Lines of Credit and Relationship
Lending in Small Firm Finance

by

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Abstract

This paper examines the role of relationship lending using a data set on small firm finance. We specifically examine price and nonprice terms of commercial bank lines of credit (L/C) extended to small firms. Our focus on bank L/Cs allows us to examine a type of loan contract where the bank-borrower relationship is likely to be an important mechanism for solving asymmetric information problems associated with financing small enterprises. We find that borrowers with longer banking relationships tend to pay lower interest rates and are less likely to pledge collateral. These results are consistent with theoretical arguments that relationship lending generates valuable information about borrower quality.

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I. Introduction

Large corporations typically obtain credit in the public debt markets, while small firms usually must depend on financial intermediaries, particularly commercial banks. Given that asymmetric information problems tend to be much more acute in small firms than in large firms, it is not surprising that the manners in which these respective groups obtain credit financing differ significantly. Bank financing often involves a long-term relationship that may help attenuate these information problems, whereas public debt financing generally does not have this feature.

The abilities to acquire private information over time about borrower quality and to use this information in designing debt contracts largely defines the unique nature of commercial banking. This is consistent with theories of financial intermediation that emphasize the information advantages of banks (e.g., Diamond 1984,1991, Ramakrishnan and Thakor 1984, Boyd and Prescott 1986). Recently, a theoretical literature on relationship lending has appeared which provides predictions about how loan interest rates evolve over the course of a bank-borrower relationship. The models of Boot and Thakor (1993) and Petersen and Rajan (1993) predict that rates should decline as a relationship matures, while the models of Sharpe (1990) and Wilson (1993) predict increases in rates over time. Boot and Thakor's model also predicts that collateral requirements on loans will be lower, the longer a

borrower has had a banking relationship. The main purpose of this paper is to provide empirical tests of these theoretical predictions using an extensive data set on small firm finance.

Two strands of the literature have provided some empirical evidence on the value of bank-borrower relationships. In the first strand, studies of "bank uniqueness" addressed the question of whether banks produce valuable private information about borrowers (e.g., James 1987, Lummer and McConnell 1989, Hoshi et al. 1990a,b, James and Weir 1990, Wansley et al. 1992, Billet et al. 1993, Shockley and Thakor 1993). Among other things, these studies provided evidence that the _existence_ of a bank-borrower relationship increases firm value. Some of these studies also indirectly provided evidence about the value of the _strength_ of a bank-borrower relationship. They found that announcements of renewals of bank lines of credit (L/Cs) often generate greater abnormal market returns than newly issued L/Cs.

The second strand of the empirical relationship lending literature provided more direct tests of the strength of the bank-borrower relationship (Petersen and Rajan 1993,1994). These studies used a continuous measure of the strength of the bank-borrower relationship -- its duration -- as opposed to the simple new-versus-renewal L/C distinction. Perhaps surprisingly, these studies did _not_ find that the rate charged on a loan depended on the strength of the relationship, although other evidence of relationship lending was found in the firm's trade credit arrangements.

Our analysis is similar to this second strand of the empirical literature in that we focus on the length of the bank-borrower relationship as a measure of its strength. We also share with these studies a focus on small, mostly untraded firms for which the bank-borrower relationship is likely to be important. This differs from the bank uniqueness studies, which generally concentrated on large, publicly traded firms that may be less dependent on banking relationships. Our study and the Petersen and Rajan (1993,1994) studies also share a third advantage over the bank uniqueness studies. We are able to test directly the predictions of the recent theoretical models of relationship lending about the path of loan interest rates over the course of the relationship.

However, our approach differs from the Petersen and Rajan (1993,1994) studies in two important ways. First, we focus exclusively on lending under L/Cs. The L/C is an attractive vehicle for studying the bank-borrower relationship because the L/C itself represents a formalization of this relationship. By limiting our study to L/Cs, we exclude from our data set most loans which are "transaction-driven," rather than "relationship-driven," and may avoid diluting our relationship lending results.

Second, we analyze the empirical association between relationship lending and the collateral decision, providing the first test of Boot and Thakor's (1993) theoretical predictions about collateral. In the process, we also test some propositions from the collateral literature about the associations among collateral, borrower risk, and loan risk.

Our data are drawn from the National Survey of Small Business Finances (NSSBF) which contains extensive information on both borrowers and loan contracts, as well as information on the relationship between the bank and the borrower. By way of preview, our empirical results are consistent with the theoretical predictions of Boot and Thakor (1993) and Petersen and Rajan (1993). We find that borrowers with longer banking relationships pay a lower interest rate and are less likely to pledge collateral. Our findings are also consistent with much of the bank uniqueness literature. However, they conflict with the loan pricing results in the second strand of the empirical bank-borrower relationship literature, which draws its data from the same source. We attribute this difference to our exclusive use of L/C loans, which are more likely to reflect relationship effects than other loans.

The paper is organized as follows. Section II discusses the extant literature on relationship lending. Section III describes the data set and motivates the variables used in the analysis. Section IV presents our econometric tests of the determination of the loan rate and whether collateral is pledged, both as functions of the strength of the bank-borrower relationship and other variables. Section V concludes.

II. The Relationship Lending Literature

The information-based literature on financial intermediation (e.g., Diamond 1984,1991, Ramakrishnan and Thakor 1984, Boyd and Prescott 1986) suggests that financial intermediaries exist because

they enjoy economies of scale and/or comparative advantages in the production of information about borrowers. Banks in particular specialize in lending to a highly information-problematic class of borrowers. Because of this specialization, contracting in the bank loan market appears to differ substantially from contracting in other major debt markets (see Carey et al. 1993). One feature often ascribed to commercial bank lending is its emphasis on relationship lending.[1] Banks may acquire information through the relationship by monitoring borrower performance over time under credit arrangements and/or through the provision of other services such as deposit accounts (see Allen, et al. 1991, Nakamura 1993), and use this information in designing future credit contracts.

Some studies have specifically modeled the association between the length of the bank-borrower relationship and loan pricing. In an extension of Diamond (1989), Petersen and Rajan (1993) developed a theoretical model with both adverse selection and moral hazard in which banks offer higher rates in the first period and lower rates in later periods after borrower types have been revealed. Boot and Thakor (1993) demonstrated that the length of the bank-borrower relationship may be important in determining loan prices even in a model without learning. They also found that collateral require-ments are related to the length of the relationship. Borrowers pay a high rate and pledge collateral early in the relationship, and then pay a lower rate and do not pledge collateral later in the

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[1]Some theoretical papers have formally examined the choice between bank debt and public debt (e.g., Diamond 1991, Rajan 1992).

relationship after they have demonstrated some project success.

The Petersen and Rajan (1993) and Boot and Thakor (1993) results stand in contrast to other theoretical models. Both Sharpe (1990) and Wilson (1993) demonstrated conditions under which lenders subsidize borrowers in early periods and are reimbursed for this subsidy in later periods. Thus, the issue of the association between loan pricing and the length of the bank-borrower relationship is ultimately an empirical one. In addition, as noted above, no one has previously tested the empirical association between collateral and the length of the bank-borrower relationship.

The bank L/C is a particularly important part of relationship lending because it represents a forward commitment to provide working capital financing under pre-specified terms.[2] It is not surprising, therefore, that much of the empirical literature on bank uniqueness has focused on bank L/Cs. James (1987) found positive abnormal returns associated with announcements of firms who were granted bank L/Cs. Lummer and McConnell (1989) and Wansley et al. (1992) found evidence that James' results were driven by L/C _renewals_ as opposed to newly initiated L/Cs. This result is consistent with the notion that information about the borrower is acquired over time through the bank-borrower relation-

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[2]Most L/Cs contain material adverse change (MAC) clauses which permit the bank to abrogate the commitment if the borrower's financial condition has changed substantially. However, these clauses can only be contingent on verifiable characteristics of the borrower. In addition, because of reputation effects and lender liability laws, banks may be reluctant to invoke these clauses except under extreme conditions (see Avery and Berger 1991).

ship and is reflected in the <u>continuation</u> of credit arrangements, as opposed to initial credit assessments. Billet, et al. (1993), however, found no difference in the announcement effects between new and renewal L/Cs.[3] One explanation for these disparate results may be that the new-renewal binomial categorization of L/Cs is at best a weak measure of the strength of the relationship. As in Petersen and Rajan (1993,1994), we avoid this measurement problem by using the continuous duration of the bank-borrower relationship as a measure of its strength. Also, unlike the uniqueness event studies which focus primarily on large publicly traded firms, we use data on small mostly untraded firms, which tend to be much more bank-dependent.

Petersen and Rajan (1993,1994) also used the NSSBF data source to analyze relationship lending. Like our paper, they used the length of the bank-borrower relationship as a measure of its strength. They found no statistical association between the strength of the bank-borrower relationship and business loan pricing in their 1994 paper (they did not include the length of the bank-borrower relationship in the loan pricing equation in their 1993 paper). However, they did find evidence of a lesser dependence on trade credit by firms with longer banking relationships, supporting the value of relationship lending. Their failure to

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[3]Billet, et al. (1993) also found higher abnormal returns for higher-rated lenders. Other papers have found that the loan announcement-related abnormal returns may be associated with firm characteristics. Slovin et al. (1992) found a negative association with firm size and Best and Zhang (1992) found a positive association with declining or uncertain earnings forecasts.

find evidence of relationship lending in bank loan pricing, which runs counter to our findings below, may be attributable to their inclusion of <u>all types of external loans</u> in their data set rather than focusing on bank L/Cs.[4] That is, they included a number of different types of loans for which reputation and relationship effects may be substantially less important than those associated with the forward commitment embodied in an L/C. These non-L/C loans include equipment loans, auto loans, mortgages, and short-term spot loans. In the parlance of Wall Street, these loans tend to be "transaction-driven" rather than "relationship-driven." Thus, the loan pricing effect of relationships may have been diluted by the inclusion of these loans in their samples. In contrast, we limit our analysis to just loans drawn under L/Cs.[5]

III. **The Data Set**

The NSSBF provides more extensive information on individual small businesses than any other publicly available source. The survey was conducted in 1988-89 by the Federal Reserve Board and the Small Business Administration (SBA). The data were obtained by telephone interviews with executives of about 3,400 businesses.

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[4]Petersen and Rajan excluded loans from the owner or the owner's family. By focusing on just bank L/Cs, we also exclude these loans from our data set.

[5]Petersen and Rajan (1993,1994) also examined the association between loan rates and the age of the firm and found that older firms had lower borrowing costs, as we find below. Petersen and Rajan (1993) found that this association was stronger in less concentrated markets.

Each interview consisted of about 200 questions covering firm description, governance, history, use of credit, relationships with financial institutions, and balance sheet and income information. The respondents represent a stratified random sample by size and geography of for-profit, nonagricultural, nonfinancial firms. Approximately 80% of the sample had less than 50 employees; 10% had 51-100 employees; and 10% had 101-500 employees. Nearly all of the firms were privately owned -- only about 0.5% were publicly traded. Asset size ranged up to $219 million. The geographical representation was also relatively uniform, with about 25% each from the Northeastern, North Central, Southern, and Western states.

Table 1 describes the variables used in this study, broken down into five main categories: L/C contract characteristics, firm financial characteristics, firm governance characteristics, industry characteristics, and information/relationship characteristics. Looking first at the <u>contract characteristics</u> of commercial L/Cs, PREM is the premium over the prime rate at which loans drawn under the L/C are priced. COLLAT indicates whether the L/C is secured, which is further decomposed by type of security -- ARINV for L/Cs secured by accounts receivable and/or inventory, and OTHERSEC for other security. ARINV may be particularly revealing because practitioners tend to view L/Cs secured by accounts receivable and inventory as the riskiest type of working capital financing. This type of financing is often referred to as "asset-based lending," where the value of the assets pledged is of primary concern to the lender rather than the cash flow prospects of the

firm. Asset-based lending generally involves a form of intense monitoring not associated with other types of loans.[6,7] OTHERSEC includes all other types of collateral, including equipment, real estate, and personal assets of the owners. The inclusion of different types of collateral distinguishes our paper from previous studies of business lending.

GUAR indicates whether the L/C is guaranteed. Guarantees are generally provided by the firm's owners, giving the lender recourse against the owners for any deficiency in payment by the borrowing firm. Guarantees are similar to the pledging of personal collateral, although they do not involve specific liens. COMPBAL indicates whether the L/C has a compensating balance requirement.

The financial characteristics of the firm consist of key financial ratios, including the leverage ratio (LEV), the current ratio (CURRRAT), the quick ratio (QUICKRAT), accounts receivable turnover (ARTURN), inventory turnover (INVTURN), accounts payable turnover (APTURN), and total assets (TA).

The governance characteristics include the legal form of the

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[6]Swary and Udell (1988) argued that this type of monitoring may produce information about overall firm performance as well as information about the value of the ARINV collateral itself.

[7]The SBA recently announced a new loan program which for the first time will provide a government guarantee for L/Cs secured by ARINV. This is a significant departure for the SBA, which previously had substantially limited the scope of its guarantees to amortizing term loans. Some lenders have expressed concern about the new program because of the intense monitoring associated with ARINV and because of the perceived riskiness of this type of secured lending (Selz 1994).

firm -- CORP for (non-Subchapter S) corporation, SUBS for Subchapter S corporation, PART for partnership, and PROP for sole proprietorship. OWNMG indicates whether the firm was owner-managed, and CONC50 signifies whether 50% or more was owned by a single family.

Industry characteristics are reflected in dummy variables for whether the firm is in the construction (CONSTR), services (SERVICES) or retail (RETAIL) industries. The bulk of the remaining respondents (OTHERIND) were in the manufacturing sector.

The information/relationship characteristics consist of AGE and RELATE. AGE refers to the number of years that current ownership has been in place. If the firm is currently owned by its founders, then AGE represents the actual age of the firm. RELATE is the number of years that the firm has purchased its L/Cs from its current lender, and represents our measure of the strength of the bank-borrower relationship.[8] RELATE captures the ability of the bank to learn more about the nature of the borrowing firm through its lending relationship. There is an important distinction between AGE and RELATE. AGE reflects information that becomes revealed to the market as a whole, i.e., its public reputation, while RELATE reflects private information revealed through the intermediation process only to the lender through the bank-borrower relationship. As noted earlier, RELATE is likely a superior measure of the strength of the relationship than the distinction

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[8]An upper limit of 30 years was imposed on AGE and RELATE. For the few publicly traded firms, AGE was also set equal to 30.

between new and renewal L/Cs used in Lummer and McConnell (1989), Wansley et al. (1992), and Billet et al. (1993).

The means of these variables for the entire sample of 872 firms who reported L/Cs are shown in the first column of Table 2. These means reveal several interesting characteristics of small firms using credit lines. The vast majority are owner-managed (89%) with a single family owning more than half of the stock (80%). Most are also organized as non-subchapter S corporations (55%). Consistent with other data sources, the majority of the L/Cs are secured (53%), usually with accounts receivable and inventory (36%). Only 7% of all L/Cs in the sample have compensating balance requirements, suggesting that this pricing element no longer plays a prominent role for small firms.

We also split the sample roughly in half between firms with assets above and below $500,000. As shown in columns two and three of Table 2, the data suggest that firms with assets greater than $500,000 may be quite different from smaller firms in that they are much more likely to be corporations, much more likely to pledge collateral, generally have lower liquidity ratios and lower profit margins, and tend to pay a lower PREM. We emphasize that $500,000 in assets is quite small, and that our subsample above this threshold should still be considered to be small firms.

IV. Econometric Specification and Test Results

Loan Rate Tests

Our loan rate tests analyze the determinants of PREM, the loan

rate premium over the bank's prime rate. PREM is regressed on the loan contract, financial, governance, industry, and information/relationship characteristics of the firm. These tests offer the opportunity to examine the role of relationship lending in commercial loan contracting by measuring the effect of RELATE on the interest rate of an L/C.

The NSSBF data set includes data on the interest rate paid on the firm's most recent loan, which is often drawn under an L/C. The survey also gives information on whether the loan was indexed to the prime and, if so, the premium over prime (PREM), and whether it was floating or fixed rate. For purposes of this analysis, the cleanest data for loan-by-loan comparison comes from using only floating rate L/C loans which were indexed to the bank's prime rate.[9]

The PREM results for the entire sample are shown in Table 3. The first column of the table excludes the potentially endogenous loan contract variables for collateral, guarantees, and compensating balances, and should be viewed as the reduced form for PREM. The coefficients of the included variables may be interpreted as the effects of these variables on the rate, inclusive of the any predicted rate-reducing effect of collateral, guarantees, and compensating balances that they may imply. For example, the coefficient of LEV represents the association between leverage and

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[9]Fixed rate L/C loans were excluded because of problems associated with the term structure of interest rates, prepayment possibilities, and imprecise information on the takedown date.

the rate on the loan <u>after</u> taking into account the expected values of collateral, guarantees and compensating balances that a marginal increase in leverage implies. Thus, the coefficients of the firm characteristics in column one can also be interpreted as reflecting the association between these characteristics and the risk of the <u>loan</u>, as reflected in its price.

Column two of table 3 includes all of the variables in the first column plus the collateral, guarantee, and compensating balance contract variables. The interpretation of the borrower and relationship characteristics now reflect their effects on the premium <u>excluding</u> their effects through the contract terms.[10] Thus, the coefficients of the firm characteristics in column two can also be interpreted as reflecting the association between these characteristics and the risk of the <u>borrower</u>, as reflected in the loan price. The regression in column three includes only the loan contract terms on the right-hand side.

The most interesting results in column one of Table 3 are the importance of the information/relationship variables, AGE and RELATE. The statistically significant negative coefficients of these variables indicate that the older the firm is in terms of current ownership and the longer the banking relationship, the

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[10]It may be noted that a bias could occur in estimating this equation because the collateral, guarantee, and compensating balance variables are endogenous to the firm and relationship characteristics. We assume a recursive model structure here in which the firm characteristics explain the contract terms up to random errors that are not significantly correlated with the PREM error term.

lower the rate on the loan (inclusive of any collateral and guarantee effects associated with these variables). The magnitudes of the AGE and RELATE coefficients of about -.02 each suggest that an additional 10 years of business experience in which the firm has a constant relationship with the same bank lowers the interest rate on L/C loans by about 40 basis points ((10+10)·.02 percent). Thus, these variables appear to be economically significant as well as statistically significant in determining the rates paid on loans.

An important distinction should be made between the AGE and RELATE coefficients, each of which is significant. The negative coefficient on AGE suggests an important role for reputation, or publicly available information, which becomes available over time to the lending community as a whole. The negative coefficient on RELATE suggests an important role for private information acquired through relationship lending where information becomes available only to the specific lender through monitoring over time.

The coefficients on the financial characteristics in column one are generally not statistically significant. This could be because the risk-reducing effects of collateral tend to offset the risk effect of these variables, or possibly because the statistical power of the regression analysis is not sufficiently strong given the relatively limited number of observations. CORP and SUBS are negative and statistically significant, indicating that loans to either type of corporation tend to be safer than other loans.

The second column in Table 3 includes the contract variables as well as all the firm and relationship variables from column one.

Again, AGE is negative and significant indicating that longer public reputations are associated with safer borrowers. RELATE is also negative and significant, providing strong evidence of the importance of relationship lending and its role in loan pricing. The magnitudes of both coefficients are again about -.02.

The RELATE results in columns one and two are consistent with the theoretical models of Boot and Thakor (1993) and Petersen and Rajan (1993). They may also shed some light on the ambiguous results found in the uniqueness event studies which have examined the difference in announcement effects between new L/Cs and renewal L/Cs. These studies relied on what may be a relatively weak binomial proxy for the strength of the bank-borrower relationship -- whether the L/C was new or a renewal. Our methodology permits a more revealing continuous measure of the relationship, its length. Using this measure (RELATE), we find that the strength of the relationship is an important determinant of loan pricing.

We next deal with an unresolved issue in the collateral literature -- the associations among collateral, borrower risk, and loan risk. Most theoretical models of collateral demonstrate that collateral will be associated with safer borrowers and loans (Bester 1985, Besanko and Thakor 1987a,b, Chan and Kanatas 1987), while others predict that riskier borrowers will more often pledge collateral (Boot et al. 1991, Black and de Meza 1992). Most of the empirical collateral literature supports the view that collateral is associated with riskier borrowers and loans (Orgler 1970, Hester 1979, Scott and Smith 1986, Berger and Udell 1990,1992, Booth

1992,1993). These empirical studies have been hampered by a dearth of data sources on the risk characteristics of individual borrowers and the lack of detailed information on the type of collateral pledged -- problems that we can resolve with our detailed borrower information and two types of collateral.

The regression in column three of table 3, which includes only the loan contract terms on the right-hand side, tests the association between collateral and loan risk. The collateral tests presented later provide some evidence that secured L/Cs are associated with observably riskier borrowers. But this does not necessarily mean that secured loans are relatively risky because recourse against collateral reduces the risk of these loans, possibly to levels below those of unsecured loans. The results in column three of Table 3 show positive coefficients on both types of collateral, indicating higher loan rates for secured loans, although none of the slope coefficients in this equation are statistically significant and the explanatory power of the regressors is very low. These results suggest that secured loans may be riskier than unsecured loans as found in prior studies, but the association is not very strong and there is not sufficient test power to reject the null hypothesis of no statistical association.

Tables 4 and 5 show the same regressions as in Table 3, except that they are for firms with assets above and below $500,000 respectively. For the firms with assets above $500,000 in Table 4, the findings substantially mirror the results for all firms, including the sign, significance, and magnitude of the coefficients

of AGE and RELATE. One notable exception in Table 4 is the positive and significant coefficient of about .35 in column 3 on ARINV. This suggests that for firms above $500,000, being secured by accounts receivable and inventory may be an important indicator of higher loan risk, for which the bank charges an additional risk premium of about 35 basis points.[11]

In contrast, in the regressions for firms below $500,000 in assets in Table 5, only one of the independent variables is statistically significant, and the R^2's are about half those for firms above $500,000. This suggests that the pricing of bank loans to very small firms may be relatively idiosyncratic -- the terms of these loans may depend more on the personal reputation of the owner-manager than on the observed characteristics of the firm.

Overall, the results of the loan rate tests suggest that the bank-borrower relationship plays an important role in commercial loan pricing, with the possible exception of the very smallest borrowers. Our results are generally consistent with the theoretical models of Boot and Thakor (1993) and Petersen and Rajan (1993), both of which generate a negative association between loan rates and the length of the bank-borrower relationship.

Collateral Tests

In order to determine whether collateral requirements are

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[11]Some caution should be exercised in interpreting this result because ARINV financing typically requires that banks closely monitor the collateral. Thus, the higher PREM for ARINV loans may be partly explained by the costs of this monitoring to the extent that these costs are not paid for by fees.

greater or lesser for borrowers with longer banking relationships, we use logit models to examine the probability of an L/C being secured. Recall that Boot and Thakor's (1993) model predicts that collateral will less often be pledged for borrowers with longer relationships. This prediction is also consistent with the conventional wisdom among bankers.

Unlike the loan interest rate data analyzed above, data on collateral are available for <u>all</u> firms with L/Cs, not just those whose last loan was a floating-rate, prime-based draw under an L/C. The explanatory variables again include the firm's financial, governance, and industry characteristics, as well as the information/relationship variables. The other contract variables, GUAR and COMPBAL, are excluded from the right hand side of these regressions because of the possibility that the collateral, guarantee, and compensating balance decisions are co-determined.[12]

Logit regressions for the probability of any type of collateral being pledged (i.e., Prob(COLLAT)) are shown in Table 6. Column one shows the results using the entire data sample. The coefficients of the information/relationship variables, AGE and RELATE,

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[12]We examine this co-determination problem by also running separate collateral regressions on two subsets of the data -- L/Cs with personal liability (corporations with a guarantee, sole proprietorships, partnerships) versus those without personal liability (corporations without a guarantee). These additional logit regressions (not shown) suggest that our results reported below generally hold for both of these groups and are robust.

are both highly significant and negative in this regression.[13] As above for the loan rates, the magnitudes of these coefficients suggest that they are economically significant in determining whether collateral is pledged. The coefficients of AGE and RELATE of about -.020 and -.026, respectively, suggest that an additional 10 years of business experience with a constant banking relationship lowers the probability that a firm pledges collateral by about 11 percentage points (evaluated at the mean probability of 53%, $(10 \cdot .020 + 10 \cdot .026) \cdot .53 \cdot (1-.53))$.

The coefficients of the information/relationship variables are again negative and of economically meaningful magnitudes using the subsamples of firms above and below $500,000 in assets, shown in columns two and three, respectively. However, the AGE coefficient in the above-$500,000 regression and both the AGE and RELATE coefficients in the below-$500,000 regression are not statistically significant. This may at least partly reflect a loss of statistical test power in the smaller subsamples. As well, the explanatory power of the below-$500,000 regression is considerably lower, presumably reflecting a finding that the terms of bank lending to very small firms is quite idiosyncratic to the owner-manager and not well explained by our firm-level economic variables.

In Table 7 the same logit regressions were run except that the dependent variable is the probability that the loan is secured by

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[13]The positive coefficient on AGE is consistent with the results of Scott and Smith (1986). They did not, however, have data on our RELATE variable.

accounts receivable and/or inventory (ARINV). The decision to pledge this type of collateral which requires intensive monitoring by the bank may have different motivations than pledging other collateral.[14] The results for the information/relationship variables in Table 7 are much the same as in Table 6 where the dependent variable was the probability of any type of collateral. Again, the coefficients of AGE and RELATE are negative and of economically significant magnitudes for the full sample and the two subsamples. The AGE coefficient in the over-$500,000 regression becomes statistically significant, whereas it was not in Table 6, but both the AGE and RELATE coefficients remain statistically insignificant in the under-$500,000 regression.

Thus, the collateral findings generally imply that the older a firm is and the longer its banking relationship, the less often it will pledge collateral. These results are consistent with Boot and Thakor (1993), who demonstrate that requiring collateral early in a relationship may be useful in solving a moral hazard problem. The findings are also consistent with the conventional wisdom in banking. As above for the PREM regression results, the collateral findings suggest that information about the firm is revealed over time. Young firms with new banking relationships may be willing to incur the costs associated with collateral because they know that pledging collateral attenuates the problems associated with

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[14]An alternative specification would be to use a trichotomous logit with the choices being ARINV, OTHERSEC, and no collateral. Regressions run under this alternative were not materially different from those reported.

asymmetric information. Over time, the firms are able to demon-
strate some project success to the lender, who then reduces the
collateral requirements.

The data shown in Tables 6 and 7 may also be used to investi-
gate the association between collateral and borrower risk.
Borrower risk should be distinguished from loan risk, which was
investigated above with the loan rate data. Borrower risk does not
include the risk-reducing effects of the pledged collateral itself.
In Table 6, the leverage coefficient (LEV) is positive and
statistically significant in all three regressions, suggesting that
more leverage is associated with a higher probability of pledging
collateral. Similarly, in Table 7, the LEV coefficient is positive
in all three regressions and statistically significant in all but
the below-$500,000 subsample. This evidence of a positive
association between borrower risk and the likelihood of collateral
being pledged is consistent with earlier studies (Hester 1979,
Berger and Udell 1990,1992).[15]

V. Conclusion

Our analysis highlights the role of relationship lending in
commercial bank loan contracting. The evidence indicates that
small firms with longer banking relationships borrow at lower rates
and are less likely to pledge collateral than other small firms.

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[15]Note, however, that the coefficients of the financial ratios
other than LEV in Tables 6 and 7 are generally statistically
insignificant or fail to have signs that consistently associate
collateral with either greater or lesser borrower risk.

These effects appear to be both economically and statistically significant. The results are consistent with the financial intermediation literature which emphasizes that banks produce private information about borrower quality (e.g., Diamond 1984,1991, Ramakrishnan and Thakor 1984, Boyd and Prescott 1986). Our empirical results also suggest that banks accumulate increasing amounts of this private information over the duration of the bank-borrower relationship. In addition, the findings in this study are consistent with recent theoretical models of bank-borrower relationships (Boot and Thakor 1993, Petersen and Rajan 1993), although our results run counter to the predictions of other theoretical models (Sharpe 1990, Wilson 1993).

Our analysis attempts to extend two strands of the empirical literature that bear on relationship lending questions. Studies of bank uniqueness found that the existence of a bank-borrower relationship increases firm value, and that the strength of the relationship -- as measured by the distinction between the announcements of L/C renewals versus newly issued L/Cs -- often generate market value as well. Their results are consistent with the notion that banks acquire valuable private information over the course of their relationships with mostly large, publicly traded firms.

Our study differs from these uniqueness studies in three important ways. First, we focus on small, mostly untraded firms, rather than large, publicly traded firms. Our small firms are generally more dependent on banks, and are more likely to have the

type of asymmetric information problems that a bank-borrower relationship may resolve. Second, we use a continuous measure of the strength of the bank-borrower relationship, the length of time that the bank has purchased L/Cs from its current bank. We believe that this measure dominates the simple binomial proxy of whether the L/C was a renewal versus a new issue as a measure of the relationship's strength. Third, we are able to test directly the predictions of the recent theoretical literature about the path of loan interest rates over the course of the relationship.

Similar to our analysis, the second strand of the empirical literature on relationship lending focused on small firms, used the continuous length of the bank-borrower relationship as a measure of its strength, and tested the path of loan interest rates over the course of the relationship (Petersen and Rajan 1993,1994). However, an important difference from our study is that this second strand of studies did not confine themselves to L/C loans. We focus on just bank lines of credit, excluding from our data set loans which are primarily "transaction-driven," rather than "relationship-driven." Our exclusion of transaction-driven loans -- such as equipment loans, auto loans, and mortgages -- may avoid diluting our relationship lending results, and may explain why our results concerning the pricing of bank loans differ from this second strand of empirical literature.

Finally, our study also differs from both strands of the empirical literature in that it analyzes the association between the pledging of collateral and the bank-borrower relationship. The

relationship lending model of Boot and Thakor (1993), as well as the conventional wisdom in banking, emphasize the role of collateral in the evolution of the bank-borrower relationship. Our empirical result that collateral is less often pledged in a mature relationship is consistent with the predictions of Boot and Thakor and the conventional wisdom. Our results may also help clarify some of the issues in the collateral literature by controlling for more types of collateral and more firm characteristics than were previously available.

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Table 1
Variable Description

Variable Name	Description
	CONTRACT CHARACTERISTICS
PREM	Premium over the prime rate
COLLAT	Equals one if loan is secured
ARINV	Equals one if loan is secured by accounts receivable and/or inventory
OTHERSEC	Equals one if loan is secured by other than accounts receivable and/or inventory
GUAR	Equals one if loan is guaranteed
COMPBAL	Equals one if loan requires compensating balances
	FINANCIAL CHARACTERISTICS
LEV	Leverage: total debt/assets
PROFMARG	Pretax profit margin (% of sales)
CURRRAT	Current ratio ((current assets)/(current liabilities))
QUICKRAT	Quick ratio ((current assets - inventory)/(current liabilities))
ARTURN	Accounts receivable turnover in days ((accounts receivable)/(sales/day))
INVTURN	Inventory turnover in days (inventory/(cost of goods sold)/day)
APTURN	Accounts payable turn in days ((accounts payable)/(cost of goods sold)/day)[1]
TA	Total firm assets (in thousands of dollars)
	GOVERNANCE CHARACTERISTICS
CORP	Equals one if firm is a non-subchapter S corporation
SUBS	Equals one if firm is a Subchapter S
PART	Equals one if firm is a partnership
PROP	Equal one if firm is a proprietorship (excluded from regressions as the base case)
OWNMG	Equals one if firm is owner-managed
CONC50	Equals one if at least 50% ownership is in one family

INDUSTRY CHARACTERISTICS

CONSTR   Equals one if in construction industry

SERVICES   Equals one if in services industry

RETAIL   Equals one if in retail industry

OTHERIND   Equals one if in other industries (excluded from the
                regressions as the base case)

INFORMATION/RELATIONSHIP CHARACTERISTICS

AGE   Number of years current owners have owned firm[2,3]

RELATE   Length of relationship with current lender in years[2]

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[1] Because of data availability, cost of goods sold per day was used in place of purchases per day.

[2] A maximum limit of 30 years was imposed on AGE and RELATE.

[3] If the firm was diffusely held, then AGE equals the number of years that the firm has been in existence.

Table 2
Variable Means - Lines of Credit

Variable	All Firms	TA Above $500,000	TA Below $500,000
PREM[1]	1.48	1.32	1.72
COLLAT	.53	.59	.47
ARINV	.36	.46	.25
OTHERSEC	.17	.13	.22
GUAR	.41	.46	.35
COMPBAL	.07	.09	.06
LEV	.59	.60	.59
PROFMARG	.12	.08	.16
CURRRAT	3.51	2.89	4.14
QUICKRAT	2.51	1.83	3.20
ARTURN	34.11	42.04	25.89
INVTURN	103.30	103.51	103.08
APTURN	91.16	94.41	87.78
TA[2]	2,346.08	4,447.77	165.81
CORP	.55	.70	.39
SUBS	.17	.20	.13
PART	.07	.05	.08
PROP	.22	.04	.41
OWNMG	.89	.85	.92
CONC50	.80	.74	.86
CONSTR	.14	.13	.15
SERVICES	.16	.10	.22
RETAIL	.23	.20	.27
OTHERIND	.47	.57	.36
AGE	13.63	16.04	11.13
RELATE[3]	11.39	12.67	10.08
Num. Obs.	872	444	428

[1]PREM available for 374, 221 and 153 observations only.
[2]000's omitted.
[3]RELATE available for 863, 437 and 426 observations only.

Table 3
Premium Over Prime Rate (Floating Only) for
Loans Issued Under Lines of Credit - All Firm Sizes

(OLS Regressions for PREM)

Variable	Excluding Loan Contract Terms	Including All Variables	Including Loan Contract Terms Only
INTERCEPT	1.8845**	2.1171**	1.3882**
ARINV		0.1106	0.2141
OTHERSEC		-0.2337	0.0424
GUAR		0.0141	0.0091
COMPBAL		-0.0616	-0.0319
LEV	0.2459	0.2092	
PROFMARG	0.3521	0.3477	
CURRRAT	0.0072	0.0075	
QUICKRAT	-0.0516	-0.0550	
ARTURN	0.0029	0.0029	
INVTURN	0.0007	0.0006	
APTURN	-0.0005	-0.0004	
LNTA	-0.0082	-0.0247	
CORP	-0.5929**	-0.6380**	
SUBS	-0.5390*	-0.5482*	
PART	-0.1784	-0.2060	
OWNMG	0.2877	0.2883	
CONC50	0.1927	0.2086	
CONSTR	0.2323	0.2735	
SERVICES	0.2577	0.2713	
RETAIL	0.1134	0.0905	
AGE	-0.0194*	-0.0181*	
RELATE	-0.0209**	-0.0206**	
Num. Obs.	371	371	371
R^2	.0973	.1022	.0044

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.

Table 4
Premium Over Prime Rate (Floating Only) for Loans Issued Under Lines of Credits - TA Above $500,000

(OLS Regressions for PREM)

Variable	Excluding Loan Contract Terms	Including All Variables	Including Loan Contract Terms Only
INTERCEPT	2.5162	2.9344*	1.0645**
ARINV		0.0161	0.3502*
OTHERSEC		-0.4361	0.0907
GUAR		-0.0510	0.1625
COMPBAL		-0.2197	-0.1601
LEV	0.5597	0.6236	
PROFMARG	0.2430	0.2576	
CURRRAT	0.0597	0.0658	
QUICKRAT	-0.2049**	-0.2154*	
ARTURN	0.0020	0.0019	
INVTURN	0.0003	0.0004	
APTURN	0.1E-4	0.0E-5	
LNTA	-0.0306	0.0541	
CORP	-0.8967	-0.9785*	
SUBS	-0.9490	-1.0292*	
PART	-0.4934	-0.5691	
OWNMG	0.3612	0.3833	
CONC50	0.2565	0.2707	
CONSTR	0.3978	0.4471	
SERVICES	0.5341	0.5597	
RETAIL	-0.3023	-0.3335	
AGE	-0.0200*	-0.0193*	
RELATE	-0.0257**	-0.0266**	
Num. Obs.	219	219	219
R^2	.1652	.1750	.0177

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.

Table 5
Premium Over Prime Rate (Floating Only) for
Loans Issued Under Lines of Credit - TA Below $500,000

(OLS Regressions for PREM)

Variable	Excluding Loan Contract Terms	Including All Variables	Including Loan Contract Terms Only
INTERCEPT	1.8589	1.9705	1.7135**
ARINV		0.1557	0.2020
OTHERSEC		-0.1808	-0.0929
GUAR		0.1636	-0.1115
COMPBAL		-0.0368	0.2501
LEV	0.0917	-0.0272	
PROFMARG	0.6124	0.6246	
CURRRAT	0.0171	0.0098	
QUICKRAT	-0.0108	-0.0116	
ARTURN	0.0057	0.0061	
INVTURN	0.0011	0.0009	
APTURN	-0.0006	-0.0005	
LNTA	-0.0560	-0.0664	
CORP	-0.4166	-0.5156	
SUBS	-0.3136	-0.3298	
PART	0.1228	0.0793	
OWNMG	0.1244	0.1518	
CONC50	0.1999	0.2145	
CONSTR	0.3126	0.3650	
SERVICES	0.2464	0.2773	
RETAIL	0.6499*	0.6520	
AGE	-0.0236	-0.0217	
RELATE	0.0042	0.0054	
Num. Obs.	152	152	152
R^2	.0883	.0941	.0073

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.

Table 6
Probability Tests on Collateral (All Types)
Lines of Credit

(Logit Regressions for the Probability of COLLAT)

Variable	All Firms	TA Above $500,000	TA Below $500,000
INTERCEPT	-3.2803**	-1.7642	-5.5487**
LEV	1.0791**	2.7985**	0.5646**
PROFMARG	-0.0256	0.3166	0.0816
CURRRAT	0.0865	0.1165	0.0541
QUICKRAT	-0.0869	-0.0531	-0.0805
ARTURN	0.0033*	0.0020	0.0059*
INVTURN	0.0001	-0.0004	0.0006
APTURN	-0.0010	-0.0016	-0.0009
LNTA	0.2201**	0.1016	0.4001**
CORP	0.0742	-0.4897	0.0936
SUBS	0.0444	-0.7290	0.4380
PART	0.3993	-1.0032	0.8143*
OWNMG	0.3307	0.4954	0.0362
CONC50	-0.0062	-0.2237	0.2542
CONSTR	-0.2184	-0.7807**	0.3710
SERVICES	0.2127	0.2089	0.5121*
RETAIL	-0.0393	-0.6008**	0.4335
AGE	-0.0203**	-0.0130	-0.0188
RELATE	-0.0257**	-0.0327**	-0.0154
Num. Obs.	863	437	426

Diagnostics

	All Firms	TA Above $500,000	TA Below $500,000
-2logL	1097.34	510.79	550.49
df	18	18	18
Chi Sq Covariates	94.34**	79.92**	38.93**

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.

Table 7
Probability Tests on Collateral (A/R and Inventory)
Lines of Credit

(Logit Regressions for the Probability of ARINV)

Variable	All Firms	TA Above $500,000	TA Below $500,000
INTERCEPT	-5.6213**	-5.0855**	-8.6773**
LEV	0.5670**	2.0804**	0.2600
PROFMARG	-0.4052	0.2675	-0.7719
CURRRAT	0.1257**	0.0692	0.1707**
QUICKRAT	-0.1438**	-0.0774	-0.1507*
ARTURN	0.0043**	0.0042*	0.0057
INVTURN	0.0003	-0.0003	0.0009
APTURN	-0.0010	-0.0030**	0.0004
LNTA	0.3146**	0.2408**	0.4770**
CORP	0.7120**	1.1438	0.5440*
SUBS	0.2933	0.6019	0.4283
PART	1.0378**	-0.0245	1.7040**
OWNMG	0.5650**	0.3572	1.0466*
CONC50	-0.0312	-0.2131	0.1199
CONSTR	-0.9176**	-1.3447**	-0.3932
SERVICES	0.0842	0.4705	0.1563
RETAIL	0.1540	-0.4043	0.7006*
AGE	-0.0239**	-0.0232*	-0.0117
RELATE	-0.0259**	-0.0299**	-0.0224
Num. Obs.	863	437	426

Diagnostics

-2LogL	968.48	506.96	417.71
df	18	18	18
Chi Sq Covariates	155.02**	95.72**	62.49**

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.