

Entrepreneurial Optimism, Credit Availability, and Cost of Financing: Evidence from U.S. Small Businesses

Na Dai¹

Associate Professor
School of Business
SUNY at Albany
1400 Washington Ave
Albany, NY 12222
ndai@albany.edu
(518) 956-8358

Vladimir Ivanov²

U.S. Securities and Exchange Commission
100 F Street N.E.
Washington D.C. 20549
ivanovv@sec.gov

Rebel A. Cole

Professor of Finance
Driehaus College of Business
DePaul University
14 E. Jackson Blvd.--Suite 900
Chicago, IL 60604
rcole@depaul.edu

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Abstract

Using a large sample of U.S. small businesses and a new measure of optimism, we examine the role of entrepreneurial optimism in small business lending. We provide evidence that moderately optimistic entrepreneurs tend to have better access to credit than less optimistic ones. On the other hand, we show that lenders curtail lending to extremely optimistic entrepreneurs by charging a much higher interest rate. Our results are robust to alternative measures of optimism and controls for private information between lenders and borrowers.

I. Introduction

While the prevalence of entrepreneurial optimism is well-recognized, its impact on various economic choices is still a subject of an ongoing debate. This debate to a certain extent reflects the two opposing views on the nature of optimism that exist in the literature. On the one hand, optimism is viewed as a type of bias characterized by distorted perceptions of the future (Weinstein (1980)), and consequently an optimist is someone who either overestimates the probability of a favorable outcome or underestimates the probability of an unfavorable outcome. A number of studies in finance and entrepreneurship emphasize this negative view of optimism.¹ These studies argue that optimistic bias (sometimes referred to as overoptimism or overconfidence) results in too much entry, excessive risk taking, inferior performance and overlending. Entrepreneurial optimism is also considered as one of the possible explanations of the private equity premium puzzle documented by Moskowitz and Vissing-Jorgensen (2002).

On the other hand, there is a strand of the psychology and medicine literature (see Scheier and Carver (1985), Scheier, Carver, and Bridges (1994)) that views optimism as generalized positive expectations about the future (also called dispositional optimism). In the finance literature, a recent study by Puri and Robinson (2007) documents that optimistic entrepreneurs work more and have higher productivity than other entrepreneurs and argues that optimism in a mild form is actually beneficial for small businesses.

While prior studies focus on the effect of optimism on risk taking and performance, very little attention has been devoted to the issue of the potential implications of entrepreneurial optimism for the availability of credit to and the cost of bank financing for small businesses. Do lenders turn down loan applications by optimistic entrepreneurs more or less often? Are banks and other financial institutions charging optimistic entrepreneurs higher or lower rates? Do financial intermediaries

¹ See, for example, De Meza and Southey (1996), Arabsheibani, de Meza, Maloney, and Pearson (2000), Barber and Odean, (2001), Heaton (2002), Bernardo and Welch (2001), Coelho, de Meza, and Reyniers (2004), Malmendier and Tate (2005a, 2005b, 2008), Cassar and Friedman (2007), and Landier and Thesman (2009).

require more or less collateral from optimistic entrepreneurs? These are all important questions that have not been systematically studied, which is surprising given the fact that bank debt is the major source of financing for small firms. Our study aims to fill this gap in the literature by examining whether the behavior of financial institutions that lend money to small businesses is consistent with the positive or negative view of entrepreneurial optimism.

The Achilles heel of any behavioral corporate finance study is the empirical measure of managerial bias. Toward this end, we design an innovative measure of optimism. In particular, we use the difference between the probability that the entrepreneur's application for loans will be denied given the firm characteristics and credit conditions and the entrepreneur's subjective assessment of this probability as our primary measure of optimism. As a robustness check, we also use several different versions of our main optimism measure. Since Puri and Robinson (2007) document that extreme optimists and moderate optimists behave differently, we also use a proxy for extreme optimism in order to examine whether lenders treat the overly optimistic entrepreneurs differently from the moderately optimistic ones. We discuss the design of our optimism measure in more detail in Section 3.

Using our optimism measures, we first examine the effect of entrepreneurial optimism (both in mild form and in extreme form) on the availability of credit. Following the literature in small business lending, we adopt two measures of credit availability – whether small businesses pay their trade credit late and whether lenders approve their most recent loan applications. Using data from the Federal Reserve Board's 2003 Survey of Small Business Finance (SSBF), we find evidence that optimistic entrepreneurs have better access to credit, consistent with the positive view of entrepreneurial optimism. For instance, we document that optimistic entrepreneurs are less likely to pay their trade credit late and their loan applications are more likely to be approved. For the extremely optimistic entrepreneurs, we do not find that they have significantly better or worse access to credit than moderately optimistic entrepreneurs.

Our second set of analyses focuses on the relation between optimism and the cost of financing. Specifically, we examine two characteristics of small business loans: whether entrepreneurs are requested to provide collateral or guarantee, and the interest rate spread over the concurrent prime rate that they are charged. We document additional evidence in support of the positive view of optimism. For instance, moderately optimistic entrepreneurs are less likely to be required to provide collateral or personal guarantee. Our findings also suggest that lenders curtail lending to extremely optimistic entrepreneurs, and they do it not by reducing loan approval rates or by requesting collateral or personal guarantees more often, but by charging higher interest rates.

We realize that our optimism measure could be polluted by lenders' private information that may be difficult to observe in our data. While it is impossible to completely eliminate the pollution due to potential unobserved factors, we take a number of approaches to alleviate the effect of this potential pollution on our main findings. First, in relevant specifications, we control for lenders' private information on the borrower's quality by including the distance and the length of relationship between lenders and borrowers, as well as the communication method used for loan applications. These variables are found in the existing literature to correlate with lenders' private information. Second, we design a proxy for banks' unobservable private information based on their historical loan decisions. Using the proxy for unobservable private information in our main regressions, we find that our results do not change. These findings indicate that it is not very likely that our measure of optimism merely reflect banks' private information.

In our opinion, this study makes contributions to the following fields in the finance and entrepreneurship literature. Broadly, our paper adds to the literature on the impact of optimism on the economic choices. Previous empirical studies examine the effect of optimism on businesses' and individuals' investment behavior (Barber and Odean (2001), Malmendier and Tate (2005a, 2005b, 2008), Cassar and Friedman (2007)) or their financing decisions (Landier and Thesmar (2009)). Our paper uses a unique measure of entrepreneurial optimism and extends the literature by providing

evidence on whether and how optimism affects small business' access to credit using the U.S. Federal Reserve Board's SSBF data.

The current literature on small business lending focuses mainly on the asymmetric information problem between lenders and borrowers and the ways to alleviate it via relationship lending, collateral requirements, choice of loan terms and maturity, use of bank guarantees, etc.² This study, for the first time, documents empirically the relation between entrepreneurial optimism and banks' lending decisions. We show that entrepreneurs' behavioral attributes, such as optimism, impact financiers' decisions. Specifically, financiers do not ration moderately optimistic entrepreneurs. In contrast, they are more willing to provide loans to moderately optimistic entrepreneurs, potentially due to the expectation that these entrepreneurs work harder and generate higher productivity (Puri and Robinson (2007)). On the other hand, financiers do curtail lending to overly optimistic entrepreneurs in view of potential over-entry and excessive risk-taking, and do it primarily through charging higher interest rates.

Our study also shed light on the debate between the positive view and negative view of optimism. Our findings suggest the two views are not necessarily in conflict with each other. Rather, they provide evidence of the effects of *different degrees* of optimism on economic choices. Our study adds evidence in support of the positive aspect of moderate optimism or optimism in a mild form as defined in Puri and Robinson (2007). We also provide evidence that extreme optimism is penalized, which in our case results in higher cost of financing.

The remainder of the paper is organized as follows: Section 2 reviews relevant literature and develops testable hypotheses; Section 3 introduces the method that we apply to measure entrepreneurial optimism; Section 4 summarizes the sample and data; Section 5 reports the results of

² See Petersen and Rajan (1994), Berger and Udell (1995), Cole (1998), Harhoff and Korting (1998), Elsas and Krahnen (1998), Scott and Dunkelberg (1999), Machauer and Weber (2000).

our empirical analysis and discusses additional robustness checks; finally, Section 6 summarizes our primary conclusions.

II. Literature Review and Hypotheses Development

In this section, we briefly review the existing literature on small business lending and entrepreneurial optimism, and put forth several hypotheses regarding the effect of entrepreneurial optimism on credit availability and the cost of credit for small businesses.

The literature on small business lending emphasizes the importance of bank credit for small firms. Despite the fact that they have small asset base and cannot offer much collateral, small firms tend to borrow significant amounts of money (Berger and Udell (1998) and Robb and Robinson (2013)). Berger and Udell (1998) report that roughly 50% of the small firms' financing comes in the form of debt. Robb and Robinson (2013) examine the capital structure of small businesses in the first year of their operation and also find a significant use of debt financing – startups use about five times as much debt as equity – which comes mainly from outside sources. Additionally, small firms tend to concentrate their external borrowing from commercial banks (Petersen and Rajan (1994), Berger and Udell (1998)). Robb and Robinson (2013) document that the majority of outside debt is in the form of various types of bank loans such as owner-backed bank loans, business bank loans, and business credit lines.

A number of empirical studies investigate whether entrepreneurs are more optimistic than the rest of the population. For example, Landier and Thesmar (2009) find that entrepreneurs overestimate employment expansion and sales growth. Cooper, Woo, and Dunkelberg (1988) find that entrepreneurs significantly overestimate the probability that their businesses will survive. Busenitz and Barney (1997) find that entrepreneurs exhibit overconfidence and representativeness (the tendency to overgeneralize from a few characteristics and observations). A recent study by

Arabshehani et al. (2012) documents that entrepreneurs are of above average optimism, and are overly optimistic even before starting their companies. In a similar vein, other studies also provide evidence that entrepreneurs tend to be optimistic (see, for example, Cassar (2010), Arabshehani et al. (2000), and Camerer and Lovallo (1988)).

Given the importance of bank financing for small businesses and the prevalence of optimism among entrepreneurs, it is surprising that, to our best knowledge, there are no empirical studies that examine the role of optimism in small business lending. The few theoretical studies that explore this relationship do so through the prism of the negative view of optimism. For example, De Meza and Southey (1996) and De Meza (2002) argue that those that are unrealistically optimistic self-select to become entrepreneurs and the entrepreneurial optimism increases overlending, especially when financiers are not completely immune to overoptimism. The presence of optimistic entrepreneurs will thus result in a lower quality of borrowers, excessive lending, and lower expected return per loan for lenders. In this situation, banks might have an incentive to limit credit to optimistic entrepreneurs in order to protect themselves from the entrance of lower quality borrowers to the current borrower pool and the eventual decrease in their expected rates of return. Similarly, Manove and Padilla (1999) argue that banks cannot readily differentiate optimists from other agents. To protect themselves, they are going to limit lending by credit rationing, charging higher interest rates, and requiring for more collateral.

On the other hand, there is a strand of the psychology literature (see, for example, Scheier and Carver (1985), and Scheier, Carver, and Bridges (1994)) that views optimism as generalized positive expectations about the future. A wealth of empirical evidence from the psychology and medical literatures tends to support this positive view of optimism. In the area of finance, a recent study by Puri and Robinson (2007) reveals that optimistic entrepreneurs work harder, and are associated with higher productivity. More importantly, these studies show that the degree of optimism matters. For instance, Puri and Robinson (2007) show that moderate optimists display

reasonable financial behavior, whereas extreme optimists display financial habits and behavior that are generally not considered prudent. Based on their findings, Puri and Robinson (2007) argue that optimism in a mild form could actually be beneficial to entrepreneurs.

Building upon these opposite views regarding the role of optimism, our hypotheses relate entrepreneurial optimism to the potential behavior of lending institutions. The negative view of optimism suggests that optimistic entrepreneurs would face tighter credit constraints and higher cost of financing as lenders try to limit their exposure to that type of entrepreneurs. Conversely, the positive view of optimism suggests that optimistic entrepreneurs will have better access to credit and lower cost of financing than other entrepreneurs. The Puri and Robinson (2007) results imply that lenders could be more willing to provide loans to moderately optimistic entrepreneurs with expectations that they are going to work harder and thus be more capable of paying back the debt, while trying to avoid extremely optimistic entrepreneurs. Thus, the Puri and Robinson (2007) findings suggest that the degree of optimism might also play a role in lenders' decisions. Based on these opposing views of optimism, we put forth the following hypotheses:

H1A: Optimistic entrepreneurs have worse access to credit: they are more likely to pay trade credit late and less likely to have their loan applications approved, other things equal.

H1B: Moderately optimistic entrepreneurs have better access to credit: they are less likely to pay trade credit late and less likely to be denied loan applications, other things equal. Extremely optimistic entrepreneurs have worse access to credit: they are more likely to pay trade credit late and less likely to be approved loan applications, other things equal.

H2A: Optimistic entrepreneurs have higher cost of borrowing, other things equal.

H2B: Moderately optimistic entrepreneurs have lower cost of borrowing, while extremely optimistic entrepreneurs have higher cost of borrowing, other things equal.

As we discuss in detail in Section IV below, we follow the literature and use two proxies for small businesses' access to credit. Petersen and Rajan (1994, 1997) argue that paying trade credit late is a very expensive way to obtain finance, and a firm is likely to do so only when rationed by institutional lenders. Our second proxy for credit availability is the probability of approval of the recently applied loans. With regard to the cost of borrowing, we adopt three measures: lenders' requirement that entrepreneurs provide collateral, lenders' requirement that entrepreneurs provide personal guarantee for the loans approved, and the interest rate charged by the lenders.

III. A New Measure of Entrepreneurial Optimism

One of the challenges incurred in empirical studies of behavioral corporate finance is measuring managerial behavioral biases. Without such an empirical measure, the optimistic manager approach is difficult to distinguish from traditional agency theory (Baker, Rubak and Wurgler (2004)) or models of costly external financing built on asymmetric information (Stein (2003)). In the spirit of Puri and Robinson (2007), we use the difference between the unbiased probability that the entrepreneur's application for loans will be denied given the firm characteristics and credit conditions and the entrepreneur's subjective assessment of this probability as our measure of optimism.

Let $E_U(d|x)$ be the unbiased probability that entrepreneur i will be denied a loan if she applies for it conditional on a vector of firm characteristics and credit conditions x . Similarly, let $E_S(d|x)$ be entrepreneur's subjective assessment of this probability. Our measure of optimism is the simply

$$\text{Optimism}_i = E_U(d|x) - E_S(d|x).$$

To estimate $E_U(d|x)$ and $E_S(d|x)$, we use data from the Federal Reserve Board's 2003 and 1998 SSBFs. In particular, the 2003 SSBF asks entrepreneurs the following question: "During the last three years, were there times when [FIRM] needed credit, but did not apply because you thought the application would be turned down?" Entrepreneurs' answers to this question (Yes, or No) would

be impacted by the true credit condition of the firm as well as the entrepreneurs' hubris or level of optimism. Note that if the firm did not need credit, the answer to the question would be "Legitimate Skip," which allows us to identify and drop such observations from the analysis. We use the answer to this question as our value for $E_S(d|x)$. Specifically, $E_S(d|x)$ is equal to one if the entrepreneur's answer to the above question is "Yes", and zero if the answer is "No."

To estimate $E_U(d|x)$, we use data on actual loan denials and approvals. Both the 2003 and 1998 SSBFs provide information on whether a firm's most recent loan application was denied or approved. We run a logit regression where the dependent variable is equal to 1 if the entrepreneur was previously denied a loan and 0 otherwise, and the explanatory variables include a number of firm characteristics and credit conditions measures. Additionally, because we use the information on loan approvals and denials later when we analyze the effect of optimism on bank loan decisions, we estimate the logit model using data from the 1998 SSFB survey. The predicted probability based on this logit regression is our value of $E_U(d|x)$.

By construction, the difference $E_U(d|x) - E_S(d|x)$ can take on values in the interval $(-1, 1)$. It will be close to -1 when the model predicts that the entrepreneur would not be denied credit, but she is afraid to apply (i.e., she is "pessimistic"). For entrepreneurs without behavioral bias $E_U(d|x) - E_S(d|x)$ should be close to 0. On the other hand, its value will be close to 1 if the model predicts that the entrepreneur should be denied credit, but she applies anyway (i.e., she is optimistic) because she overestimates the firm's chances of success. Thus, $E_U(d|x) - E_S(d|x)$ increases the more optimistic the entrepreneur is. Lastly, it should be noted that $E_U(d|x)$ could also differ from $E_S(d|x)$ because of random errors that rational entrepreneurs make. Thus, $E_U(d|x) - E_S(d|x)$ could have two components: a bias and an error. However, the error is by assumption unpredictable given the information set x and its mean should be zero. As a robustness check, we use the fractional rank of the first optimism measure, from 0 to 1, as our second measure of optimism. Moreover, as noted in Puri and Robinson (2007), extreme optimists and moderate optimists often behave differently. Similarly, we examine

whether financial institutions treat the extremely optimistic entrepreneurs differently from the moderately optimistic ones in their lending decisions. We use the squared term of our optimism measure to study the effects of extreme optimism.

It should be noted that the survey question in SSBF is about entrepreneurs' self-assessment on the probability of getting new loans from financial institutions, or entrepreneurs' view of financing risks.³ However, we feel that optimism about financing risks should be closely related to one's overall level of optimism. Thus, although here we focus on optimism regarding the financing of the business, our analysis is very relevant to the general theme of entrepreneurial optimism.

We use the above-mentioned measures of entrepreneurial optimism to empirically test the hypotheses outlined in the previous section. We believe our measures of optimisms are superior to some of the demographic characteristics on which previous studies rely on to measure optimism. The main reason is that demographic characteristics might proxy for a host of other things. Also, as often happens in the empirical analysis, a subset of the demographic characteristics might have insignificant coefficients or coefficients with opposite signs from those predicted. This makes it difficult to interpret whether managerial optimism has a significant impact or not. Using a single measure of optimism makes it easier to gauge statistical significance and interpret the coefficients.

Similar to the optimism measure in Puri and Robinson (2007), ours is also open to potential alternative interpretations. The most obvious alternative is that it could be picking up unobservable private information rather than differences in entrepreneurs' expectations. While this is a potential criticism of any such econometric approach, we believe that our measure does not introduce any systematic biases. It is true that an entrepreneur that we classify as optimistic might be simply applying for a loan because the bank and the entrepreneur have positive private information that is not available to others (e.g., the bank believes the business will have positive NPV projects in the

³ Nanda and Rhodes-Kropf (2010) define financing risk as the uncertainty that the project will be funded in the future.

future). On the other hand, it is also conceivable that an entrepreneur who, according to our model, looks like she should get a loan might be reluctant to apply because she thinks the bank may turn her down (e.g., the bank, because of its expertise in and knowledge of the business, might deem the future prospects of the business to be rather weak). Such cases certainly introduce noise in our estimation, but not any systematic bias. Nevertheless, in the analysis that follows, we try to control for lenders' potential private information regarding borrower's quality using measures well documented in the literature to alleviate this concern. We discuss the alternatives in Section 5 in great detail.

IV. Data and Summary Statistics

The primary source of data for this study is the Federal Reserve Board's 2003 SSBF data, although we use some data from the 1998 SSFB survey when estimating the measure of optimism. The firms surveyed constitute a nationally representative sample of about 4,240 small businesses operating in the U.S., where a small business is defined as a non-financial, non-farm enterprise employing fewer than 500 full-time equivalent employees.

The SSBF data provides information on each enterprise's balance sheet, income statement, its credit history, the firm's characteristics, including two-digit SIC code, organizational form, age, location, how the firm was established, and demographic characteristics of each firm's primary owner, including gender, age, business experience, and education. The surveyed data also provides detailed information about each firm's most recent borrowing experience. This includes whether the firm applied for credit and for firm that applied, whether the potential lender approved or denied the firm's credit application, and, if the lender extended credit, the terms of the loan.

Of the 4,240 firms surveyed in the 2003 SSBF, we exclude firms that are inherited or acquired as a gift or publicly traded. We require that the primary owners of firms are responsible for

daily management. Firm without assets information are also excluded. This leaves us 3,360 firms. In the analysis of most recently approved loans, we exclude renewals of pre-existing credit lines and obtain 943 observations. The SSBF survey uses multiple imputations to correct for missing or sensitive data and oversamples larger firms. In our statistical analysis, we carefully take into account the impact of multiple imputations and the sample weight.

Table 1 summarizes selected characteristics of our sample. These firms have an average age of 14 years, with average assets of \$449 thousands, average sales of \$869 thousands, and average number of employees of 7. It should be noted that these statistics reflect the means of the small business population and are smaller than the sample means which are by design biased toward larger small businesses. Small businesses exhibit high debt/assets ratio. For instance, the mean debt ratio of 2003 survey firms is 183.5%. Current liability on average accounts for 41.5% of total liability. About 80% of the small businesses are located in the urban areas. Proprietorship and corporation are the most popular organizational forms and together accounts for 91.6% of the population.

[Insert Table 1 here.]

The average age of entrepreneurs is around 51. Entrepreneurs on average have 19 years of business experience. Male entrepreneurs account for 74.3% of the sample. More than 50% of the entrepreneurs have college and graduate degrees. About 83% of the small businesses are founded by the current owners and the remaining 17% are purchased from previous owners.

About 41% of the sample had times when their trade credit is paid late. About 44% of the sample applied for credits from various financial institutions in last three years prior to the survey. The percentages of applied loans that were always approved are 84.0%. For about 8.2% of the sample, loans that they applied for over the past three years were always denied.

Panel D of Table 1 summarizes the characteristics of approved small business new loans (renew of credit lines are excluded). The average size of loans applied is \$832 thousands. The length of loans is 64 months on average. The average loan interest rate is 5.9%. About 60.3% of the loans

require certain type of collateral, and 56.8% of the loans require guarantee. About 59% of the loans are fixed interest rate loans. The average distance between the firm and the lender is 80 miles. The length of the relationship between the firm and the lender is 95 months on average.

V. Empirical Analysis

V.A. Measures of Entrepreneurial Optimism

To measure entrepreneurial optimism, as described in Section III, we use data from the 1998 SSBF to estimate a logit regression, where the dependent variable is a dummy equal to one if within the past three years (before the survey was taken) the entrepreneur applied for credit and was always denied or sometimes denied, and zero otherwise.⁴ Our independent variables include firm characteristics that potentially could impact whether financiers will grant the applicant a loan or not. These variables include firm size, measured as the natural logarithm of total assets, firm age, profit margin, the ratio of tangible assets to total assets, the ratio of debt to total assets, the percentage of current liability out of the total liability, a dummy variable indicating whether the firm is organized as a corporation, a dummy variable indicating whether the firm is located in the urban areas, and a dummy variable indicating whether the owner had a bankruptcy in the past. Industry dummies are also included.

[Insert Table 2 here.]

The results from the logit regression are presented in Table 2. As the results show, firm size, firm age, debt duration structure, and its location are significantly associated with our dependent variable. Owners are less likely to be denied credit at firms that are larger, older, less reliant upon short-term funding, and are located in rural rather than urban areas. Not surprisingly, we also find

⁴ As robustness check, we exclude the observations with sometimes denied from the estimation; the results are qualitatively similar.

that owner bankruptcy history significantly increases the probability that entrepreneurs are going to be denied credit. The pseudo R-square of the logit regression is 12%.

Based on the logit regression, we then estimate the predicted likelihood that the firm's owner will be denied credit by applying the coefficients reported in Table 2 to the 2003 SSBF data. This is our estimate for $E_U(d|x)$ in the formula for the optimism measure. The difference between $E_U(d|x)$ and $E_S(d|x)$, which, as noted above, is equal to one if the entrepreneur answers "Yes" to the question: "During the last three years, were there times when [FIRM] needed credit, but did not apply because you thought the application would be turned down?" and zero if she answers "No," is our optimism measure.

Before we proceed to our main analysis, we test the validity of our optimism measure. In Panel A of Table 3, we present the distribution of the optimism measure. The mean is 0.08, which suggests that on average entrepreneurs in the database tend to make the correct decision – they do not apply for credit if there is high likelihood to be rejected, and vice versa. For the majority of cases (2,177), the optimism measure is positive. In 457 cases (17%), the optimism measure has negative value, indicating pessimistic entrepreneurs.

In Panel B of Table 3, we relate our optimism measure to various demographic characteristics of entrepreneurs. Existing studies show that gender, race, education, experience, and personal wealth impact the level of optimism.⁵ For instance, males are typically more optimistic than females. White entrepreneurs are found to be more optimistic than entrepreneurs from other races. Education increases the level of optimism, while experience tends to reduce optimism because individuals learn from experience to achieve less biased subjective assessment. Wealthy people on average are more optimistic. The results presented in Panel B in general support these patterns.

[Insert Table 3 here.]

⁵ See, for example, Shane (2007).

In Panel C of Table 3, we link the optimism measure to entrepreneurs' assessment on the economy outlook and reasons why their previous loan application was denied. We find that more optimistic entrepreneurs are less likely to be afraid of applying for loan due to weak economic outlook. Furthermore, we show that more optimistic entrepreneurs are less likely to think that banks denied their loan applications due to reasons such as their being too young, not having enough experience, or simply prejudice or discrimination. These provide further evidence on the validity of our optimism measure.

V.B. Entrepreneurial Optimism and Credit Availability

Using the optimism measure we develop in the previous section, in this section we examine whether and how entrepreneurial optimism impacts credit availability. We use two proxies for credit availability. The first measure is a dummy variable which is equal to one if the firm had paid late on trade credit, and is equal to zero otherwise. Petersen and Rajan (1994) argue that paying late on trade credit is a very expensive way to obtain finance, and a firm is likely to do so only when it has been rationed by institutional lenders. The second measure is an indicator variable which is equal to one if the loan for which the firm most recently applied is approved, and is equal to zero otherwise. If financiers curtail lending to optimistic entrepreneurs, we should observe a negative association between optimism and the probability of approval. On the other hand, if the positive optimism theory holds, there should be a positive relation between optimism and the probability of approval. Specifically, our regression models are the following:

$$TradeCreditPaidLate = \alpha + \beta_1 \times Optimism + \beta_2 \times FirmCharacteristics + \beta_3 \times OwnerCharacteristics + \varepsilon \quad (1)$$

$$Approval = \alpha + \beta_1 \times Optimism + \beta_2 \times FirmCharacteristics + \beta_3 \times OwnerCharacteristics + \beta_4 \times PrivateInfor + \varepsilon \quad (2)$$

[Insert Table 4 here.]

We run probit regressions on whether firms paid trade credit late and use several versions of our optimism measure in Panel A of Table 4.⁶ In Model (1) we employ our main optimism measure, which is the difference between $E_U(d|x)$ and $E_S(d|x)$. In Model (2), we define the Optimistic Dummy, an indicator variable equal to one if the optimism measure has a value of greater than 0.17 (the median of its distribution), and has a value of zero otherwise. In Model (3), we use the fractional rank of the main optimism measure. To test for the importance of the degree of optimism in lending decisions, in Model (4) we include the main optimism measure and its square term. If the degree of optimism makes a difference, then we expect a non-linear relationship between our dependent variables and the optimism measure. Specifically, we expect moderately optimistic entrepreneurs to have better credit accessibility, while extremely optimistic entrepreneurs are likely to have worse credit accessibility (Hypothesis 1B).

In all models, we include measures of firm characteristics which are often used in the literature to represent the level of informational asymmetry between small businesses and banks, such as firm assets, firm age, percentage of tangible assets, profit margin, the ratio of debt to total assets, the percentage of current liability out of total liability, whether the business is organized as a corporation, and whether it is located in the urban area. In addition, we also control for several characteristics of owners that are found to influence the credit availability in the existing literature. Specifically, we include a dummy which is equal to one if the owner is male and zero if female, a dummy which is equal to one if the owner is White and zero otherwise, a dummy which is equal to one if the owner has a college or higher degree, owner's business experience, owner's personal wealth, and whether the owner was bankrupt previously. We also include the Dun & Bradstreet (DB) credit scores to control for a business's creditworthiness. Specifically, we use dummy variables

⁶ We also ran tobit regressions on the fraction of trade credit paid late using the same set of independent variables. We find that optimism is significantly negatively associated with the fraction of trade credit paid late. This set of results is available upon request.

representing the rankings of the DB credit score.⁷ In the 2003 survey, the higher the ranking, the lower the credit risk of the firm. All specifications also include industry dummies.

We find that overall optimistic entrepreneurs are less likely to pay their trade credit late as shown in Models (1) - (3), indicating better access to the credit. When we include the square term of the optimism measure, as shown in Model (4), we find that its coefficient is negative but insignificant. Thus, the results in Panel A of Table 4 suggest that optimistic entrepreneurs on average have better access to credit than non-optimistic ones, supporting the positive view of optimism (our hypotheses H1B). The results in Model (4) also suggest that extreme optimists do not have advantages in terms of credit availability.

Among the control variables, the analysis shows that small businesses set up as corporations are less likely to pay trade credit late. We further find that owner's personal wealth and owner's previous bankruptcy record are significantly and negatively associated with the probability of paying trade credit late. The former result indicates that wealthy entrepreneurs have better access to credit. The latter, more likely, suggests that owners with personal bankruptcy records make extra efforts to avoid paying trade credit late.

In Panel B of Table 4, we run probit regressions to examine whether entrepreneurial optimism impacts the probability of loan approval. In addition to the control variables we use in Panel A, we also include dummies representing loan types and proxies for the private information that financial institutions may have about the small businesses and owners and loan types. Specifically, we include the distance between the lender and the borrower, the length of relationship, and the communication method. The small business lending literature has shown that, typically, geographic proximity, long-term relationship, and in-person method of communication allow lenders to collect more private information. If our optimism measure is polluted by the unobserved factors

⁷ If the original Dun & Bradstreet credit scores fall in the range of 0-10, the SSBF DB score ranking is 1; if the score is 11-25, then the ranking is 2; if the score is 26-50, then the ranking is 3; if the score is 51-75, then the ranking is 4; if the score is 76-90, then the ranking is 5; if the score is 91-100, the ranking is 6.

related to firm quality, this shall, at least partly, alleviate the effect of the potential pollution on our findings.

As shown in Panel B of Table 4, the coefficients of our optimism measures are all significantly positive, suggesting that the loan applications of optimistic entrepreneurs are more likely to be approved than those of non-optimistic ones. The insignificant coefficient of the square term of optimism measure in Model (4), on the other hand, suggests that the extreme optimists do not have better access to credit. These findings indicate that financiers do not ration optimistic entrepreneurs (moderately or overly optimistic), consistent with our findings from Panel A and with the positive optimism theory. Similar to Cole, Goldberg, and White (2004), we find that smaller firms are more likely to be denied loans by financiers. We also find that white entrepreneurs are more likely to get loan approval.

Our analysis in this section shows that optimistic entrepreneurs are not rationed by financial lenders as they are less likely to pay their trade credit late and their loan applications are more likely to be approved compared with their less optimistic counterparts. Our findings are thus supportive of the positive view of optimism and complement the results in Puri and Robinson (2007).

V.C. Entrepreneurial Optimism and Cost of Financing

In this section, we further analyze whether financial lenders curtail lending to optimistic entrepreneurs by, for instance, requesting more collateral, requesting guarantee or co-sign from owners, and charging a higher interest rate. Specifically, if lenders curtail lending to optimistic entrepreneurs, then we expect that the loans granted to optimistic entrepreneurs are more often collateralized, guaranteed by owners, and the loan interest rate is higher. Our specifications are summarized as follows:

$$\begin{aligned} \text{Collateral / Guarantee} = & \alpha + \beta_1 \times \text{Optimism} + \beta_2 \times \text{FirmCharacteristics} + \beta_3 \times \text{OwnerCharacteristics} \\ & + \beta_4 \times \text{LoanCharacteristics} + \beta_5 \times \text{PrivateInfor} + \varepsilon \end{aligned} \quad (3)$$

$$Spread = \alpha + \beta_1 \times Optimism + \beta_2 \times FirmCharacteristics + \beta_3 \times OwnerCharacteristics + \beta_4 \times LoanCharacteristics + \beta_5 \times PrivateInfor + \varepsilon \quad (4)$$

where *Collateral or Guarantee* is a dummy which is equal to 1 if collateral or guarantee is required for a specific loan; *Spread* is measured as the difference between the actual interest rate charged and the concurrent prime rate. The control variables are grouped into four categories, including firm characteristics, owner characteristics, lenders' private information, and characteristics of loans approved. The measures of the first three groups are the same as the ones used in Table 4. In addition, we control for characteristics of loans that potentially influence the cost of financing, such as loan size, loan length, whether the loan is fixed interest, and the type of loans. All specifications also include DB score dummies and industry dummies

[Insert Table 5 here.]

Panel A of Table 5 presents the results of probit regressions of whether collateral is requested. The coefficients of our optimism measures in Models (1) - (3) are significantly and negatively associated with the probability of collateral requirement. When we include the square term of the optimism measure as shown in Model (3), the coefficient of the optimism measure remains significantly negative while the coefficient of the square term is negative but not significant. These findings suggest that financiers are less likely to require collateral or guarantee from optimistic entrepreneurs compared with other entrepreneurs. We do not find evidence that the extremely optimistic entrepreneurs are more or less likely to be required to provide collateral. Consistent with the existing literature (see, e.g., Chan and Kanatas (1985), Stiglitz and Weiss (1986), and Besanko and Thakor (1987)), we further show that the size and length of loans are positively associated with the collateral requirement.

In Panel B of Table 5, we analyze the relation between optimism and interest rate. In models (1) - (4), we use the raw interest rate as the dependent variable; in models (5) - (8), we use the spread between the interest rate and the concurrent prime rate as the dependent variable. In models

(1) – (3) and (5) – (7), we do not find any of our optimism measure to be significantly correlated with interest rate or spread. When we include the square term of optimism measure in Models (4) and (8), the coefficient of the optimism measure remains insignificant, while the coefficient of the square term is significantly positive. These findings suggest that lenders do not ration moderately optimistic entrepreneurs, a finding consistent with the results from Table 4 and the Panel A of Table 5. On the other hand, these findings also suggest that lenders curtail lending to the extremely optimistic entrepreneurs in the sense that they are charged a much higher interest rate. Taken together, these findings provide supporting empirical evidence to our hypothesis H2B, or the positive view of optimism. Among the control variables, we find that providing collateral or guarantee effectively reduces loan interest rate. Additionally, white entrepreneurs on average obtain more attractive interest rates.

V.D. Discussion of results

Overall, our analysis in this section provides evidence on three important questions related to small business lending. First, are optimistic entrepreneurs rationed by lenders? Second, if they are rationed, what is the mechanism(s) through which the rationing works (for instance, via lower approval rate, more collateral or personal guarantee, or higher interest rate)? And third, does the extent of optimism play a role in lenders' decision?

With respect to the first question, we show that moderately optimistic entrepreneurs are not rationed by lenders. Quite the opposite, our results seem to suggest that they often have better credit accessibility. These findings provide strong support for the positive theory of optimism. On the other hand, in answering questions 2 and 3 we show that the lenders do ration extremely optimistic entrepreneurs, and they do that not by reducing approval rate or requesting more collateral or guarantee, but rather by charging them a much higher interest rate. These results are consistent with the findings in Puri and Robinson (2007) that moderately optimistic entrepreneurs work harder, are associated with higher productivity, and display reasonable financial behavior, whereas extreme

optimists display financial habits and behavior that are generally not considered prudent. Overall, our findings suggest that the extent of optimism is an important factor in small business lending decisions.

V.E. Alternative Explanation and Additional Robustness Check

The previous sections establish an empirical relation between entrepreneurial optimism and banks' lending decisions. Financial institutions do not curtail lending to moderate optimists, but rather ration extremely optimistic entrepreneurs by charging them a higher interest rate. However, similar to the optimism measure in Puri and Robinson (2007), ours is also open to potential alternative interpretations. The most obvious alternative is that it could be picking up private information about business quality that may be difficult to observe rather than differences in entrepreneurs' expectations. We employ a number of approaches to determine whether optimism or the private information drives our results.

As well-established in the small business lending literature, the relationship between lenders and borrowers, the geographic proximity to lenders, and the in-person method of communication with lenders allow financiers to collect more private information regarding the quality of the firms. This helps alleviating the moral hazard and adverse selection issues generated by information asymmetry.⁸ In our regressions of loan approval and the cost of financings, we include the length of relationship between borrowers and lenders, the distance between them, and the method used to for communication (in person or not). This will, at least partly, help control for the private information that lenders have regarding the firm quality.

In SSBF survey, entrepreneurs reply whether their most recently (over the last three years) applied loans have always been approved, sometimes approved, and always denied. Note that this is

⁸ See evidence in Petersen and Rajan (1994), Berger and Udell (1995), Cole (1998), Elsas and Krahnen (1998), Harhoff and Korting (1998), Scott and Dunkelberg (1999), Degryse and van Cayseele (2000), and Machauer and Weber (2000) on relationship lending, and in Peterson and Rajan (2002) and Rice and Strahan (2010) on the geographic proximity and the in-person method of communication.

different from the dependent variable we use in Panel B of Table 4, which is based on the approval or decline of the most recent individual loan applied. We run a logit regression where the dependent variable is a dummy variable with value of 1 if loans have always been approved, and 0 otherwise. The independent variables include various characteristics of firms and entrepreneurs, similar to the ones we used in Panel A of Table 4 excluding the optimism measure. The regression results are presented in Panel A of Table 6.

[Insert Table 6 here.]

Since the dependent variable represents a series of banks' decisions regarding certain entrepreneur' loan applications within the last three years, we believe that the residuals from the above specification will capture banks' private information, if any, regarding the small business firm and its owner. We use these residuals from the logit regression as an independent variable in the cost of financing regressions and report the results from these regressions in Panel B of Table 6. Our main findings regarding optimism and the cost of bank financing do not change when this new proxy for unobservable private information is added – we still find that optimistic entrepreneurs are less likely to be required to provide collateral or guarantees, and extremely optimistic entrepreneurs are charged higher interest rates. Thus, while it is impossible to completely eliminate the pollution of our optimism measure that could be due to unobserved factors, it is unlikely that our optimism measure merely reflects banks' private information.

VI. Conclusion

We examine the impact of entrepreneurial optimism on small businesses credit availability and cost of financing using the 2003 SSBF data. Our study contributes to the current empirical literature on small business lending which has largely ignored entrepreneurial optimism as a factor in

banks' lending decisions. We also try to shed more light on the ongoing debate in the literature between the positive and negative views of optimism.

To achieve these goals, we design an innovative measure of optimism. We use the difference between the probability that the entrepreneur's application for loans will be denied given the firm characteristics and credit conditions and the entrepreneur's subjective assessment of this probability as our measure of optimism. A positive difference suggests that the entrepreneur is more optimistic, and vice versa. We also find that our measure is positively correlated with entrepreneurs' personal characteristics that prior studies show to be associated with optimism.

Using this optimism measure, we find that the heterogeneity of optimism among entrepreneurs influences banks' lending decisions. Particularly, we show that financiers do not ration moderately optimistic entrepreneurs. In fact, they are more willing to provide loans to moderately optimistic entrepreneurs. In addition, we document that moderately optimistic entrepreneurs are less likely to be required to provide collateral or guarantee for their loans, and are not charged higher interest rates compared to their less optimistic peers. The results are robust to alternative measures of optimism after controlling for the private information that lenders potentially have regarding the quality of the firms. These findings suggest that financiers view moderately optimistic entrepreneurs favorably, thus supporting the positive view of optimism. These findings complement the recent findings by Puri and Robinson (2007) on the role of optimism in entrepreneurship and in the determination of various economic choices.

We further show that lenders treat extremely optimistic entrepreneurs rather differently from the moderately optimistic ones. Specifically, lenders charge extremely optimistic entrepreneurs significantly higher interest rate, even though they do not more frequently reject the loan applications by extremely optimistic entrepreneurs. This is likely the consequence of the less prudent financial behavior of extremely optimistic entrepreneurs as documented in Puri and Robinson (2007).

Appendix: Definition of Variables

A. Dependent Variables

Trade Credit Paid Late	a dummy variable, which is equal to one if the firm had paid its trade credit late, 0 otherwise
Approval	a dummy variable, which is equal to one if the firm's loan application is approved, 0 otherwise
Collateral Guarantee or	a dummy variable, which is equal to one if the firm is requested to provide collateral or guarantee for the loan extended, 0 otherwise
Spread over prime-rate	the difference between the interest rate of a specific loan and the concurrent prime-rate

B. Independent Variables

<i>Firm Characteristics</i>	
Ln(Assets)	natural logarithm of firm's total assets
Ln(Firm age+1)	natural logarithm of the length of ownership by the current owners plus one
Percentage of tangible assets	the ratio of tangible assets (net PPE and land) to total assets
Debt Ratio	the ratio of total debt (both trade credit and interesting bearing loans) to total assets
Current Liability/Total Liability	the ratio of current liabilities to total liabilities
Profit margin	the ratio of net income to sales
Corporation	a dummy variable, which is set to equal to one if the business is organized as a corporation, 0 otherwise
Urban	a dummy variable, which is set to equal to one if the business is located in MSA, 0 otherwise
DB score dummies	If the original Dun & Bradstreet credit scores fall in the range of 0-10, the SSBF DB score ranking is 1; if the score is 11-25, then the ranking is 2; if the score is 26-50, then the ranking is 3; if the score is 51-75, then the ranking is 4; if the score is 76-90, then the ranking is 5; if the score is 91-100, the ranking is 6.
Industry dummies	two digit SIC code
<i>Owners' Characteristics</i>	
Gender	a dummy variable, which is set to equal to one if the primary owner is male, 0 if female
Education	a dummy variable, which is set to equal to one if the entrepreneur is college graduate or have post-graduate degrees, and 0 otherwise
Experience	number of years of experience as managing or owning a business
White	a dummy variable, which is set to equal to one if the entrepreneurs is White, and 0 otherwise
Ln(Wealth)	natural logarithm of the entrepreneur's other personal wealth, excluding the small business
Owner bankrupt	a dummy variable, which is set to equal to one if the entrepreneur was bankrupt before, and 0 otherwise
<i>Lenders' Private Information</i>	
Ln(Distance)	natural logarithm of the geographic distance between the financial institution and small business
Ln(Relationship)	natural logarithm of the length of relationship between the financial institution and

	small business
In Person	a dummy variable, which is set to equal to one if the entrepreneur communicates with the lender in person, and 0 otherwise
<i>Loan Characteristics</i>	
Loan Size	natural logarithm of the amount of loan granted
Loan Length	natural logarithm of the length of loans measured in months
Fixed Interest Rate	a dummy variable, which is equal to one if the loan is of fixed interest rate, 0 otherwise
Loan Type Dummies	Loan type includes new line of credit, capital lease, mortgage, vehicle loans, equipment loans, and other loans

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Table 1
Summary Statistics

The sample consists of 3,360 small businesses operating in the U.S. surveyed by the Federal Reserve Board's 2003 SSBF. Panel A and Panel B summarize the characteristics of both the small businesses and the principal owners who are also responsible for the daily management of the business. Panel C summarizes measures of credit availability to small businesses. Panel D reports the characteristics of most recently approved new loans. Renewals of line of credits are excluded. Means and standard errors reported take into account the sample weights and multiple imputations of the survey.

Table 1, continued.

	Mean	Std. Error	N
Panel A. Firm Characteristics			
Firm Age	13.9	0.23	3360
Assets (\$000)	449.4	30.4	3360
Sales (\$000)	869.0	40.9	3360
Number of Employees	7.4	0.2	3360
Tangible Assets/Total Assets	36.5%	0.8%	3360
Profit Margin	-12.1%	18.0%	3316
Debt Ratio	183.5%	93.7%	3360
Current Liability/Total Liability	41.5%	1.1%	2260
Percentage of Proprietorship	46.7%		3360
Percentage of Partnership	8.4%		3360
Percentage of Corporation	44.9%		3360
Percentage of Urban Firms	79.9%		3360
Panel B. Owner Characteristics			
Entrepreneur Age	51.1	0.25	3360
Business Experience	19.3	0.25	3360
Percentage of Male Entrepreneurs	74.3%		3360
Education			
Percentage of High School Drop Out	2.2%		3360
Percentage of High School Graduate	47.3%		3360
Percentage of College Graduate	29.9%		3360
Percentage of Post Graduate	20.6%		3360
Percentage of Real Start-Up	82.7%		3360
Panel C: Credit Availability			
Percentage of firms that trade credit is paid late	41.1%		2224
Percentage of firms applied for loans in last three years	43.6%		3360
Percentage of firms that were always approved	84.0%		1466
Percentage of firms that were always denied	8.19%		1466
Panel D: Characteristics of Most Recently Approved New Loans			
Amount Applied (\$000)	832.3	111.1	943
Loan Length (months)	64.2	2.36	894
Loan Interest Rate	5.93%	0.09%	943
Relationship with Lender (months)	94.9	4.09	943
Distance from lender (miles)	79.6	9.28	943
Collateralized	60.3%		943
Guaranteed	56.8%		943
Percentage of Fixed Interest Loans	59.0%		943
Loan Types			
Percentage of Line of Credit (new)	31.0%		943
Percentage of Capital Lease	2.1%		943
Percentage of Mortgage	17.7%		943
Percentage of Vehicle Loans	18.3%		943
Percentage of Equipment Loans	19.2%		943

Table 2
Measure of Entrepreneurial Optimism – Logistics Regression

The table presents the estimation results of a logit regression of the probability that an entrepreneur was always denied or sometimes denied when applying for credit over the last three years based on SSBF 1998. The dependent variable is an indicator variable which is equal to one if during the last three years (prior to each survey), the entrepreneur was always denied or sometimes denied when applying for credit, and is equal to zero otherwise. The control variables are described in detail in Appendix B. The coefficients estimated off this model then are applied to the 2003 survey to determine the probability that an entrepreneur's loan application will be denied given the same set of control variables. The difference between the predicted probability from this approach and the entrepreneur's subjective zero-one assessment of this probability is our measure of optimism. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% confidence level, respectively.

	Always Deny or Sometimes Deny
Ln (Assets)	-0.1679** (0.0683)
Ln (Firm Age+1)	-0.3151** (0.1587)
Profit Margin	-0.2512 (0.1704)
Percentage of Tangible Assets	0.1443 (0.3621)
Debt/Assets	-0.0004 (0.0042)
Current Liability/Total Liability	0.6720** (0.3031)
Corporation	-0.2345 (0.2409)
Urban	0.5536* (0.2966)
Owner Bankrupt	3.8786*** (1.0209)
Constant	1.0497 (0.8238)
Industry Dummies	Yes
Observations	730
Pseudo R-squared	0.121

Table 3
Robustness of Optimism Measure

Panel A provides summary statistics of our optimism measure. In Panel B, we examine the relation between our measure of optimism and various demographic characteristics of entrepreneurs that are documented in the literature to be related to optimism, including gender, ethnicity, business experience, education (college and above), and personal wealth. In Panel C, we report the correlation coefficients between our optimism measure and entrepreneurs' economic outlook and their self-assessment on the reasons why their loan applications were denied. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% confidence level, respectively.

Panel A: Summary Statistics of the Optimism Measure

Mean	0.078
5%	-0.803
25%	0.083
50%	0.172
75%	0.276
95%	0.486
Standard Deviation	0.380
Proportion > 0	2177
Proportion <= 0	457
N of Observations	2634

Panel B: Optimism and entrepreneur demographic characteristics

	(1)	(2)	(3)	(4)	(5)
Male	0.0392** (0.0187)				
White		0.1071*** (0.0275)			
Ln (Business Experience)			-0.0092 (0.0117)		
Education				0.0604*** (0.0148)	
Ln (Owner Wealth)					0.0262** (0.0123)
Constant	0.0464*** (0.0167)	-0.0208 (0.0264)	0.1050*** (0.0353)	0.0456*** (0.0108)	0.0618*** (0.0106)
Observations	2,634	2,634	2,634	2,634	2,634
Adjusted R-squared	0.0013	0.0054	-0.0001	0.0059	0.0013

Panel C: Optimism and other self-assessment

	Fear of rejection due to economic outlook (Slow Economy)	Self-assessment: loan denied due to reasons such as too young, not enough experience, prejudice or discrimination
Correlation		
Optimism	-0.111***	-0.181***

Table 4
Entrepreneurial Optimism and Credit Availability

In this table, we examine how entrepreneurial optimism impacts credit availability. We apply two measures of credit availability, whether entrepreneurs paid trade credit late and whether entrepreneurs' most recent loan applications are approved. Panel A summarizes the results from probit regressions where the dependent variable is equal to one if the firm paid late on trade credit, and is equal to zero otherwise. The sample includes 1967 observations where trade credit was used. In Panel B, we present the results from probit regressions to analyze whether entrepreneurial optimism impacts the likelihood that a loan application is approved or denied, where the dependent variable is equal to one if the firm's application was approved and is equal to zero if it was denied. The sample includes 844 new loan applications. We exclude 835 cases of renewals of existing lines of credit. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% confidence level.

Table 4, continued

Panel A: Probability of trade credit paid late

	(1)	(2)	(3)	(4)
Optimism	-0.6499*** (0.1094)			-0.8264*** (0.1681)
Optimistic Dummy		-0.6512*** (0.1091)		
Optimism Fractional Rank			-1.0037*** (0.1718)	
Optimism Square Term				-0.4281 (0.3072)
<i>Firm Characteristics</i>				
Ln (Assets)	0.0322 (0.0268)	0.0510* (0.0268)	0.0079 (0.0277)	0.0257 (0.0275)
Ln (Firm Age+1)	0.0462 (0.0708)	0.0842 (0.0713)	-0.0034 (0.0712)	0.0340 (0.0715)
Percentage of Tangible Assets	-0.2355 (0.1442)	-0.2527* (0.1438)	-0.2214 (0.1440)	-0.2300 (0.1434)
Profit Margin	-0.0069 (0.0185)	0.0069 (0.0201)	0.0019 (0.0211)	-0.0119 (0.0203)
Debt/Assets	0.0017 (0.0024)	0.0017 (0.0024)	0.0016 (0.0024)	0.0018 (0.0023)
Current Liability/Total Liability	-0.0583 (0.1196)	-0.1358 (0.1177)	0.0210 (0.1226)	-0.0291 (0.1211)
Corporation	-0.1976** (0.0920)	-0.1715* (0.0920)	-0.2358** (0.0931)	-0.2150** (0.0932)
Urban	-0.0871 (0.1052)	-0.1438 (0.1050)	0.0283 (0.1076)	-0.0572 (0.1063)
<i>Owner Characteristics</i>				
Male	-0.1287 (0.1040)	-0.1265 (0.1041)	-0.1332 (0.1040)	-0.1340 (0.1041)
White	-0.1238 (0.1620)	-0.1258 (0.1620)	-0.1183 (0.1615)	-0.1122 (0.1617)
Education	0.2497*** (0.0906)	0.2509*** (0.0908)	0.2441*** (0.0911)	0.2559*** (0.0909)
Log(Business Experience)	-0.1398 (0.0885)	-0.1380 (0.0883)	-0.1319 (0.0883)	-0.1347 (0.0885)
Ln (Owner Wealth)	-0.1983** (0.0966)	-0.1998** (0.0967)	-0.1992** (0.0966)	-0.1999** (0.0964)
Owner Bankrupt	-0.5876* (0.3083)	-1.0164*** (0.3070)	-0.8231*** (0.3118)	-0.5093 (0.3116)

Constant	-0.0440 (0.4128)	0.1814 (0.4157)	0.7304* (0.4426)	0.0952 (0.4297)
Industry Dummies	Yes	Yes	Yes	Yes
DB Dummies	Yes	Yes	Yes	Yes
Observations	1,967	1,967	1,967	1,967
Pseudo R-squared	0.113	0.113	0.113	0.114

Table 4, continued

Panel B: Probability of loan approval

	(1)	(2)	(3)	(4)
Optimism	1.1021*** (0.1682)			1.4607*** (0.2794)
Optimistic Dummy		1.0963*** (0.1688)		
Optimism Fractional Rank			1.8063*** (0.2805)	
Optimism Square Term				0.7643 (0.4811)
<i>Firm Characteristics</i>				
Ln (Assets)	0.1688*** (0.0534)	0.1352** (0.0528)	0.1940*** (0.0545)	0.1728*** (0.0542)
Ln (Firm Age+1)	0.0456 (0.1296)	-0.0168 (0.1282)	0.0914 (0.1293)	0.0330 (0.1286)
Percentage of Tangible Assets	-0.0319 (0.2504)	0.0067 (0.2511)	-0.0636 (0.2495)	-0.0363 (0.2516)
Profit Margin	0.0134 (0.0138)	-0.0008 (0.0236)	0.0129 (0.0132)	0.0228 (0.0146)
Debt/Assets	-0.0041 (0.0067)	-0.0041 (0.0066)	-0.0018 (0.0068)	-0.0026 (0.0068)
Current Liability/Total Liability	-0.1439 (0.2716)	-0.0077 (0.2704)	-0.2244 (0.2819)	-0.1521 (0.2767)
Corporation	-0.2899 (0.1806)	-0.3375* (0.1796)	-0.2554 (0.1823)	-0.2745 (0.1812)
Urban	-0.1732 (0.2123)	-0.0776 (0.2123)	-0.3644* (0.2068)	-0.2227 (0.2129)
<i>Owner Characteristics</i>				
Male	-0.0027 (0.1853)	0.0005 (0.1854)	0.0178 (0.1870)	0.0117 (0.1857)
White	0.6358*** (0.2434)	0.6249** (0.2427)	0.6309** (0.2457)	0.6202** (0.2455)
Education	0.2660 (0.1642)	0.2691 (0.1639)	0.2850* (0.1628)	0.2614 (0.1640)
Log(Business Experience)	-0.0316 (0.1456)	-0.0320 (0.1452)	-0.0440 (0.1463)	-0.0298 (0.1460)
Ln (Owner Wealth)	0.2014 (0.2085)	0.2044 (0.2070)	0.2113 (0.2012)	0.1909 (0.2048)
Owner Bankrupt	-0.9105** (0.4043)	-0.2720 (0.3995)	-0.3675 (0.4197)	-0.8674** (0.4408)
<i>Private Information</i>				
Ln (Distance+1)	0.0246 (0.0479)	0.0237 (0.0478)	0.0227 (0.0473)	0.0253 (0.0476)
Ln (Relationship+1)	0.0186 (0.0448)	0.0173 (0.0447)	0.0137 (0.0441)	0.0145 (0.0444)

In Person	0.2163 (0.2078)	0.2176 (0.2076)	0.1971 (0.2054)	0.2100 (0.2076)
Constant	-1.7013** (0.8244)	-2.0593** (0.8318)	-2.7541*** (0.8708)	-1.7963** (0.8349)
<hr/>				
DB Score Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Loan Type Dummies	Yes	Yes	Yes	Yes
Observations	844	844	844	844
Pseudo R-squared	0.304	0.302	0.302	0.307
<hr/>				

Table 5
Entrepreneurial Optimism and Cost of Borrowing

In this table, we examine the relation between entrepreneurial optimism and the cost of borrowing. In Panel A, we examine whether financial lenders more often require optimistic entrepreneurs to provide collateral or guarantee using probit regressions. The dependent variable is equal to one if collateral or guarantee is required for a specific loan, and 0 otherwise. In Panel B, we analyze whether financial lenders charge optimistic entrepreneurs a higher interest rate. The dependent variable in specifications 1-4 is the interest rate of the loan. The dependent variable in specifications 5-8 is the spread between the actual interest rate charged on the most recently applied loans and the concurrent prime rate. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% confidence level.

Table 5, continued

Panel A: Collateral or guarantee				
	(1)	(2)	(3)	(4)
Optimism	-0.8341*** (0.2729)			-1.1522*** (0.4258)
Optimistic Dummy		-0.7994*** (0.2741)		
Optimism Fractional Rank			-1.0509** (0.4432)	
Optimism Square Term				-0.7535 (0.6208)
<i>Firm Characteristics</i>				
Ln (Assets)	-0.0165 (0.0793)	0.0104 (0.0785)	-0.0330 (0.0839)	-0.0384 (0.0837)
Ln (Firm Age+1)	-0.3720** (0.1703)	-0.3288* (0.1687)	-0.4213** (0.1749)	-0.3835** (0.1757)
Percentage of Tangible Assets	-0.1141 (0.2808)	-0.1341 (0.2790)	-0.0613 (0.2819)	-0.1038 (0.2837)
Profit Margin	-0.1733 (0.2151)	-0.1274 (0.1856)	-0.1417 (0.1754)	-0.2235 (0.2275)
Debt/Assets	0.1070 (0.0858)	0.1057 (0.0849)	0.1160 (0.0852)	0.1184 (0.0881)
Current Liability/Total Liability	0.1394 (0.2904)	0.0407 (0.2885)	0.2384 (0.3029)	0.2106 (0.3044)
Corporation	0.3923** (0.1851)	0.4245** (0.1836)	0.3498* (0.1858)	0.3597* (0.1866)
Urban	-0.1629 (0.2060)	-0.2339 (0.2066)	-0.0240 (0.2118)	-0.1064 (0.2130)
<i>Owner Characteristics</i>				
Male	0.6721*** (0.2063)	0.6707*** (0.2055)	0.6522*** (0.2025)	0.6441*** (0.2040)
White	1.0524*** (0.3748)	1.0391*** (0.3729)	0.9937*** (0.3695)	1.0575*** (0.3811)
Education	0.3216 (0.2038)	0.3195 (0.2031)	0.3078 (0.2010)	0.3355* (0.2037)
Log(Business Experience)	0.2029 (0.1862)	0.2091 (0.1857)	0.2122 (0.1839)	0.1925 (0.1866)
Ln (Owner Wealth)	0.0721 (0.2338)	0.0596 (0.2336)	0.0436 (0.2324)	0.0928 (0.2333)
Owner Bankrupt	0.4125 (0.5632)	-0.0951 (0.5759)	0.1081 (0.5567)	0.8572 (0.6718)
<i>Loan Characteristics</i>				
Loan Size	0.1740* (0.0942)	0.1729* (0.0940)	0.1695* (0.0933)	0.1736* (0.0940)
Loan Length	0.1506* (0.0910)	0.1489 (0.0907)	0.1430 (0.0899)	0.1575* (0.0915)
Fixed Interest Rate	-0.0392	-0.0382	-0.0529	-0.0515

	(0.2356)	(0.2352)	(0.2324)	(0.2333)
<i>Private Information</i>				
Ln (Distance)	0.0521 (0.0571)	0.0514 (0.0569)	0.0505 (0.0565)	0.0511 (0.0572)
Ln (Relationship)	-0.0448 (0.0494)	-0.0451 (0.0492)	-0.0503 (0.0485)	-0.0430 (0.0492)
In Person	0.2919 (0.2372)	0.2871 (0.2367)	0.2871 (0.2374)	0.2995 (0.2387)
Intercept	-2.6280** (1.3230)	-2.3592* (1.3300)	-1.7911 (1.3849)	-2.2622* (1.3475)
DB Score Dummies	Yes	Yes	Yes	Yes
Loan Type Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Observations	654	654	654	654
Pseudo R-squared	0.269	0.267	0.261	0.271

Table 5, continued

Panel B: Interest Rate and Spread over prime-rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: Interest Rate			DV: Spread				
Optimism	-0.3510 (0.5644)			0.7617 (0.8494)	-0.4540 (0.5465)			0.6033 (0.8330)
Optimistic Dummy		-0.4120 (0.5664)				-0.5092 (0.5482)		
Optimism Fractional Rank			-0.3404 (1.0144)				-0.6064 (0.9772)	
Optimism Square Term				2.4470** (1.1825)				2.3253** (1.1774)
<i>Firm Characteristics</i>								
Ln (Assets)	-0.2242* (0.1357)	-0.2141 (0.1301)	-0.2258 (0.1528)	-0.1452 (0.1426)	-0.1612 (0.1347)	-0.1478 (0.1290)	-0.1724 (0.1509)	-0.0861 (0.1407)
Ln (Firm Age+1)	0.2799 (0.3212)	0.2960 (0.3146)	0.2716 (0.3395)	0.3301 (0.3273)	0.1979 (0.3129)	0.2194 (0.3060)	0.1702 (0.3307)	0.2456 (0.3193)
Percentage of Tangible Assets	-0.3451 (0.5516)	-0.3636 (0.5475)	-0.3250 (0.5590)	-0.3731 (0.5352)	-0.3778 (0.5458)	-0.3996 (0.5421)	-0.3514 (0.5543)	-0.4044 (0.5306)
Profit Margin	-0.0376 (0.0316)	-0.0324 (0.0317)	-0.0350 (0.0313)	0.0246 (0.0444)	-0.0349 (0.0323)	-0.0282 (0.0332)	-0.0330 (0.0324)	0.0242 (0.0485)
Debt/Assets	-0.0014 (0.0314)	-0.0013 (0.0312)	-0.0004 (0.0323)	0.0235 (0.0375)	-0.0001 (0.0305)	0.0002 (0.0302)	-0.0001 (0.0314)	0.0235 (0.0363)
Current Liability/Total Liability	-0.9492 (0.6843)	-0.9924 (0.6744)	-0.9271 (0.7194)	-1.1110 (0.6894)	-1.0745 (0.6742)	-1.1293* (0.6650)	-1.0232 (0.7098)	-1.2282* (0.6804)
Corporation	-0.1488 (0.3430)	-0.1360 (0.3436)	-0.1590 (0.3442)	-0.0234 (0.3427)	-0.0352 (0.3320)	-0.0183 (0.3329)	-0.0627 (0.3335)	0.0840 (0.3339)
Urban	-0.2402 (0.3541)	-0.2772 (0.3515)	-0.1949 (0.3913)	-0.4472 (0.3591)	-0.2657 (0.3549)	-0.3111 (0.3530)	-0.1875 (0.3889)	-0.4624 (0.3605)
<i>Owner Characteristics</i>								
Male	0.0743 (0.4302)	0.0754 (0.4304)	0.0624 (0.4291)	0.1497 (0.4223)	0.2640 (0.4144)	0.2643 (0.4145)	0.2507 (0.4137)	0.3356 (0.4064)
White	-1.7914**	-1.7864**	-1.8072**	-1.8128**	-1.9851**	-1.9809**	-1.9958**	-2.0054**

	(0.8964)	(0.8904)	(0.9083)	(0.9138)	(0.8908)	(0.8852)	(0.8965)	(0.9076)
Education	-0.1877	-0.1876	-0.1906	-0.2494	-0.2523	-0.2525	-0.2536	-0.3109
	(0.3711)	(0.3707)	(0.3709)	(0.3709)	(0.3696)	(0.3691)	(0.3693)	(0.3700)
Log(Business Experience)	-0.2292	-0.2218	-0.2295	-0.2569	-0.3400	-0.3320	-0.3300	-0.3662
	(0.3765)	(0.3764)	(0.3717)	(0.3680)	(0.3691)	(0.3690)	(0.3655)	(0.3617)
Ln (Owner Wealth)	-0.3747	-0.3717	-0.3926	-0.4215	-0.4590	-0.4576	-0.4720	-0.5035
	(0.3415)	(0.3403)	(0.3403)	(0.3470)	(0.3325)	(0.3311)	(0.3313)	(0.3384)
Owner Bankrupt	1.4993	1.2641	1.3678	0.5703	1.7075	1.4103	1.5275	0.8246
	(1.4097)	(1.3899)	(1.3854)	(1.4454)	(1.4414)	(1.4195)	(1.4257)	(1.4760)
<i>Loan Characteristics</i>								
Loan Size	-0.1583	-0.1586	-0.1609	-0.1686	-0.1524	-0.1532	-0.1545	-0.1622
	(0.1609)	(0.1605)	(0.1609)	(0.1613)	(0.1601)	(0.1597)	(0.1600)	(0.1599)
Loan Length	-0.3190	-0.3181	-0.3212	-0.3225	-0.3139	-0.3130	-0.3170	-0.3173
	(0.2166)	(0.2168)	(0.2166)	(0.2172)	(0.2168)	(0.2169)	(0.2169)	(0.2172)
Fixed Interest Rate	0.6582*	0.6589*	0.6538*	0.6890*	0.6862*	0.6868*	0.6808*	0.7155*
	(0.3798)	(0.3802)	(0.3784)	(0.3825)	(0.3707)	(0.3710)	(0.3695)	(0.3753)
Collateralized or Guaranteed	-0.9117**	-0.9191**	-0.8885**	-0.8598**	-0.9156**	-0.9221**	-0.8975**	-0.8663**
	(0.4299)	(0.4305)	(0.4296)	(0.4283)	(0.4245)	(0.4250)	(0.4231)	(0.4213)
<i>Private Information</i>								
Ln (Distance)	0.0841	0.0839	0.0847	0.0799	0.0789	0.0787	0.0796	0.0749
	(0.1513)	(0.1513)	(0.1514)	(0.1507)	(0.1512)	(0.1512)	(0.1512)	(0.1506)
Ln (Relationship)	-0.1227	-0.1217	-0.1245	-0.1372	-0.0636	-0.0625	-0.0653	-0.0773
	(0.0984)	(0.0982)	(0.0983)	(0.0972)	(0.0979)	(0.0977)	(0.0978)	(0.0972)
In Person	-0.1715	-0.1713	-0.1715	-0.1977	-0.3417	-0.3420	-0.3373	-0.3666
	(0.5199)	(0.5192)	(0.5180)	(0.5128)	(0.5235)	(0.5227)	(0.5220)	(0.5167)
Intercept	0.0841	0.0839	0.0847	0.0799	0.0789	0.0787	0.0796	0.0749
	(0.1513)	(0.1513)	(0.1514)	(0.1507)	(0.1512)	(0.1512)	(0.1512)	(0.1506)
DB Score Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	654	654	654	654	654	654	654	654
Adjusted R-squared	0.1468	0.1474	0.1458	0.1577	0.1444	0.1450	0.1436	0.1541

Table 6
Additional Robustness Check

In Panel A, we run logistic regression using the SSBF 2003 data, where the dependent variable is a count variable which is equal to 1 if entrepreneurs' recent loan applications (over the last three years) have always been approved, and 0 otherwise. The residuals are estimated off the regression and used as proxy for private information banks hold. In Panel B, we repeat some of the specifications in Table 6 by including this new measure of bank of private information as an additional control variable. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% confidence level.

Panel A: Logistic Regressions

	Always Approve
Ln (Assets)	0.2067*** (0.0594)
Ln (Firm Age+1)	0.3513** (0.1536)
Percentage of Tangible Assets	-0.3324 (0.2926)
Profit Margin	-0.1044 (0.1971)
Debt/Assets	-0.0021 (0.0102)
Current Liability/Total Liability	-0.1080 (0.2994)
Corporation	-0.3081 (0.2200)
Urban	-0.1662 (0.2333)
Male	0.1924 (0.2266)
White	1.6360*** (0.2881)
Education	0.1844 (0.1980)
Log(Business Experience)	-0.1586 (0.1843)
Ln (Owner Wealth)	0.8845*** (0.2612)
Owner Bankrupt	-1.0229* (0.6011)
Constant	-2.2411** (0.9053)
Industry Dummies	Yes
DB Dummies	Yes
Observations	1,337
Pseudo R-squared	0.181

Panel B: Optimism and Cost of Borrowing Using Residuals from Panel A as Measure of Banks' Private Information

VARIABLES	(1) Collateral or guarantee	(2) Interest Rate	(3) Spread
Optimism	-1.1414*** (0.4146)	0.7688 (0.8355)	0.6568 (0.8173)
Optimism Square Term	-0.7471 (0.5923)	2.2998* (1.2013)	2.2140* (1.1834)
Bank Private Information	-0.0237 (0.2057)	-0.3685 (0.4492)	-0.4326 (0.4454)
<i>Firm Characteristics</i>			
Ln (Assets)	-0.0582 (0.0822)	-0.1645 (0.1430)	-0.0885 (0.1398)
Ln (Firm Age+1)	-0.3982** (0.1737)	0.1878 (0.3489)	0.1282 (0.3422)
Percentage of Tangible Assets	-0.1295 (0.2861)	-0.4519 (0.5327)	-0.4545 (0.5293)
Profit Margin	-0.2154 (0.2147)	0.0250 (0.0450)	0.0246 (0.0490)
Debt/Assets	0.1059 (0.0854)	0.0279 (0.0380)	0.0292 (0.0367)
Current Liability/Total Liability	0.2223 (0.2996)	-1.1050 (0.6741)	-1.2363* (0.6647)
Corporation	0.3545* (0.1883)	-0.0369 (0.3467)	0.0921 (0.3350)
Urban	-0.1120 (0.2117)	-0.3529 (0.3812)	-0.3800 (0.3802)
<i>Owner Characteristics</i>			
Male	0.6325*** (0.1988)	0.0483 (0.4128)	0.2412 (0.3960)
White	1.1025*** (0.4007)	-1.8251** (0.8731)	-2.1010** (0.8653)
Log(Business Experience)	0.3181 (0.2001)	-0.1936 (0.3771)	-0.2467 (0.3747)
Education	0.1865 (0.1926)	-0.1740 (0.3873)	-0.2737 (0.3813)
Ln (Owner Wealth)	0.1279 (0.2376)	-0.4038 (0.3589)	-0.5174 (0.3459)
Owner Bankrupt	0.8355 (0.6174)	0.5500 (1.4919)	0.7376 (1.5080)
<i>Loan Characteristics</i>			
Loan Size	0.1894** (0.0909)	-0.1750 (0.1656)	-0.1753 (0.1631)
Loan Length	0.1790** (0.0904)	-0.2589 (0.2075)	-0.2702 (0.2061)
Fixed Interest Rate	-0.0536	0.7116*	0.7620**

	(0.2322)	(0.3900)	(0.3762)
Collateralized or Guaranteed		-0.8114*	-0.8466**
		(0.4248)	(0.4170)
Constant	-2.0143	13.5940***	8.9395***
	(1.3232)	(2.7720)	(2.6797)
Observations	654	654	654
Pseudo R-squared	0.2650		
R-squared		0.1523	0.1523
