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The Role of Collateral and Personal Guarantees in Relationship Lending: Evidence from Japan's Small Business Loan Market*

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Abstract

This paper investigates the role of collateral and personal guarantees in small business lending using the unique data set of Japan's small business loan market. Consistent with conventional theory, collateral is more likely to be pledged by riskier borrowers, implying they may be useful in mitigating debtor moral hazard. Contrary to conventional theory, we find that banks whose claims are either collateralized or personally guaranteed monitor borrowers more frequently. We also find that borrowers who establish long-term relationships with their main banks are more likely to pledge collateral. Our empirical evidence thus suggests that collateral and personal guarantees are complementary to relationship lending.

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1 Introduction

Recent literature on financial intermediation has focused on the role of banks as relationship lenders. Relationship lending has also received close attention by policymakers and the business community in Japan recently, following publication of the "Action Program Concerning Enhancement of Relationship Banking Functions" by Japan's Financial Services Agency in March 2003. The background paper of the Program argues that relationship banking has not been working effectively in Japan and it cites the intensive use of collateral and personal guarantees in small business lending as a typical example of Japanese banks' incompetence. The implicit assumption in this argument is that collateral and personal guarantees are incompatible with relationship lending, which requires intensive screening and monitoring of borrowers on whom information tends to be scarce and opaque. This assumption is based on the widely held view that during the "bubble economy" of the late 1980s when real estate prices were escalating rapidly, Japanese banks relied too heavily upon the value of real estate collateral in making loans to businesses and hence lost their screening and monitoring ability. On the other hand, the conventional wisdom among Japanese bankers is that banks do screen and monitor borrowers more intensively following the bursting of the bubble economy because they can no longer rely on the value of real estate collateral. If this conventional wisdom is true, collateral is likely to be used as a tool for credit enhancement, which may complement rather than substitute for screening and monitoring activities by banks.

This paper studies the role and determinants of collateral and personal guarantees in relationship lending using the unique data set of Japan's small business loan market. In particular, we are interested in whether the use of collateral and personal guarantees is in fact incompatible with screening and monitoring by the relationship lender. We argue that collateral and personal guarantees do play a positive role in relationship lending.

The intensive use of collateral and personal guarantees in small business lending is not uncommon in other developed countries. For instance, using the 1993 "National Survey of Small Business Finances in the United States," Berger and Udell (1998) argue that most small business loans are personally guaranteed by the business owners and in many cases, the business assets as well as the personal assets of insiders are explicitly pledged as collateral to back the loan.

A number of theoretical and empirical studies have examined the uses of collateral and personal guarantees in loan contracts. Given asymmetric information between creditors and borrowers, collateral and personal guarantees may mitigate the problem of adverse selection (Bester, 1985; 1987) and the problem of moral hazard (Bester, 1994; Boot, Thakor, and Udell, 1991). Collateral and personal guarantees also affect the incentives of creditors, as they will either substitute for or complement information production by financial intermediaries (Manove, Padilla, and Pagano, 2001; Rajan and Winton, 1995; Boot 2000; Longhofer and Santos, 2000). The presence of collateral and personal guarantees may also depend on the length and intimacy of the relationship between creditors and borrowers (Boot, 2000; Boot and Thakor, 1994; Sharpe, 1990). The use of collateral and personal guarantees, how it relates to the characteristics of borrowers and lenders, and the relationship between the two parties remain unclear; empirical research has yet to reach decisive conclusions about the nature of this relationship.

This paper seeks to contribute to the existing literature on collateral and personal guarantees using the unique data set of Japan's small business loan market. We are interested in how the use of collateral and personal guarantees affects the incentives of debtors, lenders, and the relationship between them. More specifically, the paper examines the following three

conventional theories. First, the paper examines whether collateral and personal guarantees are required for riskier borrowers in order to limit the extent of debtor moral hazard after loans are made. Although it does not necessarily contradict the conventional wisdom, some argue that collateral and personal guarantees are more likely to be pledged by *less* risky borrowers so as to prevent the problem of adverse selection in loan contracts. We test both hypotheses in turn. Second, the paper investigates whether collateral and personal guarantees may substitute for the bank's information production activities, such as screening and monitoring of borrowers (the "lazy bank" hypothesis). Contrary to this conventional theory, several theoretical studies, which we review briefly below, argue that collateral and personal guarantees may instead complement screening and monitoring activities by the lender. We empirically assess which hypothesis holds in Japan's small business lending market. Third, we examine the correlation between the use of collateral and personal guarantees and the closeness of the bank-borrower relationship. The current belief among Japanese policymakers and business leaders is that there is less use of collateral and personal guarantees if loans are based on solid relationships between lenders and borrowers. This belief is reflected in the Japan Financial Services Agency's Action Program. On the other hand, if collateral and personal guarantees are complementary to screening and monitoring by the relationship-lender, it would be natural to see the opposite correlation. We also test these hypotheses.

The paper is organized as follows. Section 2 reviews theoretical and empirical literature on collateral and personal guarantees in loan contracts. Section 3 describes the data used in this paper. Section 4 presents our empirical results. First, we take preliminary overviews on how the risk of the borrower, the degree of screening and monitoring by the lender, and the relationship between the two would affect the use of collateral and personal guarantees. Then, we present our estimation models and empirical results. Section 5 summarizes our key findings.

2 Literature review on the role of collateral and personal guarantees

2.1 Role of collateral under perfect information

The role of collateral and personal guarantees differs completely, depending upon whether or not there is information asymmetry between creditors and borrowers. To see this point, it is useful to consider first the situation where creditors have perfect information on borrowers. For convenience, we use the term "collateral" for both collateral and personal guarantees[1].

The exposition is a simplified version of the seminal work by Bester (1985). We consider two types of risk-neutral entrepreneurs, *G* and *B*, whose projects are distinguished by their riskiness. Both projects require the same amount of capital to carry out, and we assume the required amount of capital is a unity. The returns to the projects are R_G and R_B ($R_G < R_B$) if they

[1] To be precise, collateral is typically physical assets or securities that the creditor can sell in the event of the borrower's default. In many cases, the assets or securities pledged as collateral are owned by the borrowing firm (*inside* collateral) and hence do not increase the potential losses that the borrower may suffer. Inside collateral mainly defines the order of seniority among creditors in the case of bankruptcy, although it also deters the use of perks by the borrower. On the other hand, a personal guarantee refers to a contractual obligation of the business owner or other third parties, such as the relatives of the owner or directors of the borrowing firm, to repay the principal in the event of a default. If the borrowing firm is a limited liability entity, a personal guarantee functions as *outside* collateral, except that it does not give control over specific assets. Most of the theoretical literature, as well as our exposition below, explicitly or implicitly assumes collateral is outside, but it is often difficult to discriminate between inside and outside collateral in empirical analyses due to the lack of information.

succeed and 0 if they fail. The probability of success is given by P_G and P_B ($P_G > P_B$), respectively. Entrepreneurs finance their projects by borrowing from a bank whose loan contract is specified by the interest rate r and the amount of collateral C. Entrepreneurs face collateralization costs, which are assumed to be proportional to the amount of collateral by a factor k. For simplicity, there is only one risk-neutral bank that gains all social surpluses.

The expected profits of an entrepreneur i ($i = G, B$) are given by:

$$X_i = P_i(R_i - r_i - kC_i) - (1 - P_i)(1 + k)C_i \tag{1}$$

The expected profits of a bank for a loan contract with entrepreneur i are given by:

$$Z_i = P_i \cdot r_i + (1 - P_i)C_i \tag{2}$$

Because the bank is a monopolist, it will set the terms of loan contracts to maximize the expected profit, making the expected profit of each entrepreneur zero. Because the bank can distinguish the riskiness of borrowers under perfect information, the bank will charge different interest rates and impose different collateral requirements on each entrepreneur. If there is no collateral, the interest rate is set at $r_i = R_i$ and the bank will earn $P_i R_i$ ($X_i = 0$). On the other hand, if the bank requires a positive amount of collateral $C_i > 0$, the interest rate is set at $r_i = \left[R_i + C_i - \frac{(1+k)C_i}{P_i} \right]$ and the bank will earn $P_i R_i - kC_i$. Hence, under perfect information, the bank will not require collateral. This result obtains because a social cost accrues in registering and managing collateral.

Alternatively, the bank will not require collateral under perfect information when there is no collateralization cost but entrepreneurs are risk averse, because, from the viewpoint of an entrepreneur, increasing the loss if the project fails by providing collateral and increasing gain if the project succeeds by reducing interest payments is incompatible with risk-averseness (Bester, 1987). In other words, risk-averse entrepreneurs would buy complete insurance if there were actuarially fair insurance available. In the absence of such insurance, an entrepreneur would prefer a loan contract without collateral as a second-best choice so as to minimize the difference between the payoff if the project succeeds and the payoff if the project fails.

2.2 Role of collateral under asymmetric information

Riskiness of the borrower

The above result will be quite different if the bank cannot discern the riskiness of the entrepreneurs (*hidden information*). Under informational asymmetry, collateral can serve as a screening device in order to discern the riskiness of entrepreneurs. This follows from the observation that the marginal rate of substitution (willingness to exchange interest payment for collateral loss if default occurs) for the riskier entrepreneur is higher (in absolute value) than that of the less risky entrepreneur:

$$MRS_i = -\frac{1 + k + P_i}{P_i} \tag{3}$$

Hence, the lower-risk entrepreneur G has a relatively larger incentive to pledge collateral than the risky entrepreneur B, because of his lower probability of failure and loss of collateral.

The incentive compatibility constraint requires the bank to offer the first-best contract to the riskier entrepreneur, *B*, who has an incentive to act as if he were type *G*. Hence, as is the case under perfect information, the loan contract with the riskier entrepreneur entails no collateral. Regarding the type *G* borrower, the bank will offer a contract with "minimum" collateral[2] so as to satisfy to the following incentive compatibility constraint of the type *B* borrower:

$$X_B(r_G, C_G) \leq X_B(r_B = R_B, C_B = 0) \tag{4}$$

As a result, collateral serves as a screening device to discriminate based on the riskiness of the borrower, and to mitigate the adverse selection problem. The lower-risk borrower will choose the contract with collateral, in order to take advantage of the lower interest rate.

On the other hand, when the information asymmetry is in the form of *hidden action,* in which the lender cannot observe actions taken by a borrower after the loan is originated, collateral can be used as an incentive to mitigate the moral hazard problem. For example, Boot, Thakor, and Udell (1991) argue that if a project's probability of success depends on the degree of effort by the borrower — which is unobservable by the creditor — and the marginal impact of effort on the probability of success decreases with borrower quality (that is, riskier entrepreneurs have a higher marginal "return" to effort), then it is optimal for the lender to require collateral from the riskier borrowers in order to limit moral hazard (a lack of effort on the part of the borrower). Similarly, Bester (1994) considers the situation where the creditors cannot directly observe the project outcome and hence cannot distinguish whether the borrower defaults strategically or because he is actually unable to meet his debt obligations. Under this constraint, collateral reduces the debtor's incentive for voluntary default. Because in equilibrium the incentive to strategically default is negatively correlated with risk, the riskier borrower is more likely to be financed thorough loan contracts that entail collateral than the lower-risk borrower. Contrary to the literature on hidden information, theoretical models of hidden action argue that the riskier entrepreneurs will obtain loans with collateral while the less risky ones obtain loans without collateral. One should note, however, that the theories of hidden information, in which the borrower's risk is unobservable, and theories of hidden action, in which the borrower's risk is observable but its actions are unobservable, are not mutually exclusive because they are based on different assumptions about the informational structure.

Screening and Monitoring by the lender

Recent literature on financial intermediation has focused on the role of banks as information providers: that is, screening the borrower's project and monitoring its performance. Manove, Padilla, and Pagano (2001) argue that, from the banks' point of view, collateral can be considered a substitute for evaluation of the actual risk of a borrower. Thus, banks that are highly protected by collateral may perform less screening of the projects they finance than is socially optimal (the lazy bank hypothesis). This idea is reflected in the Financial Services Agency's Action Program, which urges banks to promote "lending activities [by] placing emphasis upon cash flow from business operations and by avoiding excessive dependence upon collateral and guarantees."

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[2] In our setting, this reduces to $C_G = \dfrac{P_B P_G (R_B - R_G)}{(1+k)(P_G - P_B)}$. The interest rate for the type *G* borrower is set at $r_G = R_G - \dfrac{P_B (R_B - R_G)}{P_G - P_B} \cdot \left(1 - \dfrac{P_G}{1+k}\right)$, which is lower than the first-best interest rate (without collateral) under perfect information. Note also that it is lower than the interest rate charged to the type *B* borrower.

However, several theoretical studies argue that collateral may complement screening and monitoring activities by the lender. For instance, in the presence of other claimants, the lender's incentive to monitor the borrower is reduced due to the informational free-rider problem, among others. In order to enhance the lender's incentive to monitor, loan contracts must be structured in a way that makes the lender's payoff sensitive to the borrower's financial health. Rajan and Winton (1995) argue that collateral may serve as a contractual device to increase the lender's monitoring incentive, because collateral is likely to be effective only if its value can be monitored. Moreover, the use of collateral as an incentive will be more extensive when the value of such collateral depreciates rapidly according to business conditions (e.g., accounts receivable and inventories), than when the value of collateral is relatively stable[3] (e.g., real estate). As a corollary, Rajan and Winton also show that if the value of collateral is too high relative to the lender's claim, the lender has no incentive to monitor because its claim is fully secured regardless of the borrower's business conditions.

The paper by Longhofer and Santos (2000) provides another explanation of how collateral may be complementary to screening and monitoring by banks. They point out that banks usually take senior positions on their small business loans. They further argue that the relationship-lending equilibrium, in which the lender establishes firm bank-firm relationships by investing in costly information production activities such as screening and monitoring, is more likely to exist when the relationship-lender (the bank) is senior to the firm's other creditors, because the lender's incentive to make such investments depends crucially on its payoff. If the bank is junior to other creditors, it gains little from additional investment in information production activities on the firm during times of poor performance, and hence has little incentive to make such investments. By making its loan senior to other creditors' claims, the bank is able to reap the benefits of its relationship-building investments. Because taking collateral effectively raises the lender's priority, this argument can easily apply to the use of collateral.

Relationship between the borrower and the lender

Banks and firms often maintain their relationship through multiple interactions over time and across products. Such relationships often involve borrower-specific information gathered by the bank through screening and monitoring. This information is thus proprietary and exclusive in nature. As a result, the borrower tends to maintain relations with only one bank. This type of lending is referred to as "relationship banking"[4] (Boot, 2000).

By establishing a solid relationship with the borrower, the lender learns about the hidden attributes and actions of the borrower and reduces the information asymmetry. Hence the terms of loan contracts may become more favorable to the borrower if the firm has transactions with a specific relationship-lender over time. For example, Boot and Thakor (1994) construct a model in which collateral requirements are negatively correlated with the duration of bank-borrower relationship: Borrowers pledge collateral early in the relationship but do not pledge collateral after they have demonstrated success with several projects.

[3] Another related benefit of using inventories and accounts receivable as collateral is that they may reveal valuable information about the business (Boot, 2000). This also shows the complementarities between collateral and information production by the financial intermediary.

[4] Relationship lending is quite different from "transactions-based lending," where a lender focuses on a single transaction and hence maintains an arm's-length relationship with a borrower. In the realm of small business lending, Berger and Udell (2002) cite financial statement lending, asset-based lending, and credit scoring lending as three forms of transactions-based lending.

Alternatively, relationship lending may enhance the use of collateral due to the *hold-up problem*: As the bank obtains the proprietary information about the borrower, the bank exerts its information monopoly by charging higher interest rates or requiring more collateral (Sharpe, 1990).

In contrast, the strand of literature that emphasizes the complementarities between collateral and screening and monitoring activities by the lender discussed in the previous subsection argues that collateral is an intrinsic component of relationship lending. This literature treats collateral as a necessary condition for the lender to invest in information production. Boot (2000) highlights another contribution of collateral in relationship lending: its role in mitigating the *soft-budget constraint problem*. The soft-budget constraint problem refers to a situation where the lender has difficulty in enforcing the loan contracts that may come with relationship lending. For example, consider the case where a borrower in difficulty asks the bank for more credit and reduced interest obligations in order to avoid default. Although a transaction-based lender would not lend to such a borrower, a relationship-lender that has already made loans might extend additional credit and lower the interest rate in the hope of recovering its previous loan. Once the borrower realizes he can renegotiate the loan contract relatively easily, he has an incentive to misbehave ex ante, such as by failing to make sufficient efforts to prevent the bad outcome (dynamic inconsistency). In such cases, collateral will increase the ex-post bargaining power of the lender and hence mitigate the soft-budget constraint problem because collateral makes the value of lender's claim less sensitive to the borrower's total net worth. The bank can credibly threaten to call in the loan and thus prevent misbehavior by the borrower.

2.3 Empirical evidence

Because collateral has little role under perfect information, most empirical literature on collateral investigates the role of collateral under asymmetric information. This subsection reviews some of these empirical studies.

Riskiness of the borrower

There are several empirical studies that examine the relationship between collateral and the riskiness of the loan or the borrower. Berger and Udell (1990) investigate the relationship between collateral and credit risk by estimating the differences in risk premiums between secured and unsecured loans. If collateral serves as an incentive device that is designed to solve the problem of adverse selection, then the risk premium of the loan should be negatively correlated with the likelihood of collateral being pledged because a low-risk borrower would choose a contract with collateral, in order to take advantage of the lower risk premium. On the other hand, if the lender observes the ex-ante risk of the borrower and requires a higher-risk borrower to pledge collateral, then there should be a positive relationship between the risk premium and the presence of collateral. Berger and Udell (1990) find a positive association between use of collateral and risk premiums, which is consistent with the hypothesis that collateral reduces debtor's moral hazard. Similarly, Berger and Udell (1995) find a positive relationship between the leverage of the borrower, which is a proxy for borrower risk, and collateral, and thus confirm their earlier result.

Pozzolo (2004) focuses on possible differences between the roles of inside and outside collateral (see footnote 1 for the definition of these terms). He argues that outside collateral is more effective in dealing with debtor incentive problems because it increases the value of assets that the lender can withhold in the event of default. Because it is difficult in practice to distinguish between inside and outside collateral due to data limitations, the study considers collateral (such

as physical assets or equities) as inside and personal guarantees as outside. Pozzolo (2004) uses a credit score, which measures the risk profile of the borrower, as a proxy for ex-ante borrower risk. The study finds no statistically significant relationship between collateral and borrower risk and interprets this result as potentially consistent with the idea that collateral mitigates the adverse selection problem, which deals with the unobservable riskiness of the borrower. The study also argues that collateral is not used as an incentive device for the moral hazard problem, presumably because such collateral is internal to the borrowing firm. The idea that internal collateral cannot serve as an incentive is supported by Elsas and Krahnen (2000), who find no statistically significant relationship between collateral and borrower quality.[5] In the case of personal guarantees (outside collateral), Pozzolo (2004) finds positive association between the two, implying that personal guarantees are used as an incentive in the presence of moral hazard.

The study by Jiménez, Salas-Fumás, and Saurina (2004) directly tests the adverse selection hypothesis and the moral hazard hypothesis by separating the ex-ante and ex-post measures of borrower riskiness. The ex-ante riskiness of the borrower, which must be distinguished to examine moral hazard hypothesis, is measured by a default dummy variable that takes the value of one if the borrower had previously defaulted on a loan at the time the new loan was made. As for the ex post-riskiness of the borrower, which is used to test the adverse selection hypothesis, the default variable takes the value of one if the borrower defaults on a loan after it is made. The authors find evidence supporting the moral hazard hypothesis. Brick, Kane and Palia (2004) obtain a similar result, using a default dummy variable for either the principal owner or the firm as a measure of the ex-ante riskiness of the borrower.

Screening and Monitoring by the lender

To our knowledge, little work has been done to empirically assess whether the use of collateral and personal guarantees are substitutive or complementary to screening and monitoring by the lender. Based on the lazy bank hypothesis, which posits collateral as a substitute, Jiménez, Salas-Fumás, and Saurina (2004) examine whether banks with a lower level of expertise in small business lending use collateral more intensively. Examining Spanish loan data from 1984 to 2002, they find that loans originated by smaller banks, which are deemed to have fewer resources for credit evaluation, and by savings banks, which traditionally make loans mainly to households rather than businesses, are more likely to extend collateralized loans. The authors argue that their findings suggest collateral is used as a substitute for the evaluation of credit risk, and hence is compatible with the lazy bank hypothesis.

Relationship between the borrower and the lender

A vast amount of empirical work has investigated how the relationship between a borrower and a lender may affect the terms of small business lending, such as interest rates, maturity, and collateral requirements. The proxy variables for "relationship" vary in the literature, such as the duration of the lender-borrower relationship, the number of financial products the borrower purchases from the lender ("scope" of relationship), and the number of banks with which the borrower has transactions.

As with the theoretical literature, the empirical results in the above studies are contradictory. Berger and Udell (1995), Brick, Kane, and Palia (2004), Harhoff and Körting (1998), and Jiménez, Salas-Fumás, and Saurina (2004) find negative relationships between the duration of

[5] Elsas and Krahnen (2000) argue that their empirical results neither support the role of collateral as a signaling device in the presence of adverse selection nor as an incentive device in the presence of moral hazard.

the bank-firm relationship and the probability that collateral will be pledged. These findings are consistent with the model of relationship banking and reputation posited by Boot and Thakor (1994). Berger and Udell (1995) and Harhoff and Körting (1998) also find the interest rate on loans falls with the duration of relationship. But Brick, Kane, and Palia (2004) argue that this result may be due to the endogeneity problem among loan contract terms; they find that endogenizing collateral and fees eliminates any significant correlation between the interest rate and the duration of the relationship.

Degryse and Van Cayseele (2000) also find a negative relationship between the interest rate and the duration of the relationship, but their paper argues this result depends on the proxies used for the relationship: They obtain a positive relationship between the scope of lender-borrower relations and the collateral requirement, implying that a relationship lender will require more collateral than a transaction-based lender, presumably because of the hold-up problem.

As for the empirical literature that analyzes the number of banks involved in transactions, Harhoff and Körting (1998) find the incidence of collateralization of credit lines increases as the number of financial institutions the firm is borrowing from rises. They argue that concentrated borrowing represents a strong lender-borrower relationship, and that their results provide evidence for the claim that such a relationship eases loan conditions for the borrower. On the other hand, Jiménez, Salas-Fumás, and Saurina (2004) find that the use of collateral decreases with the number of financial institutions used by the borrower. Interestingly, they interpret the number of lenders as an increase in the bargaining power of the borrower, and hence reach the same conclusion qualitatively as Harhoff and Körting (1998). Petersen and Rajan (1994) provide anecdotal evidence from conversations with U.S. bankers that concentrated borrowing implies a "strong relationship."

In contrast to the literature above (except Degryse and Van Cayseele (2000)), Elsas and Krahnen (2000) and Pozzolo (2004) obtain results consistent with the idea that relationship lenders do require collateral more frequently than other lenders because of the positive role such collateral plays in relationship lending. Using survey data from German banks, Elsas and Krahnen find that "housebanks," defined as relationship-lenders, have a higher probability of holding loans backed by collateral and personal guarantees than other banks. Pozzolo (2004) finds a positive relationship between the term of the loan and the probability of collateralization. He finds, however, a negative relationship between loan term and the probability of the loan being secured by personal guarantees.

3 Data

We use data from the "Survey of Corporate Procurement" (2001), the "Survey of the Financial Environment" (2002), and the "Survey of the Corporate Financial Environment" (2003) conducted by the Small and Medium Enterprise Agency of Japan (collectively referred to as "SFEs" hereinafter). In each of these surveys, a questionnaire was sent to a total of 15,000 companies, mainly small and medium-size enterprises (SMEs hereinafter), of which around 7,000 to 9,000 firms responded each year. Although the contents of the SFEs vary from year to year, the surveys ask a number of detailed questions regarding firm characteristics and financial transactions such as the number of financial institutions the firm deals with; its relationship with its "main bank" (an obvious candidate for the relationship-lender); whether loans are secured by collateral, personal guarantees, or government-sponsored credit guarantees; and interest rates charged on short-term loans. Because we are interested in the role of collateral and personal guarantees in small business lending, we restrict our sample to SMEs, that is, enterprises with

capital of no more than 300 million yen or no more than 300 regular employees. Unless otherwise stated, we use the 2002 SFE, which provides the most detailed information on the use of collateral and personal guarantees. We also use the TSR (Tokyo Shoko Research) database, which consists of financial statements of SMEs, and we match the data obtained from the TSR with that from the SFE. The TSR database also provides credit scores for the firms, and we use this variable as a proxy for the borrower's credit risk. The score ranges from 0 to 100 points, with a higher credit score implying a lower credit risk for the firm. The score consists of four components: (i) management ability such as the business experience of the manager and outstanding assets that can be collateralized (20 points); (ii) growth potential of sales and profits (25 points); (iii) stability factors such as firm age, amounts of capital, past payment and credit history of the firm (45 points); and (iv) reputation and disclosure (10 points). Based on the total credit score, the firm is judged as either "requiring no caution (80-100)," "safe (65-79)," "requiring little caution (50-64)," "requiring some caution (30-49)," or "requiring caution (less than 30)." The score is subjective in the sense that each researcher of the TSR grades the firms for which he is responsible. It should also be noted that the absolute values of the scores may be of little value in some cases because researchers are asked to assign a score of 50 points to the "average" firms with which they are working. Despite these shortcomings, the TSR credit score is viewed as a typical metric of credit risk for SMEs in Japan and we use the score with care.

Table 1 shows the median values of several variables for the 2002 SFE, depending on whether the firm pledges collateral, personal guarantees, or has government sponsored credit guarantees on its loans from the main bank. As shown in the last row, the median amount of capital for firms surveyed is over 2 million yen and the median number of employees is 36, which implies that our sample consists of relatively "large" SMEs.[6] Note also that the standard deviation of each variable is fairly large; thus we report the median rather than the average in the table.

Table 1 reveals that firms which pledge collateral or personal guarantees, or roughly three-fourths of the sample, are typical SMEs in our sample in terms of size, credit risk, and several financial ratios. Firms receiving credit guarantees, which account for about half the sample, are relatively smaller and deemed riskier than the others. They are thus subject to higher interest rates.

Composition of collateral and personal guarantees

Tables 2 and 3 show the composition of collateral by type of assets pledged and the composition of guarantors, respectively, using 2001 SFE data. The figures do not add up to 100% because more than one response is allowed. Table 2 confirms the widely held view that Japanese SMEs most often pledge real estate as collateral. Financial assets such as deposits, shares, and commercial bills are the second most common form of collateral and are especially common among the low-score (high-risk) firms. Account receivables and inventories, which are typical assets pledged for working capital in the United States, are rarely used. The table does not distinguish between inside and outside collateral[7].

Table 3 shows that the representative of the firm is the guarantor in most cases. In addition, directors other than the representative and relatives of the representative occasionally guarantee loans, especially for low-score firms. Clearly, personal guarantees serve as outside collateral.

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[6] The average number of employees for all SMEs was seven, according to the Ministry of Internal Affairs and Communications, "Establishment and Enterprise Census in Japan 2001."

[7] See footnote 1 for the definition of inside and outside collateral. Our conversations with Japanese bankers suggest that small business owners' personal assets are pledged as collateral in some cases.

4 Empirical Results

4.1 Variables

The terms of the loan contracts we analyze are whether the borrower pledges collateral and/or personal guarantees to its main bank, and the short-term interest rate charged by the main bank.[8] The variable *COLL* and *GUAR* are 0/1 variables that take the value of 1 if the borrower pledges collateral/personal guarantees to its main bank. The variable *RATE* indicates the short-term interest rate as of end of October 2002, in tenths of a basis point (i.e., 1000 indicates 1.000%).

We have grouped our explanatory variables into three classes: riskiness of the borrower, screening and monitoring by the lender, and the relationship between the borrower and the lender.

The riskiness of the borrower is approximated by several variables that help capture the risk profile of the borrower. The variable *SCORE* indicates the TSR credit score explained above. Other than *SCORE*, we use a number of financial ratios such as *LEV* (leverage ratio, i.e., debt outstanding/total assets outstanding), *PROFMARG* (profit margins, i.e., profits before tax/gross sales), *CASHRATIO* (cash ratio, i.e., cash holdings/gross sales), and *LOGSALES* (the logarithm of sales).

The 2002 SFE asks respondent firms how often they have contact with the loan officers of their main banks, whether they submit relevant documents such as financial statements and cash flow forecast tables to their main banks so that banks can assess borrowers' credit risks, and if so, how often. Hence, screening and monitoring activities by lenders are captured by the variables *DOC*, *DOCFREQ*, *CONTACTFREQ*. The 0/1 variable *DOC* takes the value of 1 if the borrower submits documents to its main bank, and the index variable *DOCFREQ* shows the frequency, with the lowest value 1 indicating the shortest frequency (1: once every 1-2 months, 2: quarterly, 3: semi-annually, 4: annually). Similarly, the index variable *CONTACTFREQ* indicates the frequency of loan officer contact and takes the value of 1-9 (1: every day, 2: weekly, 3: once every 2 weeks, 4: monthly, 5: bi-monthly, 6: quarterly, 7: semi-annually, 8: annually, 9: no contact). We also use the ratio of non-performing loans to total loans, *NPL*, as an ex-post measure of screening and monitoring activities by the lender. We assume that the bank's non-performing loan ratio is negatively correlated with the intensity of its screening and monitoring efforts.

Finally, we use the following lender-borrower relationship variables: *DURATION,* which indicates the duration of the main bank-borrower relationship, *SCOPE,* which indicates the number of financial products the borrower purchases from its main bank ("scope" relationship), and *BANKS,* which indicates the number of banks with which the borrower has transactions[9]. Similar to the definition of housebanks in Elsas and Krahnen (2000), the definition of a main bank in the SFE is somewhat subjective because each respondent firm is asked to choose its main bank based on its own perceptions. As for the number of financial products purchased, the 2002 SFE asks firms to list all products, other than loans, which they purchase from the main banks. We then tabulate the number of products that each firm has purchased.[10]

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[8] If the borrower has several short-term loans with its mainbank, the loan with the highest interest rate is reported.

[9] We also construct an index variable, *BANKONE*, which takes the value of 1 if the borrower has a sole transaction with its main bank.

[10] We exclude the items "purchasing additional stock of the mainbank" and "hiring retired bankers,"

Table 4 lists the variables used in our empirical analysis and their definitions. Several unexplained variables will be discussed below.

4.2 Preliminary findings on the role of collateral and personal guarantees

Before explaining our regression models and results, it is useful to provide a preliminary overview of how the riskiness of the borrower, the degree of screening and monitoring by the lenders, and the relationship between the two affects the share of borrowers who use collateral and personal guarantees.

Riskiness of the borrower

As stated above, we use the TSR credit score as a measure for ex-ante risk of the borrower. Table 5 shows the percentage of borrowers using collateral, the percentage of those using personal guarantees, and the average short-term interest rates (*RATE*) paid by collateral/guarantee-user and non-users, by credit score category (*SCORE*). Table 5 indicates a negative relationship between credit score and use of collateral and personal guarantees, and thus favors moral hazard hypothesis. Interestingly, even within the same credit score category, borrowers who pledge collateral and personal guarantees are charged higher interest rates than those who do not. This is consistent with the finding in Berger and Udell (1990), who argue riskier borrowers more often pledge collateral, but that recourse to collateral less than fully offsets the difference in borrower risk. The interest rate differential between the two is especially large for low-score (high-risk) borrowers.

We also investigate whether there are any preliminary findings consistent with the adverse selection hypothesis. First, following the model of Jiménez, Salas-Fumás, and Saurina (2004), we look into the amount of collateral pledged. The 2002 SFE provides a value index of collateral, which measures the present value of collateral relative to the amount of debt incurred. Table 6 shows that, once the decision has been made to pledge collateral, it is the high-score (low risk) borrowers who pledge more, suggesting the plausibility of the adverse selection model. However, we attribute this finding to the simple fact that the low-score borrowers often do not have enough assets to fully secure the loan. The bottom row of Table 6 shows the ratio of borrowers who own real estate whose value exceeds the amount of short-term and long-term loans.[11] Naturally, the percentage rises along with the score of the borrowers.

Second, we examine the relationship between the share of borrowers using collateral and personal guarantees in year 2001 and the TSR credit score in 2002 (Table 7). Because the credit score in 2002 is unobservable by the lender in 2001, we think this is a more appropriate way to test whether the lender uses collateral and personal guarantees to deal with the problem of adverse selection, under which the borrower's riskiness is unknown. Table 7 indicates, however, that the relationship between the share of borrowers using collateral and personal guarantees and the credit score a year after the loan is made is still negative, which is inconsistent with the adverse selection hypothesis.

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which appear irrelevant to building the relationship.

[11] We use the value of real estate because this is the most common asset pledged as collateral in Japan (Table 2). We have also compared the results against the value of other assets that can be collateralized, such as securities, and cash. The result is effectively the same.

Screening and monitoring by the lender

One important new approach in this paper is our use of direct measures for screening and monitoring activities by lenders in our examination of the relationship between use of collateral and personal guarantees and screening and monitoring. Because it is somewhat subjective to posit *a priori* which type of lenders have a relative advantage in evaluating and managing credit risks of small business borrowers (as was done by Jiménez, Salas-Fumás, and Saurina, 2004), our work may shed light on how collateral may affect the screening and monitoring incentives of the lender.

Table 8 shows the relationship between the frequency of document submission (*DOCFREQ*) and the use of collateral and personal guarantees, and average short-term interest rates[12]. Because the use of collateral and personal guarantees and the average short-term interest rate are affected by borrower risk, we make observations by credit-score category (the rows in Table 8). In general, the higher the percentage of loans with either collateral or personal guarantees, the more often borrowers submit documents. This preliminary result is inconsistent with the lazy bank hypothesis, which claims that a bank requires collateral as a substitute for screening and monitoring. Interest rates are somewhat higher for borrowers who submit documents more frequently.

We make a similar tabulation to investigate whether banks that contact their borrowers more often (*CONTACTFREQ*) are more likely to have loans with collateral and personal guarantees (table not reported), and obtain qualitatively the same result as above. We also examine the relationship between the non-performing loan ratio (*NPL*) and use of collateral and personal guarantees, because *NPL* may serve as an ex-post measure for screening and monitoring activities by the lender. We have found, however, no monotonic relationship between the two (table not reported).

Relationship between the borrower and the lender

Table 10 shows the relationship between the duration of the main bank-borrower relationship (*DURATION*)[13] and the use of collateral and personal guarantees, and the average short-term interest rate. As the duration increases, the share of collateralized and personally guaranteed loans rises. Note also that the collateral ratio is relatively low for borrowers with main bank relationships of less than 15 years, regardless of credit score. This suggests collateral and personal guarantees are complementary to the relationship, and is consistent with both the "hold-up" argument (the "dark side" of the relationship) and the "mitigation of the soft-budget constraint" argument (the "bright side" of relationship). Interest rates are somewhat lower for borrowers with longer main bank relationships, but the correlation is less clear-cut. The finding on interest rates is thus inconsistent with the hold-up hypothesis.

Tables 11 and 12 make similar observations for the number of financial products purchased by the borrower from its main bank (*SCOPE*) and the number of banks the borrower has

[12] We have also investigated the frequency of document submission (*DOCFREQ*) by each banking sector and checked whether a particular banking sector monitors the borrowers more frequently (Table 9). Table 9 shows that the monitoring frequency of Shinkin (credit unions) and Shinkumi (credit cooperatives) are slightly shorter than the other banking sectors, because their shares of low-score borrowers that require intensive monitoring are larger than those of the other sectors. Hence, controlling for the effect of borrower risk, we do not find any relationship between the banking sector and monitoring frequency. This reinforces our empirical strategy of not positing a priori which type of lenders have a relative advantage in evaluating and managing credit risks of small business borrowers.

[13] Each respondent firm is asked to state the exact number of years it has been dealing with its mainbank.

transactions with (*BANKS*). Table 11 leads us qualitatively to the same results as above: Borrowers with more "scope" in the relationship are more likely to pledge collateral and personal guarantees, and make slightly lower interest payments (although the relationship is less clear).

Table 12 gives a somewhat different view of the lender-borrower relationship. It shows that borrowers who establish proprietary (sole) relationships with their main banks pledge collateral and personal guarantees less often than those who do not. In the case of collateral, which is more likely to be *inside* than personal guarantees, this preliminary evidence supports the idea that the main reason for requiring borrowers to pledge collateral is to secure seniority for the main bank's claims, because the need to define seniority among creditors would be less in the case of a single transaction.

4.3 Regression model and results

We estimate the following equation to verify whether collateral and personal guarantee requirements are greater for riskier borrowers, for banks with more intensive monitoring activities, and for borrowers with more intimate banking relationships:

$$\Pr(Y_{ij} = g) = f(RISK_j, MONITORING_i, RELATION_{ij}, FIRM_j, LENDER_i, CONTRACTS_{ij}, OTHERS)$$

where Y_{ij} equals 1 if the loan made by bank i to the borrowing firm j is collateralized or personally guaranteed. $RISK_j$ is a vector of variables specifying the risk profile of the borrower. $MONITORING_i$ is a vector of variables of monitoring activities by banks. $RELATION_{ij}$ is a vector of variables indicating the bank-firm relationship. All of these variables are discussed in Table 4. $FIRM_j$ and $LENDER_i$ are dummy variables for firm and lender characteristics, where $FIRM_j$ indicates the industry the firm belongs to and $LENDER_i$ indicates the sector (such as city bank or regional bank) that the bank belongs to. Finally, we control for the contracting terms ($CONTRACTS_{ij}$) such as interest rate, $RATE_{ij}$, and whether the borrower pledges a guarantee or collateral to its main bank. These variables are potentially endogenous, and we discuss how we deal with the problem of endogenous regressors below. The variables in *OTHERS* include several variables that are specifically important determinants for collateral and personal guarantees. For example, the variable $MATURITY_j$ which represents the ratio of short-term loans to long-term loans is likely to be correlated with whether the loan is collateralized because long-term loans such as equipment lending and real estate lending are more likely to be secured by physical assets to be held by the borrower. The equation above is estimated using probit specification for both collateral and personal guarantees.

As in Berger and Udell (1990), we also estimate the following interest rate equation as an indirect test for the determinants of collateral and personal guarantees.

$$RATE_{ij} = f(RISK_j, MONITORING_i, RELATION_{ij}, FIRM_j, LENDER_i, Y_{ij}, OTHERS)$$

In particular, if a borrower who establishes a solid relationship with its main bank is more likely to pledge collateral and personal guarantees, the interest rate equation verifies whether the complementarity between collateral and personal guarantees and the bank-firm relationship is due to the hold-up problem or to mitigation of the soft-budget constraint.

Estimation strategies

We begin with the probit estimations for collateral and personal guarantees, and the OLS estimation for the interest rate, assuming that the contract-terms are exogenous explanatory variables. For example, regarding the probit estimation for collateral, the interest rates and the binary variable for personal guarantees are assumed to be exogenous.

We then implement the probit estimations for collateral and personal guarantees, treating interest rates as an endogenous variable. The estimation will follow the maximum likelihood estimation procedure with the endogenous variable in Wooldridge (2004, pp.475-476). The idea is to obtain the parameters of the model and their standard errors by maximizing the likelihood function of the following equation:

$$f(Y_{ij}, RATE \mid \mathbf{z}) = f(Y_{ij} \mid RATE, \mathbf{z}) f(RATE \mid \mathbf{z})$$

where $\mathbf{z}$ is a vector of instrumental variables. As shown in the second term of the right-hand side equation, interest rates (endogenous variable) are estimated by the instrumental variable. The instrumental variables of interest rates are measures of market power and the age of the borrowing firm (*FIRMAGE*). We use the Herfindahl Index for small business lending in the prefecture of the firm, denoted as *HHI*, as our market power measure. Because *HHI* is computed based on the share of small business lending of regional banks, second-tier regional banks, *Shinkin* (credit unions), and *Shinkumi* (credit cooperatives), we also include the aggregated share of city banks in small business lending in the prefecture of the firm (*CITYSHARE*). These market power variables are taken from the *Kinyu Journal*, "Regional Finance Map." The information obtained from the interest rates equation as well as information from the collateral (personal guarantees) equation is simultaneously used in estimating the parameters.

It may be preferable to endogenize personal guarantees (collateral) as well as interest rates in estimating the probability of collateral (personal guarantees) pledged. However, the number of endogenous variables that we can handle in the full maximum likelihood procedure is constrained by the computational difficulties in getting the iterations to converge. Alternatively, we follow the two-stage conditional maximum likelihood method (Wooldridge, 2004, pp.472-475), in which the interest rates and personal guarantees (collateral) are estimated by ordinary least squares with instrumental variables in the first step, and then the probit model for collateral (personal guarantees) is estimated in the second step, using the fitted values and the standard errors obtained in the first-step estimations. The instrumental variable used in the first-step estimation for personal guarantees is the share of equity holdings held by the owner and his relatives in the previous year, 2001: the index variables *OWNERRATIO* take the value of 1-7, with the highest value 7 indicating the 100% equity holdings (1: 0%, 2: 1-5%, 3: 6-25%, 4: 26-50%, 5: 51-74%, 6: 75-99%, 7: 100%). The instrumental variable for collateral is the ratio of real estate holdings to total assets (*LANDRATIO*).

Based on these three types of estimations, we will make our inference on how the riskiness of the borrower, the degree of screening and monitoring by the lenders, and the relationship between the two affects the share of borrowers who use collateral and personal guarantees.

Estimation results

Tables 13, 14, and 15 report our estimation results for collateral, personal guarantees, and interest rates equations, respectively. The first column of each table provides the estimates of the benchmark models in which all the terms of loan contracts are assumed to be exogenous.

The second column shows the estimates of the full maximum likelihood models with one endogenous variable (interest rates), and the third column shows the estimates of the two-step maximum likelihood models with two endogenous variables. Coefficients for firm and lender characteristics dummy variables are omitted from the tables.

We first investigate the *COLLATERAL* equation (Table 13). In the basic probit estimation for collateral, *GUAR* and *RATE* are positively correlated with the probability of collateral being pledged. The *SCORE* receives an insignificant negative coefficient, but the coefficient of *LEV* is positive and significant, suggesting that collateral is used to suppress the debtor's moral hazard. The negative and significant coefficient of *DOCFREQ* indicates the complementarity between monitoring by the lender and collateral requirements. The positive coefficients of the relationship variables (*DURATION, SCOPE*) show that collateral is also complementary to the relationship.

In the second column of Table 13, the full maximum likelihood estimation with interest rates treated as endogenous exhibits similar results. In order to achieve the convergence, we dropped several explanatory variables that are less relevant[14]. A Wald statistics test of exogeneity rejects the null hypothesis of the interest rate being exogenous. Once we control for the endogeneity of the interest rate, its coefficient becomes significantly negative. This indicates that borrowers who pledge collateral to their main bank are charged lower interest rates, presumably because collateral ensures the seniority of main bank's claims and limits debtor moral hazard. Compared with the basic probit estimation, two variables are worth noting. *SCORE* has a significantly negative sign, thus strengthening the robustness of the moral hazard hypothesis. The sign of *SCOPE* becomes negative, although it is insignificant. Nevertheless, the coefficient of *DURATION* is still positive and significant, suggesting the complementarity between collateral and the bank-borrower relationship.

The third column of Table 13 presents the estimation results for the two-step procedure in which personal guarantees as well as interest rates are endogenous. Although we lose efficiency in the coefficients for most variables to a certain degree, the results obtained in the previous estimations remain valid qualitatively.

In parallel fashion, Table 14 provides the estimation results for personal guarantees. The second and third columns of Table 14 show estimates for full and two-step maximum likelihood procedures, respectively, but the Wald statistics test of exogeneity cannot reject the null hypothesis of interest rate and collateral being exogenous. Hence, we will make our inference based on the basic probit estimation results (first column, Table 14). Somewhat surprisingly, many credit risk variables correlated with the probability of collateral being pledged are insignificant in the *GUARANTEE* equation. *SCORE* and *LEV* are insignificant, while *LOGSALES* has a significant and negative sign, indicating firms with larger sales are less likely to pledge personal guarantees. These results, however, are likely to be due to multicollinearity among *SCORE*, the terms of loan contracts, and other financial ratios. Once we drop the loan-contract and other financial ratio variables, *SCORE* has a significantly negative sign, suggesting that personal guarantees are also used to contain the debtors' moral hazard.

The complementarity of personal guarantees to monitoring and the borrower-lender relationship becomes weaker but is maintained in the *GUARANTEE* equation. The coefficient of the frequency of document submission (*DOCFREQ*) is significantly negative, which implies that personal guarantees are complementary to monitoring by lenders. *SCOPE* is significantlypositive, also suggesting the complementarity of personal guarantees and the

[14] Firm and lender characteristics dummy variables are also excluded in this estimation.

borrower-lender relationship. An exception is the negative and significant coefficient of *ONEBANK*.

Finally, Table 15 shows estimation results for the interest rate. The second and third columns are "first-step" estimation results in *COLLATERAL* equations. The negative and significant coefficient of *SCORE* indicates that the borrowers' risk is negatively correlated with the interest rates charged by the main bank. The negative coefficient of *SCOPE* and the positive coefficient of *BANKS* are inconsistent with the hold-up hypothesis.

As a robustness check, we divide our sample into credit guarantee users and non-users and re-estimated for the latter firms for the following reason: The Japanese government has credit guarantee programs designed to mitigate the financial difficulties faced by SMEs, and more than half of our sample firms use such credit guarantees. In the event a borrower cannot repay its debt to the bank, the credit guarantee corporation covers the debt, whereupon it receives a claim against the borrowing firm. In principle, the credit guarantee corporation guarantees 100% of the loans outstanding, meaning the bank bears no credit risk. As shown in Table 17, the share of borrowers who use credit guarantees is inversely related to the credit score and the share of borrowers who pledge collateral is very high among credit guarantee users, irrespective of the credit score.[15] Thus, the use of credit guarantees may have influenced our inference above. Estimation for the non-guarantee users excludes such distortions, which is shown in Table 16. We posit the probit and OLS estimation results for collateral, personal guarantees, and the interest rates. Most of the significant coefficients in Tables 13, 14, and 15 are qualitatively unchanged in the table, while a few of them lose their significance, possibly due to the smaller number of observations.

5 Concluding Remarks

This paper investigates the role of collateral and personal guarantees in small business lending using the unique data set of Japan's small business loan market. Consistent with conventional theory, collateral is more likely to be pledged by riskier borrowers, implying such collateral may be useful in mitigating debtor moral hazard. Contrary to conventional theory, we find that banks whose claims are either collateralized or personally guaranteed monitor borrowers more frequently. We also find that borrowers who establish long-term relationships with their main banks are more likely to pledge collateral. Our empirical evidence thus suggests that collateral and personal guarantees are complementary to relationship lending.

Our findings have the following implications for the current debate on strengthening the function of relationship banking in Japan. In the bubble economy period, real estate was considered such a safe collateral asset that the incentive of financial institutions to monitor the borrowers was undermined insofar as loans were collateralized. This phenomenon may be behind the widely held view that accepting collateral hinders the banks' monitoring effort and thus undermines relationship lending in Japan. However, our evidence suggests this may no longer hold true. Based on data from the early 2000s, we find that lenders who require borrowers to pledge collateral and personal guarantees are more likely to monitor intensively. Therefore, emphasizing only the negative side of collateral and recommending non-collateral loans, such as the rapidly expanding credit scoring loans, may in fact hinder screening and

[15] The maximum loan amount for the most common credit guarantee program is 200 million yen and collateral can be required for loans of more than 80 million yen. This collateral requirement is deemed to prevent moral hazard. Thus, users of credit guarantee programs may pledge collateral for institutional requirements rather than for the economic reasons we have discussed.

monitoring activities by lenders that are inherent in relationship lending. We also find that collateral is more likely to be pledged by borrowers who establish long-term relationships with their main bank. This evidence reinforces our argument.

There are a few caveats and further issues to be addressed. First, the sample firms in our analysis are rather large, which may bias our empirical results. In Japan, small businesses with no more than 20 employees make up more than 70% of all firms, while the median firm in our sample has 36 workers. Hence, it may be the case that only fairly sizable, well-established SMEs with sufficient collateral benefit from relationship lending, while their smaller counterparts that are short of collateral face strict borrowing constraints. Second, our estimation may have been biased due to inaccurate assessments of firms' credit risk. We employ the TSR credit scores and balance sheet items to measure the credit risk of a firm. However, if there is private information to which only banks have access, our empirical results may be biased due to the problem of measurement error. We may be able to better approximate the actual credit risk of firms by employing future credit scores or the firms' default measures; we need to examine this point more closely. Finally, we find evidence that weakly rejects the hold-up hypothesis: Interest rates are relatively lower for borrowers who establish a solid relationship with their main banks. However, it is beyond the scope of this paper to investigate whether collateral mitigates the soft-budget constraint problem in relationship lending. In order to evaluate the efficiencies of Japan's credit market, it is important to further investigate the motivations of banks in accepting collateral and personal guarantees. In order to make a welfare judgment, it is also necessary to evaluate whether the enhanced bargaining power of the lender, be it due to hold-up of the borrower or mitigation of the soft budget constraint, facilitates the screening and monitoring activities of the lender and thereby increases the availability of credits for small businesses. This issue should be addressed in more detail in future studies.

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Table 1　Descriptive Statistics (Median)

	No. of samples (share, %)		Capital (thousands of yen)	No. of employees	Gross sales (thousands of yen)	TSR Credit Scores	Interest rate (0.1 basis point)	profit margin	Capital/ asset ratio
With Collateral	4,834	(73.9)	197,509	38	1,299,848	55	2000	0.0139	0.2009
With Personal Guarantee	4,984	(76.2)	161,017	32	1,079,825	55	2100	0.0133	0.1991
With Credit Guarantee	3,381	(51.7)	96,277	26	873,705	53	2375	0.0120	0.1588
With Collateral and Personal Guarantee									
And With Credit Guarantee	2,819	(43.1)	104,015	28	931,178	53	2400	0.0122	0.1537
And Without Credit Guarantee	1,413	(21.6)	417,121	52	1,939,796	59	1750	0.0160	0.2966
Without Collateral, Personal Guarantee, or Credit Guarantee	889	(13.6)	464,040	45	2,098,614	60	1375	0.0182	0.3860
All Samples	6,540	(100.0)	207,012	36	1,290,303	56	2000	0.0143	0.2201
(standard deviation)			(1,797,737)	(155)	(5,837,277)	(7)	(1204)	(0.2506)	(0.3028)

Note: As of 2002 hereinafter, unless otherwise stated.

Table 2　Composition of Collateral

	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
No. of Samples	5,920	850	1,394	1,484	1,032	914	246
(share, %)	(100.0)	(14.4)	(23.5)	(25.1)	(17.4)	(15.4)	(4.2)
Percentage of Borrowers with Collateral	77.4	84.5	82.0	80.2	74.8	68.8	54.1
Composition of Collateral (multiple answers allowed, %)							
real estate	95.9	95.8	96.0	95.5	95.9	96.8	95.5
machinery	5.4	6.3	4.6	5.0	5.8	4.8	10.5
deposits	22.8	29.2	28.4	24.4	16.5	12.2	12.0
equity securities	9.2	11.4	10.9	9.2	7.0	7.0	6.0
commercial bills	6.9	8.4	8.1	7.1	5.2	5.4	2.3
other securities	2.4	3.6	3.4	2.2	1.2	1.4	0.8
proceeds of guarantee	1.2	2.6	1.1	0.8	0.9	0.8	0.8
accounts receivable	0.8	0.8	0.8	0.4	0.9	1.3	0.8
intellectual property	0.1	0.3	0.0	0.1	0.0	0.0	0.0
others	1.9	1.4	2.1	1.5	2.6	1.3	3.8

Note: As of 2001.

Table 3　Composition of Personal Guarantees

	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
No. of Samples	5,920	850	1,394	1,484	1,032	914	246
(share, %)	(100.0)	(14.4)	(23.5)	(25.1)	(17.4)	(15.4)	(4.2)
Percentages of Borrowers with Personal Guarantee	72.6	82.7	81.0	76.1	67.5	58.8	40.7
Composition of Personal Guarantee (multiple answers allowed, %)							
Representative	94.8	95.3	94.5	94.6	95.1	94.4	95.0
Executives other than representative	34.1	45.9	38.2	34.1	25.5	23.5	21.0
Relatives of representative	18.3	30.0	20.5	17.0	14.6	8.0	8.0
Third party (individuals)	2.4	6.4	2.5	2.0	0.7	0.2	0.0
Enterprises with capital relationship	6.3	7.4	6.9	5.9	5.9	5.0	4.0
Enterprises without capital relationship	0.6	1.3	0.5	0.7	0.0	0.2	0.0
Other	1.1	1.0	1.1	1.4	1.4	0.7	0.0

Note: As of 2001.

Table 4 Variable Definitions

Variables	Definitions
Terms of loan contracts	
COLL	1 if the borrower pledges collateral to its main bank, 0 otherwise
GUAR	1 if the borrower pledges a personal guarantee to its main bank, 0 otherwise
RATE	short-term interest charged by the main bank. If the borrower has several short-term loans with its main bank, the loan with the highest rate is reported
GOVGUAR	1 if the borrower uses government sponsored credit guarantees for the loans provided by its main bank, 0 otherwise
Riskiness of borrower	
SCORE	TSR Credit Score (0-100)
LEV	ratio of total debts outstanding to total assets
PROFMARG	ratio of profits before tax to gross sales
CASHRATIO	ratio of cash holdings to total assets
LOGSALES	gross sales in logarithm
Screening and monitoring by lender	
DOC	1 if the borrower submits relevant documents, such as financial statements, to its main bank, 0 otherwise
DOCFREQ	index variable indicating the frequency of document submission to the borrower's main bank: 1: once every 1-2 months, 2: quarterly, 3: semi-annually, 4: annually
CONTACTFREQ	index variable indicating the main bank's frequency of contact with the borrower: 1: every day, 2: weekly, 3: once every 2 weeks, 4: monthly, 5: bi-monthly, 6: quarterly, 7: semi-annually, 8: annually, 9: no contact
NPL	ratio of non-performing loans to total loans
Relationship between borrower and lender	
DURATION	duration of the main bank-borrower relationship in years
SCOPE	number of financial products the borrower purchases from its main bank
BANKS	number of banks the borrower has transactions with
ONEBANK	1 if the borrower has a single bank to make transaction with
Other variables	
MATURITY	ratio of short-term to long-term loans, where short-term loans are defined as loans with maturity less than one year
FIRM	borrower dummy variable classified by industry
LENDER	lender dummy variable classified by type of banking sector
Instrumental variables	
LANDRATIO	ratio of real estate holdings to total assets
OWNERRATIO	index variable for the owner and his relatives' share of equity holdings: 1: 0%, 2: 1-5%, 3: 6-25%, 4: 26-50%, 5: 51-74%, 6: 75-99%, 7: 100%
FIRMAGE	age of the borrowing firm
HHI	Herfindahl Index for small business lending in the prefecture of the firm. Herfindahl Index is computed based on the share of small business lending of regional banks, second-tier regional banks, *shinkin*, and *shinkumi*.
CITYSHARE	city banks' share of small business lending in the prefecture of the firm

Table 5　Use Rate of Collateral, Personal Guarantees and Average Interest Rates

	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
No. of Samples	5,380	868	1,521	1,366	850	663	112
(share, %)	(100.0)	(16.1)	(28.3)	(25.4)	(15.8)	(12.3)	(2.1)
Collateral							
Percentage of Borrowers with Collateral	79.7	85.1	82.0	80.7	76.5	71.5	69.6
Average Interest Rate (with Collateral, 0.1 b.p.)	2283	3073	2557	2069	1800	1636	1386
Average Interest Rate (without Collateral, 0.1f b.p.)	1842	2653	2224	1767	1552	1269	1157
Personal Guarantees							
Percentage of Borrowers with Personal Guarantees	81.8	90.6	87.2	83.7	73.6	67.1	64.3
Average Interest Rate (with Personal Guarantees, 0.1 b.p.)	2326	3080	2581	2088	1867	1648	1341
Average Interest Rate (without Personal Guarantees, 0.1 b.p.)	1600	2347	1919	1614	1392	1294	1272

Note: Sample in the table is restricted to borrowers who reported short-term interest rates.

Table 6　Value of Collateral and Real Estate Holdings

	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
No. of Samples	5,380	868	1,521	1,366	850	663	112
(share, %)	(100.0)	(16.1)	(28.3)	(25.4)	(15.8)	(12.3)	(2.1)
Percentage of Borrowers with Collateral	79.7	85.1	82.0	80.7	76.5	71.5	69.6
Distribution of Borrowers (%):							
Value of Collateral << Loans Outstanding	23.0	31.1	24.8	19.1	20.9	18.8	17.9
Value of Collateral < Loans Outstanding	24.1	25.3	26.3	24.4	24.0	17.3	15.4
Value of Collateral = Loans Outstanding	24.7	21.0	25.4	27.7	22.3	25.3	23.1
Value of Collateral > Loans Outstanding	11.8	10.3	11.1	12.6	13.2	12.0	11.5
Value of Collateral >> Loans Outstanding	14.4	10.3	10.7	14.2	17.2	24.9	29.5
Percentages of borrowers whose amount of real estate holdings exceed loans outstanding	9.0	1.8	4.1	8.6	13.7	23.0	35.9

Note: Sample in the table is restricted to borrowers who reported short-term interest rates.

Table 7　Use Rate of Collateral and Personal Guarantees in 2001: By 2002 Credit Scores

	Total	TSR Credit Scores in 2002					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
Percentage of Borrowers with Collateral in 2001	76.0	82.6	80.5	77.9	72.7	66.9	50.5
(in 2002)	(73.9)	(80.4)	(78.4)	(75.1)	(69.0)	(64.8)	(56.0)
Percentage of Borrowers with Personal Guarantee in 2001	74.8	85.8	81.5	78.4	68.3	58.9	46.7
(in 2002)	(76.2)	(87.0)	(83.9)	(78.3)	(67.1)	(60.4)	(51.6)

Table 8　Use Rate of Collateral, Personal Guarantees and Average Interest Rates: By Frequency of Document Submission

Frequency of Document Submission	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
Percentage of Borrowers with Collateral							
once every 1-2 months	91.5	92.3	94.8	88.9	89.9	78.1	93.8
quarterly	87.6	88.1	88.6	89.3	83.5	83.6	75.0
semi-annually	75.9	78.8	77.7	77.2	73.7	70.9	72.4
annually	67.2	69.3	69.5	70.1	66.0	63.8	53.3
Percentage of Borrowers with Personal Guarantee							
once every 1-2 months	89.7	92.3	91.4	91.4	85.8	71.2	68.8
quarterly	88.4	91.1	93.6	91.9	77.6	69.1	50.0
semi-annually	70.9	82.7	80.4	73.8	59.2	56.3	62.1
annually	75.7	88.0	82.9	78.2	72.0	65.4	55.1
Average Interest Rate, 0.1 b.p.							
once every 1-2 months	2634	3192	2783	2328	1879	1588	1680
quarterly	2386	3015	2555	2147	1903	1927	1023
semi-annually	1987	2870	2310	1887	1598	1508	1486
annually	1985	2758	2392	1909	1759	1508	1160

Table 9 Composition of the Frequency of Submitting Documents by Banking Sector

	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
City Banks, Long Term Credit Banks, and Trust Banks							
No. of Samples	1695	170	424	472	343	240	46
(share, %)	(100.0)	(10.0)	(25.0)	(27.8)	(20.2)	(14.2)	(2.7)
Composition of the Frequency of Submitting Documents (%)							
once in 1-2 months	20.8	34.7	28.1	18.0	16.3	12.1	10.9
quarterly	13.4	20.6	14.2	16.7	11.4	4.6	6.5
semi-annually	30.9	21.2	29.5	32.4	36.4	32.9	13.0
annually	34.9	23.5	28.3	32.8	35.9	50.4	69.6
Regional Banks and Second Regional Banks							
No. of Samples	3252	497	858	792	536	462	107
(share, %)	(100.0)	(15.3)	(26.4)	(24.4)	(16.5)	(14.2)	(3.3)
Composition of the Frequency of Submitting Documents (%)							
once in 1-2 months	23.2	44.9	30.7	17.9	13.8	9.1	10.3
quarterly	10.9	13.5	14.5	10.6	7.3	7.8	4.7
semi-annually	22.4	16.7	21.1	25.4	25.7	22.7	19.6
annually	43.5	24.9	33.8	46.1	53.2	60.4	65.4
Shinkin (credit unions) and Shinkumi (credit cooperatives)							
No. of Samples	706	200	256	150	62	36	2
(share, %)	(100.0)	(28.3)	(36.3)	(21.2)	(8.8)	(5.1)	(0.3)
Composition of the Frequency of Submitting Documents (%)							
once in 1-2 months	28.2	44.0	25.8	24.7	12.9	19.4	50.0
quarterly	13.3	11.0	16.0	13.3	6.5	19.4	50.0
semi-annually	17.8	11.5	19.1	22.0	21.0	61.1	0.0
annually	40.7	33.5	39.1	40.0	59.7	0.0	0.0

Table 10 Use Rate of Collateral, Personal Guarantees and Average Interest Rates: By Duration of Main Bank Relationship

Duration of relationship with the main bank	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
Percentage of Borrowers with Collateral							
less than 15 years	54.9	53.9	58.3	54.9	54.5	44.4	52.4
15-28 years	73.9	84.1	80.5	73.2	65.2	59.0	49.8
28-40 years	79.8	92.4	87.0	81.2	70.1	68.0	52.2
40 years or more	82.8	92.7	89.2	86.2	80.1	72.2	57.5
Percentage of Borrowers with Personal Guarantees							
less than 15 years	71.2	76.8	78.8	71.8	60.4	45.5	42.9
15-28 years	78.0	91.7	85.1	79.7	67.4	56.5	50.0
28-40 years	78.2	92.0	88.8	79.3	67.1	61.5	50.0
40 years or more	78.1	90.0	83.9	82.8	71.1	68.9	56.3
Average Interest Rate, 0.1 b.p.							
less than 15 years	2375	2987	2556	2047	1970	1769	1382
15-28 years	2351	3118	2622	2112	1828	1636	1568
28-40 years	2193	3079	2499	2050	1702	1530	1254
40 years or more	1963	2857	2319	1870	1628	1410	1286

Table 11 Use Rate of Collateral, Personal Guarantees and Average Interest Rates: By Number of Financial Products Purchased from Main Bank

# of financial products purchased from main bank	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
Percentage of Borrowers with Collateral							
0-1	48.6	54.2	55.7	43.0	41.8	42.9	26.3
2-3	67.1	78.6	72.5	65.5	59.7	53.3	47.7
4	76.0	84.6	78.4	79.9	69.1	66.4	64.4
5 or more	84.9	92.9	90.4	85.6	81.6	76.6	62.7
Percentage of Borrowers with Personal Guarantees							
0-1	58.2	72.5	68.6	53.9	39.6	38.6	31.6
2-3	71.1	85.1	82.0	71.4	56.9	48.6	40.9
4	79.5	91.9	84.5	81.8	72.0	64.6	68.9
5 or more	82.6	92.5	89.0	86.6	76.8	70.3	52.0
Average Interest Rate, 0.1 b.p.							
0-1	2299	2799	2448	2132	1797	1789	1320
2-3	2320	3173	2527	2075	1820	1523	1401
4	2226	3040	2636	2029	1773	1528	1310
5 or more	2060	2896	2385	1962	1663	1505	1284

Table 12　Use Rate of Collateral, Personal Guarantees and Average Interest Rates: By Number of Banks in Transactions

# of banks in transactions	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
Percentage of Borrowers with Collateral							
1	52.0	67.1	56.9	52.9	43.7	42.9	29.2
2	73.6	79.7	71.9	69.4	74.7	73.9	84.6
3-4	79.7	82.7	83.9	81.2	76.4	71.8	63.8
5 or more	82.5	88.2	88.1	84.7	79.4	69.3	58.8
Percentage of Borrowers with Personal Guarantee							
1	59.4	78.7	67.9	58.5	50.0	47.5	22.9
2	81.7	89.6	86.1	81.3	78.3	66.7	65.4
3-4	81.5	91.0	86.9	84.7	71.2	68.0	65.5
5 or more	79.2	87.5	88.8	82.2	70.6	60.3	56.9
Average Interest Rate, 0.1 b.p.							
1	2173	2994	2502	1899	1624	1631	1424
2	2258	2973	2478	2073	1864	1610	1343
3-4	2170	2967	2465	1948	1808	1522	1380
5 or more	2193	3084	2540	2085	1679	1474	1184

Table 13 Determinants of Collateral

Variables	Probit (GUAR, RATE exogenous)			Probit by Full MLE (RATE endogenous)			Probit by two-step MLE (GUAR, RATE endogenous)		
	coefficient	(z-value)	(p-value)	coefficient	(z-value)	(p-value)	coefficient	(z-value)	(p-value)
Terms of loan contracts									
GUAR	0.800	(12.11)	(0.000)	0.685	(9.43)	(0.000)	6.034	(3.21)	(0.001)
RATE	0.00013	(4.85)	(0.000)	-0.00082	(-15.66)	(0.000)	-0.00350	(-1.65)	(0.099)
Riskiness of Borrower									
SCORE	-0.004	(-0.73)	(0.468)	-0.050	(-14.23)	(0.000)	-0.137	(-1.78)	(0.075)
LEV	0.239	(2.16)	(0.030)	0.205	(2.91)	(0.004)	0.988	(1.61)	(0.108)
PROFMARG	-0.390	(-0.81)	(0.420)				4.983	(1.82)	(0.069)
CASHRATIO	0.427	(2.78)	(0.005)				0.323	(0.85)	(0.395)
LOGSALES	0.048	(1.65)	(0.098)				-0.228	(-0.69)	(0.489)
Screening and monitoring by the lender									
NPL	-0.526	(-0.61)	(0.540)				5.766	(1.23)	(0.217)
DOCFREQ	-0.181	(-7.00)	(0.000)	-0.188	(-9.37)	(0.000)	-0.633	(-2.11)	(0.035)
Relationship between borrower and lender									
LOG (DURATION)	0.388	(11.48)	(0.000)	0.139	(3.01)	(0.003)	0.274	(1.66)	(0.096)
SCOPE	0.090	(5.29)	(0.000)	-0.013	(-0.86)	(0.387)	-0.070	(-0.86)	(0.392)
BANKS	0.003	(0.33)	(0.742)	0.007	(1.20)	(0.232)	0.088	(1.46)	(0.145)
ONEBANK	-0.074	(-0.85)	(0.398)				0.743	(1.80)	(0.071)
Other variables									
MATURITY	-0.483	(-5.62)	(0.000)	-0.466	(-7.28)	(0.000)	-0.351	(-1.02)	(0.306)
LANDRATIO	3.323	(13.38)	(0.000)	1.289	(3.68)	(0.000)	1.688	(2.25)	(0.025)
constant	- 2.110	(-4.32)	(0.000)	4.527	(11.14)	(0.000)	13.774	(1.13)	(0.260)
# of observations	4380			4590			2243		
Log likelihood	-1544.746			-40042.165					
Wald test statistics				38.42	prob=0.0000		47.94	prob=0.0000	

Table 14 Determinants of Personal Guarantees

Variables	Probit (COLL, RATE exogenous)			Probit by Full MLE (RATE endogenous)			Probit by two-step MLE (COLL, RATE endogenous)		
	coefficient	(z-value)	(p-value)	coefficient	(z-value)	(p-value)	coefficient	(z-value)	(p-value)
Terms of loan contracts									
COLL	0.582	(6.28)	(0.000)	0.545	(3.68)	(0.000)	0.915	(1.07)	(0.286)
RATE	0.00009	(1.74)	(0.081)	-0.00085	(-2.50)	(0.012)	-0.00122	(-0.67)	(0.504)
Riskiness of Borrower									
SCORE	0.002	(0.31)	(0.754)	-0.030	(-2.30)	(0.021)	-0.043	(-0.65)	(0.516)
LEV	0.129	(0.74)	(0.458)	0.276	(1.99)	(0.047)	0.409	(0.85)	(0.393)
PROFMARG	-0.413	(-0.59)	(0.555)	0.589	(0.83)	(0.409)	0.783	(0.37)	(0.709)
CASHRATIO	-0.270	(-1.62)	(0.105)	-0.213	(-1.41)	(0.159)	-0.338	(-1.65)	(0.099)
LOGSALES	-0.338	(-7.44)	(0.000)	-0.379	(-6.26)	(0.000)	-0.580	(-1.63)	(0.102)
Screening and monitoring by the lender									
NPL	-2.445	(-1.89)	(0.059)	-0.280	(-0.17)	(0.864)	-0.659	(-0.23)	(0.816)
DOCFREQ	-0.145	(-3.84)	(0.000)	-0.233	(-8.11)	(0.000)	-0.348	(-1.04)	(0.296)
Relationship between borrower and lender									
LOGDURATION	-0.048	(-0.81)	(0.421)	-0.088	(-1.87)	(0.061)	-0.139	(-1.30)	(0.195)
SCOPE	0.082	(3.47)	(0.001)	0.040	(1.06)	(0.289)	0.066	(2.03)	(0.042)
BANKS	0.004	(0.28)	(0.782)	0.024	(1.83)	(0.067)	0.034	(0.69)	(0.492)
ONEBANK	-0.414	(-2.84)	(0.004)	-0.226	(-1.16)	(0.244)	-0.375	(-1.89)	(0.059)
Other variables									
MATURITY	-0.438	(-3.27)	(0.001)	-0.331	(-2.00)	(0.045)	-0.511	(-1.45)	(0.148)
OWNERRATIO	0.158	(7.55)	(0.000)	0.126	(2.73)	(0.006)	0.196	(2.00)	(0.045)
constant	4.524	(5.88)	(0.000)	8.786	(10.54)	(0.000)	13.084	(1.04)	(0.297)
# of observations	2294			2243			2243		
Log likelihood	-736.17755			-19052.302					
Wald test statistics				2.37	prob=0.1235		2.35	prob=0.3095	

Table 15 Determinants of Interest Rates

Variables	OLS (COLL, GUAR exogenous)			First step estimation in Full MLE in COLL equation			First step estimation in two-step MLE in COLL equation		
	coefficient	(t-value)	(p-value)	coefficient	(z-value)	(p-value)	coefficient	(t-value)	(p-value)
Terms of loan contracts									
COLL	200.615	(4.59)	(0.000)						
GUAR	145.04030	(3.13)	(0.002)	414.82820	(9.51)	(0.000)			
Riskiness of Borrower									
SCORE	-35.318	(-11.44)	(0.000)	-54.940	(-20.42)	(0.000)	-35.100	(-9.55)	(0.000)
LEV	165.056	(2.66)	(0.008)	123.248	(1.95)	(0.051)	236.323	(2.91)	(0.004)
PROFMARG	645.546	(2.44)	(0.015)				997.626	(2.93)	(0.003)
CASHRATIO	-155.009	(-2.31)	(0.021)				-33.034	(-0.40)	(0.691)
LOGSALES	-216.849	(-12.81)	(0.000)				-192.818	(-8.84)	(0.000)
Screening and monitoring by the lender									
NPL	1,500.960	(2.95)	(0.003)				1304.938	(2.13)	(0.033)
DOCFREQ	-170.002	(-11.80)	(0.000)	-127.848	(-9.07)	(0.000)	-164.908	(-9.43)	(0.000)
Relationship between borrower and lender									
LOGDURATION	-5.633	(-0.22)	(0.823)	29.463	(1.17)	(0.240)	-24.862	(-0.76)	(0.445)
SCOPE	-27.361	(-2.75)	(0.006)	-50.774	(-5.27)	(0.000)	-9.455	(-0.78)	(0.434)
BANKS	19.050	(3.37)	(0.001)	3.076	(0.58)	(0.561)	24.823	(3.70)	(0.000)
ONEBANK	-58.537	(-1.05)	(0.296)				46.831	(0.63)	(0.530)
Other variables									
MATURITY	-91.799	(-1.70)	(0.090)	-301.796	(-5.61)	(0.000)	-100.960	(-1.48)	(0.139)
FIRMAGE	-1.914	(-2.18)	(0.029)	-5.133	(-5.64)	(0.000)	-1.217	(-1.14)	(0.253)
HHI	0.021	(1.33)	(0.182)	0.005	(0.48)	(0.628)	0.011	(0.55)	(0.584)
CITYSHARE	220.551	(1.94)	(0.052)	-53.311	(-0.80)	(0.421)	166.014	(1.19)	(0.233)
LANDRATIO				-66.084	(-0.55)	(0.584)	-38.709	(-0.26)	(0.798)
OWNERRATIO							40.576	(3.56)	(0.000)
constant	7,100.074	(25.64)	(0.000)	5,679.272	(28.68)	(0.000)	6642.338	(18.47)	(0.000)
# of observations	4278			4590			2243		
Adj. R-squared	0.2791						0.3008		

Table 16 Basic Model without Credit Guarantees

Variables	COLLATERAL equation (probit)			GUARANTEE equation (probit)			RATE equation (OLS)		
	coefficient	(z-value)	(p-value)	coefficient	(z-value)	(p-value)	coefficient	(z-value)	(p-value)
Terms of loan contracts									
COLL				0.477	(4.24)	(0.000)	218.460	(4.46)	(0.000)
GUAR	0.663	(8.18)	(0.000)				87.105	(1.86)	(0.064)
RATE	0.00025	(4.65)	(0.000)	0.00005	(0.80)	(0.424)			
Riskiness of Borrower									
SCORE	0.001	(0.14)	(0.892)	0.006	(0.66)	(0.509)	-25.206	(-6.63)	(0.000)
LEV	0.098	(0.75)	(0.456)	0.146	(0.72)	(0.470)	56.025	(0.87)	(0.387)
PROFMARG	0.242	(0.34)	(0.736)	-0.349	(-0.45)	(0.653)	192.067	(0.65)	(0.518)
CASHRATIO	0.252	(1.46)	(0.145)	-0.214	(-1.17)	(0.244)	29.125	(0.40)	(0.691)
LOGSALES	0.065	(1.61)	(0.108)	-0.324	(-5.48)	(0.000)	-133.147	(-6.24)	(0.000)
Screening and monitoring by the lender									
NPL	-0.689	(-0.54)	(0.588)	-2.180	(-1.31)	(0.190)	2,125.051	(3.15)	(0.002)
DOCFREQ	-0.141	(-3.57)	(0.000)	-0.069	(-1.40)	(0.162)	-100.043	(-5.02)	(0.000)
Relationship between borrower and lender									
LOG(DURATION)	0.413	(8.00)	(0.000)	0.081	(1.08)	(0.281)	-24.129	(-0.74)	(0.458)
SCOPE	0.085	(3.62)	(0.000)	0.043	(1.46)	(0.144)	-22.464	(-1.81)	(0.071)
BANKS	0.006	(0.38)	(0.703)	0.000	(0.01)	(0.994)	9.883	(1.20)	(0.228)
ONEBANK	-0.041	(-0.34)	(0.736)	-0.432	(-2.38)	(0.017)	2.759	(0.04)	(0.968)
Other variables									
MATURITY	-0.607	(-5.11)	(0.000)	-0.258	(-1.56)	(0.118)	-108.607	(-1.68)	(0.094)
LANDRATIO	3.670	(10.13)	(0.000)						
OWNERRATIO				0.182	(6.92)	(0.000)			
FIRMAGE							-2.338	(-2.14)	(0.033)
HHI							0.031	(1.48)	(0.139)
CITYSHARE							192.811	(1.27)	(0.203)
constant	-2.867	(-4.09)	(0.000)	3.252	(3.27)	(0.001)	5,006.312	(14.06)	(0.000)
# of observations	1786			976			1753		
Log likelihood / Adj. R-squared	-790.20793			-475.10355			0.1824		

Table 17　Use Rate of Collateral, Personal Guarantees and Average Interest Rates: By the Usage of Government-Sponsored Credit Guarantees

	Total	TSR Credit Scores					
		-49	50 - 54	55 - 59	60 - 64	65 - 69	70 -
Percentage of borrowers using Credit Guarantees	51.7	79.1	68.8	52.0	31.9	18.1	6.5
Users of Credit Guarantees							
Percentage of Borrowers with Collateral	86.9	86.2	86.0	87.1	89.3	90.4	100.0
Percentage of Borrowers with Personal Guarantees	94.6	94.4	95.2	94.2	94.2	93.6	91.7
Average Interest Rate, 0.1 b.p.	2592	3145	2692	2268	2061	1971	1788
Non-users of Credit Guarantees							
Percentage of Borrowers with Collateral	60.0	58.8	61.7	62.0	59.5	59.1	52.9
Percentage of Borrowers with Personal Guarantees	56.6	59.3	59.0	61.1	54.3	53.1	48.8
Average Interest Rate, 0.1 b.p.	1673	2356	1984	1680	1561	1417	1260