How Do Relationship Lenders Price Loans to Small Firms?

"Hold-Up" Costs, Transparency, and Private and Public Security

Wako Watanabe*
Faculty of Business and Commerce
Keio University

June 2007

Abstract

We conduct a comprehensive examination on how relationship lenders price loans to small opaque firms using the rich matched data set of Japanese firms and their main banks. Our major findings are: 1. Neither measures for a borrower firm's transparency to the public (outsiders) nor measures for the firm's transparency to its main bank affect the lending rate. 2. A bank suffering from a greater ratio of non-performing loans to total asset charges a higher lending rate. 3. Treating the non-price terms of a loan contract as endogenous variables is crucial in consistently estimating the lending rate.

Keywords: Financial health, asymmetric information, main bank, non-price terms, instrumental variable

JEL classification: C31, D82, G21, G28

---

* This paper has been circulated under various titles. I would like to thank members at the Corporate Finance Study Group of the Research Institute of Industries, Economy and Trade (RIETI), especially Hikaru Fukanuma, Kaoru Hosono, Yuji Hosoya, Takahiro Nagata, Tadanobu Nemoto, Kozo Oikawa, Arito Ono, and Iichiro Uesugi for helpful comments and suggestions. Thanks also to Koki Arai, Kozo Kiyota, Juraj Lorinc, Patrick McGuire, Don Morgan, Shinobu Nakagawa, Goetz von Peter, Joao Santos, Toshitaka Sekine, Ilhyock Shim, Toshihiro Sugiyama, Ryuichi Tanaka, Hirofumi Uchida, Greg Udell, Ayako Yasuda, Masaru Yoshitomi and Haibin Zhu and seminar participants at the Bank for International Settlements, the European Central Bank, Hitotsubashi University and Yokohama National University for helpful suggestions. The financial support of the Japan Society for the Promotion of Science, Grant-in-aid for Young Scientists (B 18730207) is also gratefully acknowledged.

† Address: Faculty of Business and Commerce, Keio University, 2-15-45 Mita, Minato-ku, Tokyo, 108-8345, Japan
Phone: 81-3-5427-1252; Fax: 81- 3-5427-1252
E-mail: wakow@fbc.keio.ac.jp

1. Introduction

"Relationship lending" is said to be a lending technology that alleviates asymmetric information present between a bank and opaque small borrowing firms. Written documents, such as financial statements, often do not adequately represent their credit risk. A long financial (lending) relationship with a firm, however, allows a bank to make informal contacts with the firm, by which the bank accumulates unrecorded "soft" information on the firm's credit worthiness, information which other spot creditors are not able to gather. With such "soft" information, "relationship lenders" may effectively monitor opaque firms.

Long relationships, which may result in reduced asymmetric information, are great benefits to borrowing firms. The strong relationship, however, has its costs. A relationship lender monopolizes certain types of information on the credit worthiness of a small borrowing firm. Consequently, the bank takes advantage of its stronger position when negotiating credit terms with the firm and earns an extra "rent" relative to the interests that would be earned in competitive credit markets.[1]

Such a "rent seeking" behavior could be more avaricious when banks themselves are financially distressed. It is when a bank faces financial hardship that the incentive to take advantage of its relationships with long-term clients (borrowers) grows. A bank may pass on to the borrowers the cost of any perceived risks that they face or actual costs that they incur to the borrowers. For instance, seeking more profits to be added to its capital, a bank, whose risk based capital to asset ratio is close to the Basel regulatory minimum, may charge higher lending rates. Or banks may simply request borrowers to share the costs of writing off non-performing loans by setting higher lending rates. If such premiums on lending rates associated with the "hold up" problem are a large burden on small firms, policy measures need to be aimed at reducing small firms' dependence on their main bank.

Then how do relationship lenders determine their lending rates for ("price") loans to small firms

[1] The problem of a bank taking advantage of the collecting of proprietary information on a borrower in a long relationship by earning extra rent is called the "hold up" problem. This problem is discussed in Greenbaum et. al (1989), Sharpe (1990) and Rajan (1992).

that are generally not transparent to external creditors? The answer to this question requires comprehensive information: both quantitative and qualitative, on those involved in the lending contracts, lender banks and borrower firms, as well as on relationships between such the lenders and borrowers.

We constructed the rich matched data set of firms and their relationship lenders using the unique survey data provided in Japan, a large economy where relationship lending has been established. The observed length of relationships tends to be much longer in Japan and Germany than in other parts of the world including the United States. Such strong relationships as are found in Japan and Germany are known as the "main bank" system and the "house bank" system, respectively. The Japanese main bank system's influence on large firms (so called *keiretsu* firms) have been widely studied.[2] As Hoshi and Kashyap (2001) argue, however, financial liberalization in the 1980s enabled large *keiretsu* firms to severe their ties with their main banks in favor of unintermediated firms. Thus, the main bank system was only kept afloat in small business finances where asymmetric information is more serious. Yet, studies on the main banks' relationships with small firms have been sparse.

As is evident, use of the recent Japanese data is ideal for exploring the "hold up" problem because not only have the ultra-long relationships allowed the main banks to garner information on borrowing firms but because Japanese banks in the 1990s through the early 2000s, which had been troubled with the staggering non-performing loans whose magnitude was unparalleled in the history of the world, had the strongest incentive to "hold up" relationship borrowers.

Using the Japanese data from the early 2000s, we ask the following question. In sustained main bank relationships, how do banks price loans? The following three major questions naturally arise.

First, do relationship lenders (banks) remain concerned about the opacity of borrowing firms? In other words, do banks still value more transparency in terms of greater availability of (verifiable) hard

[2] Representative works are Hoshi, Kashyap and Scharfstein (1991), Gibson (1995) and Weinstein and Yafeh (1998).

records (documents) in assessing firms' credit quality when they are allowed to appropriate valuable unrecorded "soft" information? Does non-financial recorded information on borrowers or limited publicly available non-financial information (which is seemingly less informative than proprietary soft information) compensate for financial statements that are usually less detailed than those of larger firms? [3]

Second, do financially distressed banks really take advantage of their stronger position as a relationship lender and charge higher lending rates? If so, to what extent? Are small firms exploited by the main bank system?

Third, is loan security still important to banks when they establish strong relationships with borrowers? Do relationship lenders charge lower lending rates on secured loans than on unsecured loans, just as ordinary lenders are presumed to do? It is true that a large number of firms with a longer relationship with their bank still pledges collateral to the bank. Some firms use public guarantees to borrow from their relationship lender.

The three issues raised above are major subjects of our interest but are not the only relevant issues. Conclusions are drawn only when other determinants of pricing such as firms' financial health and various firm characteristics are adequately controlled. In this regards, only the matched lender-borrower data set allows us to conduct a comprehensive examination of relationship lenders' pricing of small business loans.

Analyzing a bank's pricing of loans is complicated since a bank can tighten the terms of a loan to a riskier firm not only by raising the lending rate of the loan, but also by tightening non-price terms: requesting that the loan be secured by collateral or by a publicly granted guarantee, or that loan maturity be shorter.[4] Without properly incorporating non-price terms into an empirical model, biases

[3] Berger and Udell (2002), Berger, Miller, Petersen, Rajan and Stein (2005) and Berger and Udell (2006) use transactions-based lending as a term for lending based on hard information in contrast to relationship lending.

[4] Inderst and Mueller (2006) propose an alternative explanation to endogenous collateral, which will be discussed

on estimates emerge not only in the effects of the non-price terms on the lending rate but also in those of other factors. Instrumental variables are used to avoid estimation biases stemming from such "non-price" terms.

Our major findings are summarized in the following three points:

First, neither measures for a borrowing firm's transparency to the public (outsiders) nor measures for the firm's transparency to its main bank affect the lending rate. This is consistent with the theoretical prediction that a relationship lender is ultimately indifferent to a firm's transparency beyond financial statements measured by the likelihood to disclose recorded information to either outsiders or to the lender itself.

Second, a financially distressed bank with a large percentage of non-performing loans charges a higher lending rate. This suggests that main banks take advantage of the proprietary information they have about their client firms. When the average lending rate is only 2.34%, the premium due to a five percentage point increase in the ratio of non-performing loans to total asset for small firms exceeds 60 basis points.

Third, treating the non-price terms of a loan contract as endogenous variables is crucial in consistently estimating a main bank's lending rate. When collateral or a public credit guarantee for a loan are not instrumented, estimation results become implausible in many regards.

The remainder of the paper is arranged as follows. In section 2, theories are discussed. In section 3, data and econometric issues are set out. In section 4, results are reported and interpreted. In section 5, several policy implications are drawn. Section 6 concludes the paper.

2. What Influence the Pricing of the Relationship Lending?

---

later.

In this section, we discuss factors that may or may not influence prices of loans in greater details.

The firm's "transparency"

A main bank likely has privileged access to unrecorded "soft" information about an opaque borrower with whom the bank has a long relationship. Consequently, the main bank assesses the borrower's credit quality based on collected soft information that the bank obtains through informal contacts with the borrower. Thus, whether a borrowing firm is transparent to outsiders (engaged in greater disclosure) or the firm discloses (verifiable) records (documents) to the bank, which is likely to be less informative than proprietary "soft" information to the bank is less likely to be relevant to the main bank's lending decisions.

The main bank's financial health

If a main bank relationship is monopolistic, a "hold up" problem may arise allowing it to take advantage of its stronger bargaining position when negotiating contract terms with a smaller borrowing firm and pass on some risks that they face or costs that may be incurred.[5] If a bank fails to meet the Basel standard for the risk adjusted capital to asset ratio, a prudential regulator will intervene and its businesses will be adversely affected. Writing off non-performing loans incurs a large amount of accounting losses.[6] [7] Hubbard, Kuttner and Palia (2002) test the importance of the influences of a

[5] Main bank relationships may not be perfectly monopolistic. Unlike in the United States, where small firms usually borrow from a single bank, in Japan, SMEs borrow from multiple banks including their main bank. Thus, main banks may face competitive pressures from non main bank lenders who may offer lower lending rates to firms with whom they have non relationships. Nevertheless, Japanese main bank relationships typically last for a very long time (the average lending relationship period for our sample firms, which is discussed later, is 36 years). The fact that firms seldom switch their main bank may imply that, in the main bank relationship, not only does the lender engage in the relationship specific investment for monitoring but the borrower also bears relationship specific sunk costs that make a borrower less willing to withdraw from the relationship. How bank competition and main bank relationships interplay is one of the least explored subjects. According to Kano et al. (2006), small *shinkin* banks in regions with less bank competition reduce lending rates to their borrowers as the main bank relationship continues, but such interplay between bank competition and lending terms has not been observed for other types of banks.

[6] Van den Heuvel (2002) and Diamond and Rajan (2000) theoretically show that weak bank health has a negative

bank's financial health on the lending rate, which they call "bank effcts," using the contract based data on loans to large firms. They find that poorly capitalized U.S. banks charge higher rates than adequately capitalized banks.

Loan security

The price of a loan (lending rate) is not the only term of a lending contract. A lender bank makes a loan to a borrowing firm at the specified price (lending rate) conditional on various other "terms" of the contract. Such non-price terms of contract include personal or physical collateralization of the loan, and a public guarantee of the loan.[8] A lender bank may reduce the lending rate on the loan secured by collateral or a personal guarantee. Likewise, a bank may reduce the lending rate on a loan secured under a public guarantee program or in exchange for greater disclosure of a firm.

Complications arise because such non-price terms, in turn, are likely to be related to the lending rate. A bank may tighten the terms of a loan to a higher risk firm by raising the lending rate and by requesting the firm that the loan be secured by either collateral, or a publicly granted guarantee. Alternatively, Inderst and Mueller (2006) propose another explanation for endogenous collateral in that competitive pressures from other lending institutions (non-relationship lenders) give a relationship lender an incentive to request collateral (a relationship lender's revenue in the case of a borrower's default) in exchange for a lower lending rate (a relationship lender's revenue when a borrower meets contractual requirements on repayments).

In essence, without doubt, a bank most likely determines the pricing of a loan and various

---

effect on a bank's lending supply function (leading to higher lending rates).

[7] If a main bank relationship were not monopolistic and lending markets were competitive, a firm would be able to borrow from a financially stronger bank that offers cheaper loans. In the equilibrium, the price of a loan would be equalized across banks with varying financial strength.

[8] A bank can also shorten the maturity of a loan or request greater disclosure of a borrowing firm.

non-price "terms" simultaneously rather than sequentially. Thus, when estimating the equation for the lending rate, variables that are meant to capture non-price terms should be treated as endogenous right-hand side variables. Otherwise, serious biases would arise in the estimated lending rate.

In the empirical literature, little deals with endogenous non-price terms. Some studies do mention the importance of non-price terms as a determining factor for lending rates. Using the 1988 wave of the Survey of Small Business Finances (SSBF), Berger and Udell (1995) include dummy variables indicating the type of collateral if a loan is collateralized in the regression equation for interest rates on lines of credit supplied to small businesses and find some (weak) evidence that interest rates on secured loans are higher than those on unsecured loans.[9] Using the data on large firms, Strahan (1999) finds that the dummy variable indicating whether a loan is secured is positively associated with the lending rate.[10] Using the Italian data, Pozzolo (2004) find that, when various borrower (risk) characteristics are controlled, the coefficient of the dummy variable for collateralization is negative and significant in the regression equation for the lending rate.

Cressy and Toivanen (2001) attempt to use the simultaneous equation system in dealing with endogenous non-price terms. However, the variables that capture informational characteristics of a borrowing firm are absent in their analysis. Hubbard, Kuttner and Palia (2002) instead intend to represent non-price terms by an endogenous fixed effect. The variables that capture the informational characteristics of a borrowing firm, however, are not present in their dataset, either.

Brick and Palia (2007) estimate the simultaneous system of equations for the lending rate and two of the important non-price terms, collateral and fees. Instruments used for non-price terms, however, are problematic. In the logit regression for the collateralization of a loan, the only significantly

[9] Using the same SSBF data, Berger and Udell (1990) find that interest rates on secured loans are on average higher than unsecured loans. They, however, do not control for bank-borrower relationships.

[10] Booth and Booth (2006) examine lending contracts from the borrowers' perspectives. Using contract based data, they estimate borrowing costs for collateralized and uncollateralized loans separately while controlling for the borrowers' decision whether to pledge collateral.

estimated coefficient is the coefficient of a dummy variable that is set to unity if either the principal owner or the firm has ever defaulted. This dummy variable does not capture a firm's incentive to offer collateral to the lender bank but its credit risk, and captures a bank's incentive to secure a loan. This is not a valid instrument for an equation characterizing a bank's pricing behavior.[11]

The strength of lender-borrower relationship

There is a large volume of empirical literature that attempts to investigate whether the strength of the relationship reduces the lending rate. The most often used measure for the strength of the lending relationship is its duration. Petersen and Rajan (1994, 2002) and Berger and Udell (1995) find that, in the United States, the longer a lending relationship lasts, the lower the lending rate to a small firm becomes.

Unlike relationships in the US, where lender-borrower relationships are relatively short (11 years in Berger and Udell [1995] and 8 years in Cole [1998], both from the Survey of Small Business Finaces [SSBF] data), European/Japanese main bank relationships last a very long time. According to Elsas and Krahnen (1998), the length of German house bank relationships is on average 20 to 30 years, depending on the size of the firm. As will be discussed in the next section, the average length of the Japanese main bank relationships with small and medium enterprises in our data set is about 35 years.[12] Though using the U.S. data, Berger and Udell (1995) discuss that "no additional information is revealed after 30 years." Elsas and Krahnen (1998) also tell us that what matters to firms is whether they have a house (main) bank or not, not how long a relationship they have had with their main bank.

[11] Bharath et al (2006) estimate the three equation system for loan price, collateralization and maturity using the dataset of large US firms. They use loan amount relative to total debt as an instrument for collateralization.

[12] Ongena and Smith (2000) argue that the large discrepancy in the duration of the relationship between Europe/Japan and the United States found in the literature is largely attributable to differences in the nature of the employed data such as firm size. In our dataset, however, relationships of smaller firms with their main banks are almost as long as those of relatively larger SMEs.

The borrowing firm's financial health

Lenders may reflect borrowing firms' financial health in their lending interest rates to deal with firms that are not fully transparent to the lenders themselves. Berger and Udell (2006) reveal that some banks depend on (audited) financial statements when lending to small firms. According to discussions of Bernanke and Gertler (1989. 1995) and Bernanke, Gertler and Gilchrist (1996, 1999), when lenders charge special premiums for financially weak borrowing firms ("external finance premiums") and such premiums are inversely related to the borrowers' financial strengths (collateral value), the effects of the monetary policy are amplified through credit markets. This is the well known "financial accelerator". Asymmetric information remains between a firm and its main bank no matter how close they are to each other as long as they remain separate entities.[13]

The firm's credit risk

A main bank should set its interest rate commensurate with a firm's mesured credit risk. Thus, the lower the predicted probability of default is, and the higher a credit score for that firm, the lower the lending rate should be.[14]

3. Data and Econometrics

3.1. Constructing a Matched Panel Data

[13] This type of lending is sometimes called scoring lending or financial statement lending, which is one of the types of lending, which is collectively known as transactions-based lending. See Berger and Udell (2002, 2006) and Berger, Udell, Miller Petersen, Rajan and Stein (2005) for relevant discussions.

[14] There are independent research houses that score small firms based on the internally developed model of a firm's probability of default. Dunn & Bradstreet is a leading firm that scores the credit quality of small firms in the United States.

The survey used in this study, the "Survey on Corporate Financial Environments" (SCFE) has been conducted annually by the Small and Medium Enterprise Agency (SMA) since 2001. The SCFE asks firms various questions concerning their relationship with their main bank, which are comparable to questions asked of small firms in the United States by the Survey of Small Business Finances (SSBF). Indeed, the SCFE, which tracks firms every survey year, is an improvement on the SSBF, which only surveys different firms every five years. We match each surveyed firm with its main bank from the answers given to the 2002 survey of the SCFE, which asked respondent firms to name their main bank.

We construct a dataset from the 2002 and 2003 surveys of the SCFE, which ask relevant questions. The SCFE asks respondent firms to provide answers to questionnaires as of October 31 of the respective survey year. The financial data of surveyed firms are compiled by the Tokyo Shoko Research Corporation (TSR). The data on firms' main banks are compiled from various publicly available forms.

In matching the SCFE survey data with data on main banks, the selected date on which the data on the main banks are recorded is March 31 of the survey year, the nearest closing date to the fiscal year for Japanese financial institutions.[15] Thus, the data from the 2002 and 2003 surveys of the SCFE are matched with the data of banks at the ends of fiscal year 2001 and fiscal year 2002, respectively. Likewise, the data on the surveyed firm from each survey of the SCFE are matched with the TSR financial data on the firm at the most recent closing date of the survey year.[16]

The qualitative data on surveyed firms such as the demographic characteristics of the firm's representative and shareholder composition were collected by TSR in 2001.

[15] Main banks of surveyed firms are not necessarily banks licensed under the Banking Act. Other depository institutions include *shinkin* banks, credit cooperatives, government financial institutions, the *Norinchukin* Bank, and agricultural and fishery cooperatives.

[16] Unlike financial institutions, closing dates are scattered throughout the calendar year.

3.2. Sample Selection

The numbers of firms surveyed in the 2002 and 2003 surveys of the SCFE were 7726 and 8846 respectively. Following the U.S. definition of a small firm set by the Small Business Administration, firms that employ less than 500 persons and whose financial statements are available for both FY 2001 and 2002 were selected. After excluding those firms whose main bank is either a governmental financial institution or a cooperative, those firms whose information on the (short-term) borrowing rate from their main bank either in the 2002 or the 2003 survey of the SCFE is missing and those firms with missing information on the length of their relationship with their main bank and their industry, 1294 firms remained.[17] [18] Furthermore, firms that reported that they switched their main banks zero, one or two years ago were dropped. This ensures that for every firm in the sample a bank matched with a firm as a main bank was indeed the firm's main bank as of March 2002, the most recent fiscal year end from October 2003 when the 2002 survey was carried out.[19] Only 1.6% of firms (21 firms) in the sample were dropped for this reason. The number of remaining firms in the sample is 1273.

Of the 1273 firms, firms with answers to various questionnaires concerning the firm's relationship with its main bank, firms that failed to answer questions in the questionnaires concerning their relationship with their main bank, or concerning collateralization and public guarantees, or failed to give demographic information on their representative were dropped. A very small number of firms who had not reported to their main bank neither in 2002 nor in 2003 were also excluded. 832 firms

[17] Only 0.9% of surveyed firms have a cooperative as their main bank.

[18] 5.6% and 7.5% of firms report that they did not have a main bank in the 2002 and 2003 surveys of the SCFE respectively. Contract terms were surveyed only for loans borrowed from main banks. Names of non-main banks that lend to surveyed firms are not identified.

[19] Main banks are reported only in October 2002. "Two years ago" reported in October 2003 likely ranges from April 2001 (two-and-half years ago) to April 2002 (one-and-half years ago). For some of these firms their main bank in March 2002 was quite likely different from the main bank they reported in October 2002.

remained in the two-year panel data.[20]

3.3. The Empirical Model

We model a simultaneous system of equations for the lending rate and two of the important non-price terms, collateralization and credit guarantees as the following three-equation system.

$$r_{ijt} = \alpha_r + \beta_r BANK_{it} + \gamma_r RELAT_{ijt} + \delta_r INFO_{jt} + \varphi_r RISK_{jt} + \kappa_r FIRM_{it} + \pi_r C_{ijt} + \tau_r G_{ijt} + u_{ijt}$$

$$\begin{cases} \Pr(G_{ijt}=1)_{ijt} = F^g\left(\alpha_g + \gamma_g RELAT_{ijt} + \delta_g INFO_{jt} + \beta_g BANK_{it} + +\varphi_g RISK_{jt} + \kappa_g FIRM_{it} + \pi_g C_{ijt} + \omega_g r_{ijt} + \rho_g IV^g{}_{jt} + \varepsilon^g{}_{ijt}\right) \\ \Pr(C_{ijt}=1)_{ijt} = F^c\left(\alpha_c + \gamma_c RELAT_{ijt} + \delta_c INFO_{jt} + \beta_c BANK_{it} + \varphi_c RISK_{jt} + \kappa_c FIRM_{it} + \tau_c G_{ijt} + \omega_c r_{ijt} + \rho_c IV^c{}_{jt} + \varepsilon^c{}_{ijt}\right) \end{cases}$$

The first equation models the main bank's decision to set the lending rate *r*. The second and the third equations model the main bank's decisions to request the borrowing firm to provide collateral on a loan and to request that the firm obtain credit guarantees from the government funded Credit Guarantee Corporations (CGCs), respectively. Subscripts *i*, *j*, and *t* represent a firm, its main bank, and year.[21]

RELAT is a variable that is meant to measure the strength of the lender-borrower relationship. INFO is a vector of variables that are meant to measure either the firm's transparency or availability of the firm's recorded information. BANK is a vector of variables that are meant to measure the main bank specific variables that include variables measuring the bank's financial health. RISK is a variable that is meant to measure the credit risk of the firm. FIRM is a vector of firm specific variables that include the firm's solvency and demographic variables. IV^c and IV^g are sets of instrumental variables for collateralization and for credit guarantees from the CGCs, respectively.

[20] Firms whose main bank is the *Norinchukin* Bank, a central institution of agricultural, forestry and fishery cooperatives are not included in the final sample of 832 firms. We included these firms at the earlier stage of this project in our sample. Including or excluding these firms did not alter the empirical results.

[21] Fees are possibly another "important" non-price "term." Fees have become increasingly an important source of income for Japanese banks. In 2002 and 2003, however, unlike U.S. banks, fees were still less important to Japanese banks. For regional and regional 2 banks that are the major main banks of our sample firms the ratio of non-interest income to gross operating profits is around 10%. The ratio for large "major" banks (city, trust and long-term credit banks) is around 30% while the ratio for U.S. banks is above 40% (Bank of Japan [2007]).

More detailed explanations of endogenous and exogenous variables follow in order. Definitions of these variables are also summarized in Table I.

3.4. Endogenous and Exogenous Variables

The interest rate on a loan

Each survey of the SCFE asks respondents what is the highest short-tern borrowing rate offered by their main bank. Use of the short-term rate with maturity of less than one year as a dependent variable, allows us to control for the maturity of the lending contract. Figure 1 presents the distribution of short rates surveyed in 2002 and 2003 surveys of the SCFE.[22] [23]

Collateralization and credit guarantees

The indicator variable C is set to unity if the firm's loans from their main bank are (partially) collateralized by physical assets or personal guarantees. Another indicator variable G is set to unity if the firm's loans from their main bank are (partially) guaranteed by the Credit Guarantee Corporations (CGCs).

Survey questionnaires regarding collateralization and credit guarantees are not identical between the two surveys of the SCFE. +In the 2002 survey of the SCFE only, respondent firms were directly asked whether they offered physical collateral or a personal security to their main bank, and whether they were using CGCs to guarantee loans received from their main bank.

[22] The data on short-term rates are the only universally available figures for the borrowing rate. However, the data on longer-term rates, which are most likely the rates on funds for financing the firm's investment, may not be comparable across firms because maturities vary. Since a main bank often rolls over short loans, a firm's objective to borrow short is not necessarily just to finance short-term working capital but is often to finance longer term projects. Furthermore, the fact that a fixed collateral is usually established for a firm's entire loan amount by its main bank suggests that the main bank most likely mixes long-term and short-term loans in a single basket in managing the borrower's loans.

[23] In Figure 1, some firms are observed to borrow at rates below the prime rate. According to a practitioner, banks lend to firms with a very low credit risk at rates below the prime rate.

In the 2003 survey of the SCFE, respondent firms were asked the total amount of short-term and long-term loans that they received from their main bank.[24] Then, they were asked the amount of loans from the main bank that was physically collateralized and the amount of loans guaranteed by the CGCs. In a separate questionnaire, they were asked whether or not they offered personal security to their main bank. Regarding the data from the 2003 survey of the SCFE, C is set to be unity if either the amount of collateralized loans from the main bank is greater than zero or the firm is offering personal guarantees to the main bank. Likewise, G is set to be unity if the amount of loans guaranteed by the CGCs is positive.

The firm's "transparency" (INFO)

Variables included in INFO are the interaction term between the frequency of the firm's reporting to its main bank (the reporting frequency in one year) and the dummy variable that is set to unity if the firm reports to its main bank voluntarily (DOCWILL is the interaction term of the frequency DOC and the dummy variable DOC_WILL), the number of board members (BOARD), and the dummy variable that is set to unity if the firm is owner-managed (OWNER).[25] [26]

DOCWILL rather than the frequency of reporting itself is used as it measures a firm's willingness to report to its main bank and is exogenous to the bank's setting of the lending rate. Whether a firm reports at its will or not is based only on the questionnaire surveyed in the 2002 SCFE that asks a

[24] There may be individual loan contracts between a firm and its lender bank that are neither even partially collateralized nor publicly guaranteed. Should there be a default, though, what matters to the lender is not the recovery of each individual loan but the recovery of all the loans that the bank has supplied. Thus, whether some of the loans from the main bank to the firm are collateralized or publicly guaranteed influences any lending rate including the highest short rate, the rate charged on one of multiple contracts between the bank and the firm that are not necessarily collateralized or publicly guaranteed.

[25] A firm is defined to be owner managed if the equity share of the firm's representative and persons sharing the same last name with the representative exceeds 50%. OWNER may capture the firm's appetite for risk taking. Indeed, the average credit score of owner managed firms is significantly larger than the average score of non owner managed firms.

[26] Since there are very few listed firms in the sample (1.5%), the dummy variable that is set to unity if the firm is listed in stock exchanges is not included.

respondent firm whether it reports to its main bank either "on a main bank's request", it reports to its main bank "at its own will", or had not reported to its main bank at all during the one year period preceding the survey date. A firm is assumed to have reported voluntarily in both 2002 and 2003 if its answer to this question is "at its own will", since its reporting was voluntary at the initial stage. Owner-managed firms or firms with the small number of board members are less likely to leave recorded information. FAGE is included since young start ups are little known to external creditors.

The main bank's financial health (BANK)

Independent variables included in BANK are the book capital to asset ratio (BCAR), the dummy variable that is set to unity if the bank's regulatory status is "international" (BBISCLASS), the ratio of non-performing loans to total asset (BNPL), the ratio of loan loss provisions to total asset (BLOSS), the ratio of liquid assets to total asset (BLIQUID), and a logarithm of total asset (LNBTASSET).

The book-based capital to asset ratio is used because a bank can easily manipulate with the Basel regulatory capital to asset ratio.[27] "International" banks that are allowed to conduct international businesses need to meet a higher regulatory standard (8% for the Basel ratio) than "domestic" banks (4%). BLIQUID is a ratio of liquid assets to total asset, a measure for the bank assets' liquidity used by Kashyap and Stein (1999). Liquid assets include cash, deposits, call loans and securities.[28]

The strength of lender-borrower relationship (RELAT)

Relationship length between a firm and its main bank (LENGTH) is included as a measure of the

[27] Ito and Sasaki (1999) discuss that Japanese banks issued subordinated debts and had their affiliate firms undertake subordinated debts when core capital became scarce. Half of the capital to meet the regulatory standard should be core Tier 1 capital, which is roughly equivalent to book capital.

[28] Hubbard, Kuttner and Palia (2002) include the bank's ROA as another "bank effect" variable. We excluded the ROA since it is very strongly correlated with the short rate and we suspect a reverse causality (higher lending rates generate a higher ROA.).

strength of the lender-borrower relationship. [29]

The firm's credit risk (RISK)

We include the credit score rated by TSR (SCORE). The score ranges from 0 to 100. (A firm with a score of 100 is the safest.) The score is based on the firm's financial statements and a wide range of additional qualitative attributes.

Firm specific variables (FIRM)

Variables included in FIRM are the firm's capital to asset ratio (CAPITAL) and various firm specific control variables. Control variables are the logarithm of total assets (LNTASSET), the current ratio (the ratio of current assets to current liabilities, CURRENT), the logarithm of short borrowing (LNSHORT), age of the firm's representative (AGE), a dummy variable that is set to unity if the firm's representative owns residential housing (HOUSE), a dummy variable that is set to unity if the educational attainment of the firm's representative is college educated or a graduate of a more advanced institution (EDUC), industry dummies and region dummies.[30] LNSHORT is included as a proxy for the quantity of a firm's short-term loans from its main bank that is not directly observed. LNSHORT is treated as an endogenous variable.

3.5. Instrumental Variables for Collateralization and Public Credit Guarantees

[29] Berger and Udell (1995), Petersen and Rajan (2002) and Degryse and Ongena (2005) employ the length of the main bank firm relationship as a variable to measure the relationship strength in running the regression for the lending rate. The recent work by Kano et al. (2006) and Uchida, Udell and Watanabe (2006 b) explore other candidate variables including the number of lenders and the scope of financial services that a firm receives from its main bank.

[30] Eight region dummies for Hokkaido, Tohoku, Kitakanto, Chubu, Kansai, Chugoku, Shikoku, and Kyushu are included, but the dummy variable for Greater Tokyo is excluded as a variable for the base group. Nine industry dummy variables for construction, information and communication, transportation, wholesale, retail, real estate, services, and other industries are included, but a dummy variable for the manufacturing industry is excluded as a variable for the base group.

Instrumental variables for the indicator variable for collateralization, C, are the share of immovables within the total asset (ESTATE), interaction terms of the share of immovable assets with region dummies and industry dummies and the share of movables within the total assets (MOVABLE). These variables are used because firms that are rich in collateralizable assets such as real estates have the ability to pledge collateral and therefore are more willing to offer it to their main bank.[31] Interaction terms with region dummies are meant to capture variations in land prices across regions. Interaction terms with industry dummies are meant to capture variations in the importance of immovables across industries.

The instrumental variable for the indicator variable for public credit guarantees, G, is a dummy variable that is set to unity if the firm is eligible to apply for credit guarantees to CGCs (GELIGIBLE). Firms that are eligible to apply for public credit guarantees from CGCs are "small and medium enterprises (SMEs)" as defined by the SMA. The trick in constructing this instrumental variable is that firms selected in the sample are "small" firms defined by the simpler US standard, which do not necessarily coincide with "SMEs" by the more elaborate Japanese standard (see Table II for definitions of "SMEs").[32]

3.6. The Instrumental Variable Regression

We run the standard instrumental variable regression (two-stage least squares, 2SLS) for the lending rate using all the exogenous variables included in the equation for the lending rate and instrumental variables for collateralization and public credit guarantees mentioned just above as a set of

---

[31] Farinha and Santos (2002) use the ratio of immovables to total debt as a proxy for a firm's ability to pledge collateral when running regressions for the number of lender banks.

[32] It is well known that consistency of estimates on coefficients in the linear regression equation with endogenous dummy independent variables holds as long as selected instrumental variables are exogenous and correlated with endogenous dummy variables. We added the logarithm of firm sales as an instrumental variable for LNSHORT.

instrumental variables.[33]

4. Results

4.1. Preliminary Results

Summary statistics

Table III shows summary statistics of variables used in this study. The median and the mean of the number of employees are 50 and 83 respectively.[34] Average sales are 3,992 million yen. The average short rate is 2.05%. Ninety-two percent of firms in the sample pledged collateral to their main bank, whereas 51% of firms obtained public guarantees from the CGCs to get loans from their main bank. The main banks of 61% of firms are regional or regional 2 banks. Twenty-nine percent and nine percent of firms use large nation-wide banks (city banks or trust banks) and *shinkin* banks as their main bank respectively.[35] The average length of the relationships with a main bank is 36 years. Ninety-five percent of firms are eligible for public credit guarantees. We do not utilize the panel structure of the data in the following regression analyses since there are little dynamic variations in many variables including the three endogenous variables over the two-year sample period.[36]

---

[33] Linear regressions of endogenous dummy variables on instrumental variables are run at the first stage of the 2SLS regression. The predicted probabilities for collateralization and public credit guarantees, which are then used as independent variables for the second stage linear regression for the lending rate, may be less than zero or greater than one. Such "invalid" predicted values for probabilities do not bias estimates of coefficients in the equation for the lending rate.

[34] Japanese firms surveyed in the SCFE are relatively larger than American firms surveyed in the SSBF. The median and the mean for firms surveyed in the 1998 survey of the SSVF are 3 and 23 respectively.

[35] *Shinkin* banks are small credit associations (Speigel and Yamori [2004]).

[36] The short rate barely changes over the sample period since the prime rate, the bottom line of the rate, stays the same at 1.375%.

The first stage

Tables IV. Panels A and B present the results of the first stage OLS regressions for collateralization and public credit guarantees, respectively.

The estimated coefficient of ESTATE is positive and statistically significant in the equation for collateralization regardless of whether the interaction terms between ESTATE and region and industry dummies (column 1) are included (column 2). Likewise, the estimated coefficient of GELIGIBLE is positive and significant in the equation for public credit guarantees regardless of the inclusion of interaction terms. These strong results validate our choice of instruments. The model fit is improved when interaction terms are included in both first stage regressions.

4.2. Results

Table V presents the regression results for the equation for the main bank's lending rate. The following discussion is mainly based on the 2SLS regression results reported in the first column. The second column presents the 2SLS regression results when G (public credit guarantees) is treated as an exogenous variable, whereas the third column presents the simple OLS regression results.

The firm's "transparency" (INFO)

All coefficients of variables are estimated to be statistically insignificant. Such results are a sharp contrast to Berger and Udell (1995) who find that more transparent firms, such as incorporated firms and non-owner managed firms, enjoy lower borrowing rates than opaque firms, such as unincorporated firms and owner managed firms.

There are possibly two explanations for our results' departure from that of Berger and Udell. One explanation is that in shorter bank-firm relationships in the U.S., transparency is a matter of great importance to banks. Another explanation is that Berger and Udell's estimates may be biased due to

endogeneity of non-price terms. We will return to this endogeneity problem shortly.

It is worth mentioning that the coefficient of DOCWILL is positive, though insignificant. This might suggest that high risk firms are willing to report more often to their main bank to get loans even if not request by the bank.

The main bank's financial health (BANK)

The coefficient of BNPL is positive and statistically significant at the 5% significance level. Financially distressed banks suffering from a large amount of non-performing loans relative to total asset force borrowing firms to share the costs of writing off non-performing loans by charging higher interest rates.

Collateralization

The estimated coefficient of C (collateralization) is not significant. One way to interpret this result is that Japanese banks do not properly price voluntarily pledged collateral. Is this a valid interpretation? Answers to this question will be discussed in the next sub section.[37]

Public credit guarantees

The estimated coefficient of G (public credit guarantees) is positive but not statistically significant. We save the interpretation of this result for the next sub section.

[37] A firm that voluntarily offers collateral to its main bank should send a signal to the bank that it is a safer firm. If so, the bank should reduce the lending rate to this safer firm. If this theory holds true in the real world, the coefficient of collateral should be negative. Another way to interpret the variable C is that it captures the firm's collateral value. This is a valid argument since C is instrumented by the share of immovables in the firm's assets. In the latter interpretation of C, its coefficient is again theoretically negative. The fact that the coefficient of the firm's capital to asset ratio is positive and the coefficient of C is statistically insignificant may suggest that both C and the firm's capital to asset ratio capture the firm's collateral value. To test this hypothesis, we dropped the capital to asset ratio as an independent variable so as to examine whether the coefficient of C turns negative and significant. The coefficient of C, however, remained insignificant.

The importance of the simultaneity bias due to non-price terms

Ignoring endogeneity due to non-price terms would seriously bias the estimation of the main bank's pricing behavior. The estimated equation for the lending rate when non-price terms are treated as exogenous variables is implausible in many regards. The coefficients of DOCWILL (the frequency of reporting to a main bank when a firm's report is voluntary) and FAGE (firm age) are positive and statistically significant and the coefficients of C (collateralization) and G (public credit guarantees) are positive and significant. The positive estimates of the coefficients of C and G on the third column of Table V suggest that banks require riskier firms to collateralize loans or to have loans secured by public credit guarantees. [38]

The strength of lender-borrower relationship (RELAT)

The estimated coefficient of LENGTH is not statistically significant. This is not necessarily inconsistent with Berger and Udell (1995) who found that the coefficient of the length of the relationship is negative because they impose a maximum limit of 30 years on the relationship duration. In contrast, the average relationship duration in our sample is 36 years.

A firm's credit risk (RISK)

The risks embedded in firms are properly priced as the coefficient of SCORE is estimated to be negative and statistically significant.

Firm specific variables (FIRM)

[38] An augmented regression test suggested by Davidson and MacKinnon (1993) rejects a joint hypothesis that C, G and LNSHORT are all exogenous (F(3,1620)=2.61, p value = 0.050) but does not reject a joint hypothesis that C and G are both exogenous (F(2, 1620) = 0.41. The p value = 0.666). This does not necessarily mean C and G are exogenous. One of the possible causes for the rejection of the joint hypothesis is an inadequate explanatory power of instrumental variables. We will return to this issue later.

The negative and significant coefficients of CAPITAL and LNTASSET support the view that a high collateral value of a firm reduces the cost of borrowing. Main banks (relationship lenders) do utilize financial statements. Is relationship lending merely a title and financial statement (transactions-based) lending in practice? Many practitioners contend that the essence of a firm-bank relationship is to help small firms prepare more reliable financial statements. To do so, main banks utilize relationship specific information about the firms.

4.3. Further Evidence on Non-price Terms of Contract

In the benchmark results, neither security by collateral nor security by public credit guarantees seems to be priced on lending rates set by the main banks. They even seem to set a premium for secured loans relative to unsecured loans. Do main banks really ignore security in pricing loans? In this sub section, we will provide alternative interpretations of benchmark results.

Collateralization

Why do main banks not seem to price collateral?[39] According to the former bank examiner at the Bank of Japan, in the second half of 2003, banks switched from loan by loan management based on collateral to management of pooled loans. This fact, however, does not seem to contribute to an insignificant coefficient of C. The coefficient stays insignificant when the sample date is limited to 2002 (Results are not reported).

[39] According to Table 4-1, the F statistic for excluded instrumental variables is 9.29 for the endogenous variable C (collateralization), suggesting that employed instruments may not be strong enough (their correlation with C may not be strong enough). So we need to be cautious when interpreting the coefficient of C. Weak instruments tend to cause larger estimated standard errors for endogenous variables. The threshold for the first stage F statistic at 10 is suggested by Staiger and Stock (1997) for a case of a single endogenous variable. Various other test statistics have been recently proposed, but so far there is little consensus on standard tests for empirical use. The F statistic does not increase either when the logarithm of short borrowing (LNSHORT), an endogenous variable other than non-price terms, is dropped or when total loan to total debt ratio, the instrument employed by Bharath et al (2006), is added as an additional instrumental variable.

The 2002 round of the SCFE asked firms to give a self assessment of the value of collateral they pledged to their main bank relative to the amount of loans outstanding borrowed from the main bank. If they pledged collateral to their main bank, firms were asked to choose from five alternatives, "(the value of collateral is) substantially less than the amount of loans outstanding", "slightly less than the amount of loans outstanding", "about the same as the amount of loans outstanding", "slightly greater than the amount of loans outstanding" and "substantially greater than the amount of loans outstanding". As shown in Table VI. Panel A, interest rates on uncollateralized loans are far lower than on collateralized loans, and rates on collateralized loans tend to increase with the degree of collateral coverage.[40] [41]

Do banks price the degree of collateral coverage while only allowing safe firms to borrow uncollateralized loans? The coefficient of the extent of collateral coverage, when added to endogenous variables, is not significant. The dummy variable that indicates whether a firm pledges collateral to the main bank (C) is not significant, either. (column1, Table VII)[42]

Indeed, banks seem not to directly price security by collateral. Banks are doing so indirectly through pricing credit scores (as indicated from a negative and significant coefficient of credit score). As shown in Table VI. Panel A, firms exempt from pledging collateral to their main bank score the highest, while, for firms pledging some collateral to their main bank, credit scores tend to increase with the extent of collateral coverage. It is worth mentioning that in practice independent research houses

[40] Firms that answered that they pledgeed collateral to their main bank but did not answer the question concerning collateral coverage are dropped in Table 6.

[41] Firms that do not pledge collateral to their main bank, however, are those whose performance is generally good but hold less real estate relative to their total asset. The average size of such firms, which hire on average slightly more employees than firms in the entire sample (97 persons versus 81 persons), triples the average size of all firms in the sample both in sales and total asset. These firms are also better capitalized and earn higher credit scores. Thus, many firms who did not pledge collateral to their main bank were most likely exempted, though they may have had been quite prepared to offer collateral.

[42] In converting a survey question to an independent variable that measures collateral coverage, 0.5, 0.75, 1, 1.25 and 1.5 are assigned to "substantially less", "slightly less", "about the same", "slightly greater" and "substantially greater", respectively.

(Tokyo Shoko Research in our case) do weigh in the extent of collateral coverage when scoring firms' credit quality.

Public credit guarantees

Although it is not statistically significant, the magnitude (55 basis points) of a positive and significant coefficient of G are partially secured by public credit guarantees is counterintuitive. Loan security by public credit guarantees is not only priced, but banks likely penalize firms for securing loans. This straightforward interpretation of the result is not persuasive. Another explanation is that firms that borrow with public credit guarantees are generally riskier firms. Row 2 of Table VI. Panel B supports this view. The average credit score increases with the extent of the CGC coverage.

Is there any alternative interpretation?

Indeed, the positive estimate could be consistent with a firm's incentive structure in the presence of fees for guarantees. A fee paid to the CGC for its guarantee is expensive in the low interest rate environment. The standard fee is 1.35% of the outstanding loan amount. Thus, if a firm is confident in its ability to repay a loan to a bank on time, it would not obtain the CGC's guarantee at the cost of a fee. In other words, firms that are willing to obtain guarantees are riskier firms rather than safer firms.[43] Safer firms may send a positive signal to their main bank by offering collateral, but may not bother to bear the cost of a fee in order to simply send a positive signal. Banks in return raise interest rates on loans to firms willing to obtain the CGC's guarantees.

There is a certain data limitation related to the issue discussed above. Remember that a firm is asked to report the highest of short interest rates on loans borrowed from its main bank.[44] The highest

[43] Main banks may reduce lending rates to transparent firms that obtain the CGC guarantees but may maintain lending rates to opaque firms that obtain CGC guarantees. This hypothesis, however, is not empirically supported since when interaction terms of transparency measures with G are included as independent variables, their coefficients are not statistically significant.

[44] Firms may report the interest rate including a fee rate (the ratio of a fee to the amount outstanding) by mistake

interest rate for a firm is unlikely to be for one on a loan secured by CGC's guarantee unless loans borrowed from the main bank are fully covered by guarantees. All things being equal, greater CGC coverage of loans to a firm makes an unsecured loan to that firm less susceptible to default as they are relaxed debt burdens. Nonetheless the inherent risk of a firm selecting to be dependent on public credit guarantees may more than offset reduction in credit risk due to greater security given by increased CGC coverage.

How would the results change if interest rates on secured loans were available? We conjecture that the coefficient of G would be smaller but would not become negative. Why can we say this? According to the survey conducted by the Japan Small and Medium Enterprise Corporation (present the Organization for Small & Medium Enterprises and Regional Innovation, Japan) in June 2004, on average, banks discount an interest rate on a loan to a firm secured by the CGC's guarantee relative to unsecured loan to that firm by 49 basis points. Given this fact, based on row 1 of Table 6-2, average interest rates on secured loans are estimated to be 1.92%, 2.19%, 2.24% and 3.17% by ascending order with respect to CGC coverage. (Recall that the interest rate for the highest bracket does not have the average rate of discount subtracted because rates reported in this bracket are rates on perfectly secured loans). The amount of 1.92% for secured loans in the lowest bracket (more than 0% but less than 40%) is higher than the 1.59% charged to firms without the CGC coverage, suggesting that banks treat secured loans to risky firms with lower credit score less favorably than unsecured loans to safe firms with higher score. This may indicate that the variable G could pick up the firm's credit risk that the credit score fails to capture.

Alternatively, according to a government sector economist who has frequent contact with Japanese bankers, main banks likely force firms that can borrow only with CGC's guarantees to accept higher

---

since in practice fees are paid to the CGC through a lender bank acting as a middleman between the borrowing firm and the CGC and the firms may perceive the total cost of borrowing including the fees, as interest payments. This could be a source of the overestimation of the coefficient of G. According to practitioners though, firms are less likely to add the fee rate to the interest rate since banks inform firms of the interest rate and the fee rate separately.

lending rates. If this is the case, the positive coefficient of G is another evidence of main banks' exploitation of opaque small firms.

4.4. Main Bank Dependence and Lending Rates

Do competition with non main-bank lenders push down the main bank's lending rate?

According to a private sector consultant on pricing of bank loans, a Japanese bank first computes the benchmark lending rate for each contract based on hard information, primarily financial statements, and then sets the contractual rate somewhere between the prime rate and the benchmark based on soft information gathered through an established relationship with the borrowing firm and the competitive environment the bank faces.

We are wondering then whether main banks discount lending rates when they are under competitive pressures from competing lenders. The SCFE asks a firm the number of banks the firm has had "transactions" with by bank type and then asks the firm the balance of loans from banks of that type. Unfortunately the data on these variables are unreliable. Apparently, some respondent firms reported the number of banks they had "some" transactions with (deposit accounts, etc), whereas others reported the number of banks from whom they borrowed. Many firms reported a positive number for the number of banks of a certain bank type with whom they have "transactions" and then answered zero to the question pertaining to the balance of loans from banks of that type. As a result, the maximum number reported for the number of banks is 69! Because of the dubious data reliability of the data, we decided not to use these variables.[45] Unfortunately, measures showing the concentration of local bank lending markets are not available.

Since data on interest rates set (offered) by non-main bank lenders are not available, we cannot tell whether the interest rate set by the main bank is higher or lower than rates set by non-main bank

[45] We experimented with various ways to include "the number of banks", but results changed with every attempt. We believe these failed regression attempts are due to "noise" on this variable.

lenders. Thus, the discussion is highly speculative. As we see from the benchmark results, main banks force relationship borrowers to bear the cost of the banks' financial distress. On the other hand, firms rarely switch main banks (Only 17% of firms surveyed in the 2003 SCFE survey reported that they had ever switched main banks). This implicates that opacity of small firms is too severe for non-main banks to set credit terms competitive with main banks.[46] This fact contrasts with experiences of large Japanese *keiretsu* firms. Using data of large manufacturing firms in Japan, Weinstein and Yafeh (1998) found that firms with a main bank pay larger debt repayments relative to their entire debts than firms without. Since such large firms were sufficiently transparent, the main banks' relationships no longer improved credit terms. The fact that large firms eventually did leave main banks for unintermediated credit markets shows that these firms were not "locked in" to their relationships.

Are smaller firms more exploited by main banks?

Relative to the US SSBF data, our SCFE data include larger firms. Larger firms are less dependent on a single main bank and can diversify financing sources, while small firms tend to be dependent on their main bank.[47] [48] Bank effects on lending rates should emerge if a borrowing firm is dependent on a single (main) bank and the bank is not under competitive pressures from non-main bank lenders. If this scenario holds true, bank effects are stronger for smaller firms than for larger firms.

To test this hypothesis, we ran the regression for a sample of smaller firms with less than 50

[46] Less than 10% of firms in our sample borrow only from their main bank. Firms borrow from non-main banks under tighter terms perhaps because they insure against unexpected liquidity needs.

[47] The average main bank's share in loans is 54% for small firms with less than 50 employees, whereas the average main bank's share in loans for large firms with no less than 50 employees is 46%.

[48] Regressions for sub samples of firms with a higher dependence on their main bank for loans and firms with a lower dependence did not produce plausible estimates due to the small sample size.

employees. As expected, the estimated coefficient of BNPL (the ratio of non-performing loans to total asset) is much larger than that of the baseline sample and is statistically significant at the one percent level (column 2, Table VII). If BNPL increases by five percentage points, the lending rates to the bank's small borrowers rise by 62 basis points on average based on this estimate.[49] This magnitude is not negligible in the super low interest rate environment.[50] [51] In addition, the coefficient of G is significant at the 1% level and much larger (85 basis points) than the coefficient for the baseline sample. These two findings jointly reinforce the hypothesis that small firms are greatly exploited by their main banks. On the contrary, the coefficient of BNPL is not significant for larger firms with at least 50 employees, though a large J statistic reduces the reliability of the resultse (column 3, Table VII).

4.5. Does the Length of the Relationship Really Not Matter?

Our baseline results suggest that, in very long and established main bank relationships, a marginal increase in the length of the relationship is of little importance. This implication does not necessarily rule out the possibility that the length of the relationship may matter to certain subgroups of firms. Our baseline results simply refer to the average situation of firms in the sample.

<u>The non-linear relationship between the length of the relationship and the lending rate</u>

The length of the relationship length may matter more to firms at the beginning of the relationship

[49] The average short rate and the average ratio of non-performing loans to total asset is 2.338% and 0.0531, respectively.

[50] Hubbard, Kuttner and Palia (2002) find a larger bank effect using the U.S. data from 1987 to 1992. During their sample period, the federal funds rate moved from 2.92% to 6.43%. During our sample period, the overnight call rate was virtually 0%.

[51] The F statistic for excluded instruments is 9.72 for C, suggesting that the reported standard error for the coefficient of C is less likely to be biased. Limiting the sample to small firms, on the other hand, invalidates the key instrumental variable for public credit guarantees, GELIGIBLE, which indicates whether a firm is eligible to apply for public credit guarantees, since small firms with less than 50 employees are all eligible for public credit guarantees.

than to firms with a mature relationship. That is, the marginal increase in the length of the relationship could be much more important at the beginning of the relationship than at the later stage when the relationship is well established. The benchmark results, however, remain virtually the same when LENGTH is given the logarithm (LNLENGTH). The effect of relationship duration remains negligible (Model 1 of Table 8).[52]

Credit score and the length of the relationship

Banks may care more about relationships with riskier firms more than with safer firms. To examine this hypothesis, we ran the regression with an interaction term of credit score and the length of the relationship. The coefficient of the interaction term indeed is negative and statistically significant while the coefficient of relationship duration turns positive and significant (Model 2 of Table VIII). Does this finding really support the hypothesis? The credit score ranges from 25 to 80. For 90% of firms (excluding the top and bottom five percentiles), which are squeezed in a narrow band with credit scores from 48 to 68, the magnitude of the coefficient of the length of the relationship is negligible.

A firm's transparency and the length of the relationship

A bank may care more about its borrower's transparency (to outsiders as well as to the bank) when the bank's relationship with the firm is still immature. To examine this hypothesis, we explored the regression with interaction terms of the length of the relationship and transparency measures (DOCWILL, BOARD and OWNER) as additional independent variables.[53] Two interaction terms

[52] We attempted regressions using a sample of firms whose relationship with their main bank is shorter (less than 10 years/ less than 20 years), but the results were implausible due to lack of sample size. We made yet another attempt to capture nonlinearity of the length of the relationship by including dummy variables indicating quartiles of relationship length, but none of these dummy variables were statistically significant. These results are not reported.

[53] The interaction term with FAGE was not included since FAGE is strongly correlated with the length of the relationship, and therefore the interaction term may merely capture the non-linearity of the length of the relationship.

carry statistically significant coefficients (Model 3 of Table VIII). The negative coefficient of an interaction term with DOCWILL and the magnitude of the positive coefficient of DOCWILL imply that frequent voluntary reporting by a firm with a short main bank relationship is a negative signal to a main bank, but that frequency of voluntary reporting by many firms with long and established relationships is not a bank's major concern. The magnitude of the positive coefficient of an interaction term with BOARD and a positive but insignificant coefficient of BOARD suggest that the number of board members does not matter to a main bank's pricing of loans except when a main bank relationship is of extremely long duration.

"Bank effects" and the length of the relationship

Exploiting stronger relationships, financially weaker main banks may charge higher lending rates to firms with longer relationships. When added, the interaction term between LENGTH and BNPL is indeed negative and weakly significant (the results are not reported). When, then, the interaction term between firm age and BNPL is added, neither of the coefficients of interaction terms is significant (the results are not reported). The negative coefficient of the interaction term between LENGTH and BNPL most likely emerged spuriously due to the correlation of LENGTH and FAGE.

Distance as another measure for the relationship strength

Referring to the importance of distance between a lender and a borrower in relationship lending Petersen and Rajan (2002) discuss, "If ... much of this information is soft and difficult to communicate, the decision to offer credit has to be made very close to where the information is gathered." Information accumulated in a bank over the long course of relationship could be richer about firms located closer to the bank than those located farther. When the measure for distance (DISTANCE) is

added, its coefficient is indeed positive (Model 4 of Table VIII).[54] This implies either that banks value richer information gathered through frequent contacts that the geographic proximity allows or that communication (or transportation) costs due to a longer distance are incorporated in lending rates.

4.6. Robustness Checks

In this sub section, we conduct further robustness tests. To overview, our benchmark 2SLS results from Table V are mostly robust. The results of these robustness checks are presented in Table 9 with the benchmark results from Table 5 reappearing for the purpose of comparison (Model 1).

Use of the estimated short borrowing from the firm's main bank as an independent variable

In the benchmark regression, we used the quantity of all short-term loans borrowed by a firm rather than the quantity of short-term loans borrowed from the firm's main bank as an independent variable. We estimated the amount of short-term loans that a firm borrows from its main bank, which in itself is not available in either round of the SCFE. The amount of total loans that firms borrowed from their main bank is surveyed only in the 2003 survey. Multiplying the amount of total loans from a firm's main bank in the 2003 survey of the SCFE by the share of the firm's short-term loans within its firm's total loans in FY 2003 produces our estimate of the amount of short-term loans a firm borrowed from its main bank in (FY) 2003.

Our baseline results remain unchanged when LNSHORT is replaced by LNSHORT_MAIN (the logarithm of the estimated short-term loans from the firm's main bank) (Model 2 of Table IX). The coefficient of LNSHORT_MAIN itself is not statistically significant, which is consistent with the findings of Hubbard, Kuttner and Palia (2002): that the facility size of a contract is of little relevance to

[54] DISTANCE is constructed based on the question that asks firms to choose from six alternatives "less 500 meters", "greater than 500 meters and less than 1 kilometers", "greater than 1 kilometers and less than 10 kilometers", "greater than 10 kilometers and less than 30 kilometers", "greater than 30 kilometers and less than 50 kilometers" and "greater than 50 kilometers" fro the distance from a firm to a branch of its main bank that the firm deals with. In the regression, these alternatives are replaced with values of 0.5 (kilometers), .75, 5.5, 20, 40 and 75 in order.

the lending rate.

A set of instrumental variables without interaction terms

As shown in Table IV. Panwel A, when interaction terms are excluded from a set of instrumental variables, the F statistic for excluded instruments "happens" to be very large (34.16).[55] With the smaller but "strong" set of instruments excluding interaction terms, the results are mostly the same qualitatively as the baseline results (the third column of Table IX).

Audited financial statements

Main banks may trust audited financial statements. To test this hypothesis, we constructed a variable AUDIT that is set to unity if a firm's financial statements are either audited by certified public accountants or verified by licensed tax accountants and included this variable as well as interaction terms of AUDIT and financial statement based variables (CAPITAL, TASSET, CURRENT). The coefficient of AUDIT itself is negative but insignificant, and none of these interaction terms is significant, rejecting the hypothesis (results are not reported).[56]

5. Policy Implications

5.1. Prudential Policy Implications

Our finding that more financially distressed banks charge higher rates to small borrowing firms suggests that helping banks to write off non-performing loans with public capital would relax

[55] Additionally, we replaced ESTATE (the ratio of immovables to total asset) with the ratio of immovables to total debt, which is used by Farinha and Santos (2002) and re-estimated the short rate, but the results remained qualitatively the same as the baseline results (Results are not reported). We also included a lagged ROA of a main bank as an additional independent variable, but its coefficient was not significant.

[56] AUDIT is also used in Kano et al (2006) and Uchida, Udell and Watanabe (2006 a).

borrowing conditions faced by small firms dependent on their main bank. In the same spirit, the super expansionary monetary policy in Japan during a "lost decade" did not have much of the desired real effects partly because, due to poor bank health (and perhaps inadequate public bail out program for banks), the borrowing costs of a large number of bank-dependent firms were not reduced as much as those with "unintermediated" borrowing.

We estimated the short rate for firms borrowing from a main bank with a larger BNPL (no less than 0.06). The estimated coefficient of BNPL is more than twice that of the baseline coefficient (results are not reported)[57]. Banks suffering from relatively large non-performing loans exhibited greater "bank effects" partly because they were under more intensive regulatory pressure. This finding is in line with Peek and Rosengren's (1995) finding that banks under formal regulatory action reduced lending while those who were not did not during the 1990-1991 period.

Banks were under unusually strong regulatory pressure to write off non-performing loans and, as a result, "bank effects" were probably larger during our sample period than earlier when pressures were low. On October 30, 2002, the Financial Services Agency announced the "Program for Financial Revival". The "Program" requested banks to "terminate" the non-performing loans problem "towards FY 2004".

5.2. Disclosure Policy Implications

Encouraging small firms to disclose more reliable financial statements would not improve their borrowing conditions with their main banks even though with which they had had very long business relationships. Such a policy, however, would encourage small firms to depend less on their main bank and allow other creditors, who have not previously had a relationship with a firm to offer their services. Rents appropriated by linked to their financial distress would gradually disappear, and small firms

[57] We decided not to report the results since the associating J statistic was too small

would be able to borrow cheaply in more competitive credit markets, whether intermediated or not.[58]

5.3. Other Policy Implications

Our empirical results show that a firm's balance sheet strength such as capital to asset ratio (leverage ratio), total asset and collateral coverage are directly or indirectly reflected in the lending rates. The "external finance premium" discussed by Bernanke and Gertler (1989. 1995) and Bernanke, Gertler and Gilchrist (1996, 1999) appears to be inversely related to the firm's collateral value, which suggests the presence of a credit channel of monetary policy transmission through bank dependent small firms.

6. Conclusion

In this paper, we conducted a comprehensive examination of how relationship lenders price loans to small opaque firms.

Use of data from the Survey on Corporate Financial Environments (SCFE) allowed us to match the data on borrowers with the data on their main banks. Using data from the SCFE's 2002 and 2003 surveys, we ran regressions of the lending rate of a loan to a firm from its main bank on various factors after controlling for a firm's demographic characteristics. Such factors include the strength of the lender-borrower relationship, the firm's transparency to outsiders, the borrowing firm's transparency to their main bank, the main bank's financial health, a firm's financial health and the non-price terms of contract such as collateralization and public credit guarantees.

Use of instrumental variables allowed us to avoid biases due to endogenous non-price terms

[58] Our empirical findings ensure coherency of the current policy framework undertaken by the Japanese Small and Medium Enterprise Agency (SMA). The SMA's recent policy regarding the SME finances is twofold: 1 to set up more rigorous accounting standards: and 2 to encourage SMEs to utilize less traditional financial instruments such as asset backed securities and financial scoring loans.

(collateralization and public credit guarantees) and to obtain consistent estimates of the coefficients in the equation for the lending rate.

We found that: 1. Neither measures for a borrower firm's transparency to the public (outsiders) nor measures for the firm's transparency to its main bank affect the lending rate. 2. A financially distressed main bank that suffers from greater non-performing loans charges a higher lending rate, supporting the view that main banks take advantage of their stronger bargaining position when in negotiations with their borrowing firms in a less competitive environment. 3. Treating non-price terms of a loan contract to be endogenous is crucial in consistently estimating a main bank's pricing of loans.

References

Bank of Japan, 2007, Financial System Report, March 2007, available at http://www.boj.or.jp/en/type/ronbun/fsr/fsr07a.pdf

Berger, Allen N., Nathan H. Miller, Mitchell A. Petersen, Raghram G. Rajan and Jeremy C. Stein, 2005, Does Function Follow Organizational Form? Evidence from the Lending Practices of Large and Small Firms, *Journal of Financial Economics*, 76 (2), 237-69.

Berger, Allen N. and Gregory F. Udell, 1990, Collateral, Loan Quality, and Bank Risk, *Journal of Monetary Economics*, 25 (1), 505-529.

Berger, Allen N. and Gregory F. Udell, 1995, Relationship Lending and Lines of Credit in Small Business Finance, *Journal of Business*, 68 (3), 351-381.

Berger, Allen N. and Gregory F. Udell, 2002, Small Business Credit Availability and Relationship Lending: the Importance of Bank Organizational Structure, *Economic Journal*, 112 (477), F32-F53.

Berger, Allen N. and Gregory F. Udell, 2006, A More Complete Conceptual Framework for SME Finance, *Journal of Banking and Finance*, 30 (11), 2945-66.

Bernanke, Ben S. and Mark Gertler, 1989, Agency-Costs, Net Worth and Business Fluctuations, *American Economic Review*, 79(1), 14-31.

Bernanke, Ben S. and Mark Gertler, 1995, Inside the Black Box: the Credit Channel of Monetary Policy Transmission, *Journal of Economic Perspective*, 9(4), 27-48.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist, 1996, The Financial Accelerator and the Flight to Quality, in John Taylor and Michael Woodford, ed.: *Handbook of Macroeconomics*, Ch 21, vol 1C, 1341-93.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist, 1999, The Financial Accelerator in a Quantitative Business Cycle Framework, *Review of Economics and Statistics*, 78 (1), 1-15.

Bharath Sreedhar, Sandeep Dahiya, Anthony Saunders and Anand Srinivasan, 2006, Lending Relationships and Loan Contract Terms: Does Size Matter? presented at the conference, “Corporate Finance of Financial Intermediaries” held at the Wharton School of University of Pennsylvania.

Booth, James R. and Lena Chua Booth, 2006, Loan Collateral Decisions and[59] Corporate Borrowing Costs, *Journal of Money, Credit and Banking*, 38 (1), 63-90.

Brick, Ivan E. and Darius Palia, 2007, Evidence of Jointness in the Terms of Relationship Lending, Journal of Financial Intermediation, 16 (3): 452-76.

Cole Rebel A. 1998, The Importance of Relationships to the Availability of Credit, *Journal of Banking and Finance*, 22, 959-977.

Cressy, Robert and Otto Toivanen, 2001, Is There Adverse Selection in the Credit Market? *Venture Capital*, 3 (3), 215-238.

Davidson, Russell and James G. MacKinnon, 1993, Estimation and Inference in Econometrics, (Oxford University Press).

Diamond, Douglas W. and Raghuram G. Rajan, 2000, A Theory of Bank Capital, *Journal of Finance*, 55 (6), 2431-65.

Elsas Ralf and Jean Pieter Krahnen, 1998, Is Relationship Lending Special? Evidence from Credit-file Data in Germany, *Journal of Banking and Finance*, 22(10-11), 1283-1316.

Farinha, Luisa A. and Joao Santos, 2002, Switching from Single to Multiple Bank Lending Relationships: Determinants and Implications, *Journal of Financial Intermediation*, 11 (2), 124-51.

Gibson Michael S., 1995, Can Bank Health Affect Investment? Evidence from Japan, *Journal of Business* 68 (3): 281-308.

Greenabum, Stuart I., George Kanaats and Venezia Ithbak, 1989, Equilibrium Loan Pricing under the Bank-Client Relationship, *Journal of Banking and Finance* 13 (2): 221-35.

Hoshi, Takeo and Anil K. Kashyap, 2001, Corporate Financing and Governance in Japan, the MIT Press.

[59]

Hoshi, Takeo, Anil K. Kashyap and David Scharfstein, 1991, Corporate Structure, Liquidity and Investment: Evidence from Japanese Industrial Groups, *Quarterly Journal of Economics* 106 (1): 33-60.

Hubbard, Glenn G., Kenneth N. Kuttner and Darius N. Palia, 2002, Are There Bank Effects in Borrowers' Costs of Funds? Evidence from a Matched Sample of Borrowers and Banks, *Journal of Business* 75 (4): 559-81.

Inders, Roman and Holger M. Mueller 2007, A Lender-Based Theory of Collateral, forthcoming in the *Journal of Financial Economics*.

Ito, Takatoshi and Yuri Nagataki Sasaki, 2002, Impacts of the Basel Capital Accord on Japanese Banks' Behavior, *Journal of the Japanese and International Economies* 16 (3): 372-397.

Kano, Masaji, Hirofumi Uchida, Gregory F. Udell and Wako Watanabe, 2006, Information Verifiability, Bank Organization, and Bank Competition: The Benefit of Bank-Borrower Relationships in Japan, RIETI Discussion Paper 06-E-003.

Kashyap, Anil K. and Jeremy C. Stein, 2000, What Do a Million Banks Have to Say about the Transmission of Monetary Policy? *American Economic Review* 90 (3): 407-428.

Degryse, Hans and Steven Ongena, 2005, Distance, Lending Relationships, and Competition, *Journal of Finance* 60 (1): 231-66.

Peek, Joe and Eric S. Rosengren, 1995, Bank Regulatory Agreements in New England, *New England Economic Review* May/June, Federal Reserve Bank of Boston

Petersen, Mitchell A. and Raghuram G. Rajan, 1994, The Benefits of Lending Relationships: Evidence from Small Business Data, *Journal of Finance*, 49 (1), 3-37.

Petersen, Mitchell A. and Raghuram G. Rajan, 2002, Does Distance Still Matter? The Information Revolution in Small Business Lending, *Journal of Finance*, 57 (6), 2533-69.

Pozzolo Alberto F., 2004, The Role of Guarantees in Bank Lending. mimeo.

Rajan, Raghram G., 1992, Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt, *Journal of Finance*, 47 (4): 1367-1400.

Sharpe, Steven A., 1990, Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships, *Journal of Financ*e, 45 (4): 1069-87.

Staiger, Douglas and James H. Stock, 1997, Instrumental Variables Regression with Weak Instruments, *Econometrica*, 65 (3), 557-86.

Speigel, Mark and Nobuyoshi Yamori, 2006, Determinants of Voluntary Bank Disclosure: Evidence from Japanese Shinkin Banks, in Michael M. Hutchison and Frank Westermann, ed.: *Japan's Great Stagnation* (The MIT Press).

Strahan, Phillip E. 1999, Borrower Risk and the Price and Nonprice Terms of Bank Loans, Federal Reserve Bank of New York, staff report.

Uchida, Hirofumi, Greg F. Udell and Wako Watanabe 2006 a, Are Trade Creditors Relationship Lenders? RIETI Discussion Paper 06-E-026.

Uchida, Hirofumi, Greg F. Udell and Wako Watanabe 2006 b, Bank Size and Lending Relationships in Japan mimeo, presented in 20th Annual TRIO Conference on Organizational Innovation and Firm Performance supported by NBER-CEPR-TCER, and Hitotsubashi Unviersity.

Van den Heuvel, Skander, 2002, The Bank Capital Channel of Monetary Policy, mimeo, the Wharton School, University of Pennsylvania.

Weinstein, David E. and Yishay Yafeh, 1998, On the Costs of a Bank-Centered Financial System: Evidence from Changing Main Bank Relations in Japan., Journal of Finance, 53 (2), 635-72.

Table I. Description of Endogenous and Exogenous Variables

Variables	Description
Non-price terms	
C	A dummy variable that is set to unity if a firm's loans from its main bank are (partially) collateralized by physical assets or by personal securities
G	A dummy variable that is set to unity if a firm's loans from its main bank are (partially) guaranteed by Credit Guarantee Corporations
RELAT	
LENGTH	The length of the main bank relationship
INFO	
DOC	The frequency of a firm's reporting to its main bank (annual)
DOC_WILL	The dummy variable that is set to unity if the firm reports to its main bank by the firm's voluntary will rather than at its request.
DOCWILL	The interaction term between DOC and DOC_BANK
FAGE	Firm age
BOARD	The number of board members
OWNER	The dummy variable that is set to unity if the firm is owner-managed
BANK	
BCAR	The book capital to asset ratio
BBISCLASS	A dummy variable that is set to unity if the bank's regulatory status is "international"
BNPL	The ratio of non-performing loans to total asset
BLOSS	The ratio of loan loss provisions to total asset
BLIQUID	The ratio of liquid assets to total asset
LNBTASSET	A logarithm of total asset
RISK	
SCORE	The credit score of 0 to 100 (a firm with a score of 100 is the safest)
FIRM	
CAPITAL	A firm's book capital to asset ratio
LNTASSET	the logarithm of total assets
CURRENT	The ratio of current assets to current liabilities
LNSHORT	the logarithm of short borrowing
LNSHORT_MAIN	the logarithm of the estimated short-term loans from a firm's main bank
AGE	age of the firm's representative
HOUSE	A dummy variable that is set to unity if the firm's representative owns residential housing
EDUC	A dummy variable that is set to unity if the educational attainment of the firm's representative is college or more advanced
Instrumental variables	
ESTATE	The share of immovables in the total assets
MOVAB+E	The share of movables in the total assets
GELIGIBLE	A dummy variable that is set to unity if a firm qualifies to apply for credit guarantees from Credit Guarantee Corporations

Table II. Definitions of SMEs
The Eligibility toApplying fopr Credit Guarantees from Credit Guarantee Corporations

Industry	Equity is no more than	or	The number of employees is no more than
Manufacturing, construction and transportation	300 million yen		300
Wholesale	100 million yen		100
Retail	50 million yen		50
Service	500 million yen		100
Mining	300 million yen		300
Manufacturers of rubber products	300 million yen		900
Lodging	50 million yen		200
Software and information processing service	300 million yen		300

Note: 1 dollar is equal to 122.48 yen as of October 31, 2002 and 1 dollar is equal to 108.99 yen as of October 31, 2003.

Table III. Descriptive Statistics

Variable names	Mean	Std. Dev.	Min	Max
Short rate	2.05	0.873	0.00	8.90
Non-price terms				
C	0.918			
G	0.505			
BANK				
BCAPR	0.0370	0.0131	0.0011	0.0998
BBISCLASS	0.358			
BNPL	0.0516	0.0199	0.0122	0.1505
BLOSS	-0.0171	0.0069	-0.0463	-0.0033
BLIQUID	0.305	0.067	0.140	0.622
BTASSET (100 million yen)	273,136	402,790	630	1,409,860
LARGE	0.294			
REGIONAL	0.518			
REGIONAL 2	0.095			
SHINKIN	0.088			
RELAT				
LENGTH	35.6	14.6	2	91
INFO				
DOC	4.3	4.2	1	12
DOC_WILL	0.618			
FAGE	51.3	26.1	7	379
BOARD	4.8	2.6	1	18
OWNER	0.385			
RISK				
SCORE	57.2	6.5	25	80
FIRM				
CAPITAL	0.252	0.228	-1.900	0.925
TASSET (million yen)	3,993	7,055	49	74,935
CURRENT	1.451	1.221	0.078	28.119
SHORT (million yen)	968	2,756	0	46,772
SALES (million yen)	3,992	6,231	63	56,990
AGE	60.0	9.4	31	91
HOUSE	0.941			
EDUC	0.648			
Instrumental variables				
ESTATE	0.242	0.171	0	0.912
NONESTATE	0.070	0.117	0	0.788
GELIGIBLE	0.945			

Table III. Continued

Variable names	Mean	Std. Dev.	Min	Max
Industry dummies				
Manufacturing	0.417			
Construction	0.191			
Information	0.005			
Transportation	0.028			
Wholesale	0.171			
Retail	0.055			
Real estate	0.022			
Services/restaurants	0.070			
Other	0.043			
Employees	82.7 50	86.3	1	495
N	1664			

Note
1. 1 yen is equal to 122.48 dollars as of October 31, 2002 and 1 yen is equal to 108.99 yen as of October 31, 2003.
2. The bottom value in the mean cell for “employees” is the median.
3. For definitions of variables, see Table I

Table IV. Panel A. The Results of the First Stage for Collateralization
(Continue to the next page)

	Without interaction terms	With interaction terms
RELAT		
LENGTH	0.0021***	0.0019***
	(0.0005)	(0.0005)
INFO		
DOCWILL	0.0018	0.0016
	(0.0011)	(0.0011)
BOARD	0.0035	0.0028
	(0.0033)	(0.0034)
OWNER	0.019*	0.018
	(0.011)	(0.011)
FAGE	0.0006***	0.0006***
	(0.0002)	(0.0002)
BANK		
BCAPR	0.282	0.470
	(0.557)	(0.565)
BBISCLASS	-0.025	-0.033
	(0.019)	(0.019)
BNPL	-0.676	-0.703
	(0.517)	(0.524)
BLOSS	-0.920	-0.884
	(1.111)	(1.125)
BLIQUID	0.066	0.094
	(0.136)	(0.136)
LNBTASSET	0.0217**	0.0232**
	(0.0106)	(0.0105)
REGIONAL	0.036	0.034
	(0.035)	(0.035)
REGIONAL2	0.032	0.027
	(0.048)	(0.049)
SHINKIN	0.078	0.072
	(0.055)	(0.056)

Table IV. Panel A. Continued

	Without interaction terms	With interaction terms
RISK		
SCORE	-0.0020*	-0.0025**
	(0.0011)	(0.0012)
FIRM		
CAPITAL	-0.093***	-0.068
	(0.035)	(0.036)
LNTASSET	-0.0144*	-0.008
	(0.0160)	(0.016)
CURRENT	-0.0082	-0.0082
	(0.0046)	(0.0113)
HOUSE	0.055	0.058*
	(0.034)	(0.035)
AGE	-0.0022***	-0.0023***
	(0.0007)	(0.0006)
EDUC	-0.059***	0.065***
	(0.012)	(0.013)
LNSALES (the logarithm of sales)	-0.018	-0.019
	(0.016)	(0.016)
Instrumental variables		
ESTATE	0.233***	0.233**
	(0.035)	(0.087)
MOVABLE	-0.521***	-0.422***
	(0.081)	(0.086)
GELIGIBLE	0.077*	0.077*
	(0.043)	(0.043)

Table IV Panel A. Continued

	Without interaction terms	With interaction terms
Interaction terms with ESTATE		
Service		0.512***
		(0.125)
Other industry		0.649***
		(0.155)
Hokkaido		-0.199*
		(0.119)
Kita Kanto		-0.274*
		(0.151)
Chubu		-0.295***
		(0.101)
observations	1664	1664
R-squared	0.249	0.271
F statistic for excluded instruments (p value)	34.16 (0.000)	9.29 (0.000)

Note

1. *, ** and *** show that a coefficient is statistically significant at 10 %, 5% and 1% respectively.
2. Robust standard errors are in parentheses
3. Only coefficient estimates of interaction terms that are statistically significant at least at the 10 percent significance level are presented.
4. In addition, industry dummies and region dummies are included as control variables.
5. For definitions of variables, see Table I

Table IV. Panel B. The Results of the First Stage of Public Credit Guarantees
(Continue to the next page)

	Without interaction terms	With interaction terms
RELAT		
LENGTH	-0.0013	-0.0013
	(0.0009)	(0.0009)
INFO		
DOCWILL	0.0118***	0.0112***
	(0.0027)	(0.0027)
BOARD	-0.0050	-0.005
	(0.0047)	(0.005)
OWNER	0.0530**	0.0496**
	(0.0236)	(0.0240)
FAGE	0.0010**	0.0009**
	(0.004)	(0.0004)
BANK		
BCAPR	-1.880*	-1.856
	(1.106)	(1.123)
BBISCLASS	0.035	0.030
	(0.033)	(0.034)
BNPL	-1.397	-1.299
	(0.872)	(0.895)
BLOSS	-2.456	-2.110
	(2.141)	(2.158)
BLIQUID	-0.186	-0.147
	(0.236)	(0.240)
LNBTASSET	-0.005	-0.010
	(0.020)	(0.020)
REGIONAL	0.132**	0.114*
	(0.063)	(0.064)
REGIONAL2	0.098	-0.076
	(0.084)	(0.085)
SHINKIN	0.257**	0.228**
	(0.111)	(0.113)

Table IV. Panel B Continued

	Without interaction terms	With interaction terms
RISK		
SCORE	-0.0129***	-0.0137***
	(0.0022)	(0.0022)
FIRM		
CAPITAL	-0.392***	-0.369***
	(0.073)	(0.080)
LNTASSET	-0.053**	-0.049**
	(0.022)	(0.022)
HOUSE	0.024	0.034
	(0.049)	(0.050)
AGE	-0.0032***	-0.0032***
	(0.0012)	(0.0012)
EDUC	-0.075**	-0.071***
	(0.025)	(0.025)
LNSALES	-0.058**	-0.060***
(the logarithm of sales)	(0.024)	(0.024)
Instrumental variables		
ESTATE	0.041	-0.279
	(0.066)	(0.174)
MOVABLE	-0.244***	-0.252**
	(0.093)	(0.100)
GELIGIBLE	0.127***	0.108***
	(0.041)	(0.041)
Interaction terms with ESTATE		
Information		-1.055***
		(0.236)
Wholesale		0.700***
		(0.199)
observations	1664	1664
R-squared	0.326	0.338
F statistic for excluded instruments (p value)	5.63 (0.000)	5.95 (0.000)

Note

1. *, ** and *** show that a coefficient is statistically significant at 10 %, 5% and 1% respectively.
2. Robust standard errors are in parentheses
3. Only coefficient estimates of interaction terms that are statistically significant at least at the 10 percent significance level are presented.
4. In addition, industry dummies and region dummies are included as control variables.
5. For definitions of variables, see Table I

Table V. 2SLS Regression Results for the Lending Rate
(Continue to the next page)

	C, G endogenous	C endogenous	OLS
RELAT			
LENGTH	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)
INFO			
DOCWILL	0.008	0.011**	0.011**
	(0.006)	(0.004)	(0.004)
BOARD	-0.000	-0.001	-0.005
	(0.008)	(0.008)	(0.007)
OWNER	-0.004	0.030	0.002
	(0.041)	(0.039)	(0.035)
FAGE	0.002	0.002*	0.002**
	(0.001)	(0.001)	(0.001)
BANK			
BCAPR	0.943	0.214	1.313
	(2.192)	(1.938)	(1.873)
BBISCLASS	-0.037	-0.026	-0.020
	(0.050)	(0.050)	(0.048)
BNPL	3.573**	3.307**	3.151**
	(1.506)	(1.530)	(1.467)
BLOSS	1.736	1.359	0.705
	(3.692)	(3.648)	(3.625)
BLIQUID	0.007	-0.068	0.033
	(0.405)	(0.405)	(0.393)
LNBTASSET	-0.036	-0.041	-0.035
	(0.034)	(0.034)	(0.033)
REGIONAL	-0.027	-0.002	0.010
	(0.111)	(0.105)	(0.103)
REGIONAL2	0.042	0.068	0.052
	(0.154)	(0.152)	(0.150)
SHINKIN	0.198	0.252	0.279
	(0.189)	(0.175)	(0.173)

Table V Continued

	C, G endogenous	C endogenous	OLS
RISK			
SCORE	-0.019***	-0.021***	-0.026***
	(0.005)	(0.004)	(0.003)
FIRM			
CAPITAL	-0.600***	-0.668***	-0.733***
	(0.130)	(0.095)	(0.091)
LNTASSET	-0.224**	-0.278***	-0.0132***
	(0.104)	(0.075)	(0.020)
CURRENT	0.059*	-0.293***	0.0145
	(0.032)	(0.065)	(0.0104)
LNSHORT	0.094	0.120**	0.003
	(0.060)	(0.048)	(0.010)
HOUSE	0.124*	0.134**	0.095
	(0.064)	(0.063)	(0.060)
AGE	0.001	0.000	-0.000
	(0.002)	(0.002)	(0.002)
EDUC	-0.067	-0.080**	-0.083**
	(0.042)	(0.040)	(0.037)
Non-price terms			
C	0.260	0.356	0.226***
	(0.258)	(0.216)	(0.055)
G	0.553	0.299***	0.353***
	(0.348)	(0.048)	(0.035)
number of observations	1664	1664	1664
Hansen's J statistic	22.471	22.963	
(p value)	(0.167)	(0.192)	

Note

1. *, ** and *** show that a coefficient is statistically significant at 10 %, 5% and 1% respectively.
2. Robust standard errors are in parentheses.
3. In addition, industry dummies and region dummies are included as control variables.
4. For definitions of variables, see Table I

Table VI. Panel A. The Average Short Rate and Credit Score by Collateral Coverage (%)

	no collateral pledged	substantially less than loans outstanding	slightly less than loans outstanding	about the same as loans outstanding	slightly greater than loans outstanding	substantially greater than loans outstanding
average short rate	1.44	2.28	2.10	2.12	2.04	1.84
average credit score	60.6	55.4	56.1	58.2	57.5	59.4
frequency	9.35	18.05	23.85	21.87	12.91	13.97
number of observations	71	137	181	166	98	106

Table VI. Panel B. The Average Short Rate and Credit Score by CGC Coverage (%)

	no public credit guarantee	more than 0% but no more than 40%	more than 40% but no more than 60%	more than 60% but less than 100%	100%
average short rate	1.59	2.41	2.68	2.73	3.17
average credit score	59.5	55.0	53.8	52.6	52.2
frequency	47.22	39.73	5.68	5.80	1.57
number of observations	391	329	47	48	13

Table VII. 2SLS Regression Results for the Lending Rate
(Continue to the next page)

	Collateral value included	Smaller firms	Larger firms
RELAT			
LENGTH	-0.002	-0.003	0.003
	(0.003)	(0.003)	(0.002)
INFO			
DOCWILL	-0.001	-0.000	0.015**
	(0.006)	(0.007)	(0.007)
BOARD	-0.004	-0.015	0.010
	(0.011)	(0.012)	(0.009)
OWNER	-0.044	0.085	-0.117
	(0.061)	(0.060)	(0.058)
FAGE	-0.000	0.003	0.001
	(0.001)	(0.002)	(0.001)
BANK			
BCAPR	-0.945	3.879	2.608
	(3.740)	(2.748)	(2.961)
BBISCLASS	0.060	0.005	-0.109
	(0.071)	(0.079)	(0.068)
BNPL	4.482**	5.437***	1.030
	(2.069)	(2.249)	(1.814)
BLOSS	4.894	4.164	-0.098
	(5.052)	(5.533)	(4.655)
BLIQUID	0.069	0.734	-0.741
	(0.598)	(0.61)	(0.487)
LNBTASSET	-0.032	-0.015	-0.027
	(0.049)	(0.054)	(0.037)

Table VII Continued

	Collateral value included	Smaller firms	Larger firms
RISK			
SCORE	-0.019***	-0.026***	-0.015***
	(0.006)	(0.006)	(0.005)
FIRM			
CAPITAL	-0.867***	-0.514**	-0.815***
	(0.248)	(0.149	(0.179)
LNTASSET	-0.161	-0.119	-0.128
	(0.128)	(0.101	(0.088)
CURRENT	0.366	0.008	0.108**
	(0.364)	(0.277)	(0.050)
LNSHORT	0.044	0.025	0.014
	(0.0838)	(0.065	(0.057)
HOUSE	0.150	0.224	0.042
	(0.099)	(0.102	(0.036)
AGE	-0.001	0.004	-0.004
	(0.003)	(0.003)	(0.004)
EDUC	-0.060	-0.019	-0.125**
	(0.068)	(0.061)	(0.056)
Non-price terms			
C	0.120	0.078	0.005
	(0.510)	(0.306)	(0.222)
collateral value relative to the outstanding	0.300		
	(0.465)		
G	0.422	0.846***	0.593**
	(0.412)	(0.315)	(0.273)
observations	759	808	856
J statistic	13.906	22.311	37.006
	(0.606)	(0.133)	(0.003)

Note

1. *, ** and *** show that a coefficient is statistically significant at 10 %, 5% and 1% respectively.
2. Robust standard errors are in parentheses
3. In addition, industry dummies and region dummies are included as control variables.
4. For definitions of variables, see Table I

Table VIII. 2SLS Regression Results for the Lending Rate
(Continue to the next page)

	Model 1	Model 2	Model 3	Model 4
RELAT				
LENGTH		-0.022*	-0.004	-0.000
		(0.011)	(0.003)	(0.003)
LNLENGTH	-0.043			
	(0.046)			
DISTANCE	-0.043			-0.043*
	(0.046)			(0.023)
INFO				
DOCWILL	0.008	0.009	0.025**	0.011*
	(0.006)	(0.006)	(0.012)	(0.006)
BOARD	0.000	0.001	-0.029	-0.015
	(0.008)	(0.008)	(0.0110)	(0.0102)
OWNER	-0.037	-0.035	-0.029	-0.041
	(0.040)	(0.040)	(0.110)	(0.056)
FAGE	0.002	0.002	0.002*	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
LENGTH* DOCWILL			0.0004*	
			(0.0003)	
LENGTH* BOARD			0.0008*	
			(0.004)	
LENGTH* OWNER			-0.0002	
			(0.0003)	
BANK				
BCAPR	0.926	0.907	-0.710	2.664
	(2.189)	(2.189)	(2.117)	(3.348)
BBISCLASS	-0.038	-0.041	-0.040	-0.032
	(0.050)	(0.051)	(0.050)	(0.076)
BNPL	3.552**	3.606**	3.569**	4.390**
	(1.505)	(1.508)	(1.504)	(2.099)
BLOSS	1.699	1.620	1.781	4.276
	(3.693)	(3.698)	(3.739)	(4.864)
BLIQUID	0.064	0.090	-0.051	-0.102
	(0.405)	(0.405)	(0.406)	(0.576)
LNBTASSET	-0.037	-0.034	-0.040	-0.013
	(0.035)	(0.034)	(0.034)	(0.051)

Table VIII Continued

	Model 1	Model 2	Model 3	Model 4
RISK				
SCORE	-0.018***	-0.032***	-0.019**	-0.015***
	(0.005)	(0.008)	(0.005)	(0.006)
LENGTH* SCORE		-0.0004*		
		(0.0002)		
FIRM				
CAPITAL	-0.604***	-0.589***	-0.582**	-0.437**
	(0.130)	(0.134)	(0.130)	(0.186)
LNTASSET	-0.226**	-0.222**	-0.241**	-0.146**
	(0.098)	(0.098)	(0.095)	(0.100)
LNSHORT	0.095	0.094	0.106*	0.038
	(0.059)	(0.060)	(0.059)	(0.059)
LNSHORT_MAIN				
HOUSE	0.127**	0.133**	-0.133	-0.147
	(0.064)	(0.064)	(0.064)	(0.095)
AGE	0.000	0.000	-0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)
EDUC	-0.068	-0.068	-0.068	-0.033
	(0.042)	(0.042)	(0.042)	(0.064)
Non-price terms				
C	0.252	0.226	0.226	-0.005
	(0.249)	(0.262)	(0.262)	(0.331)
G	0.550	0.564	0.564	0.776**
	(0.342)	(0.343)	(0.354)	(0.390)
observations	1664	1664	1664	832
J statistic	22.455	22.558	20.792	17.898
	(0.168)	(0.164)	(0.236)	(0.808)

Note

1. *, ** and *** show that a coefficient is statistically significant at 10 %, 5% and 1% respectively.
2. Robust standard errors are in parentheses
3. In addition, industry dummies and region dummies are included as control variables.
4. For definitions of variables, see Table I

Table XI. 2SLS Regression Results for the Lending Rate
(Continued to the next page)

	Model 1 (Baseline)	Model 2	Instruments exclude interaction terms
RELAT			
LENGTH	-0.002	-0.003	-0.003
	(0.002)	(0.003)	(0.003)
INFO			
DOCWILL	0.008	0.002	0.013
	(0.006)	(0.009)	(0.011)
BOARD	-0.000	0.002	0.003
	(0.008)	(0.011)	(0.009)
OWNER	-0.004	-0.008	-0.002
	(0.041)	(0.054)	(0.056)
FAGE	0.002	0.003*	0.003*
	(0.001)	(0.002)	(0.001)
BANK			
BCAPR	0.943	3.453	-0.192
	(2.192)	(2.944)	(3.237)
BBISCLASS	-0.037	-0.078	0.007
	(0.050)	(0.067)	(0.0783)
BNPL	3.573**	4.536*	4.084**
	(1.506)	(2.422)	(1.714)
BLOSS	1.736	-0.122	1.644
	(3.692)	(6.365)	(4.002)
BLIQUID	0.007	0.117	0.163
	(0.405)	(0.592)	(0.443)
LNBTASSET	-0.036	-0.041	-0.042
	(0.034)	(0.050)	(0.042)

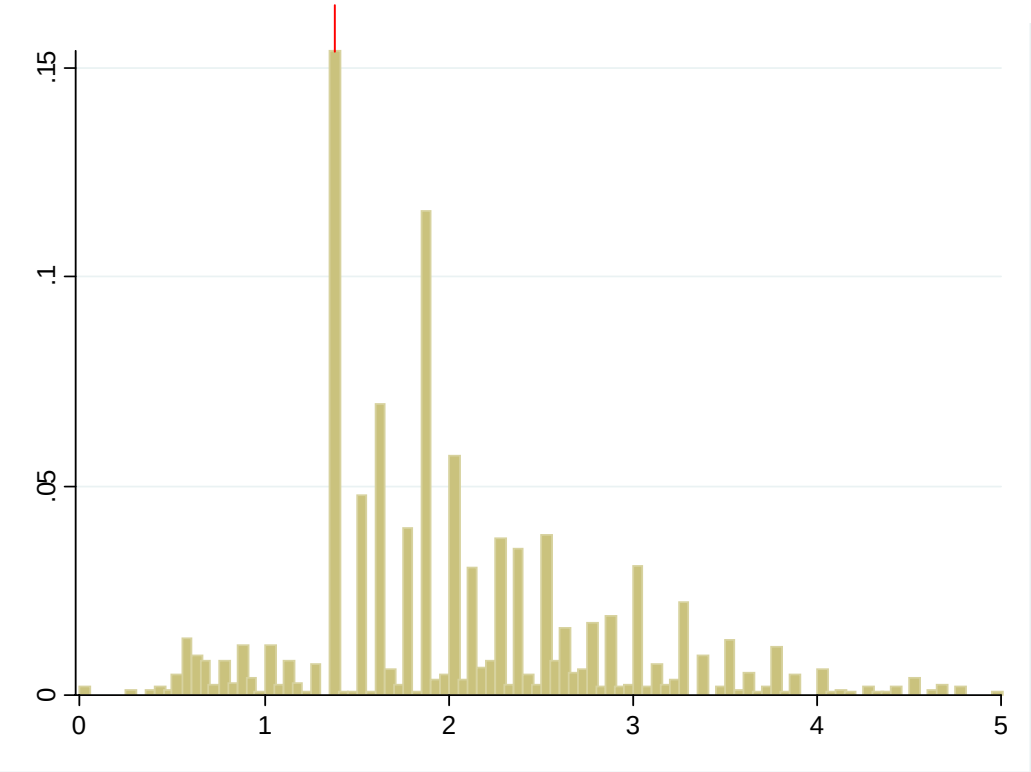
Table XI Continued

	Model 1 (Baseline)	Model 2	Instruments exclude interaction terms
RISK			
SCORE	-0.019***	-0.024***	-0.023**
	(0.005)	(0.007)	(0.011)
FIRM			
CAPITAL	-0.600***	-0.665***	-0.729**
	(0.130)	(0.163)	(0.308)
LNTASSET	-0.224**	-0.199	-0.289*
	(0.104)	(0.124)	(0.149)
CURRENT	0.059*	0.065	0.021*
	(0.032)	(0.049)	(0.148)
LNSHORT	0.094		0.000
	(0.064)		(0.000)
LNSHORT_MAIN		0.085	
		(0.084)	
HOUSE	0.124*	0.115	-0.017
	(0.064)	(0.097)	(0.093)
AGE	0.001	0.000	-0.001
	(0.002)	(0.003)	(0.003)
EDUC	-0.067	-0.096**	-0.062
	(0.042)	(0.057)	(0.057)
Non-price terms			
C	0.260	0.172	0.916
	(0.258)	(0.327)	(0.833)
G	0.553	0.571	0.052
	(0.348)	(0.467)	(0.998
observations	1664	832	1664
J statistic	22.471	15.101	0.000
	(0.167)	(0.588)	(0.999

Note

1. *, ** and *** show that a coefficient is statistically significant at 10 %, 5% and 1% respectively.
2. Robust standard errors are in parentheses
3. In addition, industry dummies and region dummies are included as control variables.
4. For definitions of variables, see Table I

Figure 1. The Distribution of the Short Rate (2002, 2003)



Note
1. The horizontal axis represents the short rate.
2. The vertical axis represents the frequency.
3. The red vertical line indicates the short-term prime rate at 1.375 percent.