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The Joint Effect of Relationship Lending on Loan Interest Rates, Collateral, and Fees: Evidence From Small Business Data

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Abstract

This paper examines the joint impact of borrower-lender relationships on loan interest rates, collateral and fees. Using a simultaneous system of equations with well-identified instruments, we find that firms that have a shorter relationship with their lenders have both a higher likelihood of collateral and are charged higher fees. Further, once we endogenize for collateral and fees, we do not find a significant correlation between loan rates and the length of the relationship between borrowers and lenders. We also find that fees are positively related to fixed rate loans, and the evidence for sorting by borrower credit risk is mixed. These results suggest that fees and loan interest rates are complements, as fees are used to compensate lenders for refunding risk. Consistent with the moral hazard arguments for collateral, we find a positive relationship between collateral and the risk of the firm.

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Introduction

The theoretical financial intermediation literature (Diamond 1984, 1991, Ramkrishnan and Thakor 1984, Fama 1985, Sharpe 1990, Rajan 1992, Padilla and Pagano 1997, Diamond and Rajan 2001, among others) has often argued that banks produce information about borrower firms through their lending relationships, which is otherwise not available to the capital markets. This information production that accrues over the relationship might involve the accumulation of repayment history, the borrower's characteristics learned through managerial visits, any renegotiations, and other "soft" information. Using this argument, many empirical papers have then focused on the impact of the bank-borrower relationship on the borrower's loan rate. More specifically, these papers have examined if the length of the lending relationship has a significant impact on the borrower's loan interest rate?

The empirical evidence on this issue is mixed. On the one hand, Berger and Udell (1995), Harhoff and Korting (1998), and Degryse and Cayseele (2000) find that the length of the bank-borrower relationship is negatively and statistically significantly related to the loan rate. On the other hand, Petersen and Rajan (1994) and Elsas and Krahnen (1998) find a positive but statistically insignificant relationship to the loan rate. However, the price of credit could be decomposed into two components, namely the borrower's interest rate and other "shadow" prices. If the length of the lending relationship has a significant impact on these "shadow" prices, then one should endogenize these "shadow" prices in examining the impact of the bank-borrower relationship on the borrower's loan rate. In doing so, we examine the impact of the bank-borrower relationship on two "shadow" prices, namely, whether the loan is collateralized, and whether the loan has any fees attached to it. Accordingly, this paper contributes to the existing literature in the following ways.

One, Berger and Udell (1994, 1995) examine the determinants of collateral and find that firms with a longer relationship with their lenders have a lower probability of having to post collateral. They then include collateral as an *exogenous* independent variable in the loan rate regression. We *endogenize* collateral in a simultaneous set of equations, in order to accurately estimate the impact of the length of the lending relationship on the firm's loan rate. Two, we examine a comprehensive set of regressors on borrower loan rates for lines of credit only. In examining lines of credit only, Berger and Udell (1995) argue: " By limiting our study to L/Cs, we exclude from our data set most loans that are "transaction driven" rather than "relationship driven" … (page 353)." They examine a large set of regressors but exclude Petersen and Rajan's (1994, 1995) macroeconomic interest rate variables and bank concentration ratios. Petersen and Rajan (1994,1995) examine all different types of loans (rather than lines of credit) while ignoring the role of collateral. We include the macroeconomic interest rate variables and bank concentration ratios while focusing on lines of credit only.

Three, all the empirical studies have ignored the role of fees charged to a borrower firm. Are these fees potentially important? According to an article in Fortune (October 2002, page 164): "There is no question that banks want high-fee business too, and they're pretty explicit about their desires. Banks argue that without more fees their customers might be left without lenders … commercial banks may earn as little as 0.1% for extending a line of credit." Accordingly, a bank might charge a borrower a lower loan rate given that she gets a higher return from fees. Further, do borrowers with a longer relationship with their lenders get charged a higher fee, a lower fee, or no fees? After analyzing the impact of the borrower-lender relationship on fees, we then endogenize fees in order to examine the impact of these fees on the borrowers' loan rate. Four, a minor point, we check if the relationships that held in the late 1980s (as found by Berger and Udell 1994,1995, and Petersen and Rajan 1994, 1995) also held during the

1990s. In doing so, we use both the 1993 and 1998 *National Survey of Small Business Finance*.

We find the following results.

1. We find that firms with longer lending relationships are charged lower fees. As in Berger and Udell (1995) we also find that firms with longer lending relationships have a lower probability of collateral. After endogenizing for both fees and collateral in a system of equations, we find that the lending relationship has no significant correlation with loan interest rates, consistent with Petersen and Rajan (1994) and Elsas and Krahnen (1998).
2. Given that theoretical arguments suggest that collateral and fees are endogenously chosen by loan market participants, we present a methodology to accurately identify the impact of regressors using a simultaneous system of equations with well-identified instruments. Not doing so can create problems in interpreting standard regression results. Our strategy in identifying valid instruments is three-fold. First, we used the extant theory in order to minimize arbitrariness. Second, we find that the instrumental variables are empirically related to the dependent variables in our sample. Third, we find that the error term in the loan rate equation is uncorrelated with our instruments.
3. Consistent with the moral hazard arguments for collateral (see Boot, Thakor and Udell 1991, Boot and Thakor 1994, John, Lynch, and Puri 2002), we find a positive relationship between the collateral and the risk of the firm. We propose a new proxy to measure the information asymmetry regarding managerial effort and ability. This proxy is a dummy variable that is set to unity when the principal owner or the firm has previously defaulted. We find that this variable is more strongly related to the probability of requiring collateral than the existing literatures proxies (for example, CEO ownership, etc.)

4. Consistent with Petersen and Rajan (1994,1995), loan interest rates are related to macroeconomic variables such as the prime rate, the term structure, and the default premium. Accordingly, all regression specifications of loan interest rates should include these variables.
5. We find that fees are higher for fixed rate loans. We hence examine if this positive relationship is because of refunding risk driven solely by potential changes in macroeconomic conditions (with no regard to any differential impact of borrower credit risk), or refunding risk driven by sorting due to borrower credit risk. However, we find mixed evidence for sorting according to borrower credit risk. Specifically, we find that both smaller firms and more profitable firms have a higher probability of borrowing at fixed rates.
6. A minor result -- many of the previous literatures results which used the 1988-89 survey hold when one uses the 1993 and 1998 survey.

The paper is organized as follows. In Section I, we describe the data, the empirical methodology, and the different proxy variables used. In Section II, we present our results. Section III gives our conclusions and possible extensions for future research.

I. Data, Methodology, and Variables Used

Our sample is derived from the 1993 and 1998 *National Survey of Small Business Finances*, under the guidance of the Board of Governors of the Federal Reserve System and the Small Business Administration. As in Berger and Udell (1995) we restrict our sample of firms to those who obtain a line of credit only. We were able to identify 1109 firms from the 1993 Survey and 258 firms from the 1998 Survey. After omitting firms with missing data entries, our final sample consisted of 1125 firms. All the macroeconomic variables at the time the line of credit was granted (namely, the prime rate, the slope of the term structure, and the

default spread variable) are obtained from the Federal Reserve Bank of St. Louis (http://research.stlouisfed.org).

We now present our empirical methodology. We begin by estimating OLS regressions of the previous empirical literature by running loan interest rates on all variables, (which are assumed to be exogenous). Then, given that the theories on collateral and fees propose that these variables are endogenously determined, we define a system of simultaneous equations. Our strategy to identify valid instruments is three-fold. First, we use the extant theory so as to minimize any arbitrariness. Second, we test to make sure that the instrumental variables are empirically related to the dependent variables in our sample. Third, we examine if the error term in the simultaneous set of equations is uncorrelated with the instruments. As is detailed below, for loan interest rates we use the theory of Petersen and Rajan (1994); for collateral we use the theories of Besanko and Thakor (1987 a,b), Bester (1985), Boot, Thakor and Udell (1991), Boot and Thakor (1994), Chan and Kanatas (1985), John, Lynch, and Puri (2002); and for fees we use the idea that fees might be charged for refunding risk, allowing us to link fees to whether the loan is fixed or variable. In Section III of this paper, we show that our instruments are strongly related to the dependent variables.

We hence describe our equations in detail. Equation (1) examines the loan interest rate charged to borrowers (the usual equation used by both Berger and Udell 1995, and Petersen and Rajan, 1994, 1995). Equation (2) defines the determinants of fees charged on loans. We observe that 527 out of 1,125 firms (or 47% of our sample) were not charged any fees. This issue and the censoring below zero of *Fees* made us use a Tobit regression to estimate equation (2). Given that whether a loan is collateralized or not is a binary variable, equation (3) is estimated as a logistic regression. In order to satisfy the rank and order conditions for system identification, we use instrumental variables, denoted by the vector **Z** for each of the three equations. The control variables common to all three equations are denoted by the vector

X. We then employ the two-stage least squares technique to test our hypotheses. Our empirical specification is as follows:

$$Loan\ Rate = \alpha_{LR} + \beta_{LR} Collateral + \gamma_{LR} Fees + \Omega_{LR}\mathbf{X} + \lambda_{LR}\mathbf{Z}_{LR} + \varepsilon_{LR} \quad (1)$$

$$Fees = \alpha_{PF} + \beta_{PF} Collateral + \gamma_{PF} Loan\ Rate + \Omega_{PF}\mathbf{X} + \lambda_{PF}\mathbf{Z}_{PF} + \varepsilon_{PF} \quad (2)$$

$$Collateral = \alpha_{CO} + \beta_{CO} Fees + \gamma_{CO} Loan\ Rate + \Omega_{CO}\mathbf{X} + \lambda_{CO}\mathbf{Z}_{CO} + \varepsilon_{CO} \quad (3)$$

We begin by explaining the dependent variables in our system of equations. For equation (1), the dependent variable *Loan Rate* is the contractual coupon rate of the line of credit. For equation (2), the dependent variable *Fees* is the fraction of fees collected by the lending institution on the total amount borrowed. For equation (3), the dependent variable *Collateral* equals to unity if collateral is required by the loan, and zero otherwise. Table 1 provides a summary of our variables and notation.

Table 1

The control variables common to all three equations are classified into firm characteristics, loan characteristics, macroeconomic variables, and database year. We describe these variables in detail below. Firm characteristics capture the profitability and risk characteristics of the firm. We include the following set of firm operating characteristics: a) the leverage of the firm, *Debt*, defined as the ratio of the total debt outstanding to the level of annual sales; b) the profitability of the firm, *Profit*, defined as ratio of earning before interest and taxes to annual sales; c) the liquidity of the firm, *Cash*, defined as the ratio of the level of cash holdings to the annual sales of the firm; d) size of the firm, *Size*, defined as the logarithm of the firm's annual sales; e) a dummy variable, *Company*, which equals unity if the firm's owners enjoy limited liability protection; f) the bargaining power of the borrower proxied by the variable, *Number*, defined as the number of lending sources available to the firm at the time of loan approval; and g) industry dummies variables to capture industry characteristics

based upon the borrowers two-digit SIC code (the results of which are not reported). We expect that the loan rate will be positively related to risk of default, which in turn should be positively related to leverage of the firm, and negatively related to the firm's profitability, liquidity, size, legal liability, and bargaining power of the firm. Therefore, we expect a positive coefficient for *Debt*, and negative coefficients for *Profit, Cash, Size,* C*ompany*, and *Number* in the loan rate equation.

We now describe the loan characteristic variables. Our first loan characteristic is whether the loan requires a compensating balance. Accordingly, we include a variable, *Comp Bal*, that is set to unity if the line of credit requires a compensating balance, and zero otherwise. Banking theory (Diamond 1984, 1991, Ramkrishnan and Thakor 1984, Fama 1985, Sharpe 1990, Rajan 1992, among others) suggests that banks obtain information through lending relationships. Accordingly, we include a variable *Relation,* defined as the number of years the firm has a relationship with the lending institution. The lending relationship variables capture the potential impact of asymmetric information on the level of interest rate charged. On the one hand, Berger and Udell (1995) find that the length of the bank-borrower relationship is negatively and statistically significantly related to the loan rate. On the other hand, Petersen and Rajan (1994) find a positive but statistically insignificant relationship to the loan rate. We test which of these two results hold in our regressions. Given that banks are posited by these theories to have this superior monitoring technology, we also include a dummy variable, *Bank*, that equals to unity if the lender is a bank, savings or thrift institution, and is equal to zero, otherwise.

We include the maturity of the line of credit, *Maturity,* as a control variable. Although we are well aware that loan maturity is itself an endogenous variable (see for example, Brick and Ravid, 1985, 1991, and Barclay, Marx and Smith, 2002), we are constrained by the need to correctly identify our system of equations. More specifically, it is difficult to find an instrument for loan maturity that is not related to a loan's interest rate, collateral, and fees

charged. In order to minimize the impact of endogenizing maturity in our system of equations, we estimate two different specifications in all our regressions. In the first specification, we include maturity as an independent variable, whereas in the second specification we exclude maturity as an independent variable.

Given that macroeconomic variables influence the underlying cost of capital of firms, we include them in our set of control variables (consistent with Petersen and Rajan 1994, 1995). We include the following three macroeconomic variables, aligned to the date (month and year) the loan was made, in our set of control variables: a) the prime rate, denoted as *Prime*; b) the yield spread between the five-year Treasury note rate and the yield of a monthly three-month Treasury bill, denoted as *Term*; and c) the default spread at the time of the loan approval, *Default*, defined as the difference between the yield of a Baa bond and that of a Aaa bond. We expect that economy wide risk and its impact upon the risk of individual firms should be positively related to the prime rate, the risk of default, and the slope of the term structure (given that the yield curve becomes more steeply sloped and increasing as expected inflation increases). Consequently, we expect *Loan Rate* to be positively related to *Prime, Term,* and *Default*. Our last control variable is a dummy variable*, Year*, that is set to unity if the firm observation is obtained from the 1998 Survey, and zero if the firm observation is obtained from the 1993 Survey.

We now describe the various instrumental variables (**Z**) used. For equation (1), we use two instrumental variables (and different transformations thereof), namely, the market power of the lending institution and the age of the borrower firm. Petersen and Rajan (1995) suggest that bankers in concentrated markets (monopolistic bankers with market power) charge lower interest rates to young firms with the understanding that they can extract future surplus through higher interest rates later. Accordingly, we include a dummy variable *HHI Conc,* that is equal to unity if the Herfindahl Index for deposits in the firm's MSA is greater than 1800, and zero otherwise. We define the variable *Firm Age,* as the age of the firm in years. As in

Petersen and Rajan (1995), we would expect to find a negative relationship between the concentration dummy and loan interest rates. In addition, we create an interaction variable *Inter1,* which is the interaction term between the concentration dummy and the borrower firm's age. As in Petersen and Rajan (1995), we expect a positive sign on *Inter1*, if the negative relationship between the concentration dummy and loan interest rates is more pronounced for younger firms.

Financial theory suggests that the required return lenders demand from borrowers should be positively related to the loan's default risk. However, lenders can charge borrowers for risk on different dimensions, namely, the loan rate and lending fees. If the two charges are potential substitutes for a given borrower's risk class, then one would expect a negative relationship between the loan interest rate and loan fees.[2] Loan fees and loan interest rates might also be positively related because fees may be used to compensate lenders for the refunding risk embedded in the prepayment option of fixed rate loans. There are two possible reasons for this complementary relationship. The first reason is solely related to changes in macroeconomic interest rates. As interest rates fall, borrowers have the incentive to refund the loan. The lender will then be forced to "reprice" its existing loan and offer a lower rate. The upfront fee is one way to compensate the lending institution for the refunding risk because for a given coupon rate and fee, the return to the lender is inversely related to the actual amount of time the loan is outstanding. Under this argument, one expects to find no relationship between the credit quality of borrower firms and the probability of borrowing at fixed rates. The second reason for complementarity is that low quality firms would borrow at fixed interest rates because the impact of a credit rating change on their loan interest rates is greater than for high quality firms. More specifically, low credit

[2] Bruekner (1994), Dunn and McConnell (1981), Dunn and Spatt (1985), and Leroy (1996) demonstrate theoretically that points can be used by banks to differentiate those mortgage borrowers with high probabilities of prepayment because they are more mobile from those borrowers with low probabilities of prepayment. Borrowers who tend not to prepay would, in equilibrium, select low interest rate and high loan fee contracts. Borrowers who

risk firms would be protected against the impact of future credit risk deterioration upon their existing loans. If their credit risk improves, they can exercise the implicit embedded option to refinance. Under this argument, one expects to find a positive relationship between credit quality of borrower firms and the probability of borrowing at fixed.

For equation (2) the fees equation, we use the instrumental variable, *Fixed,* a dummy variable equal to unity if the line of credit has a fixed coupon rate, and zero otherwise. As argued above, fees might be regarded as substitutes or complements to the loan rate. If fees were a substitute for loan interest rates, one would a priori expect no relationship between fees charged and whether the loan is fixed, and a negative relationship between fees and the loan interest rates. If fees are complements to loan interest rates because fees are used to compensate lenders for refunding risk, one would a priori expect a positive relationship between fees charged and whether the loan is fixed, and a positive relationship between fees and the loan interest rates. Refunding risk should be more present in a fixed-rate loan than a variable rate loan and the probability of refunding is higher for high interest rate loans than low interest rate loans.

The literature has offered two competing hypotheses regarding the relationship between risk and the probability of collateral being required to secure the loan, and the loan interest rate charged. According to the asymmetric information theories regarding the quality of the firm (see Besanko and Thakor 1987 a,b, Chan and Kanatas 1985, and Bester 1985), borrower firms know their own default probabilities while lenders do not. In such a framework, low risk borrowers pledge more collateral as it is less costly for them to do so. Therefore, one would expect a positive relationship between the quality of the firm and the probability that these firms offer collateral. In an alternative explanation for collateral, which we term the moral hazard theories (see Boot, Thakor and Udell 1991, Boot and Thakor 1994,

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tend to prepay would select low loan fees and high interest rate contracts. Note that these papers argue for substitution that is unrelated to the default risk factor of the firm.

John, Lynch, and Puri 2002), the quality of the borrower firm is observable, whereas managerial effort is unobservable. In order to mitigate the problem of unobservable managerial effort, high-risk borrowers would be required to pledge more collateral. Accordingly, one would expect a negative relationship between the quality of the firm and the probability of collateral.

If collateral is used to compensate lenders for default risk and to ensure managerial effort, we can use five instrumental variables for collateral in equation (3). Consequently, we employ as instrumental variables the CEO's characteristics, the tangibility of the firm's assets, and if the firm or its principal owner has defaulted. These variables are: the age of the CEO, denoted as *CEO age*; b) the CEO percentage ownership of the firm, *CEO share*; c) the number of years experience as the CEO of the firm, *CEO exp*; d) a dummy variable, *Delinq*, that is equal to unity if either the principal owner or the firm has defaulted; and e) the ratio of long-term tangible assets to sales, *NFA*. We hypothesize that uncertainty concerning the effort level of older and more experienced CEOs is smaller than younger and less experienced CEOs. Similarly, less uncertainty should be present for older firms as well. Hence, we would expect the probability that collateral is required is negatively related to age of the firm, CEO and CEO experience. On the other hand, we expect uncertainty with respect to managerial effort and ability to increase if either the firm or its principal owner has been delinquent on a previous loan. Finally, we expect the probability of a collateral requirement to increase the more long-term tangible assets the firm has.

In order to ensure that our loan rate equation (namely, equation (1)) is well identified in our sample, we test if its error term ε_{LR} is uncorrelated with our instruments. More specifically, we conduct an F-test to examine if $E(\varepsilon_{LR}, \mathbf{Z})=0$.

We hence examine the data on 1,125 firms by analyzing the descriptive statistics of our variables (see Table 2). Our borrower firms have an average loan interest rate of 8.46 percent, and a median loan interest rate of 8.0 percent. Additional loan fees increased the

coupon rate of the loan by an average of 68 basis points, but with a median increase of 3 basis points only. However, for the 598 firms in our sample that were charged a loan fee, the average loan fee increased the coupon rate of the loan by 129 basis points. The median increase for this group was 50 basis points. On average 60 percent of the line of credits required collateral. The borrower firms have an average debt level of 36.1 percent of sales. The firms have an average profitability to sales ratio of 5.3 percent, with a median ratio of 3.2 percent. We find that these small firms have a significant level of liquidity, given that on average they hold 7.6 percent of sales in cash. Our borrower firm has average sales of $8.84 million and a median size of $2.88 million. On average, 79 percent of the firms have limited liability protection. The net fixed tangible long-term assets are on average 41.54% of sales. Its median value is 8.62%

Table 2

During 1993 and 1998, the average prime rate was 6.9 percent, and the median prime rate was 6.5 percent. The average yield spread between the five-year Treasury note and the monthly Treasury bill was 2.38 percent with a corresponding median value of 2.71 percent. Our average (median) default premium, defined as the yield difference between the Baa and Aaa bonds, was 0.71 percent (0.68 percent). The borrower firms have on average 7.6 years of a relationship with their lending institution, and a median value of five years. On average, 92 percent of the lines of credit were made available by banking institutions. 10.5 percent of the approved lines of credit on average required a compensating balance. The average maturity on the lines of credit is 24 months, with a median maturity of one year. A much larger sample of 1,107 firms are from the 1998 database, whereas a much smaller sample of 258 firms exists on the 1993 database.

We find that 40.4 percent of our firms borrow from institutions in highly concentrated markets. However, our median firm borrows in a competitive market. The average age of the borrower firms in our sample is 16.5 years. Nearly 29% of the lines of credit in our sample are

on fixed interest rates, whereas the median firm borrows on a variable rate of interest. On average, firms have 1.15 sources of credit with a median value of only one source. The average age of the CEO is 50 years, and the average (median) percentage equity ownership of the CEO is 65.8 percent (58 percent). The CEO on average has 20.1 years in experience, and approximately 21.4 percent of the sample experienced a delinquency on the part of the firm or its principal owner.

II. Empirical Results

Consistent with the previous empirical literature, we begin by regressing the loan rate variable on all other variables assuming that both fees and collateral are not endogenously determined.[3] Although we understand that these regressions are mis-specified, we present the results for exposition. In Table 3, we present the regression results for two specifications, the first includes the variable *Maturity*, and the second excludes this variable. This way we hopefully control for the effect of using maturity as an exogenous variable on our results. We find that *Fees* are not significantly related to the loan rate. We also find that *Collateral* is also not significantly related to the loan rate, consistent with the results of Berger and Udell (1995). We find that borrowers with higher liquidity have a lower loan interest rate. No significant relationship is found between the loan interest rate and borrowers debt levels and the borrowers profitability. As in the previous literature, smaller borrower firms are charged a higher loan interest rate, whereas the limited liability status of the borrower firm has no significant relationship with loan interest rates. As in Petersen and Rajan (1994, 1995), we find loan interest rates to be significantly related to the macroeconomic variables. Specifically, loan interest rates are positively related to the prime rate, negatively related to the slope of the term structure, and positively related to the default premium. As in Berger and Udell (1995), Harhoff and Korting (1998), and Degryse and van Cayseele (2000), we find that the length of

the bank-borrower relationship is negatively related to the loan rate. This result is inconsistent with those of Petersen and Rajan (1994) and Elsas and and Krahnen (1998) who find no significant relationship to loan interest rates.

Table 3

Borrowers who get their lines of credit from banks are charged a lower loan interest rate, as are borrowers who have multiple lending sources. No significant relationship is found between loan interest rates and the compensating balance of the borrower firm. The maturity of the line of credit has no significant effect on loan interest rates, and also importantly does not change any of our other results in any significant manner. Fixed rate loans are charged higher loan interests rates as are firms with higher tangible assets. The CEO's age and experience have no significant relationship with loan interest rates, whereas CEO's with higher share ownership are charged higher loan interest rates. The default record of either the firm or its principal owner has no significant relationship with loan interest rates. The market power and firm age variables have no significant relationship with loan interest rates.

We now turn our attention to estimating the simultaneous set of equations where collateral and fees are jointly determined along with loan interest rates. We begin this analysis by examining the strength of our instrumental variables in our data set. The results to examine the validity of our instruments for all three endongenous variables are given in Tables 4,5, and 6. All these tables have three specifications. The first specification examines the power of the instrumental variables. The second specification includes the instrumental variables along with the control variables, and the third specification is the same as the second but excludes the variable *Maturity*.

Table 4 summarizes the results for *Fees.* In the first specification, we find a significant positive relationship between *Fees* and *Fixed.* We find that the Tobit regression is well specified, given the statistically significant likelihood ratio of 35.13. We find a pseudo R^2 of

[3] Strictly speaking, the previous literature has not included fees in any specification.

0.013, wherein the pseudo R^2 is defined as $(L_p^{2/1,125} - L_w^{2/1,125})/(1 - L_w^{2/1,125})$, where L_p is the maximum of the likelihood function with respect to all the parameters, and L_w is the maximum of the likelihood function with respect to the intercept term only (see Maddala 1983). In the second column we also include all the control variables. Only maturity and fixed loan rates are statistically significantly related to fees, with no other control variables statistically significant. The positive sign on the fixed rate dummy suggest preliminary evidence for the complementarity of fees. The pseudo R^2 drops to 0.011.When we drop maturity as an exogenous variable in our third specification, we find no major changes in the results on *Fixed.* These results suggest that *Fixed* is a strong instrument for fees.

Table 4

We hence examine the strength of the instruments for collateral. This test effectively examines the determinants of collateral, as in Berger and Udell (1990, 1995). We run a logistic regression for collateral on the various independent variables, the results of which are presented in Table 5. Once again, we run three specifications in order to test: the effectiveness of our instrumental variables, and control for our inclusion of loan maturity as an independent variable. Each specification gives a parameter coefficient that is the probability of the loan being collateralized. For example, we a find statistically significant parameter of 0.54 on the variable *Debt*. This suggests that borrowers with higher levels of debt have a higher probability of their lines of credit having collateral. The odds ratio suggests that firms with higher debt levels have 1.7 times the higher likelihood of collateral than firms with lower debt levels. The firm's profitability and liquidity ratios have no statistically significant effect on the probability of their loans having collateral. We also find that larger firms are more likely to have their lines of credit collateralized. Limited liability borrower firms, and lenders who are financial firms, have no statistically significant effect on the lines of credit having collateral. We also find that none of the macroeconomic factors (namely, *Prime, Term, and Default*) have a statistically significant effect on the lines of credit having collateral. Consistent with

Berger and Udell (1995), we find that the length of the relationship has a statistically significant effect on the lines of credit having collateral. Specifically, borrower-lenders with shorter relationships have a higher likelihood of collateral. The odds ratio suggests that borrower-lenders with shorter relationships have a slightly higher likelihood of collateral than borrower-lenders with longer relationships.

Table 5

Borrowers with higher compensating balances do not have a higher or lower probability of collateralized loans. Lines of credit with longer maturity have a higher likelihood of collateral. We find that younger borrower firms and concentrated banking markets have no statistically significant effect on the line of credit having collateral. None of the CEO characteristics variables (CEO age, CEO share ownership, and CEO experience) have a statistically significant effect on the probability of collateral when the logistic equation includes the control variables as independent variables. However, we find that if the firm or owner has previously defaulted on his or her loan has a strong statistically significant positive effect on the probability of having collateral. This last result is consistent with the moral hazard theory for collateral, given that these observable default risk proxies increase the likelihood of collateral. We find that our logistic regression is well specified, given the statistically significant likelihood ratios of 59.86 (instrumental variables only), 163.36 (instrumental and control variables that include maturity), and 142.76 (instrumental and control variables that exclude maturity). The pseudo R^2 of the specifications are almost identical whether or not we include maturity, suggesting that for lines of credit, maturity may not significantly affect the other determinants of the probability that collateral is required.

In Table 6, we present the results for the validity of instruments in our sample for loan interest rates. The instrumental variables for *Loan Rate* are all statistically significant in the first specification, which does not include any of the control variables. Specifically, we run a regression of loan interest rates on the three instruments for loan interest rates, *HHI, Firm age*,

and *Inter1*. We find that all three instruments are related to loan interest rates and are strongly consistent with the results of Petersen and Rajan (1995). Specifically, we find a negative relation for *HHI*, suggesting that banks in more concentrated markets charge a lower interest rate. We also find a negative and statistically significant relationship on *Firm age*, suggesting that younger firms are charged a lower interest rate. The interaction term *Inter1* is positive and statistically significant, suggesting that concentrated banks can charge younger firms a lower interest rates with the understanding that they can extract future surplus through higher interest rates later.

Table 6

In the latter two specifications, we also include all the control variables while controlling for maturity. We find that borrowers who have higher levels of debt and profitability are not charged a different interest rate than those with lower levels of debt and profitability. However, borrower with higher levels of liquidity (*Cash*) is charged a lower interest rate. In addition, larger firms are charged a lower interest rate. Borrowers with limited liability protection have a negative statistically significant relationship with loan interest rates. Consistent with Petersen and Rajan (1994,1995) we find that the macroeconomic variables have a statistically significant relationship to loan interest rates. Specifically, we find that the higher the prime rate the higher the interest rate charged to borrowers. Additionally, we find the higher the default premium in the economy, the higher the loan interest rates. Finally, we find a negatively significant relationship between *Relation* and *Loan Rate*, a result consistent with those found by Berger and Udell (1995) and not found by Petersen and Rajan (1994). No statistically significant relationship is found between the borrower's compensating balance and loan interest rates and between the number of lenders and loan interest rates. We also find no statistically significant relationship between the loan's maturity and loan interest rates. We find that borrower from banks are ceteris paribus charged a lower interest rate. We find an adjusted R^2

of 0.24 in the second and third specifications, and the F-statistic that all parameter coefficients are jointly equal to zero is strongly rejected at the one-percent level of significance.

We now examine the impact of endogenizing fees and collateral on the loan interest rate charged to borrowers. Specifically, we run regressions of *Fees* (Tobit regression) and *Collateral* (logistic regression) on all the various instrumental variables, the fitted values of which are then used in the second stage as independent variables in the regression of loan interest rates. The results of estimating such a simultaneous system of equations are given in Table 7. Once again, we run two specifications, with and without maturity. We find that *Fees* is positively related to loan interest rates and this relationship is statistically significant at the one-percent level. This result suggests strong support for the complementarity argument wherein higher fees are fees are used to compensate lending institutions for refunding risk associated with fixed rate loans. We also find a statistically positive significant relationship for *Collateral*, suggesting that collateral is used to minimize the moral hazard risk problem facing the lender. All the previous results of Table 6 are generally found to hold in Table 7 except that we find no statistical relationship between *Relation* and *Loan Rate* once we endogenize for the probability of collateral and the imposition of loan fees. This result is inconsistent with those found by Berger and Udell (1995) but consistent with those found by Petersen and Rajan (1994).

We now examine if our system of equations is well specified. Accordingly, we test if the loan interest rate's error term ε_{LR} is uncorrelated with our instruments, i.e., we conduct an F-test on $E(\varepsilon_{LR}, \mathbf{Z})=0$. In both specifications, we find that we cannot reject the null of zero correlation, suggesting that our system of equations is well identified.

We next examine if this positive relationship is because of refunding risk driven solely by potential changes in macroeconomic conditions (with no regard to any differential impact of borrower credit risk), or refunding risk driven by sorting due to borrower credit risk. In order to test these two arguments we run a logistic regression of which types of firms take fixed rate loans,

and which types of firms take variable rate loans. The results from this regression are given in Table 8. We find mixed evidence for borrower sorting. On the one hand, small firms (who a priori are likelier to be riskier than larger firms) are more likely to borrow at fixed rates than large firms, and this relationship is statistically significant at the one-percent level. On the other hand, more profitable firms (as denoted by operating profits) are also more likely to borrow at fixed rates, although this relationship is statistically significant at the ten-percent level only. No other variables are statistically significantly related to whether a firm borrows at fixed or variable interest rates. The evidence for and against sorting according to borrower credit risk is therefore mixed.

Table 8

III. Conclusions

Using the arguments made in the theoretical banking literature**,** Berger and Udell (1995) and Petersen and Rajan (1994), among others, have empirically examined the determinants of a firm's borrowing cost, with a focus on the impact of lender-borrower relationships on the borrower's loan rate and found mixed results. However, these empirical studies have ignored the endogenous choice of other "shadow" prices, namely, the choice of collateral and fees charged. Using a simultaneous system of equations with well-identified instruments, we find that firms that have a shorter relationship with their lenders both have a higher likelihood of collateral and are charged higher fees. Further, once we endogenize for collateral and fees, we do not find a significant correlation between loan rates and the length of the relationship between borrowers and lenders. We also find that fees are positively related to fixed rate loans, and the evidence for sorting by borrower credit risk is mixed. These results suggest that fees and loan interest rates are complements, as fees are used to compensate lenders for refunding risk. Consistent with the moral hazard arguments for collateral, we find a positive relationship between collateral and the risk of the firm.

Future research might examine the impact of bank characteristics on loan interest rates (as in Kayshyap, Stein and Wilcox, 1993, Kayshyap and Stein, 1997, and Hubbard, Kuttner, and Palia 2002). However, this requires a matched sample of borrowers and banks which the NSSBF survey does not provide. In addition, one might examine the role of foreign banks on loan interest rates, collateral, and fees. Maybe they prefer a different borrower profile from US domestic banks. One might also examine the impact of bank mergers on loan interest rates (see Berger, et.al. 1998, Sapienza 2002, for the impact on bank mergers on the amount of small business lending). We leave such issues for future research.

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Table 1: Variable Definitions

Variables	Definitions
Dependent variables:	
Loan rate	contractual coupon rate on line of credit
Fees	fees collected by the lending institution as a fraction of the total amount borrowed
Collateral	set to unity if collateral is required by the loan, and zero otherwise
Control variables:	
Debt	ratio of total debt outstanding to level of sales
Profit	ratio of earnings before interest and taxes to sales
Cash	ratio of level of cash holdings to sales
Size	natural logarithm of firm's sales
Company	set to unity if the firm's owners enjoy limited liability protection, and zero otherwise
Prime	prime rate
Term	yield spread between the five-year Treasury note and the monthly three-month Treasury bill
Default	difference between the yield of a Baa bond and a Aaa bond
Relation	number of years the firm has had a relationship with the lending institution
Bank	set to unity if the lender is a bank, savings or thrift institution, and zero otherwise
Comp bal	set to unity if the line of credit agreement requires a compensating balance, and zero otherwise
Number	number of lending sources available to the firm
Maturity	number of months the line of credit is outstanding
Year	set to unity if the firm observation is obtained from the 1998 Survey, and zero if the firm observation is obtained from the 1993 Survey

Table 1 (continued)

Table 1 (continued)

Variables	Definitions
Instrumental Variables:	
For Loan rate:	
HHI	set to unity if the Herfindahl Index for deposits in the MSA of the firm is greater than 1800, and zero otherwise
Firm age	age of the firm
Inter1	interaction of HHI and Firm age (*HHI* x *Firm age*)
For Fees:	
Fixed	set to unity if the line of credit has a fixed coupon rate, and zero if the coupon rate is a variable rate
For Collateral:	
CEO age	age of CEO
CEO share	percentage ownership of firm held by CEO
CEO exp	number of years experience as CEO of the firm
Delinq	set to unity if either the principal owner or the firm has defaulted, and zero otherwise
NFA	ratio of tangible long-term assets to sales

Table 2: Descriptive Statistics

Variable	Unit	#	Mean	Median	Standard Deviation
Dependent Variables:					
Loan rate	Percent	1,125	8.456	8.000	1.908
Fees (all L/Cs)	Fraction	1,125	0.0068	0.0003	0.017
Fees (L/Cs where fees charged)	Fraction	598	0.0129	0.0050	0.022
Collateral	Dummy	1,125	0.601	1.000	0.490
Control Variables:					
Debt	Fraction	1,125	0.360	0.205	0.592
Profit	Fraction	1,125	0.053	0.032	0.277
Cash	Fraction	1,125	0.076	0.020	0.578
Size	Log	1,125	14.590	14.877	1.987
Company	Dummy	1,125	0.794	1.000	0.404
Prime	Percent	1,125	6.904	6.500	0.944
Term	Basis Pts	1,125	2.382	2.710	0.908
Default	Basis Pts	1,125	0.707	0.680	0.094
Relation	Years	1,125	7.596	5.000	8.031
Bank	Dummy	1,125	0.919	1.000	0.273
Comp bal	Dummy	1,125	0.105	0.000	0.307
Number	Quantity	1,125	1.146	1.000	0.669
Maturity	Months	1.127	24.004	12.000	32.036
Year	Dummy	1,125	0.217	0.000	0.413
Instrumental Variables:					
For Loan Rate:					
HHI	Dummy	1,125	0.404	0.000	0.491
Firm age	Years	1,125	16.548	13.000	14.893
Inter1	Interaction	1,125	7.064	0.000	13.163
For Fees:					
Fixed	Dummy	1,125	0.288	0.000	0.453
For Collateral:					
CEO age	Years	1,125	50.205	50.000	10.450
CEO share	Percent	1,125	65.840	59.000	30.461
CEO exp	Years	1,125	20.130	20.000	10.530
Delinq	Dummy	1,125	0.214	0.000	0.410
NFA	Fraction	1,125	0.415	0.086	3.069

Table 3: Determinants of Loan rate (All variables are exogenous)

Ordinary least squares regression of *Loan rate* on all exogenous variables specified in the previous empirical literature. The dependent variable is *Loan rate*, defined as the contractual coupon on the line of credit. The independent variables are defined as follows: *Fees,* fees collected by the lending institution as a fraction of the total amount borrowed; *Collateral*, set to unity if collateral is required by the loan, and zero otherwise; *Debt,* ratio of total debt outstanding to level of sales; *Profit,* ratio of earnings before interest and taxes to sales*; Cash,* ratio of the level of cash holdings to sales; *Size,* natural logarithm of firm's sales; *Company,* set to unity if the firm's owners enjoy limited liability protection, and zero otherwise; *Prime,* prime rate; *Term,* yield spread between the five-year Treasury note and the monthly three-month Treasury bill; *Default,* difference between the yield of a Baa bond and a Aaa bond; *Relation,* number of years the firm has had a relationship with the lending institution; *Bank,* set to unity if the lender is a bank, savings or thrift institution, and zero otherwise; *Comp bal,* set to unity if the line of credit requires a compensating balance, and zero otherwise; *Maturity,* number of months the line of credit is outstanding; *Year,* set to unity if the firm observation is obtained from the 1998 survey, and zero if the firm observation is obtained from the 1993 survey; *Fixed,* set to unity if the line of credit has a fixed coupon rate, and zero if the coupon rate is a variable rate; *CEO age,* age of the CEO; *CEO share,* percentage ownership of firm held by CEO; *CEO exp,* number of years experience as CEO of the firm; *Delinq,* set to unity if either the principal owner or the firm has defaulted, and zero otherwise; *NFA* is the ratio of tangible long-term assets to sales; *HHI,* set to unity if the Herfindahl Index for deposits in the MSA of the firm is greater than 1800, and zero otherwise*; Firm age,* age of the firm; and *Inter 1,* interaction of HHI and Firm age (HHI x Firm age). (p-values are given in parentheses). Two digit industry dummies are included, the results of which are not reported.

Variable	with maturity parameter	(p-value)	without maturity parameter	(p-value)
Intercept	4.638[a]	(0.003)	4.571[a]	(0.004)
Fees	3.875	(0.187)	3.683	(0.208)
Collateral	-0.048	(0.656)	-0.060	(0.578)
Debt	-0.057	(0.578)	-0.062	(0.548)
Profit	-0.306	(0.113)	-0.314	(0.105)
Cash	-0.671[c]	(0.007)	-0.674[c]	(0.007)
Size	-0.206[a]	(0.000)	-0.205[a]	(0.000)
Company	-0.138	(0.346)	-0.130	(0.371)
Prime	0.737[a]	(0.000)	0.736[a]	(0.000)
Term	-0.254[c]	(0.084)	-0.251[c]	(0.088)
Default	1.038[c]	(0.060)	1.021[c]	(0.064)
Relation	-0.013[c]	(0.068)	-0.013[c]	(0.071)
Bank	-0.743[a]	(0.000)	-0.735[a]	(0.000)
Comp bal	-0.028	(0.865)	-0.028	(0.865)
Number	-0.151[c]	(0.052)	-0.146[b]	(0.058)
Maturity	-0.001	(0.396)	--	--
Year	-1.036[a]	(0.002)	-1.031[a]	(0.003)
Fixed	0.426[a]	(0.000)	0.422[a]	(0.000)
CEO age	-0.003	(0.613)	-0.003	(0.649)
CEO share	0.005[b]	(0.014)	0.005[b]	(0.013)
CEO exp	-0.005	(0.464)	-0.006	(0.407)
Delinq	0.183	(0.136)	0.191	(0.120)
NFA	0.103[b]	(0.035)	0.104[b]	(0.034)
HHI	-0.113	(0.485)	-0.115	(0.477)
Firm age	-0.000	(0.969)	-0.000	(0.969)
Inter 1	0.009	(0.209)	0.009	(0.208)
Adj. R^2	0.252		0.252	
F-value (p-value)	13.20[a]	(0.000)	13.62[a]	(0.000)

[a] statistically significant at 1% level, [b] statistically significant at 5% level, and [c] statistically significant at 10% level, respectively.

Table 4: (Validity of Instruments 1:) Determinants of Fees

Tobit regression of fees charged to borrowers on lines of credit for a sample of 1,125 firms for the years 1993 and 1998. The dependent variable is *Fees* defined as the fees collected by the lending institution as a fraction of the total amount borrowed. We use a Tobit regression given that *Fees* is censored at zero (and 47% of our sample is charged zero fees). The independent variables are defined as follows: *Fixed,* set to unity if the line of credit has a fixed coupon rate, and zero if the coupon rate is a variable rate; *Debt,* ratio of total debt outstanding to level of sales; *Profit,* ratio of earnings before interest and taxes to sales*; Cash,* ratio of the level of cash holdings to sales; *Size,* natural logarithm of firm's sales; *Company,* set to unity if the firm's owners enjoy limited liability protection, and zero otherwise; *Prime,* prime rate; *Term,* yield spread between the five-year Treasury note and the monthly three-month Treasury bill; *Default,* difference between the yield of a Baa bond and a Aaa bond; *Relation,* number of years the firm has had a relationship with the lending institution; *Bank,* set to unity if the lender is a bank, savings or thrift institution, and zero otherwise; *Comp bal,* set to unity if the line of credit requires a compensating balance, and zero otherwise; *Number,* number of lending sources available to the firm*; Maturity,* number of months the line of credit is outstanding; and *Year,* set to unity if the firm observation is obtained from the 1998 survey, and zero if the firm observation is obtained from the 1993 survey; (p-values are given in parentheses). Two digit industry dummies are included, the results of which are not reported.

Variable	instrumental variables only		instrumental and control variables (with maturity)		instrumental and control variables (without maturity)	
	parameter	(p-value)	parameter	(p-value)	parameter	(p-value)
Intercept	-0.003	(0.858)	-0.004	(0.890)	-0.000	(0.987)
Instrumental variable:						
Fixed	0.004[b]	(0.011)	0.003[c]	(0.068)	0.004[c]	(0.067)
Control variables:						
Debt			0.001	(0.668)	0.001	(0.512)
Profit			-0.003	(0.295)	-0.003	(0.402)
Cash			0.001	(0.866)	0.001	(0.369)
Size			0.000	(0.371)	-0.001	(0.208)
Company			-0.000	(0.180)	-0.000	(0.947)
Prime			0.000	(0.937)	0.000	(0.919)
Term			0.001	(0.730)	0.001	(0.812)
Default			0.004	(0.673)	0.006	(0.552)
Relation			-0.000[b]	(0.029)	-0.000[b]	(0.020)
Bank			-0.000	(0.978)	-0.001	(0.867)
Comp bal			0.003	(0.248)	0.003	(0.263)
Number			0.000	(0.989)	-0.000	(0.822)
Maturity			0.000[a]	(0.000)	--	--
Year			0.006	(0.332)	0.005	(0.395)
Pseudo R^2	0.013		0.011		0.010	
Likelihood ratio	35.13[a]		132.61[a]		115.22[a]	

[a] statistically significant at 1% level, [b] statistically significant at 5% level, and [c] statistically significant at 10% level, respectively.

Table 5: (Validity of Instruments 2:) Determinants of Collateral

Logistic regression for whether the line of credit is collateralized for 1,125 firms for the years 1993 and 1998. The dependent variable is *Collateral* defined as a dummy variable set to unity if collateral is required by the loan, and zero otherwise. The independent variables are defined as follows: *CEO age,* age of the CEO; *CEO share,* percentage ownership of firm held by CEO; *CEO exp,* number of years experience as CEO of the firm; *Delinq,* set to unity if either the principal owner or the firm has defaulted, and zero otherwise; *NFA* is the ratio of tangible long-term assets to sales.*Debt,* ratio of total debt outstanding to level of sales; *Profit,* ratio of earnings before interest and taxes to sales*; Cash,* ratio of the level of cash holdings to sales; *Size,* natural logarithm of firm's sales; *Company,* set to unity if the firm's owners enjoy limited liability protection, and zero otherwise; *Prime,* prime rate; *Term,* yield spread between the five-year Treasury note and the monthly three-month Treasury bill; *Default,* difference between the yield of a Baa bond and a Aaa bond; *Relation,* number of years the firm has had a relationship with the lending institution; *Bank,* set to unity if the lender is a bank, savings or thrift institution, and zero otherwise; *Comp bal,* set to unity if the line of credit requires a compensating balance, and zero otherwise; *Number,* number of lending sources available to the firm*; Maturity,* number of months the line of credit is outstanding; and*Year,* set to unity if the firm observation is obtained from the 1998 survey, and zero if the firm observation is obtained from the 1993 survey; (p-values are given in parentheses). Two digit industry dummies are included, the results of which are not reported.

Variable	instrumental variables only			instrumental and control variables (with maturity)			instrumental and control variables (without maturity)		
	parameter	(p-value)	Odds ratio	parameter	(p-value)	Odds ratio	parameter	(p-value)	Odds ratio
Intercept	-10.485	(0.958)		-14.780	(0.890)		-14.122	(0.942)	
Instrumental variables:									
CEO age	-0.008	(0.311)	0.992	-0.004	(0.634)	0.996	-0.007	(0.440)	0.993
CEO share	-0.007[a]	(0.002)	0.994	0.002	(0.537)	1.002	0.001	(0.602)	1.001
CEO exp	0.008	(0.321)	1.008	-0.007	(0.406)	0.993	-0.003	(0.702)	0.997
Delinq	0.431[a]	(0.007)	1.538	0.492[a]	(0.003)	1.636	0.453[a]	(0.006)	1.573
NFA	-0.008	(0.712)	0.993	-0.092	(0.221)	0.912	-0.093	(0.207)	0.911
Control variables:									
Debt				0536[a]	(0.001)	1.710	0.560[a]	(0.000)	1.751
Profit				0.347	(0.177)	1.414	0.394	(0.123)	1.483
Cash				0.391	(0.270)	1.479	0.395	(0.260)	1.484
Size				0.257[a]	(0.000)	1.293	0.247[a]	(0.000)	1.280
Company				0.262	(0.165)	1.300	0.206	(0.269)	1.228
Prime				-0.045	(0.684)	0.956	-0.041	(0.702)	0.960
Term				-0.077	(0.692)	0.926	-0.093	(0.627)	0.911
Default				0.279	(0.709)	1.322	0.391	(0.590)	1.479
Relation				-0.025[a]	(0.004)	0.975	-0.026[a]	(0.002)	0.975
Bank				0.404	(0.112)	1.498	0.332	(0.192)	1.394
Comp bal				-0.037	(0.863)	0.963	-0.037	(0.861)	0.963
Number				0.086	(0.421)	1.089	0.052	(0.619)	1.053
Maturity				0.011[a]	(0.000)	1.011	--	--	
Year				-0.748	(0.332)	0.473	-0.772[c]	(0.079)	0.462
Pseudo R^2	0.006			0.016			0.014		
Likelihood ratio	59.86[a]			163.36[a]			142.76[a]		

[a] statistically significant at 1% level, [b] statistically significant at 5% level, and [c] statistically significant at 10% level, respectively.

Table 6: (Validity of Instruments 3:) Determinants of Loan rate

Ordinary least squares regression of *Loan Rate*, defined as the contractual coupon on the line of credit, for 1,125 firms for the years 1993 and 1998. The independent variables are defined as follows: *HHI,* set to unity if the Herfindahl Index for deposits in the MSA of the firm is greater than 1800, and zero otherwise*; Firm age,* age of the firm; *Inter 1,* interaction of HHI and Firm age (HHI x Firm age); *Debt,* ratio of total debt outstanding to level of sales; *Profit,* ratio of earnings before interest and taxes to sales*; Cash,* ratio of the level of cash holdings to sales; *Size,* natural logarithm of firm's sales; *Company,* set to unity if the firm's owners enjoy limited liability protection, and zero otherwise; *Prime,* prime rate; *Term,* yield spread between the five-year Treasury note and the monthly three-month Treasury bill; *Default,* difference between the yield of a Baa bond and a Aaa bond; *Relation,* number of years the firm has had a relationship with the lending institution; *Bank,* set to unity if the lender is a bank, savings or thrift institution, and zero otherwise; *Comp bal,* set to unity if the line of credit requires a compensating balance, and zero otherwise; *Number,* number of lending sources available to the firm*; Maturity,* number of months the line of credit is outstanding; and *Year,* set to unity if the firm observation is obtained from the 1998 survey, and zero if the firm observation is obtained from the 1993 survey; (p-values are given in parentheses). Two digit industry dummies are included, the results of which are not reported.

Variable	instrumental variables only		instrumental and control variables (with maturity)		instrumental and control varaibles (without maturity)	
	parameter	(p-value)	parameter	(p-value)	parameter	(p-value)
Intercept	7.200[a]	(0.000)	6.067[a]	(0.000)	6.017[a]	(0.000)
Instrumental variables*:*						
HHI	-0.576[a]	(0.001)	-0.161[b]	(0.041)	-0.165[b]	(0.043)
Firm age	-0.022[a]	(0.000)	-0.003[c]	(0.076)	-0.003[c]	(0.078)
Inter1	0.017[b]	(0.024)	0.011[c]	(0.082)	0.011[c]	(0.083)
Control variables*:*						
Debt			-0.021	(0.827)	-0.026	(0.786)
Profit			-0.265	(0.174)	-0.274	(0.159)
Cash			-0.207[b]	(0.029)	-0.207[b]	(0.029)
Size			-0.278[a]	(0.000)	-0.278[a]	(0.000)
Company			-0.167	(0.255)	-0.159	(0.276)
Prime			0.745[a]	(0.000)	0.744[a]	(0.000)
Term			-0.235	(0.112)	-0.232	(0.117)
Default			0.949[c]	(0.087)	0.927[c]	(0.094)
Relation			-0.013[c]	(0.067)	-0.013[c]	(0.071)
Bank			-0.764[a]	(0.000)	-0.756[a]	(0.000)
Comp bal			-0.012	(0.941)	-0.012	(0.943)
Number			-0.121	(0.120)	-0.116	(0.134)
Maturity			-0.001	(0.397)	--	--
Year			-0.975[a]	(0.003)	-0.968[a]	(0.005)
Adj. R^2	0.034		0.236		0.236	
F-value (p-value)	5.39[a]	(0.000)	16.07[a]	(0.000)	16.77[a]	(0.000)

[a] statistically significant at 1% level, [b] statistically significant at 5% level, and [c] statistically significant at 10% level, respectively.

Table 7: Determinants of Loan rate (System of Equations)

Two-stage least squares (2SLS) regression of *Loan rate* with *Collateral* and *Fees* endogenously determined. The dependent variable is *Loan rate*, defined as the contractual coupon on the line of credit. The independent variables are defined as follows: *Debt,* ratio of total debt outstanding to level of sales; *Profit,* ratio of earnings before interest and taxes to sales*; Cash,* ratio of the level of cash holdings to sales; *Size,* natural logarithm of firm's sales; *Company,* set to unity if the firm's owners enjoy limited liability protection, and zero otherwise; *Prime,* prime rate; *Term,* yield spread between the five-year Treasury note and the monthly three-month Treasury bill; *Default,* difference between the yield of a Baa bond and a Aaa bond; *Relation,* number of years the firm has had a relationship with the lending institution; *Bank,* set to unity if the lender is a bank, savings or thrift institution, and zero otherwise; *Comp bal,* set to unity if the line of credit requires a compensating balance, and zero otherwise; *Maturity,* number of months the line of credit is outstanding; and *Year,* set to unity if the firm observation is obtained from the 1998 survey, and zero if the firm observation is obtained from the 1993 survey. (p-values are given in parentheses). Two digit industry dummies are included, the results of which are not reported.

Variable	with maturity parameter	(p-value)	without maturity parameter	(p-value)
Intercept	-3.569	(0.220)	-3.672	(0.206)
Fees	124.65[a]	(0.000)	125.41[a]	(0.000)
Collateral	1.716[b]	(0.017)	1.725[b]	(0.016)
Control variables:				
Debt	-0.012	(0.898)	-0.017	(0.862)
Profit	-0.267	(0.167)	-0.276	(0.154)
Cash	-0.278[a]	(0.004)	-0.279[a]	(0.004)
Size	-0.214[a]	(0.000)	-0.214[a]	(0.000)
Company	-0.164	(0.262)	-0.158	(0.281)
Prime	0.753[a]	(0.000)	0.752[a]	(0.000)
Term	-0.246[c]	(0.095)	-0.243[c]	(0.098)
Default	0.933[c]	(0.091)	0.914[c]	(0.097)
Relation	-0.004	(0.554)	-0.004	(0.573)
Bank	-0.763[a]	(0.000)	-0.756[a]	(0.000)
Comp bal	-0.007	(0.964)	-0.007	(0.966)
Number	-0.133[c]	(0.085)	-0.129[c]	(0.093)
Maturity	-0.001	(0.452)	--	--
Year	-1.028[a]	(0.002)	-1.020[a]	(0.003)
Adj. R^2	0.245		0.245	
F-value (p-value)	17.58[a]	(0.000)	18.39[a]	(0.000)
Test for $E(\varepsilon_{LR}, \mathbf{Z})=0$:				
F-value (p-value)	1.45	(0.160)	1.44	(0.164)

[a] statistically significant at 1% level, [b] statistically significant at 5% level, and [c] statistically significant at 10% level, respectively.

Table 8: Determinants of Whether the Loan is Fixed or Variable

Logistic regression for whether the line of credit has a fixed or variable coupon rate, for 1,125 firms for the years 1993 and 1998. The dependent variable is *Fixed* defined as a dummy variable set to unity if the line of credit has a fixed coupon rate, and zero if the coupon rate is variable. The independent variables are defined as follows: *Debt,* ratio of total debt outstanding to level of sales; *Profit,* ratio of earnings before interest and taxes to sales*; Cash,* ratio of the level of cash holdings to sales; *Size,* natural logarithm of firm's sales; *Company,* set to unity if the firm's owners enjoy limited liability protection, and zero otherwise; *Prime,* prime rate; *Term,* yield spread between the five-year Treasury note and the monthly three-month Treasury bill; *Default,* difference between the yield of a Baa bond and a Aaa bond; *Relation,* number of years the firm has had a relationship with the lending institution; *Bank,* set to unity if the lender is a bank, savings or thrift institution, and zero otherwise; *Comp bal,* set to unity if the line of credit requires a compensating balance, and zero otherwise;); *Number,* number of lending sources available to the firm*; Maturity,* number of months the line of credit is outstanding; *Year,* set to unity if the firm observation is obtained from the 1998 survey, and zero if the firm observation is obtained from the 1993 survey; *HHI,* set to unity if the Herfindahl Index for deposits in the MSA of the firm is greater than 1800, and zero otherwise*; Firm age,* age of the firm; *Inter 1,* interaction of HHI and Firm age (HHI x Firm age*CEO age,* age of the CEO; *CEO share,* percentage ownership of firm held by CEO; *CEO exp,* number of years experience as CEO of the firm; *Delinq,* set to unity if either the principal owner or the firm has defaulted, and zero otherwise; and *NFA* is the ratio of tangible long-term assets to sales. (p-values are given in parentheses). Two digit industry dummies are included, the results of which are not reported.

	with maturity			without maturity		
Variable	parameter	(p-value)	Odds ratio	parameter	(p-value)	Odds ratio
Intercept	14.224	(0.950)		14.348	(0.949)	
Control variables:						
Debt	-0.119	(0.418)	0.888	-0.107	(0.463)	0.898
Profit	0.455[c]	(0.086)	1.576	0.471[c]	(0.076)	1.602
Cash	-0.062	(0.874)	0.940	-0.058	(0.882)	0.944
Size	-0.334[a]	(0.000)	0.716	-0.336[a]	(0.000)	0.715
Company	0.112	(0.571)	1.118	0.100	(0.611)	1.107
Prime	0.176	(0.129)	1.193	0.179	(0.123)	1.196
Term	0.098	(0.634)	1.103	0.092	(0.653)	1.096
Default	0.389	(0.609)	1.475	0.421	(0.579)	1.523
Relation	0.003	(0.748)	1.003	0.003	(0.786)	1.003
Bank	0.017	(0.951)	1.017	0.000	(0.999)	1.000
Comp bal	0.072	(0.760)	1.074	0.069	(0.767)	1.072
Number	0.080	(0.461)	1.083	0.070	(0.518)	1.072
Maturity	0.002	(0.267)	1.002	--	--	--
Year	-0.045	(0.925)	0.956	-0.061	(0.898)	0.941
Instrumental variables for Loan Rate:						
HHI	-0.201	(0.403)	0.818	-0.198	(0.410)	0.821
Firm age	-0.004	(0.595)	0.996	-0.004	(0.601)	0.996
Inter1	0.006	(0.584)	1.006	0.006	(0.584)	1.006
Instrumental variables for Collateral:						
CEO age	0.003	(0.778)	1.003	0.002	(0.829)	1.002
CEO share	0.004	(0.118)	1.004	0.004	(0.122)	1.004
CEO exp	-0.007	(0.503)	0.993	-0.005	(0.577)	0.995
Delinq	0.098	(0.572)	1.103	0.088	(0.609)	1.092
NFA	-0.012	(0.874)	0.988	-0.014	(0.860)	0.986
Pseudo R^2	0.016			0.016		
Likelihood ratio	149.7[a]	(0.000)		148.4[a]	(0.000)	

[a] statistically significant at 1% level, [b] statistically significant at 5% level, and [c] statistically significant at 10% level, respectively.