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ABSTRACT

In this paper, we investigate how personal bankruptcy law affects small firms' access to credit. When a firm is unincorporated, its debts are personal liabilities of the firm's owner, so that lending to the firm is legally equivalent to lending to its owner. If the firm fails, the owner has an incentive to file for personal bankruptcy, since the firm's debts will be discharged and the owner is only obliged to use assets above an exemption level to repay creditors. The higher the exemption level, the greater is the incentive to file for bankruptcy. We show that supply of credit falls and demand for credit rises when non-corporate firms are located in states with higher bankruptcy exemptions. We test the model and find that, if small firms are located in states with unlimited rather than low homestead exemptions, they are more likely to be denied credit, they receive smaller loans and interest rates are higher. Results for non-corporate versus corporate firms suggest that lenders often disregard small firms' organizational status in making loan decisions.

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Introduction

Small businesses are the primary source of new jobs in the U.S. economy. From 1990 to 1995, businesses with fewer than 500 employees accounted for 76.5 percent of net new jobs. But small businesses have a very high turnover rate compared to large businesses. Over 13 percent of U.S. jobs in 1995 were in firms that did not exist before 1990 and over 12 percent of jobs in 1990 were in firms that had ceased to exist by 1995.[2] Despite the importance and the complexity of small business as a contributor to the U.S. economy, there has been surprisingly little academic research on the economic environment faced by small business owners or the effects of policy variables on small business success.

In this paper, we investigate how personal bankruptcy law affects small firms' access to credit. It is well known that the U.S. has separate bankruptcy procedures for individuals versus corporations. What is less well known is that personal bankruptcy procedures also apply to small firms. When a firm is non-corporate, its debts are personal liabilities of the firm's owner, so that lending to the firm is legally equivalent to lending to its owner. If the firm fails, the owner can file for bankruptcy and his/her business and unsecured personal debts will be discharged. When a firm is a corporation, limited liability implies that the owner is not legally responsible for the firm's debts. However, lenders to small corporations often require that the owner guarantee the loan and may also require that the owner give the lender a second mortgage on his/her house. This wipes out the owner's limited liability for purposes of the particular loan and makes small corporate firms into corporate/non-corporate hybrids. Thus personal bankruptcy law applies to non-corporate firms and may also apply to small corporate firms.[3]

We test whether variation in personal bankruptcy exemptions across U.S. states affects small firms' access to credit, using the 1993 *National Survey of Small Business Finance* (NSSBF). We find that small businesses are more likely to be denied credit if they are located in states with high rather than low homestead exemptions and that, if they receive loans, the loans are smaller and interest rates are higher. We also find that bankruptcy exemption levels affect

[2] See U.S. Small Business Administration (1998).

[3] Sullivan, Warren and Westbrook (1989) surveyed a sample of individuals who filed for bankruptcy during the 1980's and estimated that around 20% had debts from a failed business. This is nearly double the proportion of all U.S. households that has self-employment income.

both non-corporate and corporate firms, suggesting that lenders often ignore small business' organizational status in making their loan decisions.

The remainder of the paper is organized as follows. After a brief literature review, section 2 discusses personal bankruptcy law. Section 3 discusses a simple model of small business credit markets. Section 4 presents the empirical results and Section 5 concludes.

1. Literature Review

We know of only one article that examines the effect of personal bankruptcy law on business credit markets. Scott and Smith (1986) examined the effect of the new U.S. Bankruptcy Code, adopted in 1978, on business credit markets. They argued that adoption of the Code caused the cost of business loans to increase and that lenders raised interest rates in response. They found support for this hypothesis in their empirical work. However their study examined only the net effect on interest rates of many changes adopted simultaneously as part of the 1978 Code, all of which applied uniformly over the U.S. Our study, in contrast, uses cross-section variation in bankruptcy exemption levels across U.S. states to examine whether exemption levels affect the availability of small business credit.

On the personal bankruptcy side, Gropp, Scholz and White (1997) investigated how varying bankruptcy exemption levels across states affect markets for non-business loans. They found that in states with higher exemption levels, applicants were more likely to be turned down for credit, but demand for loans increased. Overall they found that higher bankruptcy exemption levels shift credit from households with low assets to those with high assets, since lenders are willing to accommodate the increased demand of the latter group but not the former. Berkowitz and Hynes (1999) and Lin and White (2001) re-examined this issue for mortgage loans.

Peterson and Rajan (1994, 1996) examine small business credit markets using earlier versions of the NSSBF. They are mainly concerned with examining the effects of long term relationships between firms and banks and the effects of concentration in local banking markets on interest rates and availability of business credit. More recent research on banking relationships, using a later version of the NSSBF, includes Cole (1998) and Cole, Goldberg, and L. White (1999). Cavalluzzo, Cavalluzzo, and Wolken (1999) examine patterns of race

discrimination in banking relationships. There are also a number of theoretical models that examine the effects of bankruptcy on credit markets.[4]

2. Bankruptcy Law and Small Firms

When unincorporated firms fail, their owners typically have high debt levels, much of which consists of debts of the failed firm. Owners have an incentive to file for bankruptcy, both because their unsecured personal and business debts will be discharged and because creditors must immediately terminate collection efforts and legal actions to obtain repayment.[5] Under the Chapter 7 bankruptcy procedure, debtors' future earnings are completely exempt from the obligation to repay pre-bankruptcy debt, but they must turn over any assets they own above an exemption level to the bankruptcy trustee, who uses these assets to repay debt. When debtors file under Chapter 7, they cannot file again for 6 years.

While bankruptcy is a matter of Federal law and the procedure is uniform across the country, Congress gave the states the right to set their own bankruptcy exemption levels and these vary widely. Most states have several types of exemptions: for equity in owner-occupied principle residences (the homestead exemption), for equity in cars, for cash, and for various types of goods (furniture, clothing, cooking utensils, farm implements, family bibles, tools of the trade, sometimes a horse, etc.). In most states, the homestead exemption is the largest and other exemptions are small. Debtors therefore have an incentive to convert cash or financial assets into additional home equity by repaying part of their mortgage loans before filing for bankruptcy, if their home equity is less than the homestead exemption.[6]

There is also a second personal bankruptcy procedure, Chapter 13, and debtors are allowed to choose between them. Under Chapter 13, debtors must propose a plan to use some of their future earnings to repay part or all of their debt, but all of their assets are exempt. This procedure is generally less favorable to business owners than Chapter 7, because failed entrepreneurs often have no non-exempt assets and because having an obligation to repay past

[4] Bester (1994) predicts that firms are less likely to default when loans are collateralized and Hart and Moore (1989) predict that firms are more likely to default when they have a single creditor rather than multiple creditors and when the liquidation value of the firm's assets is lower. Unfortunately our data do not allow these predictions to be tested, because default can occur anytime during the seven years prior to the survey while other firm characteristics are for the time of the survey only.

[5] One might question whether potential entrepreneurs would be familiar with bankruptcy law and bankruptcy exemptions. We found that self-help manuals such as *Legal Guide to Starting & Running a Small Business, Vol. 1,* contain a clear explanation of bankruptcy. See Steingold (1999).

[6] White (1998b) discusses various strategies for sheltering assets in bankruptcy.

debt from future earnings would make it difficult to start a new business. Because creditors are entitled to receive no less in Chapter13 than they would have received in Chapter 7 (13 U.S.C. Section 1325(a)(4)), exemption levels are likely to have similar effects on credit markets regardless of the chapter that business owners would choose if they filed for bankruptcy.[7]

Now consider the possibility that the firm is incorporated. Corporate firms are legally separate from their owners, so that owners are not personally responsible for the debts of their corporations. Holding everything else constant, this means that small corporations are less credit-worthy than small non-corporate firms, because the former have only the corporation's assets to back up business debt, while the latter have both the firm's assets and the owner's personal assets. Lenders also know that owners of small corporations can easily shift assets between their personal accounts and their corporations' accounts, so that lenders may not view the corporate/non-corporate distinction as meaningful for small firms. In making loans to small corporations, lenders therefore may require that owners personally guarantee the loans. This abolishes the legal distinction between corporations and their owners for purposes of the particular loan and puts the owner's personal assets at risk to repay the loan.

3. A Stylized Model

Suppose an entrepreneur owns a non-corporate firm and wishes to invest in a risky project. In period 1, the entrepreneur has wealth W. She can apply for a loan, D, to be used for a project with risky return, R. Assuming that the loan is made, it will have an interest rate of r and be due in period 2. The owner's wealth in period 2 if she repays the loan will be $W + R - D(1+r)$ which we denote Z. We further assume that Z has strictly positive density, $f(Z)$.[8]

In period 2, the owner may file for bankruptcy under Chapter 7. Denote the combined value of the various bankruptcy exemptions in the owner's state of residence as X. Also suppose the cost of filing for bankruptcy is C, where $C < D(1+r)$. C is assumed to include both the out-of-pocket cost of filing and the cost of reduced access to credit in the future. If the owner files for bankruptcy, then the debt of $D(1+r)$ will be discharged, but she must use any wealth that exceeds the exemption level, or $\max[Z - X - C, 0]$, to repay the debt. Let Z^* be the level of period 2 wealth at which owners are indifferent between filing versus not filing for bankruptcy,

[7] An additional restriction that makes Chapter 13 less attractive than Chapter 7 to small business owners is that unsecured debt discharged in Chapter 13 cannot be higher than $250,000. There is no limit in Chapter 7.

so that they file for bankruptcy if $Z < Z^*$ and repay in full otherwise. In the region around Z^*, owners' net wealth is $Z - D(1+r)$ if they do not file for bankruptcy and X if they do (assuming that they pay the cost of bankruptcy C before filing). Therefore they are indifferent between filing versus not filing at the wealth level $Z^* = X + D(1+r)$. This means that owners' net wealth in period 2 has three regions: a high region in which owners repay the debt in full and their net wealth is $Z - D(1+r)$; a middle region in which owners file for bankruptcy, repay $Z - X - C$ in bankruptcy, and have net wealth of X; and a low region in which owners file for bankruptcy, repay nothing, and have net wealth of $Z - C$. The dividing point between the middle and low regions is $Z = X + C$.

A representative lender maximizes expected profits,

$$\int_{X+C}^{X+D(r)(1+r)} (Z - X - C) f(Z) dZ + \int_{X+D(r)(1+r)}^{\infty} D(r)(1+r) f(Z) dZ , \qquad (1)$$

with respect to the interest rate they are willing to offer. The first term on the left hand side is the expected value of repayment if owners file for bankruptcy and the second term is the expected value of repayment if owners avoid bankruptcy.

Lenders realize that the amount of debt that owners apply for depends on the interest rate and the exemption level, so that $D = D(X, r)$. Solving for the first order condition of (1) with respect to r and assuming for simplicity that $C = 0$, we get:

$$\int_{X+D(1+r)}^{\infty} [D'_r(X,r)(1+r) + D(X,r)] f(Z) dZ = 0 \qquad (2)$$

Since *f(Z)* is positive, this becomes $D(X,r) = -D'_r(X,r)(1+r)$. To ensure that both D and $(1+r)$ are nonnegative, the sign of D'_r must be negative, i.e., entrepreneurs' demand for debt must be negatively related to the interest rate.

As an example, suppose the demand curve for debt is additive, $D(X, r) = \alpha(X) - \beta r$ where β is a positive constant. The optimal interest rate is $r = (1/2)((\alpha(X)/\beta) - 1)$. Here the slope of the relationship between the interest rate and exemption level is determined by the sign of $\alpha(X)$. Moreover, substituting r into the demand curve, we find $D = (1/2)(\beta + \alpha(X))$. Thus loan size should vary in the same way as the interest rate in response to changes in the exemption.

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[8] The model would be unchanged if part of the uncertainty in the entrepreneur's period 2 wealth came from other sources, such as risky projects that the entrepreneur invested in before period 1.

We expect the sign of $\alpha(X)$ to be generally positive. Bankruptcy provides partial wealth insurance to business owners by transferring some wealth from non-bankruptcy to bankruptcy states. When the exemption level rises, the level of partial wealth insurance increases. Assuming that owners are risk averse, they benefit from the additional wealth insurance and therefore their demand for loans increases.[9]

The market clearing condition for this model is that expected return (1) equal lenders' opportunity cost of funds, or:

$$D(1+r_f) = D(1+r)\int_{X+D(1+r)}^{\infty} f dZ + \int_{X}^{X+D(1+r)} (Z-X) f dZ \qquad (3)$$

where r_f is the available risk free rate. Eq. (3) implies that the market clearing interest rate r is positively related to the probability of owners filing for bankruptcy and negatively related to the lender's expected percentage return conditional on bankruptcy. As the exemption level rises, the probability of bankruptcy rises and the expected percentage return in bankruptcy falls (since entrepreneurs repay Z-X if $X \le Z \le Z^*$), so that the market clearing interest rate must rise. If the exemption level is high enough, credit rationing occurs because no interest rate is high enough to clear the market and/or owners' demand for credit falls to zero. Note that in this simple model, owners always file for bankruptcy if the exemption level is unlimited. Therefore lenders would never lend in states with unlimited exemptions.

In this model, there is either no credit rationing or complete credit rationing that shuts the loan market down completely. But partial credit rationing would occur in the model if individual owners' creditworthiness varied according to some observable characteristic, such as owners' wealth or their firms' wealth in period 1. Then the threshold for credit rationing would vary with wealth as well as the exemption level. As the exemption level rises, lenders first reach the no-lending threshold for owners who have low wealth. They cease lending to low-wealth owners, but continue to lend to owners having medium or high wealth. As the exemption level continues to rise, lenders would reach the no-lending threshold for owners with medium wealth. They cease lending to medium-wealth owners, but continue to lend to owners having high wealth. Thus as the exemption level rises, lenders gradually impose credit rationing on a higher fraction of potential borrowers.[10]

[9] See Fan and White (2001) for discussion of how bankruptcy provides partial wealth insurance for entrepreneurs and a derivation of the optimal bankruptcy exemption level.

[10] Credit rationing is usually associated with models that assume heterogeneous borrowers and asymmetric information concerning borrowers' types. However as the discussion here shows, it may also occur when all

Finally, note that although we did not differentiate between the homestead and other exemptions, it is straightforward to show that the predictions are qualitatively the same for both. Berkowitz and Hynes (1999) and Lin and White (2001) present models that differentiate between the two types of exemptions and also differentiate between secured (mortgage) versus unsecured (business) loans.

4. Empirical Tests

Our primary data source is the 1993 NSSBF. This survey covers a representative sample of U.S. non-financial, non-farm, for-profit businesses that have fewer than 500 employees. There are approximately 1,750 non-corporate firms and 2,800 corporate firms in the sample.[11]

The NSSBF asks managers whether their firms applied for credit within the past three years and, if so, was the most recent application for credit denied. Managers are also asked whether they were discouraged from applying for loans at any time during the past three years because they anticipated being turned down. We define a dummy variable, "discouraged/denied", which equals one if managers either were discouraged from applying for credit or applied but were turned down on their most recent application within the past three years. We refer to firms that are discouraged/denied as credit rationed and we run separate regressions explaining whether corporate and non-corporate firms are credit rationed.[12]

The main explanatory variables of interest are the homestead and personal property exemptions in the state where the firm is located. The personal property exemption is defined as the sum of the state's exemptions for cash and for equity in vehicles, plus the value of the wildcard exemption. Table 1 shows the two exemptions by state in 1993. The homestead exemption varies widely across states, from zero in one state to unlimited in seven states, with a median value of $15,000. In contrast, the personal property exemption is both smaller and less

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information is common knowledge. Stiglitz and Weiss (1981) show that credit rationing may occur when increases in the interest rate would cause borrowers to shift from safe to risky projects or would cause adverse selection among borrowers. Applied to our context, this suggests that in response to an increase in the exemption level, lenders may impose credit rationing rather than raise the interest rate, because raising the interest rate would reduce lenders' return by lowering borrower quality. Credit rationing of this type could occur at any exemption level, although it seems more likely to occur at medium or high exemption levels. See Longhofer (1997) for a model of credit rationing with heterogeneous borrowers and common knowledge.

[11] The NSSBF is produced by the Federal Reserve Board and the Small Business Administration. See Cole and Wolken (1995) for discussion. We use the internal version of the dataset, which identifies the state in which the firm is located.

variable. The median value of the personal property exemption is $7,000, with a minimum value of $2,800. The maximum personal property exemption is $60,000 in Texas, but only two other small states besides Texas have personal property exemptions higher than $25,000. The correlation between the two exemptions is .24, but falls to .094 if Texas is excluded.[13]

We enter the homestead exemption as dollar value (in thousands of dollars) and dollar value squared. For states with unlimited homestead exemptions, we set the homestead exemption equal to the maximum dollar value across all states, which is $160,000. We also enter a separate dummy variable which equals one for states that have unlimited homestead exemptions. This means that the coefficient of the unlimited exemption dummy captures the marginal effect of the homestead exemption being unlimited rather than $160,000. We enter the personal property exemption as dollar value (in thousands of dollars) and dollar value squared. Since no states have unlimited personal property exemptions, there is no unlimited dummy.

An important issue is whether the bankruptcy exemption level can be treated as exogenous to lenders' decisions to ration credit. As part of the 1978 Bankruptcy Code, Congress adopted a uniform Federal bankruptcy exemption, but it gave the states the right to opt out of the Federal exemption by adopting their own exemptions. All states did so by 1983, although about one-third allowed their residents to choose between the state's exemption and the Federal exemption.[14] Between 1983 and 1993, only a few states changed their exemption levels each year and the Federal bankruptcy exemptions remained unchanged. Exemption levels do not appear to be correlated with state loan market or demographic characteristics: a recent study explaining state exemption levels in the 1990's found that the only significant correlate was the state's exemption level in the 1920's (Posner, Hynes, and Malani, 2001).[15] We therefore treat exemption levels as exogenous.

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[12] Firms may be both discouraged and denied, because they may have been turned down on their most recent loan application and also discouraged from applying for a loan at some time during the past three years. See below for tests of whether the two types of firms differ.

[13] In computing a dollar value for the personal property exemption, we ignore exemptions for specific goods and use only exemptions for cash, vehicles and near-cash assets such as jewelry that are specified as dollar values. Two states have unlimited exemptions for a single vehicle: Louisiana (for a "non-luxury auto") and Hawaii (for an otherwise unspecified vehicle). We code these at $20,000 and $40,000, respectively.

[14] Sixteen states allowed their residents to choose between the state and the Federal exemptions as of 1993. We substitute the Federal exemption for the state exemption if the firm is located in a state that allows its residents to choose and the Federal exemption is higher. Some states also have higher exemptions for married couples who file for bankruptcy and, if so, we use the exemptions applicable to married couples.

[15] The authors also ran a regression explaining state exemption levels in the 1920's and found that the population density and the proportion of farmers at that time were statistically significant. They interpret this result as indicating that debt relief was a more salient political issue in the past than it is now.

Other important variables are measures of the owner's and the firm's previous financial difficulties. A previous bankruptcy filing has a theoretically ambiguous effect on credit-worthiness. Because debtors who have filed for bankruptcy under Chapter 7 cannot file again under Chapter 7 for six years, they are more credit-worthy from lenders' viewpoint. But debtors can still file for bankruptcy under Chapter 13 or default on repaying their loans without filing for bankruptcy. If they do the latter, then lenders have the right to sue for repayment, but such lawsuits are often not financially worthwhile. In addition, a past bankruptcy filing is evidence of weak entrepreneurial ability. These considerations suggest that lenders may view a past bankruptcy filing as negative evidence of credit-worthiness. In contrast, a past personal or business delinquency is unambiguously negative evidence concerning credit-worthiness. It signals weak entrepreneurial ability and also signals that debtors are knowledgeable about default procedures and willing to use them. Our bankruptcy variable is a dummy variable that equals one if the firm or its principle owner filed for bankruptcy within the past seven years. Our delinquency variables are separate dummy variables for whether owners have been delinquent on personal financial obligations during the past 3 years and whether the firm has been delinquent on business obligations during the past 3 years.[16]

We include a number of firm demographic characteristics as additional evidence concerning firms' perceived creditworthiness. These are the firm's age, the owner's age, separate dummy variables for whether more than 50% of the firm's equity is owned by an African-American or a member of another minority group (Hispanic or Asian), separate dummy variables for whether the firm is family-owned or female-owned, and the firm's total employment in log form. Financial variables include the firm's ratio of debts to assets, its ratio of profits to assets,[17] the rate of growth of sales between 1990 and 1992, and a vector of dummy variables for the firm's sector (results for the latter are not shown).[18] We also include a dummy

[16] The personal financial delinquency variable equals one if the owner has been delinquent by 60 days or more on one or more personal obligations. The business delinquency variable is similarly defined. All of the bankruptcy and financial delinquency variables in our data are self-reported. But lenders can and routinely do obtain information on past bankruptcy filings and past financial delinquencies from credit reporting services. See White (1998a) for a model of the relationship between default and bankruptcy.

[17] Because the latest loan application can be any time during the past three years, financial variables such as the level of debt and the level of assets may or may not include the proceeds of the latest loan. See below for discussion of robustness checks in which we compare the results for firms that applied for loans more recently versus further back in time.

[18] Gordon and Mackie-Mason (1994) argue that firms have tax incentives to choose corporate versus non-corporate form, which implies that the two types of firms may differ systematically. In particular, owners of money-losing firms have an incentive to choose non-corporate status so that the firm's losses can be deducted against other income

variable for a high Herfindahl index of bank deposit concentration in the market where the firm is located and the number of lenders that the firm borrows from. If the lender is a bank, we include the number of years that the firm and the bank have had a relationship and we also include a dummy variable that equals one if the years of relationship variable is missing. We also include dummy variables for whether the firm has a checking or saving account with the bank and for whether the firm purchases services from the bank that are information intensive.[19] Finally, as a measure of local macroeconomic conditions, we include the unemployment rate in the state where the firm is located.

Table 2 shows summary statistics.[20] Statistics are shown by type of firm and separately by whether firms are credit rationed (discouraged/denied). The overall probability of firms being credit rationed is 526/(526+1303) = .29 for non-corporate firms versus 736/(736+2072) = .26 for corporations. Firms that are credit rationed are much more likely to have owners who have filed for bankruptcy or have been financially delinquent in the past. The proportion of credit rationed firms/owners that have filed for bankruptcy is .06-.08, compared to only .01 for non-credit-rationed firms/owners. The proportion of credit rationed firms that have past business delinquencies is .36 for non-corporate firms and .45 for corporate firms, compared to only .11 and .13 for non-corporate and corporate firms that are not credit-rationed, respectively. The figures for past personal delinquency have a similar pattern. Among the important differences between the two types of firms are that corporate firms are larger on average, less likely to be family owned, and less likely to be owned by African-Americans or other minorities.

Credit rationing. Table 3 shows the results of logit regressions explaining whether firms are credit rationed. Non-corporate firms are in the left hand column and corporate firms are in the right hand column.[21] Variables that are significant at the 95% level are asterisked. The dollar homestead exemption variable and the unlimited homestead exemption dummy have the

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of the owner; while owners of profitable firms have an incentive to choose corporate form in order to take advantage of corporate tax rates that tend to be lower than the top individual tax rate. Thus choice of organizational form may signal the firm's profit level. However because we control for individual firms' profit levels (relative to assets), we do not expect the choice of organizational form to bias our results for the effects of bankruptcy exemption levels.

[19] The "years of relationship missing" variable is included because otherwise we would have to drop 120 non-corporate and 50 corporate observations. We follow Petersen and Rajan (1994) in our choice of financial variables. Following their lead, we truncate sales growth at the 95% level and define the cutoff for a high Herfindahl index at HHI $\geq$ 1800.

[20] In all calculations, we use the NSSBF sampling weights which make the sample representative of the target population of U.S. small businesses.

[21] Robust standard errors clustered by state are reported. See Moulton (1986).

predicted positive signs in both regressions, while the squared dollar homestead exemption variables are negative in both regressions.[22]

The personal property exemption coefficients are not statistically significant for either type of firm. This probably reflects the fact that the personal property exemption is smaller and less variable than the homestead exemption. In addition, the state that has by far the largest personal property exemption—Texas—also has an unlimited homestead exemption, so that the homestead exemption may be capturing part of the effect of the personal property exemption on lending behavior.[23]

The past bankruptcy filing and past personal and business delinquency variables are all positive and significant for both types of firms. The sizes of the coefficients are similar in the two samples, suggesting that lenders view the effects of past bankruptcy and delinquency similarly for non-corporate and corporate borrowers. Although the theoretical prediction for the sign of the past bankruptcy variable is ambiguous, the results suggest that lenders view a past bankruptcy filing as a clear negative signal concerning credit-worthiness. The positive signs of the past financial delinquency variables are also in line with our predictions.[24]

We calculated the predicted probability of firms being credit rationed for various exemption levels. We assume that both types of firms are family-owned, are not African-American- or other minority-owned, and have average values for the other right-hand-side variables. If a non-corporate firm is located in a state whose homestead and personal property exemptions are both at the 25th percentile of the relevant distributions and if neither the firm nor its owner has previously filed for bankruptcy or been delinquent, then its probability of being credit rationed is .122. This figure rises to .140 if the homestead exemption in the firm's state is instead at the 50th percentile, and to .196 if the homestead exemption is at the 75th percentile.

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[22] The linear term for corporations and the unlimited dummy for noncorporates were not significant. However, an *F*-test shows that the three homestead exemption variables are jointly statistically significant at the .99 level in both samples.

[23] Studies of the effect of bankruptcy exemptions on whether loan applicants are denied mortgage loans have found positive and significant effects for the personal property exemption. But these studies use much larger datasets. See Berkowitz and Hynes (1999) and Lin and White (2001).

[24] The results for the demographic and lender relationship variables have been discussed by other authors. Petersen and Rajan (1994) and Berger and Udell (1995) found that the number of years that the firm has had a relationship with its lender, whether the firm has a checking account with the lender, and whether the firm buys information-intensive services from the lender are important determinants of whether firms are credit rationed. For discussion of the result that African-American and minority-owned firms are more likely to be credit rationed, see Cole (1998), Cole, Goldberg, and L. White (1999), and Cavalluzzo, Cavalluzzo, and Wolken (1999). All of these papers used the same or earlier versions of the NSSBF.

Overall, the probability of non-corporate firms being credit rationed rises by 32% if firms are located in states with unlimited rather than low homestead exemptions.

For corporate firms, the pattern is similar. The predicted probability of being credit rationed is .196 if both exemptions are at the 25th percentile, .221 if the homestead exemption rises to the 70^{th} percentile, .172 if the exemption rises to the 80^{th} percentile and .255 if the exemption is unlimited. Overall, the probability of corporate firms being credit rationed rises by 30% if firms are located in states with unlimited rather than low homestead exemptions. These results are generally supportive of the theoretical model discussed in the previous section. Risk averse entrepreneurs gain from having partial wealth insurance and this causes demand for loans to rise even though interest rates are rising.

Nevertheless, the probability of credit rationing is not monotonically increasing in the homestead exemption level. For non-corporates, for example, the probability drops from .196 at the 75^{th} percentile to .154 at the 90^{th} percentile, and then rises to .161 if the homestead exemption becomes unlimited. For corporates, the probability of credit rationing drops in the 70^{th} – 100^{th} percentile range, before rising again when the exemption level becomes unlimited. We do not have a good explanation for why the probability of credit rationing displays this non-monotonic behavior when the homestead exemption level is high but not unlimited.

These results have several implications. First, corporations are more likely to be credit rationed than non-corporate firms over most of the observed range (though not when the homestead exemption is around the 90^{th} percentile). This is in accord with our predictions, since owners' assets always guarantee the debt of non-corporate firms but do not always guarantee the debt of corporate firms. All else equal, more assets are available to back up loans to non-corporations. Second, the marginal effect of bankruptcy exemptions are larger for non-corporate than corporate firms. This makes sense because the sample of corporate firms is a mixture of corporations that are able to borrow on their own and corporations that are unable to borrow unless their owners provide guarantees. For the former group, the exemption level is irrelevant and, for the latter, it should have the same marginal effect as for the sample of non-corporations. Because the marginal effects of the exemption variables for corporations are an average over the two types, we expect them to be smaller than the marginal effects for non-corporate firms.

Holding the exemption levels fixed, the probability of firms being credit rationed approximately triples when their owners have previously filed for bankruptcy and approximately doubles when firms or their owners have previous financial delinquencies, with a previous

business delinquency having a larger effect than a previous personal delinquency. These effects are similar for both non-corporate and corporate firms. Both types of firms have about a 50% probability of being credit rationed if their owners have previously filed for bankruptcy. The results suggest that a past bankruptcy filing or a past delinquency severely handicaps entrepreneurs who attempt to obtain loans for a new business.[25]

The effect of bankruptcy exemptions on the probability of credit rationing should depend on the wealth of the potential borrower, since debtors are less likely to file for bankruptcy at a given exemption level when they have higher wealth. Because our dataset consists of small businesses, we do not know the business owner's personal wealth. But we do know the net value of business assets minus liabilities and we use this as a proxy for entrepreneurs' wealth. We reran the model in table 3 with interactions between all of the exemption variables and a dummy variable that equals one if business net assets are in the top half of the distribution.

The results are shown in table 4 for the exemption variables only. Firms with relatively few net assets have exemption coefficients that are larger in absolute value and more statistically significant than the results for the entire sample in table 3. For firms with high net assets, the overall effect--calculated by adding the coefficient for the low asset firms plus the coefficient on the interaction term--is close to zero. Thus the exemption is more important as a determinant of credit rationing for firms with low net asset levels than for firms with high net asset levels.

This finding is as expected. Demand for loans is increasing in the exemption, regardless of whether the firm has high or low wealth. But while lenders accommodate the increased loan demand for customers whose businesses have high net assets; they respond by rationing credit to customers whose businesses have low net assets.[26]

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[25] We ran several additional checks to determine whether the results are robust to changes in the specification of the model. First, we checked whether the two types of credit rationed firms--"discouraged" versus "denied"--differ systematically from each other. To do so, we reran the model in table 3 for each group separately. Second, we redefined our benchmark credit rationing variable so that firms were treated as credit rationed if they were denied credit on a prior loan application, even though their most recent application was approved, or if they were offered credit but on worse terms than they applied for. Third, firms' most recent loan application may occur anytime during the three years prior to the survey. Early loan applications present potential endogeneity problems, because the bankruptcy exemption variables and the other control variables are for the year of the survey. We reran the models in table 3, but excluded firms whose most recent loan applications occurred more than one year prior to the survey. In all cases, the results for the exemption and financial delinquency variables remained substantially the same as those in table 3.

[26] See Gropp, Scholz and White (1997) for discussion of the effect of borrowers' wealth on access to credit by households. They find similar differences in the probability of credit rationing for low versus high wealth borrowers.

Interest rates. Table 5 gives the results of Tobit regressions explaining the interest rate on the most recent loan that the firm obtained.[27] The samples are the same as for the model of credit rationing in table 3. All firms that did not receive credit are right censored at an interest rate of 17 percent (the maximum interest rate in the sample is 16.5 percent).[28] All of the homestead exemption variables are statistically significant in both samples, except for the unlimited homestead exemption dummy in the corporate sample. The results are similar to the credit rationing results: the homestead exemption coefficients are positive, the squared exemption coefficients are negative, and the unlimited exemption coefficients are positive. Again, none of the personal property exemption variables are statistically significant. The past bankruptcy variables are significantly positive as expected in both samples, but of the past delinquency variables, only the personal delinquency variable in the corporate sample is statistically significant. Among the other variables, an interesting result is that the high Herfindahl index variable and the number of lenders variable are significantly negative (though only at the 10% level for non-corporate firms). Small businesses pay lower interest rates when there is more competition in the local lending markets and when firms borrow from more lenders. Larger firms also pay lower interest rates and firms owned by African-Americans and other minorities pay higher interest rates.

We calculated the predicted effects of changes in the homestead exemption level on interest rates, following the same procedure as used above. If the homestead exemption increases from the 25th to 50th percentile, the interest rate for non-corporate firms is predicted to rise by .60 percentage points and, if the exemption increase is from the 50th to the 75th percentile, it rises by a further 1.33 percentage points. The predicted overall increase from the 25th percentile to unlimited is 2.15 percentage points. For corporate firms, the interest rate rises by .27 percentage points when the exemption level increases from the 25th to the 50th percentile and by a further .56 percentage points from the 50th to the 75th percentile. For both firm types,

[27] We did not use a two-stage Heckman model because it did not seem possible to separate the credit rationing model from the interest rate determination model, since any observable information that affects what interest rate lenders charge also affects whether they ration credit.

[28] Because we have no information concerning the interest rate for firms that were credit rationed, we reran the model with the truncated interest rate set at levels between 18 and 30%. The results for higher interest rates were that the size and significance of the homestead exemption coefficients gradually increased, but everything remained the same. We report the results for the interest rate of 17% because this specification has the highest log-likelihood value.

however, the increase in interest rates is non-monotonic when exemptions are above the 75th percentiles. This result is surprising but consistent with the credit rationing results.

As expected, the responsiveness of the interest rate to changes in the exemption level is higher for non-corporate firms than corporations. This is presumably because lenders are willing to lend to some small corporate firms qua corporations, but treat other small corporate firms as though they were non-corporate—i.e., they require that owners personally guarantee the loans and therefore bankruptcy exemption levels matter. A past bankruptcy filing also has a larger effect on non-corporate than corporate firms: it is predicted to increase the interest rate for non-corporate firms by 5.4 percentage points and for corporate firms by 2.1 percentage points.

Loan size. For the most recent loan application, the NSSBF asks the size of the loan that the lender offered.[29] We ran Tobit models explaining loan size (in logs) for the samples of non-corporate and corporate firms where loan size is left censored at zero. Again, we expect the coefficients to reflect a combination of supply and demand considerations. An increase in the bankruptcy exemption level causes entrepreneurs to demand larger loans because the consequences of business failure are not as bad, but also causes lenders to reduce loan supply because lending is more risky. Thus we could observe either positive or negative coefficients on the exemption variables, depending on which effect is larger.

The results are shown in table 6. For both types of firms, the signs of the homestead exemption variables are reversed from the previous results—the homestead exemption and unlimited homestead exemption variables have negative signs, but the squared homestead exemption variables are positive. All three variables are statistically significant for non-corporate firms, but the unlimited exemption dummy is insignificant for corporate firms. The personal property exemption variables are not significant in either sample. As expected, the past bankruptcy filing and past personal delinquency variables are negative and significant in both regressions, but the past business delinquency variables are insignificant.

Finally we turn to the predicted effects of the homestead exemption level on loan size. For non-corporate firms, if the exemption increases from the 25th to the 75th percentile, loan size falls by about $79,000. The overall change predicted by an increase of the exemption from the

[29] The NSSBF actually asks separately how much the firm applied for and how much the lender offered. In theory, these separate measures might allow us to separately estimate a demand curve from the former and a supply curve from the latter. However, in practice, the two variables are extremely closely related, with a correlation coefficient of .994. Presumably, firms apply for the amount of credit that they expect lenders to provide and lenders may tell borrowers in advance how much they are willing to lend.

25th percentile to unlimited is a reduction of $198,000. For corporate firms, if the exemption increases from the 25th to the 75th percentile, loan size is predicted to fall by $68,000 and when increased from the 25th percentile to unlimited, loan size falls by $41,000. The general decreasing relationship between loan size and the exemption level is consistent with our model, but there is again a region above the 75th percentile where predicted loan size rises rather than falls as the exemption level increases. As predicted, the marginal effects of changes in the exemption level are larger for non-corporate firms than for corporations. Finally, a past personal bankruptcy filing is predicted to reduce loan size for non-corporate firms by $470,000 and for corporations by $72,000.

5. Conclusion

This paper investigates how personal bankruptcy law affects small firms' access to credit. We show that higher personal bankruptcy exemptions are predicted to cause increased credit rationing and higher interest rates. These predictions apply to both non-corporate firms and corporations, although the marginal effects are should be larger for non-corporate firms. Personal bankruptcy exemptions affect credit markets for small corporate firms because small business owners can easily transfer funds from the firm to themselves even if the firm is corporate. Thus lenders may not view the corporate/non-corporate distinction as meaningful for small firms.

We test the model and find that small businesses located in states with high homestead exemptions are more likely to be credit rationed and, if they receive loans, interest rates are higher and loan size is smaller. However we find that the effect of increases in exemption levels is non-monotonic: as the exemption level rises, the probability of credit rationing and the interest rate first rise, then fall, and then rise again when the exemption level becomes unlimited. For loan size, the pattern is the same with the opposite sign. We also find that the effect of changes in exemption levels on the probability of credit rationing is much larger for firms with low net assets than for firms with high net assets, regardless of whether they are corporate or non-corporate. When owners of either type of firm have previously filed for bankruptcy, the probability that their firms are credit rationed triples and, when firms or their owners have previously been delinquent on personal or business obligations, the probability that firms are credit rationed doubles.

Each year for the past several years, the U.S. Congress has adopted legislation that would limit homestead exemptions to a maximum of $100,000. Although the intended effect of the change is to discourage well-off consumers from taking advantage of bankruptcy to shield their assets from creditors, our results suggest that the change would make it easier for small businesses to obtain credit.

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Table 1: 1993 Bankruptcy Exemptions by State

Chapter 7 bankruptcy exemption levels are reported by state from Elias, Renauer and Leonard (1994). The homestead exemption is for equity in owner-occupied principle residences. The personal property exemption is the sum of the state's exemptions for cash, equity in vehicles, and near cash assets such as jewelry.

	Homestead exemption ($)	Personal prop. exemption ($)
Alabama	10,000	6,000
Alaska	54,000	6,000
Arizona	100,000	3,300
Arkansas	Unlimited	2,900
California	75,000	5,000
Colorado	60,000	2,000
Connecticut	15,000	10,700
D.C.	15,000	10,700
Delaware	15,000	10,700
Florida	Unlimited	2,000
Georgia	10,000	2,800
Hawaii	40,000	42,000
Iowa	Unlimited	10,200
Idaho	100,000	3,000
Illinois	15,000	6,400
Indiana	15,000	8,200
Kansas	Unlimited	40,000
Kentucky	10,000	7,000
Louisiana	15,000	25,000
Massachusetts	100,000	3,350
Maryland	0	11,000
Maine	15,000	3,200
Michigan	15,000	10,700
Minnesota	Unlimited	6,000
Missouri	8,000	3,500
Mississippi	150,000	20,000
Montana	80,000	1,200
North Carolina	20,000	10,000
North Dakota	160,000	12,400
Nebraska	20,000	5,000
New Hampshire	60,000	2,000
New Jersey	15,000	10,700
New Mexico	40,000	9,000
Nevada	95,000	3,000
New York	20,000	9,800
Ohio	10,000	3,600
Oklahoma	Unlimited	6,000
Oregon	20,000	16,200
Pennsylvania	15,000	10,700
Rhode Island	15,000	10,700
South Carolina	15,000	10,700
South Dakota	60,000	4,000
Tennessee	7,500	8,000
Texas	Unlimited	60,000
Utah	10,000	3,000
Virginia	10,000	10,000
Vermont	60,000	21,200
Washington	60,000	7,000
Wisconsin	40,000	4,400
West Virginia	15,000	2,800
Wyoming	20,000	4,000

Table 2: Summary Statistics

This table gives means and standard deviations of select variables from 1993 *National Survey of Small Business Finance*. Noncorporate firms include proprietorships and partnerships; corporate firms include corporations and S-corporations. Credit-constrained indicates that the firm was either discouraged from applying for a loan or applied and was denied, both within the past three years. All dollar amounts are in thousands.

	Noncorporate Not credit constrained		*Noncorporate* Credit constrained		*Corporate* Not credit constrained		*Corporate* Credit constrained	
Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Discouraged/denied	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Discouraged	0.00	0.00	0.95	0.22	0.00	0.00	0.93	0.25
Denied	0.00	0.00	0.57	0.50	0.00	0.00	0.47	0.50
Homestead exemption	61.86	57.18	66.73	56.69	56.14	57.68	55.74	56.16
Personal prop. exemption	12.64	16.27	12.84	17.00	11.61	14.47	10.83	13.73
Past bankruptcy filing	0.01	0.11	0.06	0.25	0.01	0.11	0.08	0.27
Past personal delinquency	0.09	0.28	0.37	0.48	0.05	0.22	0.25	0.43
Past business delinquency	0.11	0.31	0.36	0.48	0.13	0.33	0.45	0.50
Owner's age	50.65	11.83	46.51	10.18	51.57	11.27	47.99	10.63
Firm's age	15.43	13.77	10.95	8.57	17.26	14.61	12.76	12.19
Family owned	0.89	0.31	0.94	0.23	0.75	0.44	0.77	0.42
Female owned	0.23	0.42	0.26	0.44	0.21	0.41	0.27	0.44
African-American owned	0.06	0.24	0.26	0.44	0.04	0.20	0.18	0.39
Other minority owned	0.23	0.42	0.51	0.50	0.13	0.34	0.32	0.47
Employment	9.31	30.19	6.23	21.35	52.69	76.86	29.52	54.90
Profits/assets ratio	1.26	6.31	1.22	4.24	0.49	2.81	0.47	3.70
Debt/assets ratio	0.53	0.82	0.70	0.80	0.60	0.62	1.03	2.94
Sales growth	15.39	416.72	3.12	43.69	2.38	39.29	1.25	2.40
HHI > 1800	0.53	0.50	0.47	0.50	0.49	0.50	0.42	0.49
Years of bank relationship	9.83	8.82	6.91	5.95	10.00	9.39	6.72	6.52
Checking account at bank	0.94	0.25	0.89	0.32	0.94	0.24	0.87	0.34
Number of lenders	0.03	0.24	0.06	0.39	0.19	0.67	0.27	0.98
State unemployment rate	0.07	0.02	0.07	0.02	0.07	0.02	0.07	0.02
Loan size	759.92	5539.52	308.73	1234.63	1406.30	5265.58	849.02	2893.89
Interest rate	8.91	2.40	10.17	3.76	8.05	1.76	8.96	2.56
No. of observations	1303		526		2072		736	

Table 3: Logit Regressions Explaining Whether Firms are Credit Rationed

The dependent variable is whether firms were credit constrained (discouraged/denied) within the past three years. Standard errors are shown in parentheses. Asterisks indicate significance at the 95% level.

	Non-corporate firms		Corporate firms	
	Coefficient	Std.error	Coefficient	Std.error
Homestead exemption	0.0186*	(.0074)	0.0115	(.00625)
Homestead exemption squared	-.00011*	(.000045)	-.000120*	(.0000438)
Unlimited homestead exemption	0.512	(.377)	1.69*	(.436)
Personal property exemption	0.0118	(.0209)	0.0104	(.0223)
Personal property exemption squared	-.000218	(.00033)	-.000281	(.000376)
Past bankruptcy	1.58*	(.444)	1.58*	(.364)
Past personal delinquency	0.902*	(.219)	0.791*	(.219)
Past business delinquency	1.24*	(.175)	1.16*	(.169)
Owner's age	-0.0143*	(.0069)	-0.00823	(.00568)
Firm's age	-0.0103	(.00857)	-0.00728	(.00664)
Family owned	0.492*	(.254)	0.0635	(.100)
Female owned	-0.156	(.126)	0.126	(.154)
African-American owned	1.20*	(.180)	1.008*	(.214)
Other minority owned	0.548*	(.173)	0.212	(.176)
Employment (in logs)	-0.0750	(.0865)	-0.176*	(.0604)
Profit/asset ratio	0.0119	(.00857)	-0.0493*	(.0210)
Debt/asset ratio	0.197	(.110)	0.265*	(.095)
Sales Growth	-.000157	(.000227)	-.000453	(.00102)
HHI > 1800	-0.0633	(.184)	-0.0312	(.198)
Years of bank relationship	-0.0264*	(.0142)	-0.0240*	(.0117)
Years of bank relationship missing	-.195	(.310)	.297	(.584)
Checking account at bank	-0.369	(.273)	-0.700*	(.215)
Number of lenders	0.356	(.215)	0.0619	(.0612)
State unemployment rate	1.92	(3.93)	-1.415	(5.02)
Number of observations	1801		2780	
Pseudo-R^2	0.189		0.160	

Table 4: Logit Regressions Explaining Whether Firms are Credit Rationed When Net Assets are High versus Low

The model is the same as in table 3, except that the exemption variables are interacted with a dummy variable equaling one if the firm's net assets are in the top half of the distribution. Assets are net of liabilities. Only the results for the homestead exemption variables are given. Standard errors are shown in parentheses. Asterisks indicate significance at the 95% level.

	Non-corporate firms		Corporate firms	
	Coefficient	Std.error	Coefficient	Std.error
Homestead exemption	.0248*	(.00793)	.0167*	(.00631)
Homestead exemption squared	-.000167*	(.000050)	-.000190*	(.000045)
Unlimited homestead exemption	.949*	(.413)	2.37*	(.626)
Homestead exemp x high asset dummy	-.0129*	(.00443)	-.00964	(.00651)
Homestead exemp squared x high asset dummy	.000105*	(.000034)	.000127*	(.000057)
Unlimited homestead exemp x high asset dummy	-.947	(.567)	-1.25	(.850)
Pseudo-R^2	0.1919		0.1647	

Table 5: Effects of Bankruptcy Exemptions on Interest Rates

This table presents results from Tobit regressions explaining the interest rate on loans for non-corporate and corporate firms. Interest rates for firms that were credit rationed are right censored 17 percent, which is above the maximum value of 16.5 percent in the sample. Asterisks indicate statistical significance at the 95 percent level.

	Non-corporate firms		Corporate firms	
	Coefficient	*p*-value	Coefficient	*p*-value
Homestead exemption	0.0824*	.009	0.0367*	.033
Homestead exemption squared	-0.000588*	.007	-0.000271*	.030
Unlimited homestead exemption	4.91*	.025	1.70	.168
Personal property exemption	-0.139	.233	0.0652	.283
Personal prop. exemption squared	0.0011	.565	-.000939	.362
Past bankruptcy	5.71*	.052	2.20*	.053
Past personal delinquency	2.03	.077	1.45*	.021
Past business delinquency	-0.867	.392	-0.540	.250
Owner's age	0.106*	.002	0.0887*	.000
Firm's age	-0.0257	.467	0.0191	.317
Family owned	2.28	.058	-0.905*	.030
Female owned	0.501	.541	0.513	.189
African-American owned	5.26*	.027	8.31*	.000
Other minority owned	9.10*	.000	1.88*	.007
Employment (in log form)	-1.35*	.001	-1.33*	.000
Profit/asset ratio	0.111	.171	0.139*	.017
Debt/asset ratio	-0.507	.177	-0.206	.205
Sales growth	-0.00104	.102	0.00952	.442
HHI > 1800	-1.18	.088	-0.854*	.015
Years of bank relationship	0.000923	.986	-0.00365	.989
Years of bank relationship missing	-.480	.769	3.95*	.007
Checking account at bank lender	1.31	.328	0.844	.196
Number of lenders	-2.43	.058	-0.939*	.000
Intercept	15.2*	.000	13.1*	.000
Number of observations	1801		2779	
Pseudo R^2	.0508		.0205	
Log likelihood	-2140.96		-5808.21	

Table 6: Effects of Bankruptcy Exemptions on Loan Size

This table presents results from Tobit regressions explaining loan size (in log form) for non-corporate and corporate firms. Loan size for all firms that did not receive credit is censored at zero. *P*-values are given and asterisks indicate statistical significance at the 95 percent level.

	Non-corporate firms		Corporate firms	
	Coefficient	*p*-value	Coefficient	*p*-value
Homestead exemption	-0.0970*	.010	-0.0382	.077
Homestead exemption squared	0.000677*	.010	0.000304	.051
Unlimited homestead exemption	-5.18*	.050	-2.34	.129
Personal property exemption	0.126	.371	-0.0802	.290
Personal prop. exemption squared	-0.00082	.723	0.00114	.376
Past bankruptcy	-7.56*	.034	-2.99*	.036
Past personal delinquency	-3.07*	.027	-1.93*	.014
Past business delinquency	1.08	.371	0.730	.213
Owner's age	-0.127*	.002	-0.120*	.000
Firm's age	0.0333	.434	-0.0153	.519
Family owned	-2.74	.057	1.27*	.015
Female owned	-1.13	.247	-0.782	.110
African-American owned	-5.26	.061	-10.04*	.000
Other minority owned	-10.7*	.000	-2.35*	.007
Employment (in log form)	1.68 *	.000	1.95*	.000
Profit/asset ratio	-0.164	.109	-0.173*	.017
Debt/asset ratio	1.02*	.016	0.284	.158
Sales growth	0.000927	.209	-0.00851	.576
HHI > 1800	1.74*	.036	1.047*	.017
Years of bank relationship	-0.0209	.737	-0.00436	.898
Years of bank relationship missing	-9.99	.000	-5.89	.002
Checking account at bank lender	-1.363	.400	-1.34	.100
Number of lenders	2.83	.068	1.17*	.000
Intercept	2.28	.495	4.98*	.002
Number of observations	1801		2780	
Pseudo R^2	.0485		.0220	
Log likelihood	-2275.52		-6133.26	