which present results from the full model including behavioral variables (Column 4) and interactive variables to allow for differential effects in high tech industries (Column 5). In Column 5, we see that the coefficient on *black* is negative and significant ($p < 0.05$), after controlling for selection bias. Legal incorporation, *corp*, is associated with greater likelihood of loan approval ($p<.01$). Having access to other forms of credit in the form of trade credit, *tradecredit*, is also associated with a higher likelihood of approval ($p<.01$). On the other hand, having a business credit card, is associated with lower likelihood of approval ($p<.01$) while having business line of credit is insignificant. Taken together, these several variables suggest a nuanced relationship between degree of credit constraint and the types of alterative credit available to a new firm.

Turning our attention to Column 5, in addition to the results discussed above, several additional nuances are clear. After we control for selection bias, the behavioral variables continue to be important predictors of the likelihood of loan approval only in conjunction with high tech firms. In particular, fear of having a loan application denied magnifies the likelihood of loans being not approved in high tech indutries, *high*didnotapply*, while optimistic expectations, *high*future*, increases the likelihood of loan approval in those industries.

One unexpected resulted is the negative coefficient on *startup experience* ($p<.01$). A possible interpretation of this result is that previous startup experience may have resulted in business closure or failure, which is not captured in the survey but would be known to banks. Logically, having started a business that failed in the past might lead to lower likelihood of new loan approvals.

Interestingly, the coefficient on *high credit score* is not significant alone, but is positive and highly significant when interacted with the dummy variable for high tech industries ($p<.01$), suggesting that the information revealed through verified creditworthiness is particularly valuable in the context of informationally opaque firms, which is often inherent in high-tech industries.

6 Discussion and Policy Implications

From these results we see that a nuanced relationship exists between the young firms' access to financial resources and key characteristics of the entrepreneur, the firm, and capital constraints within the context of a turbulent economy. In future work, we investigate more carefully the relationship between information transparency and the ability of entrepreneurs to procure adequate capital for their firms. The role of external validation in the form of outside equity holders and credit history are explored.

This work has important implications for policy and policymakers at all levels. In particular, given the role of young firms and entrepreneurs in job creation and economic growth, policymakers need to consider ensure that entrepreneurs and credit worthy firms are able to secure adequate financial resources for growth and success. In addition, this work provides policy makers additional insight into young technology-based firms, which are important contributors to the U.S. economy. Securing funding for new technology-based firms is particularly problematic, however, since many such firms are built upon intellectual capital rather than on physical assets, so it is difficult to determine the value and prospects of the firm. Ensuring these firms have adequate access to financial capital will enable them to continue to drive innovation, growth, and job creation in the U.S. economy.

Table 1. Sample Characteristics, 2008

	All Firms		Non-High Tech		High-Tech	
Obs	4022		3432		590	
Outcomes	*mean*	*se*	*mean*	*se*	*mean*	*se*
Applied for New Loan	0.1238	*0.0076*	0.1205	*0.0080*	0.1670	*0.0250*
Always Approved for Loan	0.6691	*0.0313*	0.6735	*0.0335*	0.6274	
Revenue (mill)	0.5583	*0.0364*	0.5475	*0.0387*	0.6912	
Profit (mill)	0.0476	*0.0239*	0.0552	*0.0255*	-0.0529	*0.0396*
Behavioral Characteristics						
Did not apply out of Fear	0.1887	*0.0091*	0.1895	*0.0096*	0.1783	*0.0258*
Did not Meet Expected Growth	0.3435	*0.0087*	0.3409	*0.0091*	0.3822	*0.0254*
Future Revenue less than 5%	0.2256	*0.0076*	0.2258	*0.0079*	0.2228	*0.0226*
Economic Crisis has a Significant Effect	0.2558	*0.0080*	0.2579	*0.0084*	0.2248	*0.0217*
Personal Outlook in Uncertainty	0.0906	*0.0051*	0.0886	*0.0053*	0.1212	*0.0176*
Outside Help	0.6074	*0.0089*	0.6066	*0.0094*	0.6190	*0.0254*
Owner Characteristics						
Black	0.0856	*0.0052*	0.0859	*0.0055*	0.0815	*0.0157*
Female	0.3096	*0.0064*	0.3204	*0.0068*	0.1492	*0.0150*
Hours Worked by Owner	42.376	*0.4416*	42.381	*0.4625*	42.301	*1.3585*
Owner Age	44.859	*0.1997*	44.857	*0.2099*	44.891	*0.5444*
College Degree or Higher	0.4844	*0.0091*	0.4704	*0.0095*	0.6921	*0.0240*
Work Experience	0.4405	*0.0090*	0.4301	*0.0094*	0.5945	*0.0267*
Previous Startup	0.4238	*0.0090*	0.4197	*0.0095*	0.4840	*0.0266*
Firm Characteristics						
Comparative Advantage	0.6167	*0.0089*	0.6102	*0.0094*	0.7128	*0.0243*
Product	0.5127	*0.0091*	0.5116	*0.0095*	0.5284	*0.0262*
Home base	0.4970	*0.0091*	0.4946	*0.0095*	0.5329	*0.0269*
High Tech	0.0632	*0.0031*	0.0000	*0.0000*	1.0000	
Multiple Owners	0.5628	*0.0091*	0.5626	*0.0095*	0.5653	*0.0264*
Corporate Form	0.1870	*0.0070*	0.1808	*0.0073*	0.2802	*0.0234*
High Credit Score	0.5290	*0.0091*	0.5245	*0.0096*	0.5963	*0.0264*
Rural	0.1665	*0.0065*	0.1702	*0.0069*	0.1122	*0.0174*
PPE/Asset Ratio	0.3525	*0.0083*	0.3582	*0.0088*	0.2767	*0.0202*
RD Emp/Emp Ratio	0.1044	*0.0057*	0.1003	*0.0059*	0.1663	*0.0186*
Trade Credit	0.5257	*0.0091*	0.5290	*0.0096*	0.4778	*0.0265*
Log(Emp)	0.8286	*0.0222*	0.8117	*0.0234*	1.0502	*0.0665*
Log(Assets)	0.1081	*0.0067*	0.1066	*0.0071*	0.1305	*0.0162*
Insider Financing/Total Financing Ratio	0.0554	*0.0053*	0.0552	*0.0055*	0.0572	*0.0176*
Has Bus. C.Card	0.1654	*0.0068*	0.1669	*0.0071*	0.1437	*0.0182*
Has Bus. C.LIne	0.0779	*0.0049*	0.0772	*0.0051*	0.0881	*0.0133*
Has Intellectual Property	0.1204	*0.0058*	0.1132	*0.0060*	0.2284	*0.0209*

Notes: Survey weighted sample means and adjusted standard errors.

Table 2. Probit regressions, Loan Demand

VARIABLES	(1) All Years App for Loan	(2) 2007 App for Loan	(3) 2008 App for Loan	(4) 2008 App for Loan	(5) 2008 App for Loan
Did not apply out of Fear	0.232**	0.244*	0.196	0.124	0.0505
	(0.0954)	(0.135)	(0.131)	(0.139)	(0.152)
interaction with high-tech					0.888**
					(0.353)
Did not Meet Expected Growth				-0.175	-0.221*
				(0.127)	(0.134)
interaction with high-tech					0.312
					(0.360)
Future Revenue less than 5%				-0.130	-0.109
				(0.127)	(0.131)
interaction with high-tech					-0.829*
					(0.463)
Economic Crisis has a Significant Effect				0.336***	0.350***
				(0.127)	(0.134)
interaction with high-tech					0.0900
					(0.339)
Personal Outlook in Uncertainty				0.0887	0.138
				(0.146)	(0.158)
interaction with high-tech					-0.156
					(0.380)
Outside Help				0.192*	0.190
				(0.113)	(0.121)
interaction with high-tech					0.307
					(0.340)
Black	-0.123	-0.111	-0.0744	-0.138	-0.176
	(0.158)	(0.211)	(0.240)	(0.254)	(0.266)
Female	0.0505	-0.0266	0.145	0.163	0.208
	(0.0975)	(0.138)	(0.133)	(0.136)	(0.136)
Hours Worked by Owner	0.00143	0.00254	-0.000419	-0.000628	5.34e-05
	(0.00184)	(0.00274)	(0.00250)	(0.00253)	(0.00259)
Owner Age	-0.0213	-0.0105	-0.0363	-0.0351	-0.0315
	(0.0242)	(0.0346)	(0.0347)	(0.0350)	(0.0358)
Age^2	0.000106	-3.97e-06	0.000231	0.000221	0.000189
	(0.000257)	(0.000371)	(0.000366)	(0.000370)	(0.000379)
College Degree	0.259***	0.366***	0.116	0.101	0.0924
	(0.0918)	(0.126)	(0.130)	(0.131)	(0.134)
Graduate Degree	0.183	0.237	0.129	0.133	0.113
	(0.116)	(0.161)	(0.166)	(0.169)	(0.174)
Work Experience	0.00303	-0.000655	0.00565	0.00712	0.00823
	(0.00444)	(0.00576)	(0.00641)	(0.00658)	(0.00678)
Previous Startup	0.135*	0.143	0.126	0.140	0.135
	(0.0805)	(0.115)	(0.114)	(0.116)	(0.116)
Comparative Advantage	0.0498	-0.00393	0.0993	0.0743	0.0745
	(0.0886)	(0.125)	(0.124)	(0.126)	(0.127)
Product	0.0571	0.0816	-0.0127	-0.0130	0.0336
	(0.0926)	(0.120)	(0.123)	(0.124)	(0.131)
Home base	0.0685	-0.0104	0.195	0.214*	0.207

	(0.0867)	(0.121)	(0.121)	(0.120)	(0.129)
High Tech	0.259*	0.0990	0.232	0.254	0.179
	(0.135)	(0.153)	(0.193)	(0.192)	(0.519)
Multiple Owners	0.227***	0.271**	0.202	0.187	0.164
	(0.0846)	(0.117)	(0.124)	(0.124)	(0.125)
Corporate Form	0.124	-0.0319	0.321***	0.316***	0.307**
	(0.0853)	(0.120)	(0.120)	(0.121)	(0.123)
Medium Credit Score	-0.0179	-0.0918	-0.000553	0.0277	0.0809
	(0.107)	(0.147)	(0.155)	(0.156)	(0.169)
interaction with high-tech					-0.154
					(0.463)
High Credit Score	0.0612	-0.136	0.231	0.228	0.279*
	(0.103)	(0.144)	(0.147)	(0.147)	(0.159)
interaction with high-tech					-0.149
					(0.427)
Previous Revenue	0.0598*	0.0734	0.0534	0.0525	0.0755
	(0.0346)	(0.0580)	(0.0415)	(0.0418)	(0.0472)
interaction with high-tech					-0.0925
					(0.0730)
Previous Profit	0.0228	0.00840***	0.0332	0.0331	-0.102
	(0.110)	(0.00245)	(0.143)	(0.145)	(0.237)
interaction with high-tech					0.294
					(0.291)
Has Intellectual Property	-0.0443	-0.202	0.138	0.119	0.161
	(0.0954)	(0.139)	(0.132)	(0.133)	(0.141)
interaction with high-tech					-0.432
					(0.344)
Rural	0.190*	-0.00934	0.362**	0.397***	0.434***
	(0.101)	(0.142)	(0.143)	(0.144)	(0.146)
PPE/Asset Ratio	0.215*	0.178	0.319*	0.323*	0.331*
	(0.126)	(0.180)	(0.174)	(0.177)	(0.181)
RD Emp/Emp Ratio	0.0370	-0.00371	0.0930	0.0504	0.0843
	(0.114)	(0.138)	(0.169)	(0.172)	(0.179)
Trade Credit	0.388***	0.506***	0.284**	0.237**	0.248**
	(0.0866)	(0.116)	(0.120)	(0.120)	(0.126)
Log(Emp)	0.00745	0.00528	0.0149	0.0157	0.00827
	(0.0480)	(0.0634)	(0.0678)	(0.0680)	(0.0704)
Log(Assets)	0.156	0.0343	0.296**	0.275*	0.257*
	(0.110)	(0.174)	(0.143)	(0.146)	(0.150)
Insider Financing/Total Financing Ratio	0.259	-0.0412	0.598**	0.727**	0.781***
	(0.187)	(0.264)	(0.278)	(0.284)	(0.285)
Has Bus. C.Card	0.0597	0.0757	0.0206	-0.0134	-0.0157
	(0.0845)	(0.121)	(0.117)	(0.119)	(0.120)
Has Bus. C.LIne	0.760***	0.840***	0.769***	0.769***	0.757***
	(0.0957)	(0.137)	(0.135)	(0.138)	(0.138)
Constant	-1.351**	-1.392*	-1.272	-1.387*	-1.611*
	(0.572)	(0.782)	(0.793)	(0.799)	(0.831)
Industry F.E.s	Y	N	N	N	Y
Year F.E.s	Y	N	N	N	N
Observations	2,329	1,170	1,159	1,149	1,149

Notes: (standard errors in parentheses): * $p < 0.10$, ** $p < 0.05$, ***, $p < 0.01$;
Significance tests are two-tailed.

Table 3. Probit regressions, Loan Approval

VARIABLES	(1) All Years Approved	(2) 2007 Approved	(3) 2008 Approved	(4) 2008 Approved	(5) 2008 Approved
Did not apply out of Fear	-2.583***	-4.039***	-2.264***	-2.313***	-11.18***
	(0.352)	(0.858)	(0.370)	(0.392)	(2.315)
interaction with high-tech					-4.006*
					(2.243)
Did not Meet Expected Growth				-0.112	0.746
				(0.349)	(0.838)
interaction with high-tech					-6.711***
					(2.279)
Future Revenue less than 5%				1.003***	7.311***
				(0.345)	(2.465)
interaction with high-tech					-10.40***
					(3.688)
Economic Crisis has a Significant Effect				-0.197	-5.619***
				(0.337)	(1.829)
interaction with high-tech					11.85***
					(3.007)
Personal Outlook in Uncertainty				-0.570	2.127*
				(0.369)	(1.191)
interaction with high-tech					-14.11***
					(3.440)
Outside Help				0.0975	1.602**
				(0.303)	(0.663)
interaction with high-tech					3.729**
					(1.847)
Black	-0.263	1.217	-0.476	-0.191	-7.875***
	(0.600)	(0.895)	(0.870)	(0.860)	(2.749)
Female	-0.912***	-1.433**	-0.987***	-1.030***	-0.996
	(0.273)	(0.648)	(0.336)	(0.328)	(1.143)
Hours Worked by Owner	-0.0176***	-0.0192*	-0.0225***	-0.0247***	-0.0247
	(0.00566)	(0.0101)	(0.00835)	(0.00759)	(0.0228)
Owner Age	-0.0205	-0.0182	-0.281**	-0.310**	-0.471
	(0.0849)	(0.127)	(0.136)	(0.140)	(0.400)
Age^2	6.20e-05	-0.000108	0.00329**	0.00355**	0.00491
	(0.000967)	(0.00136)	(0.00156)	(0.00162)	(0.00464)
College Degree	0.0878	0.653	0.266	0.228	2.431**
	(0.282)	(0.505)	(0.359)	(0.337)	(1.169)
Graduate Degree	-0.377	-0.225	0.0153	-0.134	1.215
	(0.393)	(0.531)	(0.471)	(0.511)	(0.872)
Work Experience	0.0185	0.0174	0.0126	0.0236	0.112**
	(0.0127)	(0.0247)	(0.0177)	(0.0177)	(0.0477)
Previous Startup	0.323	0.670	0.0252	0.145	3.073***
	(0.262)	(0.504)	(0.287)	(0.310)	(0.994)
Comparative Advantage	0.217	0.977*	-0.103	-0.0211	1.414***
	(0.258)	(0.529)	(0.307)	(0.333)	(0.500)
Product	0.799***	0.876**	0.557	0.506	4.944***
	(0.304)	(0.441)	(0.349)	(0.378)	(1.289)
Home base	0.743**	0.897	0.865**	0.660*	4.643***

	(0.298)	(0.610)	(0.383)	(0.375)	(1.156)
High Tech	-1.815***	-2.410***	-0.609	-0.709	0.0799
	(0.410)	(0.542)	(0.464)	(0.467)	(2.814)
Multiple Owners	0.424*	0.359	0.549	0.584	1.271
	(0.246)	(0.389)	(0.351)	(0.377)	(0.796)
Corporate Form	0.405*	0.0411	1.006***	1.001***	5.682***
	(0.239)	(0.367)	(0.327)	(0.331)	(1.234)
Medium Credit Score	0.578	1.245**	0.187	0.344	1.813
	(0.395)	(0.602)	(0.481)	(0.464)	(1.278)
interaction with high-tech					12.62***
					(3.579)
High Credit Score	0.466	0.562	0.276	0.221	2.802**
	(0.291)	(0.509)	(0.352)	(0.335)	(1.405)
interaction with high-tech					-1.790
					(1.582)
Previous Revenue	0.0777	-0.0179	0.161*	0.154	0.0228
	(0.0762)	(0.0873)	(0.0945)	(0.120)	(0.252)
interaction with high-tech					0.606
					(0.483)
Previous Profit	1.033**	0.361	2.061**	1.708**	8.161***
	(0.430)	(0.309)	(0.830)	(0.791)	(2.617)
interaction with high-tech					5.354*
					(2.968)
Has Intellectual Property	0.409	0.529	0.451	0.740**	1.830
	(0.261)	(0.506)	(0.341)	(0.347)	(1.306)
interaction with high-tech					-2.128
					(2.187)
Constant	2.518	3.632	7.729***	8.397***	8.185
	(1.829)	(2.913)	(2.779)	(3.022)	(7.907)
Industry F.E.s	Y	N	N	N	Y
Year F.E.s	Y	N	N	N	N
Observations	515	257	269	266	261

Notes: (standard errors in parentheses): * $p < 0.10$, ** $p < 0.05$, ***, $p < 0.01$;
Significance tests are two-tailed.

Table 4. Heckprobit results (two-stage with selection equation)

	(1)		(2)		(3)		(4)		(5)	
VARIABLES	always_approved	new_loans	always_approved	new_loans	always_approved	new_loans	always_approved	new_loans	always_approved	new_loans
high_credscore	0.00125		0.00219		-0.0250		-0.0269		-0.0611	
	(0.0460)		(0.0553)		(0.0655)		(0.0656)		(0.0721)	
prev_revenue	-0.0239		0.00334		-0.0266		-0.0283		-0.0216	
	(0.0197)		(0.0344)		(0.0188)		(0.0201)		(0.0206)	
prev_netprofitloss	0.0197		0.343**		-0.0670		-0.0544		-0.0921	
	(0.102)		(0.161)		(0.0839)		(0.0849)		(0.0840)	
prev_intp_d	-0.158***		-0.205**		-0.134**		-0.143**		-0.147**	
	(0.0555)		(0.0972)		(0.0642)		(0.0642)		(0.0690)	
black	-0.303***		-0.345***		-0.325**		-0.357**		-0.257	
	(0.101)		(0.111)		(0.134)		(0.150)		(0.161)	
female	-0.0206		0.0123		-0.0237		-0.0333		-0.0473	
	(0.0569)		(0.0667)		(0.0699)		(0.0672)		(0.0716)	
hours_own	-0.00259**		-0.00118		-0.00504***		-0.00524***		-0.00583***	
	(0.00108)		(0.00137)		(0.00141)		(0.00144)		(0.00152)	
age_own	-0.00285		0.0406		-0.0117		-0.0101		-0.0152	
	(0.0174)		(0.0388)		(0.0246)		(0.0247)		(0.0257)	
agesq	9.81e-05		-0.000409		0.000189		0.000170		0.000227	
	(0.000188)		(0.000429)		(0.000262)		0.00		(0.000274)	
colldeg	-0.00496		0.0170		0.00634		-0.00714		-0.0109	
	(0.0479)		(0.0647)		(0.0598)		(0.0573)		(0.0569)	
high_exp	0.110**		0.0147		0.117*		0.113*		0.0967	
	(0.0505)		(0.0621)		(0.0665)		(0.0650)		(0.0656)	
startup	-0.132***		-0.0324		-0.199***		-0.203***		-0.208***	
	(0.0422)		(0.0556)		(0.0558)		(0.0541)		(0.0552)	
compadv_0	-0.0226		-0.119**		0.0821		0.0800		0.0568	
	(0.0472)		(0.0555)		(0.0635)		(0.0618)		(0.0604)	
product_0	0.114**		0.0834		0.0893		0.0902		0.0958	
	(0.0484)		(0.0619)		(0.0764)		(0.0775)		(0.0801)	
homebase_0	0.0680		0.0372		0.147*		0.163**		0.155*	
	(0.0516)		(0.0647)		(0.0754)		(0.0792)		(0.0797)	
hightech_0	-0.122		-0.239***		-0.0132		-0.0316		-0.407**	
	(0.0760)		(0.0792)		(0.0757)		(0.0756)		(0.203)	
prev_team	-0.0268		0.0348		-0.154**		-0.161**		-0.161**	
	(0.0501)		(0.0624)		(0.0695)		(0.0675)		(0.0687)	
prev_corp	0.0490		-0.0292		0.189***		0.192***		0.217***	
	(0.0508)		(0.0825)		(0.0637)		(0.0668)		(0.0703)	
rural	0.0528		-0.0223		0.0877		0.102		0.109	
	(0.0526)		(0.0740)		(0.0663)		(0.0633)		(0.0665)	
ppe_ratio	0.000390		0.0590		0.0513		0.0334		0.0287	

	(0.0760)	(0.0882)	(0.0990)	(0.101)	(0.109)
rd_emp	-0.151***	-0.172*	-0.160***	-0.175***	-0.161**
	(0.0472)	(0.101)	(0.0588)	(0.0612)	(0.0656)
tradecredit	0.0659	-0.0333	0.190***	0.201***	0.198***
	(0.0501)	(0.0639)	(0.0609)	(0.0612)	(0.0593)
ln_emp	0.0144	0.0171	0.0443	0.0547	0.0607
	(0.0343)	(0.0521)	(0.0400)	(0.0401)	(0.0402)
ln_assets	-0.0258	-0.179*	0.0371	0.0289	0.0286
	(0.0487)	(0.105)	(0.0333)	(0.0345)	(0.0370)
prev_insiderfinancing_ratio	-0.251**	-0.170	-0.335**	-0.367***	-0.324**
	(0.114)	(0.153)	(0.139)	(0.130)	(0.131)
has_bus_ccard	-0.140***	-0.102	-0.245***	-0.236***	-0.226***
	(0.0464)	(0.0636)	(0.0690)	(0.0740)	(0.0746)
has_bus_cline	0.0604	0.108*	0.0688	0.0549	0.0678
	(0.0473)	(0.0598)	(0.0700)	(0.0714)	(0.0732)
expected_growth				0.0697	0.0670
				(0.0679)	(0.0728)
future_revenue				-0.0317	-0.0472
				(0.0698)	(0.0748)
economy_effect				-0.0463	-0.0394
				(0.0664)	(0.0722)
personal_outlook				0.0190	0.0335
				(0.0821)	(0.0937)
help_out				0.00164	-0.0201
				(0.0568)	(0.0623)
highXdidnotapply					-0.222*
					(0.129)
highXhigh_cred					0.499***
					(0.192)
highXpre_rev					-0.0825**
					(0.0356)
highXpre_prof					0.648***
					(0.208)
highXpre_int					0.0262
					(0.187)
highXexpect					0.237
					(0.159)
highXfuture					0.316**
					(0.159)
highXeconomy					-0.00628
					(0.166)
highXpers_out					-0.0297
					(0.179)
highXhelp_out					0.0575

										(0.141)
_Iyear_2008	-0.0696									
	(0.0457)									
didnotapply		0.644***		0.717***		0.622***		0.588***		0.593***
		(0.0713)		(0.0883)		(0.0880)		(0.0740)		(0.0738)
prev_bankloan_ratio		0.347***		0.275*		0.322**		0.276**		0.259**
		(0.0908)		(0.149)		(0.126)		(0.107)		(0.109)
Constant	-0.0503	-1.383***	-1.126	-1.411***	-0.0162	-1.355***	-0.351	-1.709***	-0.215	-1.708***
	(0.440)	(0.0398)	(0.961)	(0.0536)	(0.630)	(0.0573)	(0.650)	(0.0503)	(0.683)	(0.0503)
athro		1.562***		1.890***		1.578***		1.703***		1.780***
		(0.158)		(0.344)		(0.189)		(0.173)		(0.202)
lnsigma		-0.382***		-0.304**		-0.423***		-0.332***		-0.326***
		(0.0748)		(0.125)		(0.0823)		(0.0808)		(0.0889)
Observations	3,150	3,150	1,626	1,626	1,524	1,524	2,936	2,936	2,936	2,936

Notes: (standard errors in parentheses): * p < 0.10, ** p < 0.05, ***, p < 0.01;
Significance tests are two-tailed.

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