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Distant lending for regional small businesses using public credit guarantee schemes: Evidence from Japan*

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Abstract

In this paper, we investigate to what extent banks use public credit guaranteed loans for distant small business borrowers. Existing studies argue that when banks provide loans for these borrowers, the information asymmetry between them is severe. These studies then empirically show how banks can mitigate this problem. In this analysis, we focus instead on the role of Japan's public credit guarantee scheme in mitigating these same information problems. If banks provide credit guaranteed loans, they suffer few losses from borrower default because the public credit guarantee corporations (not the small business borrowers) make payments to the banks. Therefore, banks can provide loans to distant borrowers even if the information asymmetry is severe. To conduct our analysis, we use semiannual bank-region level data from Japan, which allows us to control for several unobserved fixed effects. The results show that the credit guarantee loan size is larger if banks provide loans to distant small business borrowers. In addition, the default rate is higher when banks provide credit guaranteed loans to distant borrowers. These results suggest that banks successfully mitigate the losses of distant lending using the public credit guarantee scheme.

Keywords: distant lending, public credit guarantees, small businesses, bank loans, bank competition

JEL classification: G21; G28; M21

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1 Introduction

This paper investigates empirically how banks offer credit to distant small business borrowers. A critical issue concerning this practice is how banks mitigate the problems associated with the asymmetric information about the creditworthiness of distant small business borrowers. To investigate this issue, we focus on the role of public credit guarantee schemes. In general, small business borrowers are informationally opaque. Therefore, when banks offer credit to these borrowers, asymmetric information about their creditworthiness is severe for banks (Berger and Udell, 1998), which then causes problems with adverse selection and moral hazard. Therefore, many existing studies have investigated how banks mitigate this asymmetric information when lending to small business borrowers. For example, Petersen and Rajan (1994) show that long-term lending relationships (or relationship lending) between banks and small business borrowers enhance credit availability. Several other studies, (for example, Berger et al., 2005) argue that the soft qualitative information obtained through relationship lending is important for monitoring small business borrowers. Therefore, banks establishing lending relationships have a competitive advantage over other banks.

The relationship lending literature suggests that the physical distance between banks and small businesses is a key factor in creating these lending relationships. However, only frequent and continuous interaction over time creates relationship lending; thus, this process is costly for banks located far from their potential borrowers (see, for example, Degryse and Ongena, 2005; Agarwal and Hauswald, 2010; Bellucci et al., 2013; Nguyen, 2019). This literature implies that entry into local credit markets is difficult for banks outside these markets. Therefore, greater distance can be a barrier to entry for local credit markets. However, as Kroszner and Strahan (1999) and Petersen and Rajan (2002) argue, the distance between banks and small business borrowers is increasing because information technology innovations enhance the banks' monitoring ability, even in small business lending. Many empirical studies investigate the reasons why banks offer distant

lending for small businesses. For example, DeYoung et al. (2008) argue that banks use credit scoring loans for more distant small businesses, which is one of several transaction lending technologies. Banks can then use this hard information generated by credit scoring models to distinguish between borrowers; therefore, they can offer loans to borrowers, even if the lenders and borrowers are far apart. Elsewhere, Frankel and Jin (2015) show that securitization enhances interbank lending competition because banks can offset the risks of distant lending through securitization, while Di and Pattison (2020) focus on industry specialization to mitigate the information gap arising with distant borrowers. In particular, some lenders offer distant loans by targeting low-risk industries and thereby enjoy better loan performance. Lastly, Sengupta (2007) argues that foreign banks, which are usually distant lenders, make greater use of collateral as a screening device to mitigate the information asymmetry.

In this study, we investigate how banks located outside local credit markets mitigate information asymmetry using data from Japan. In other words, we consider how they successfully offer loans to distant small business borrowers. As Ishikawa and Tsutsui (2013) argue, the Japanese local credit market is segmented by prefecture (or narrow regional area).[1] Therefore, distant lending is difficult for banks outside local credit markets. However, some banks in other prefectures have recently begun to offer loans to small businesses in the home prefecture. According to the Nihon Keizai Shimbun (Nikkei) on June 13, 2018,[2] the ratio of loans to firms in other prefectures is increasing, being 35% as of March 2018. The key motivation for these loans to firms in other prefectures is the low profitability of regional banks. Using this evidence as a starting point, our research question is how Japanese banks successfully mitigate the information asymmetry between banks and distant small businesses. To investigate this, we focus on the use of a public credit guarantee for regional banks.

[1] Uchino (2014) also supports the existence of geographical market segmentation by estimating the bank deposit interest rate.

[2] See the Nikkei website: https://www.nikkei.com/article/DGKKZO31718500T10C18A6EE9000/ (in Japanese) (last accessed: October 2021).

The public credit guarantee scheme in Japan is a program that enhances the credit supply of small businesses. If credit guaranteed loans by banks are in default, public credit guarantee corporations (CGCs) owned by the local government make payments to the banks, instead of to small business borrowers. In case of default, the CGCs collect their outstanding debt from the small business borrowers. Using this scheme, banks can offer loans to small businesses, even if the information gap is very severe or the small businesses very risky. Empirically, many previous studies show that the credit guarantee scheme indeed enhances credit availability for small businesses because it also increases the credit supply by mitigating the information problem (see, for example, Riding and Haines Jr., 2001; Riding et al., 2007; Cowling, 2010; Zecchini and Ventura, 2009; Uesugi et al., 2010; Cowan et al., 2015; Martin-Garcia and Santor, 2021). Some recent studies examine the default rates of credit guarantee schemes. For example, Patel (2021) shows that the default rates of credit guarantee schemes increase with interbank competition. Elsewhere, Caselli et al. (2021) investigate the empirical relationships between default rates and the type of financial intermediary.

Because the information gap is severe and the probability of debt repayment problems is high for banks, banks located outside local markets often offer loans to small businesses using the public credit guarantee scheme. For this reason, we predict that banks located outside the local credit market use a larger size of credit guaranteed loans than banks inside the local market. As argued, banks located outside the market have an information disadvantage. In addition, banks will not readily take on risk, even if banks offer guaranteed loans to risky firms. Therefore, we predict that banks located outside the local market offer guaranteed loans to more risky small businesses.[3]

To investigate this issue, we use unique data on public credit guarantees in Japan. Following a reform of Japan's credit guarantee program for small- and medium-sized

[3]Not only the benefit of using the public credit guarantee scheme but also the cost of the scheme is significant. When banks offer credit guaranteed loans to small business borrowers, the borrowers must pay a credit guarantee fee to the CGCs in addition to the usual interest payments to the banks. Therefore, these banks will have a price disadvantage over those banks located inside local credit markets.

enterprises (SMEs) in 2018, the Small and Medium Enterprise Agency began to publish semiannual bank–region-level data on the use of the credit guarantee and loan default. In general, the use of the credit guarantee and loan default will depend on the demand for credit guarantees by banks, the supply of credit guarantees by the CGCs, and the business conditions in each region and over time. Using this data set, we can control for the fixed effects of banks, regions (prefectures), and time (as half years). Furthermore, we can control for bank×half-year and region×half-year fixed effects because multiple observations by bank and region in each half year are available. By controlling for region, bank, and half-year fixed effects, we can extract the credit guarantee loans and defaults that solely depend on the distance from the bank's head office. Consequently, we can compare the use of credit guarantee loans for incumbent local and distant lenders after controlling for the unobserved fixed effects of banks, region, half year, banks×half year, and region×half year. If banks indeed use credit guarantees more for distant lending as we suggest, the size of credit guaranteed loans will be larger for distant lending after controlling for the bank, region, and half-year fixed effects. Furthermore, the default rate will be higher for the distant lending as banks attempt to mitigate the information gap.

Using bank–region-level data, we obtain the following results. First, larger banks and banks specialized in small business lending are more likely to enter other local credit markets using credit guaranteed loans. Monopolistic banks also offer more guaranteed loans to small businesses located outside their incumbent market. In addition, banks offer more credit guaranteed loans to distant small businesses if business conditions and firm profitability in regions where the small businesses are located are more favorable. Second, banks located in outside markets offer larger credit guaranteed loans for small businesses after controlling for bank, region, bank×half year, region×half year, and half-year fixed effects. This suggests that banks located in outside markets attempt to mitigate information asymmetry using credit guaranteed loans. Finally, the share of defaulting firms is higher for credit guaranteed loans to small businesses outside the local market

of banks after controlling for bank, region, bank×half year, and half-year fixed effects. This finding is consistent with that of previous studies that the default rates for distant lending are high.

The remainder of the paper is organized as follows. Section 2 reviews the related literature and Section 3 describes the data set. Section 4 presents the estimation results for the determinants of distant lending and Section 5 introduces our empirical strategy for estimating the effects of distant lending on credit guarantees and discusses the results. Section 6 concludes the paper.

2 Literature Review

Many previous studies show that the physical distance between banks as lenders and borrowers impedes credit availability because they are unable to establish close lending relationships. For example, Nguyen (2019) argues that a longer distance between lenders and borrowers caused by bank branch closures decreases local small business lending. Degryse and Ongena (2005) and Bellucci et al. (2013) show that interest rates are higher if the bank–borrower distance is large, which implies that banks at a greater distance have a disadvantage.[4] Agarwal and Hauswald (2010) show that credit availability for distant borrowers is lower than for nearby firms. Dell'Ariccia and Marquez (2004) argue that foreign banks face particularly severe information asymmetry because the distance to the borrowers is especially large; therefore, they lend to transparent firms using transaction-based lending technology. Milani (2014) shows that because banks face difficulty collecting information on borrowers, the credit quality of distant loans is poorer. In addition, the collection of hard information helps mitigate the adverse effects of the distance between borrowers and banks.

As Petersen and Rajan (2002) conclude, the distance between banks and borrowers

[4]Conversely, Agarwal and Hauswald (2010) show that firms near banks pay higher interest than more distant firms.

has become longer over time because of the development of information technology and DeYoung et al. (2011) argue that this development is the result of the adoption of credit scoring technologies by the lending banks. Therefore, the negative effects of distance on the credit availability of small businesses have become smaller. Granja et al. (2019) suggest that the distance between borrowers and banks is cyclical because more distant small business loans are riskier for banks. In Japan, Ono et al. (2016) focus on main bank mergers and argue that an increase in the distances between borrowers and main banks have positive effects on the probability of switching main bank relationships. Recently, Uesugi et al. (2021) investigate empirically the interregional flow of funds between prefectures using the bank branch-level data of Japan.

Other existing studies investigate how distant lenders enter the local credit market. Sengupta (2007) argues that banks use collateral as a screening device for borrowers to help overcome this disadvantage and DeYoung et al. (2008) show that banks use credit scoring loans to acquire hard information on distant borrowers. Frankel and Jin (2015) show that securitization can be an effective tool to mitigate the disadvantages of distant lending. Di and Pattison (2020) demonstrate that industry specialization also mitigates the disadvantages of distant small business lending. Our paper is related to this literature, which shows that banks offer more credit guaranteed loans for risky distant small business borrowers, an issue not addressed by previous studies.

Many extant studies also investigate the relationship between credit guarantee schemes and credit availability. For example, using data from Canada, Riding and Haines Jr. (2001) and Riding et al. (2007) show that credit guarantee schemes enhance the credit availability of loans for small businesses. Similar results are obtained for many countries, including Italy (Zecchini and Ventura, 2009), Japan (Uesugi et al., 2010; Ono et al., 2013), Korea (Kang and Heshmati, 2008; Oh et al., 2009), Spain (Martin-Garcia and Santor, 2021), the United Kingdom (Cowling, 2010), and the United States (Hancock and Wilcox, 2007). Tang and Uchida (2020) demonstrate significant differences in the

banks' use of credit guarantees. Wilcox and Yasuda (2019) show that guaranteed loans are complements to nonguaranteed loans using Japanese bank-level data. Our paper investigates the banks' use of credit guaranteed loans for distant lending, which relates to the literature on public credit guarantees for small businesses.

Recent studies also discuss the determinants of default with credit guarantee schemes. For example, Saito and Tsuruta (2018) reveal that banks offered credit guaranteed loans for risky small business borrowers during the global financial crisis. Patel (2021) investigate the degree of competition between banks and the default rate of credit guarantees, which shows that the default rate of credit guarantee schemes increases alongside interbank competition. Caselli et al. (2021) show that default rates for guaranteed loans are higher when banks (not mutual guarantee institutions) are involved in the credit guarantee process. Our paper reveals the effects of distant lending on the default rates of credit guarantee schemes, which is a new finding in this literature.

3 Data

To investigate the empirical relationships between the use of credit guarantees and distant lending, we use semiannual region–bank-level data. The sample period is fiscal year (FY) 2018 and FY 2019.[5] We focus on city and regional banks (*toshi ginko, chiho ginko, dainichiho ginko* in Japanese). In this paper, we use two types of semiannual data from financial institutions. First, we obtain data on credit guaranteed loans and loan defaults for each bank across 51 regions (47 prefectures and 4 cities) from the Small Business Agency's website.[6] Second, we obtain the financial statement data of financial institutions from the *Financial Statements of All Banks*,[7] and *Nikkei Financial Quest* at the end of every half FY. We construct the following databases. The first set of data (data1) comprises

[5]In Japan, the FY starts in April and ends in March.

[6]See the Small and Medium Enterprise Agency's website for details: https://www.chusho.meti.go.jp/kinyu/shikinguri/hosho/jisseki.htm

[7]See the Japanese Bankers Association's website: https://www.zenginkyo.or.jp/en/stats/year2-01/

observations for regions where the amount of credit guarantees is zero or positive. This set holds data for regions where banks have entered and regions where banks have not entered using the credit guarantee. To investigate the types of banks that offer distant lending, we exclude regions where a bank's head office is located. The second set of data (data2) comprises observations excluding regions where the amount of credit guarantees is zero. This set contains only data for regions where banks have entered using the credit guarantee. To compare the use of credit guarantees between regions where a bank's head office is located and where it is not, we include regions where a bank's head office is located.

4 Determinants of Distant Lending with a Public Credit Guarantee

4.1 Equation

We investigate what types of banks offer loans to small businesses located in distant regions using the public credit guarantee. We estimate the following equation:

$$y_{i,j,k,t} = \alpha_1 \mathbf{X}_{i,t-1} + \alpha_2 Distance_{j,k} + \kappa_j + \lambda_k + \nu_t + \tau_{j,t} + \mu_{i,j,k,t}, \quad (1)$$

where the natural logarithm of (1 + yen amount of credit guarantee acceptances) and the natural logarithm of (1 + number of credit guarantee acceptances) are the dependent variables ($y_{i,j,k,t}$) for bank i in region j during half year t located in region k; $\mathbf{X}_{i,t-1}$ is a vector of variables for bank i (bank size, capital asset ratio, nonperforming loans ratio, loan–deposit ratio, and SME loans ratio) in half year t–1; κ_j is the region fixed effects of region j; λ_k is the region fixed effects of bank i's head office (region k); ν_t is the half-year fixed effects of year t; $\tau_{j,t}$ is region×half-year fixed effects; and $\mu_{i,j,k,t}$ is the error

term of bank i in region j during half year t located in region k, with t ranging from first half of FY2018 to second half of FY2019. We use data1, which holds data for both regions where banks have entered and regions where banks have not entered using the credit guarantee. To investigate the determinants of lending to distant regions, we omit regions where bank i's head office is located, which means that observations are excluded if j equals k. The data contain 19,080 bank–half year–region observations in our entire sample, comprising 97 banks over four periods. Because semiannual financial statement data for some financial institutions are not available from *Nikkei Financial Quest*, we do not include the observations for those banks.

Distance is defined as the number of kilometers between the prefecture capitals of bank i's head office (region k) and region j.[8] Bank size is the natural logarithm of a bank's total assets in the previous half year (t–1). We use the capital asset ratio defined under Basel regulations in the previous half year (t–1). The nonperforming loans ratio is normalized by the bank's total loans in the previous half year (t–1). Loan–deposit ratio is the ratio of total loans to total deposits in the previous half year (t–1). SME loans ratio is the ratio of loans to SMEs to total loans in the previous half year (t–1).

In addition to Equation (1), we estimate the following regression to investigate the effects of competition and business conditions in regions i and k:

$$\begin{aligned} y_{i,j,k,t} &= \alpha_1 \mathbf{X}_{i,t-1} + \alpha_2 Distance_{j,k} + \alpha_3 HHI_{j,t} + \alpha_4 HHI_{k,t} \\ &+ \alpha_5 \Delta Land\ Price_{j,t} + \alpha_6 \Delta Land\ Price_{k,t} + \nu_t + \mu_{i,j,k,t}, \end{aligned} \tag{2}$$

where $y_{i,j,k,t}$ is for bank i in region j during half year t located in region k and $\mu_{i,j,k,t}$ is the error term of bank i in region j during half year t located in region k. HHI is the Herfindahl–Hirschman Index calculated using data on credit guaranteed loans for each

[8] We obtain data on distance from the website of the Geospatial Information Authority of Japan: https://www.gsi.go.jp/KOKUJYOHO/kenchokan.html

bank from the Small Business Agency's website, as introduced in Section 3. $\Delta LandPrice$ is the annual rate of change of the land price for each prefecture, obtained from *Land Price Research by Prefectural Governments*.[9] We omit the regional fixed effects for regions j and k because these are highly correlated with HHI and $\Delta LandPrice$.

HHI is a proxy for the degree of competition in each region. A higher HHI indicates that the lending market for small businesses is more competitive. $\Delta LandPrice$ is a proxy for business conditions in each region. A higher $\Delta LandPrice$ signifies that business conditions are more favorable and that credit demand by small businesses should also be higher.

We also estimate the following regression to investigate the effects of financial conditions of borrowers in regions i and k:

$$\begin{aligned} y_{i,j,k,t} &= \alpha_1 \mathbf{X}_{i,t-1} + \alpha_2 Distance_{j,k} + \alpha_7 Firm\ Liquidity_{j,t} + \alpha_8 Firm\ Liquidity_{k,t} \\ &+ \alpha_9 Firm\ ROA_{j,t} + \alpha_{10} Firm\ ROA_{k,t} \\ &+ \alpha_{11} Firm\ Leverage_{j,t} + \alpha_{12} Firm\ Leverage_{k,t} + \nu_t + \mu_{i,j,k,t}, \end{aligned} \tag{3}$$

where $y_{i,j,k,t}$ is for bank i in region j during half year t located in region k and $\mu_{i,j,k,t}$ is the error term of bank i in region j during half year t located in region k. We obtain the financial conditions of borrowers in regions k and j from *Basic Survey of Japanese Business Structure and Activities*, conducted by the Ministry of Economy, Trade and Industry.[10] This survey covers firms with 50 or more workers and 30 million yen or more of capital stock. These data investigate business activities in Japan each year, which includes the financial condition of firms. We use the aggregate values for firms' financial

[9] See the website of the Ministry of Land, Infrastructure, Transport and Tourism: https://www.mlit.go.jp/totikensangyo/totikensangyo_fr4_000264.html (in Japanese, last accessed in January 2021).

[10] See https://www.meti.go.jp/english/statistics/tyo/kikatu/index.html (last accessed: May 2021) for a detailed explanation of this survey.

conditions for each year by prefecture. Firm liquidity is defined as the ratio of liquid assets to total assets at the end of the previous FY. Firm leverage is defined as the ratio of debt to total assets at the end of the previous FY. Firm ROA is defined as the ratio of operating income to total assets at the end of the previous FY. We use the same values for firm leverage, liquidity, and ROA if the year is the same. Like the previous equation, we omit the regional fixed effects for regions j and k because they are highly correlated with these prefecture-level variables.

4.2 Estimation results

Table 1 provides summary statistics for the variables used in the econometric analysis. Table 2 presents the correlation matrix for the independent variables. Table 3 details the estimation results for Equation (1). Columns (1)–(4) show the results where the number of credit guarantee acceptances is specified as the dependent variable. As shown, the estimated coefficient for distance is negative and statistically significant at the 1% level. This suggests that banks located at a greater distance from borrowers offer fewer credit guaranteed loans compared with the use of credit guarantees in a region nearer the bank's head office. These results are consistent with those from previous studies. Focusing on the variables representing the characteristics of banks, the estimated coefficients for bank size and SME loans ratio are statistically significant at the 1% level (column 1). The estimated effect of bank size is positive, suggesting that larger banks offer more credit guaranteed loans for distant borrowers. SME loans have positive effects; thus, banks that specialize in small business lending offer more credit guaranteed loans for distant borrowers.

Focusing on the distribution of distance, we can see that the maximum is 880.6 kilometers (km), the 95th percentile is 425.2 km, and the 75th percentile is 151.3 km. These figures suggest that banks are unable to offer loans to firms located at very long distances. To exclude observations at these long distances, we limit observations to situations where the distance is less than 1,000 km in column (2), 400 km in column (3), and 200 km

in column (4). The estimated coefficients for distance, bank size, and SME loans ratio remain statistically significant at the 1% level. The estimated coefficients for the loan–deposit ratio are positive and statistically significant at the 1% level in column (4). If the loan–deposit ratio is high, so is the lending ability of the banks. Therefore, they expand lending to regions outside their market. To do this, these banks offer loans to distant small firms using credit guarantees. The estimated coefficient for the nonperforming loans ratio is negative and statistically significant at either the 5% or 10% level, which suggests that banks with a high level of nonperforming loans do not expand lending to regions outside their market.

In columns (5)–(8), we specify the yen amount of credit guarantee acceptance for bank i in region j as the dependent variable. The estimation results are similar to those in columns (1)–(4) and indicate that large banks and banks specialized in small business loans offer distant loans for small businesses using public credit guarantees.

Table 4 provides the estimation results for HHI and ΔLand price in regions k and j. Region j is the region that bank i enters, and region k is where bank i is located. In all columns, the estimated coefficients for HHI in region k are positive and statistically significant at the 1% level. This implies that banks located in monopolistic markets offer more loans to distant small businesses. The estimated coefficients for HHI in region j are negative and statistically significant at the 5% level, as shown in columns (1), (2), (5), and (6). This partly suggests that banks tend to offer fewer loans to distant small businesses in monopolistic markets, but the effect is not robust. The estimated coefficients for ΔLand price in region k are positive, but these become negative or statistically insignificant if we limit the observations. However, the estimated coefficients for ΔLand price in region j are positive and statistically significant at the 1% level in all columns. This indicates that banks offer more loans to distant small businesses if the region is more economically active. Overall, the estimation results in Table 4 indicate that banks are more likely to enter other local credit markets using public credit guarantees if they enjoy a monopolistic position

in their market as the incumbent. Banks then offer loans to distant small businesses using the public credit guarantee in those regions where the economic conditions for borrowers are most favorable.

Table 5 shows the estimation results for Equation (3). The estimated coefficients for the firm liquidity of region k are positive and statistically significant at either the 1% or 5% level, apart from the results in columns (4) and (8). These suggest that banks offer more distant loans if firms in regions of their market have more liquid assets. In contrast, the estimated coefficients for firm liquidity of region j are negative and statistically significant at the 1% level. If firms have few liquid assets (including cash holdings), the credit demand for bank loans is high. Therefore, they offer more credit guaranteed loans to distant small businesses if the credit demand from firms in regions of their market is low and those outside their market are high.

The estimation results for firm ROA also differ between regions k and j. The estimated coefficients for firm ROA of region k are negative and statistically significant at the 1%, 5%, or 10% level. These results suggest that banks offer more credit guaranteed loans for distant small businesses if firms in their markets are more unprofitable. In contrast, the estimated coefficients for firm ROA of region j are positive and statistically significant at the 1% level, apart from columns (4) and (8). These results suggest that banks offer more credit guaranteed loans for distant small businesses if the distant small businesses are more profitable. In addition, these results imply that banks offer more loans for small businesses outside their markets because the firms in their market are unprofitable while those in other markets are profitable. The estimated coefficients for firm leverage in regions k and j are both positive and statistically significant at the 1% level, apart from columns (4) and (8). If the small businesses in their market are highly leveraged, banks offer more credit guaranteed loans to small businesses in other markets. In addition, if small businesses outside their markets are highly leveraged, they also offer them more credit guaranteed loans. In general, very small businesses are likely to be financially distressed (as argued by

Opler and Titman, 1994); thus, they offer more credit guaranteed loans to distant small businesses to offset any losses from default.

5 Public Guaranteed Loans and Loan Default for Distant Lending

5.1 Hypotheses

Because regional banks have few branches outside the prefecture where their head office is located, the information problem is especially severe for distant lending. To offer loans to distant small businesses, banks must mitigate any information problems. To do this, we predict that banks offer more credit guaranteed loans to distant small businesses than less distant borrowers at the same bank.

Hypothesis 1: The size of credit guaranteed loans for distant small businesses is larger than for less distant small businesses, after controlling for bank, region, and time fixed effects.

Banks have an information disadvantage in lending to distant small business borrowers. Therefore, if banks offer loans to these distant small businesses using the credit guarantee scheme, the problems of adverse selection and moral hazard should be more severe for distant borrowers. Adverse selection implies that risky borrowers borrow more loans using credit guarantees. In addition, banks face difficulty in monitoring distant borrowers following the acceptance of loans. If the moral hazard is severe, small business borrowers choose risky investment projects following the acceptance of guaranteed loans. Of note is that the coverage rates of credit guarantee programs in Japan are either 80% or 100%; therefore, banks make few losses if distant borrowers default. Hence, banks have little

incentive to prevent the default of credit guaranteed loans. Together, these problems account for the increase in the default rate of credit guaranteed loans.

Hypothesis 2: The default rate of credit guaranteed loans for distant small businesses is higher than for less distant small businesses, after controlling for bank, region, and time fixed effects.

5.2 Empirical strategy

To investigate the hypotheses in subsection 5.1, we estimate the following equation:

$$z_{i,j,k,t} = \beta_1 Outside_{j,k} + \rho_i + o_j + \pi_t + \xi_{i,t} + \upsilon_{j,t} + \sigma_{i.j,k,t}, \tag{4}$$

where credit guarantee loan size (= the natural logarithm of (yen amount of loans with credit guarantee/number of loans with credit guarantee)) and default rate (= number of defaulting loans with credit guarantee/number of loans with credit guarantee) are dependent variables ($z_{i,j,k,t}$) for bank i in region j in half year t located in region k; ρ_i are bank fixed effects;[11] $\emptyset_j$ are the regional fixed effects; π_t are the half-year fixed effects; $\xi_{i,t}$ are the bank×half-year fixed effects; $\upsilon_{j,t}$ are the region×half-year fixed effects; and $\sigma_{i.j,k,t}$ is the error term of bank i in region j in half year t located in region k. Credit guarantee loans are a proxy for the average amount of credit guarantees for small business borrowers for bank i in region j in half year t. The default rate is a proxy for the average default rate of bank i in region j in half year t. Outside are variables concerning distant lending. We use three proxies for outside. The first is the distance (in km) between the prefecture capitals of regions j and k (Distance). In other words, the distance between the regions

[11] Fixed effects for region k are omitted because bank fixed effects are perfectly correlated with the fixed effects of region k.

where the bank and its small business borrowers are located. The second is a dummy variable that takes a value of one if region k is not equal to region j, which means bank i's head office is not located in region j (No head office dummy). The third is the natural logarithm of (1 + number of branches) in region j of bank i located in region k (Branches). If the number of branches is small, this area is not the main market for this bank. In this case, we interpret that banks offer distant lending to borrowers in this area. We acquire data on the number of branches for each bank by prefecture from *Nihon Kinyuu Meikan* (The Japan Financial Directory), published by The Japan Financial News Co., Ltd. We use observations that offer credit guaranteed loans for region j (number of credit guarantees $_{i,j,t} > 0$), which comprise data only for regions where banks have entered using the credit guarantee (data2).

The use of credit guarantees and the incidence of loan defaults are affected by the demand for credit guarantees by banks, the supply of credit guarantees by the CGCs, and the business conditions at each time and for each region. For example, Tang and Uchida (2020) demonstrate that bank fixed effects have significant effects on the use of credit guarantees, while Cowling (1998) concludes that regional effects on credit guarantee use are also significant. However, we cannot control for unobserved effects using quantitative data for each bank and region. Therefore, unobserved omitted variable bias may be severe.

To mitigate the unobservable omitted variable bias, we control for several fixed effects, namely, the bank fixed effects (ρ_i), the bank×half-year fixed effects ($\xi_{i,t}$), the region fixed effects ($\varnothing_j$), the region×half-year fixed effects ($\upsilon_{j,t}$), and the half-year fixed effects (π_t). We can control for bank and bank×half-year fixed effects because we have multiple observations for bank i in each half year t. Similarly, we can control for the region and region×half-year fixed effects because we have multiple observations for region j in each half year t. These fixed effects enable the clear identification of the effects of borrower distance on bank credit guarantee use. Therefore, by estimating Equation (4), we can accurately extract the effects of distance, no head office dummy, and branches on credit

guarantees and defaults because these fixed effects are controlled using semiannual bank–region-level data. This identification strategy is like that in Khwaja and Mian (2008), which identifies the effect of a bank liquidity shock on borrowers by comparing the same firm borrowing from two different banks. By applying this notion, we compare the use of credit guarantees in the same region for two or more different banks and those in the same banks from two or more different regions.

If banks offer more credit guaranteed loans for distant small business borrowers using the public credit guarantee, the effects of distance and no head office dummy will be positive and those of branches will be negative for credit guarantee loans. Furthermore, if banks offer more risky small business borrowers using the public credit guarantee in distant regions, the effects of distance and no head office dummy will be positive and those of branches will be negative for credit guarantee loans. In our full sample, there are 1,488 bank–half year–region observations, comprising 108 banks and 51 regions over four half years.

To confirm robustness, we estimate the following regression:

$$z_{i,j,k,t} = \beta_1 Outside_{j,k} + \beta_2 \mathbf{X}_{i,t} + \nu_i + \xi_j + o_t + \pi_{i.j,k,t}, \tag{5}$$

where $\mathbf{X}_{i,t}$ is a vector of bank variables (bank size, capital asset ratio, nonperforming loans ratio, loan–deposit ratio, SME loans ratio, and prefecture dummies for the head office of banks) for bank i in half year t. We control bank×half-year fixed effects by bank characteristics using variables $\mathbf{X}_{i,t}$, instead of $\rho_{i,t}$. The definitions of $\mathbf{X}_{i,t}$ are identical to those for Equation (1).

5.3 Estimation results

Table 6 details summary statistics for the variables used in Equations (4) and (5). Table 7 is the correlation matrix for independent variables in Equations (4) and (5). Table 8

provides the estimation results for Equations (4) and (5) with credit guarantee as the dependent variable. Columns (1)–(6) provide the estimation results for Equation (4) and Columns (7)–(12) present those for Equation (5). In column (1), the estimated coefficient for distance is positive and statistically significant at the 1% level. This suggests that the credit guarantee loan size for distant small business borrowers is larger than that for less distant borrowers. Column (2) shows the estimation results using only observations for regional banks. The estimated coefficient for distance is positive and statistically significant at the 1% level.

In columns (3) and (4), we specify no head office dummy as the dependent variable. The estimated coefficients are positive and statistically significant at the 1% level. These results suggest that banks offer larger credit guaranteed loans for small businesses in regions where their head office is not located. Column (3) shows that banks increase by 4.79 percent of yen amount of loans with credit guarantee (normalized by the number of loans) if banks' head office is not located in the borrowers' region.

In columns (5) and (6), we use branches as a proxy for outside. The estimated coefficients are negative and statistically significant at the 1% level. This suggests that banks offer larger-sized credit guaranteed loans to regions with a small number of branches. In columns (7)–(12), we control for bank heterogeneity using variables reflecting each bank's financial condition, instead of bank× half-year fixed effects. The estimation results for the distance, head office dummy, and branches are similar to those using bank×half-year fixed effects.

Table 9 provides the estimation results using the default rate as the dependent variable. Like Table 8, we show the estimation results for Equation (4) in columns (1)–(6) and those for Equation (5) in columns (7)–(12). In column (1), the estimated coefficient for distance is positive and statistically significant at the 1% level. Column (2) shows that the coefficient is also positive and statistically significant at the 1% level when we limit observations to the subsample of regional banks. These results suggest that banks offer

loans to risky small business borrowers if the distance between a bank and its borrowers is large. Columns (3) and (4) supply the estimation results using the head office dummy as a proxy of outside. The estimated coefficients for the head office dummy are also positive and statistically significant at the 1% level. Column (3) shows that the default rate is 0.17 percent higher if banks' head office is not located in the borrowers' region. Table 6 shows that the mean default rate is 0.87 percent, so the magnitude is economically significant. In columns (5) and (6), we present the estimation results using branches as a proxy for outside. The estimated coefficients are negative and statistically significant at the 1% level. This suggests that the default rate is higher in regions with a smaller number of branches. If we use the financial conditions of banks to control for bank heterogeneity in (7)–(12), the estimation results are similar to those in columns (1)–(6).

6 Conclusion

In this paper, we empirically investigate whether banks offer credit guaranteed loans for distant borrowers using semiannual bank–region-level data from Japan. We also investigate whether the loan default rate for this distant lending is higher. The semiannual bank–region data we use allow us to control for several unobserved fixed effects, including bank, region, half year, bank×half-year, and region×half-year fixed effects. Therefore, we can more accurately reveal the effects of distance on the use of credit guaranteed loans by banks.

Our estimation results are as follows. First, if banks are larger and more specialized in SME loans, they offer more distant lending using credit guaranteed loans. In addition, banks offer more credit guaranteed loans to distant small businesses if banks are monopolistic and the business conditions of regions where the small businesses are located are more favorable. Second, credit guarantee loan size is larger if banks offer credit guaranteed loans for small businesses in a region outside the banks' head office region. Third, the default rate of credit guaranteed loans is higher if banks offer loans to distant borrow-

ers. From these estimation results, we argue that Japanese banks successfully mitigate the problems associated with information asymmetry in lending using the public credit guarantee scheme. In addition, they also offset the high risk of distant lending using this same scheme.

These estimation results suggest several interpretations. First, outside banks face high monitoring costs after accepting loans, which increases the probability of default of distant borrowers. Second, incumbent banks offer more loans to creditworthy borrowers, which provides some evidence of cherry-picking behavior. As a result, the default rates of outside banks for distant borrowers are high compared with those of incumbent banks. This is consistent with the notion that banks have an information disadvantage in lending to distant small business borrowers, compared with incumbent banks (as argued by Nemoto et al., 2016). In addition, incumbent banks have less incentive to offer loans to these borrowers even if the loans are credit guaranteed because they hope to maintain good relationships with CGCs in their region. Third, because the lending relationships between outside lenders and distant borrowers are weak, the banks do not offer more loans when the borrowers face financial distress. As argued by Berlin and Mester (1999) and Boot (2000), through intertemporal smoothing of loan interest rates, banks can offer credit to firms with lending relationships during periods of financial distress. If this effect is weak for distant borrowers, the default rates can be higher than those for less distant borrowers. Using our data, we cannot empirically investigate which of these accounts are feasible; thus, we defer them to future research.

Risky borrowers have an incentive to use distant loans from outside lenders. They have fewer collateralized assets and creditworthy financial statements, so they might face severe credit constraints. Therefore, they apply for credit guaranteed loans from distant borrowers even if they have to pay a guarantee fee in addition to interest payments. This agrees with our results indicating that the default rates of distant lenders are higher than those of incumbent lenders. However, we cannot empirically investigate the creditworthi-

ness and collateral of distant borrowers, which remains for future work.

Our paper has several policy implications. The credit guarantee scheme enhances the entry of distant lenders because this mitigates the entry barrier caused by the information gap between banks and small business borrowers. As a result, the credit availability of small businesses is enhanced by this policy, which enhances social welfare. In contrast, this policy induces credit supply for risky small business borrowers, which increases social costs. If banks have losses from the default of small business borrowers, they offer few loans or high interest rates to the borrowers. However, using credit guarantee schemes, banks have few losses from the default of borrowers. Therefore, they offer excessive loans to risky small business borrowers. In sum, our paper implies that the credit guarantee scheme enhances credit supply from distant lenders by absorbing the excessive default cost of the lenders by the government.

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Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln(1 + Number of credit guarantee acceptances)	19,080	0.186	0.853	0.000	7.221
ln(1 + Amount of credit guarantee acceptances)	19,080	0.323	1.450	0.000	10.663
Distance	19,080	5.994	0.804	2.442	7.716
Bank Size	19,080	15.039	1.164	12.536	19.234
Nonperforming Loans Ratio	19,080	0.020	0.012	0.005	0.149
SME Loans Ratio	19,080	0.731	0.111	0.465	0.985
Capital Asset Ratio	19,080	0.103	0.026	0.059	0.211
Loan–Deposit Ratio	19,080	0.740	0.093	0.525	1.081
HHI of region i	19,080	0.219	0.082	0.061	0.407
HHI of region j	19,080	0.219	0.088	0.061	0.407
ΔLand price of region i	19,080	0.691	2.606	-2.600	12.000
ΔLand price of region j	19,080	0.868	2.843	-2.600	12.000
Firm liquidity of region k	19,080	0.497	0.073	0.304	0.629
Firm liquidity of region j	19,080	0.504	0.070	0.304	0.629
Firm ROA of region k	19,080	0.042	0.011	0.016	0.101
Firm ROA of region j	19,080	0.043	0.012	0.016	0.101
Firm leverage of region k	19,080	0.561	0.082	0.287	0.718
Firm leverage of region j	19,080	0.546	0.084	0.287	0.718

Note: This table provides summary statistics for the variables used in the econometric analysis.

Table 2: Cross-correlation table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Distance	1.000															
(2) Bank Size	–0.105	1.000														
	(0.000)															
(3) Nonperforming Loans Ratio	0.025	–0.369	1.000													
	(0.001)	(0.000)														
(4) SME Loans Ratio	–0.057	–0.325	0.373	1.000												
	(0.000)	(0.000)	(0.000)													
(5) Capital Asset Ratio	–0.060	0.652	–0.269	–0.417	1.000											
	(0.000)	(0.000)	(0.000)	(0.000)												
(6) Loan–Deposit Ratio	0.050	–0.271	0.096	0.351	–0.286	1.000										
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)											
(7) HHI of region i	0.146	–0.333	0.075	–0.155	–0.062	0.075	1.000									
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)										
(8) HHI of region j	0.100	0.006	–0.002	0.004	0.002	–0.003	–0.020	1.000								
	(0.000)	(0.436)	(0.819)	(0.568)	(0.810)	(0.631)	(0.006)									
(9) $\ Delta price of region i	0.037	–0.006	0.005	–0.008	–0.005	0.004	0.009	–0.346	1.000							
	(0.000)	(0.387)	(0.502)	(0.278)	(0.464)	(0.551)	(0.205)	(0.000)								
(10) $\ Delta price of region j	0.004	0.342	–0.183	0.282	0.102	0.056	–0.403	0.007	–0.015	1.000						
	(0.596)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.363)	(0.032)							
(11) Firm liquidity of region k	–0.080	–0.057	0.046	–0.142	0.108	–0.039	0.238	–0.004	0.007	–0.455	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.584)	(0.339)	(0.000)						
(12) Firm liquidity of region j	–0.099	0.001	–0.001	0.004	–0.001	-0.001	–0.005	0.098	–0.417	0.008	–0.020	1.000				
	(0.000)	(0.914)	(0.879)	(0.614)	(0.851)	(0.918)	(0.451)	(0.000)	(0.000)	(0.255)	(0.005)					
(13) Firm ROA of region k	–0.065	–0.030	0.018	–0.007	0.074	–0.021	0.075	0.002	–0.008	–0.124	0.534	–0.008	1.000			
	(0.000)	(0.000)	(0.015)	(0.363)	(0.000)	(0.004)	(0.000)	(0.831)	(0.251)	(0.000)	(0.000)	(0.243)				
(14) Firm ROA of region j	–0.049	–0.001	–0.001	0.001	0.002	–0.005	–0.001	0.032	–0.144	–0.005	–0.006	0.494	–0.006	1.000		
	(0.000)	(0.941)	(0.848)	(0.853)	(0.808)	(0.472)	(0.906)	(0.000)	(0.000)	(0.472)	(0.408)	(0.000)	(0.388)			
(15) Firm leverage of region k	0.187	0.021	0.008	–0.081	–0.059	0.199	–0.095	0.002	–0.008	0.189	–0.479	0.011	–0.575	0.015	1.000	
	(0.000)	(0.005)	(0.279)	(0.000)	(0.000)	(0.000)	(0.000)	(0.784)	(0.285)	(0.000)	(0.000)	(0.137)	(0.000)	(0.043)		
(16) Firm leverage of region j	0.164	–0.001	–0.001	0.003	0.003	–0.007	0.001	–0.044	0.112	–0.008	0.011	–0.425	0.018	–0.584	–0.018	1.000
	(0.000)	(0.897)	(0.916)	(0.713)	(0.709)	(0.338)	(0.840)	(0.000)	(0.000)	(0.298)	(0.121)	(0.000)	(0.015)	(0.000)	(0.015)	

Table 3: Estimation Results for Determinants of Distant Lending Using Credit-Guarantee Acceptance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(1 + Number of credit guarantee acceptances)				ln(1 + Amount of credit guarantee acceptances)			
	Full	Distance <1000 km	Distance <400 km	Distance <200 km	Full	Distance <1000 km	Distance <400 km	Distance <200 km
Distance	–0.5138***	–0.5361***	–0.9185***	–1.7428***	–0.8659***	–0.9035***	–1.5336***	–2.8424***
	(0.016)	(0.017)	(0.030)	(0.060)	(0.026)	(0.027)	(0.048)	(0.097)
Bank Size	0.1498***	0.1612***	0.2767***	0.4842***	0.2646***	0.2846***	0.4897***	0.8514***
	(0.013)	(0.014)	(0.025)	(0.047)	(0.022)	(0.024)	(0.042)	(0.079)
Nonperforming Loans Ratio	–0.7577	–0.8656*	–1.8802**	–3.7118*	–1.4022*	–1.5818*	–3.4156**	–6.8506**
	(0.480)	(0.511)	(0.945)	(1.983)	(0.836)	(0.890)	(1.632)	(3.414)
SME Loans Ratio	0.8735***	0.9024***	1.3912***	2.1558***	1.4995***	1.5394***	2.3369***	3.5654***
	(0.124)	(0.136)	(0.269)	(0.522)	(0.208)	(0.228)	(0.451)	(0.873)
Capital Asset Ratio	–0.2657	–0.4469	–1.3628	–2.6301	–0.2708	–0.5822	–2.1084	–3.9672
	(0.494)	(0.534)	(0.919)	(1.727)	(0.850)	(0.916)	(1.567)	(2.908)
Loan–Deposit Ratio	0.0750	0.0893	0.3019	1.2279***	0.1081	0.1307	0.5149	2.1555***
	(0.078)	(0.087)	(0.184)	(0.357)	(0.134)	(0.149)	(0.314)	(0.604)
Borrowers' Prefecture Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Half-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Head Office Prefecture Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrowers' Prefecture ×Half-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	19,080	17,133	8,475	3,514	19,080	17,133	8,475	3,514
R-squared	0.254	0.259	0.331	0.431	0.263	0.268	0.340	0.435

This table presents estimates from linear regressions (OLS) with the natural logarithm of (1 + number of credit guarantee acceptances) or the natural logarithm of (1 + yen amount of credit guarantee acceptances) as the dependent variables. Distance is defined as the number of kilometers between the prefecture capitals of bank i's head office and region j. Bank size is the natural logarithm of a bank's total assets in the previous half year (t–1). The capital asset ratio is defined under Basel regulations in the previous half year (t–1). The nonperforming loans ratio is normalized by a bank's total loans in the previous half year (t–1). Loan–deposit ratio is the ratio of total loans to total deposits in the previous half year (t–1). SME loans ratio is the ratio of loans to SMEs to total loans in the previous half year (t–1). Estimation results for the constant term omitted. Estimated robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Estimation Results for Distant Lending Using Credit-Guarantee Acceptance, Bank Competition, and Business Conditions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(1 + Number of credit guarantee acceptances)				ln(1 + Amount of credit guarantee acceptances)			
	Full	Distance <1000 km	Distance <400 km	Distance <200 km	Full	Distance <1000 km	Distance <400 km	Distance <200 km
Distance	–0.4091***	–0.4687***	–0.8668***	–1.4767***	–0.6914***	–0.7904***	–1.4501***	–2.4189***
	(0.013)	(0.015)	(0.030)	(0.057)	(0.022)	(0.025)	(0.049)	(0.094)
Bank Size	0.1059***	0.1195***	0.1937***	0.2520***	0.1916***	0.2153***	0.3472***	0.4580***
	(0.008)	(0.008)	(0.015)	(0.028)	(0.013)	(0.014)	(0.025)	(0.048)
Nonperforming Loans Ratio	0.7053*	0.7135	0.6624	1.7069	1.2198*	1.2282	1.1082	2.4290
	(0.417)	(0.445)	(0.783)	(1.606)	(0.714)	(0.762)	(1.338)	(2.738)
SME Loans Ratio	–0.1208*	–0.0934	–0.3302**	–0.4793	–0.1772	–0.1312	–0.5344**	–0.6796
	(0.063)	(0.069)	(0.137)	(0.303)	(0.108)	(0.119)	(0.237)	(0.520)
Capital Asset Ratio	0.0319	0.0761	–1.0394*	–1.2205	0.4667	0.5336	–1.2783	–1.2048
	(0.354)	(0.372)	(0.617)	(1.151)	(0.612)	(0.641)	(1.057)	(1.967)
Loan–Deposit Ratio	–0.0584	–0.0622	–0.0146	0.6409**	–0.1489	–0.1623	–0.0748	1.0708**
	(0.057)	(0.064)	(0.134)	(0.285)	(0.099)	(0.111)	(0.232)	(0.491)
HHI of region k	0.4907***	0.3711***	0.5655***	1.1629***	0.7728***	0.5885***	0.9103***	1.9585***
(regions where bank i is located)	(0.072)	(0.087)	(0.172)	(0.363)	(0.124)	(0.149)	(0.295)	(0.621)
HHI of region j	–0.1611**	–0.1968**	–0.1062	–0.0444	–0.2912**	–0.3333**	–0.1063	–0.0266
(regions where bank i enters)	(0.066)	(0.079)	(0.160)	(0.317)	(0.114)	(0.138)	(0.279)	(0.544)
ΔLand price of region k	0.0189***	0.0127***	0.0088	–0.0549***	0.0349***	0.0255***	0.0210**	–0.0804***
(regions where bank i is located)	(0.002)	(0.003)	(0.006)	(0.012)	(0.004)	(0.005)	(0.010)	(0.020)
ΔLand price of region j	0.0354***	0.0386***	0.0665***	0.0569***	0.0613***	0.0680***	0.1168***	0.1034***
(regions where bank i enters)	(0.002)	(0.004)	(0.008)	(0.013)	(0.004)	(0.006)	(0.013)	(0.022)
Borrowers' Prefecture Fixed Effects	No	No	No	No	No	No	No	No
Half-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Head Office Prefecture Fixed Effects	No	No	No	No	No	No	No	No
Borrowers' Prefecture ×Half-year Fixed Effects	No	No	No	No	No	No	No	No
Number of Observations	19,080	17,133	8,475	3,514	19,080	17,133	8,475	3,514
R-squared	0.192	0.205	0.256	0.259	0.199	0.211	0.264	0.263

This table presents estimates from linear regressions (OLS) with the natural logarithm of (1 + number of credit guarantee acceptances) or the natural logarithm of (1 + yen amount of credit guarantee acceptances) as the dependent variables. HHI is the Herfindahl–Hirschman Index calculated using data on credit guaranteed loans for each bank. ΔLand price is the annual rate of change of the land price for each prefecture. For the definitions of the other independent variables, see the notes for Table 3. Estimation results for the constant term omitted. Estimated robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Estimation Results for Distant Lending Using Credit-Guarantee Acceptance and Financial Conditions of Borrowers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(1 + Number of credit guarantee acceptances)				ln(1 + Amount of credit guarantee acceptances)			
	Full	Distance <1000 km	Distance <400 km	Distance <200 km	Full	Distance <1000 km	Distance <400 km	Distance <200 km
Distance	–0.4317***	–0.4985***	–0.8950***	–1.4286***	–0.7297***	–0.8421***	–1.5001***	–2.3558***
	(0.014)	(0.016)	(0.030)	(0.057)	(0.023)	(0.026)	(0.049)	(0.093)
Bank Size	0.0992***	0.1110***	0.1812***	0.1749***	0.1853***	0.2063***	0.3327***	0.3376***
	(0.008)	(0.008)	(0.015)	(0.026)	(0.014)	(0.015)	(0.026)	(0.045)
Nonperforming Loans Ratio	–0.6853*	–0.0475	0.0727	3.8094**	–1.3617**	–0.2889	–0.2199	5.4477**
	(0.391)	(0.423)	(0.742)	(1.548)	(0.667)	(0.721)	(1.263)	(2.615)
SME Loans Ratio	0.1668***	0.0775	–0.0711	–0.9974***	0.3776***	0.2272**	0.0021	–1.4127***
	(0.062)	(0.068)	(0.131)	(0.278)	(0.106)	(0.116)	(0.223)	(0.470)
Capital Asset Ratio	0.5741*	0.4430	–0.2351	–0.2060	1.3510**	1.1274*	0.0822	0.4735
	(0.343)	(0.361)	(0.605)	(1.138)	(0.592)	(0.622)	(1.036)	(1.936)
Loan–Deposit Ratio	–0.2277***	–0.2202***	–0.3048**	0.6699**	–0.4561***	–0.4491***	–0.6031**	1.0689**
	(0.063)	(0.069)	(0.145)	(0.293)	(0.109)	(0.120)	(0.248)	(0.502)
Firm liquidity of region k	0.3086***	0.5605***	0.5190**	0.4683	0.5978***	1.0208***	0.9351***	0.8095
(regions where bank i locates)	(0.091)	(0.104)	(0.209)	(0.455)	(0.153)	(0.175)	(0.350)	(0.759)
Firm liquidity of region j	–0.7531***	–0.6793***	–1.3494***	–2.5158***	–1.2532***	–1.1303***	–2.2083***	–3.8663***
(regions where bank i enters)	(0.091)	(0.107)	(0.211)	(0.459)	(0.154)	(0.181)	(0.355)	(0.760)
Firm ROA of region k	–1.2025*	–1.8230***	–2.7568**	–9.5955***	–2.3489**	–3.3675***	–5.0885**	–16.8574***
(regions where bank i locates)	(0.629)	(0.677)	(1.263)	(3.134)	(1.022)	(1.101)	(2.052)	(5.021)
Firm ROA of region j	1.9116***	1.5935***	2.1957**	0.6259	3.2849***	2.7551***	3.8267**	0.9803
(regions where bank i enters)	(0.524)	(0.576)	(1.083)	(2.324)	(0.905)	(0.993)	(1.855)	(3.893)
Firm leverage of region k	0.9368***	0.9690***	0.9772***	0.2220	1.6530***	1.7137***	1.7487***	0.4646
(regions where bank i locates)	(0.095)	(0.103)	(0.194)	(0.425)	(0.160)	(0.174)	(0.328)	(0.712)
Firm leverage of region j	0.8387***	0.8227***	1.1594***	2.3767***	1.4078***	1.3773***	1.9348***	4.0721***
(regions where bank i enters)	(0.086)	(0.095)	(0.177)	(0.357)	(0.147)	(0.163)	(0.300)	(0.593)
Borrowers' Prefecture Fixed Effects	No	No	No	No	No	No	No	No
Half-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Head Office Prefecture Fixed Effects	No	No	No	No	No	No	No	No
Borrowers' Prefecture ×Half-year Fixed Effects	No	No	No	No	No	No	No	No
Number of Observations	19,080	17,133	8,475	3,514	19,080	17,133	8,475	3,514
R-squared	0.194	0.206	0.256	0.271	0.199	0.212	0.263	0.275

This table presents estimates from linear regressions (OLS) with the natural logarithm of (1 + number of credit guarantee acceptances) or the natural logarithm of (1 + yen amount of credit guarantee acceptances) as the dependent variables. Firm liquidity is defined as the ratio of liquid assets to total assets at the end of the previous FY. Firm leverage is defined as the ratio of debt to total assets at the end of the previous FY. Firm ROA is defined as the ratio of operating income to total assets at the end of the previous FY. For the definitions of the other independent variables, see the notes for Table 3. Estimation results for the constant term omitted. Estimated robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Credit guarantee	1,488	2.3315	0.3336	1.1858	3.3391
Default	1,488	0.0087	0.0079	0.0000	0.0670
No head office	1,488	0.6875	0.4637	0.0000	1.0000
Distance	1,488	3.1317	2.2306	0.0000	6.7817
Branches	1,488	2.7339	1.3622	0.0000	5.6419
Size	1,488	15.6231	1.6186	12.4678	19.2343
Nonperforming loans ratio	1,488	0.0174	0.0103	0.0053	0.1493
SME loans ratio	1,378	0.7238	0.1087	0.4651	0.9846
Capital asset ratio	1,428	0.1119	0.0362	0.0585	0.2111
Loan–deposit ratio	1,488	0.7270	0.0954	0.5252	1.0810

Note: This table provides summary statistics for the variables used in the econometric analysis.

Table 7: Cross-correlation Table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) No head office	1.000							
(2) Distance	0.947	1.000						
	(0.000)							
(3) Branches	–0.730	–0.728	1.000					
	(0.000)	(0.000)						
(4) Size	0.282	0.332	0.040	1.000				
	(0.000)	(0.000)	(0.124)					
(5) Nonperforming loans ratio	–0.152	–0.173	0.003	–0.537	1.000			
	(0.000)	(0.000)	(0.907)	(0.000)				
(6) SME loans ratio	–0.084	–0.142	–0.044	–0.436	0.397	1.000		
	(0.002)	(0.000)	(0.102)	(0.000)	(0.000)			
(7) Capital asset ratio	0.206	0.257	0.035	0.790	–0.435	–0.528	1.000	
	(0.000)	(0.000)	(0.188)	(0.000)	(0.000)	(0.000)		
(8) Loan–deposit ratio	–0.130	–0.190	–0.059	–0.519	0.248	0.492	–0.517	1.000
	(0.000)	(0.000)	(0.022)	(0.000)	(0.000)	(0.000)	(0.000)	

Table 8: Estimation Results for Effects of Distance on Credit Guarantee

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Credit guarantee	Credit guarantee	Credit guarantee	Credit guarantee	Credit guarantee	Credit guarantee
	All	Regional banks	All	Regional banks	All	Regional banks
Distance	0.0102***	0.0097***				
	(0.002)	(0.003)				
No head office			0.0479***	0.0398***		
			(0.010)	(0.011)		
Branches					–0.0222***	–0.0163***
					(0.004)	(0.004)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank×Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture×Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,488	1,235	1,488	1,235	1,488	1,235
R-squared	0.892	0.881	0.892	0.880	0.894	0.881

	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	Credit guarantee	Credit guarantee	Credit guarantee	Credit guarantee	Credit guarantee	Credit guarantee
	All	Regional banks	All	Regional banks	All	Regional banks
Distance	0.0119***	0.0116***				
	(0.002)	(0.002)				
No head office			0.0580***	0.0480***		
			(0.008)	(0.009)		
Branches					–0.0226***	–0.0163***
					(0.003)	(0.004)
Bank size	–0.0295	–0.0076	–0.0301	–0.0074	–0.0263	–0.0048
	(0.058)	(0.065)	(0.057)	(0.064)	(0.058)	(0.066)
Nonperforming loans ratio	–0.3259	–0.2494	–0.3259	–0.2409	–0.3208	–0.2392
	(0.505)	(0.643)	(0.491)	(0.647)	(0.461)	(0.589)
SME loans ratio	–0.2036	–0.1232	–0.2036	–0.1171	–0.2101	–0.1217
	(0.390)	(0.389)	(0.388)	(0.390)	(0.393)	(0.395)
Capital asset ratio	–0.8639	–0.3280	–0.8666	–0.3069	–0.8823	–0.3126
	(1.067)	(1.439)	(1.066)	(1.448)	(1.045)	(1.417)
Loan–deposit ratio	0.0039	–0.0465	0.0007	–0.0484	0.0021	–0.0462
	(0.228)	(0.236)	(0.227)	(0.237)	(0.228)	(0.239)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank×Half-year fixed effects	No	No	No	No	No	No
Prefecture×Half-year fixed effects	No	No	No	No	No	No
Number of observations	1,333	1,080	1,333	1,080	1,333	1,080
R-squared	0.895	0.887	0.896	0.887	0.897	0.887

This table presents estimates from linear regressions (OLS) with the credit guarantee loan size (= the natural logarithm of (yen amount of loans with credit guarantee/number of loans with credit guarantee)) as the dependent variable. Distance is the number of kilometers between the prefectural capitals of regions j and k. No head office dummy is a dummy variable equal to one if region k does not equal region j. Branches is the natural logarithm of 1 + number of branches in region j of bank i at half year t. For the definitions of the other independent variables, see the notes for Table 3. Estimation results for the constant term omitted. Estimated robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9: Estimation Results for Effects of Distance on Default Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Default	Default	Default	Default	Default	Default
	All	Regional banks	All	Regional banks	All	Regional banks
Distance	0.0004***	0.0005***				
	(0.000)	(0.000)				
No head office			0.0017***	0.0020***		
			(0.000)	(0.001)		
Branches					–0.0007***	–0.0008***
					(0.000)	(0.000)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank×Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture×Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,488	1,235	1,488	1,235	1,488	1,235
R-squared	0.469	0.505	0.469	0.505	0.471	0.508

	(5)	(6)	(7)	(8)	(7)	(8)
Dependent variable	Default	Default	Default	Default	Default	Default
	All	Regional banks	All	Regional banks	All	Regional banks
Distance	0.0003***	0.0004***				
	(0.000)	(0.000)				
No head office			0.0014***	0.0016***		
			(0.000)	(0.001)		
Branches					–0.0006***	–0.0007***
					(0.000)	(0.000)
Bank size	–0.0048	–0.0067	–0.0048	–0.0067	–0.0047	–0.0067
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Nonperforming loans ratio	–0.0075	0.0079	–0.0075	0.0082	–0.0074	0.0080
	(0.034)	(0.038)	(0.034)	(0.038)	(0.034)	(0.038)
SME loans ratio	–0.0232	–0.0062	–0.0232	–0.0061	–0.0234	–0.0064
	(0.022)	(0.023)	(0.022)	(0.023)	(0.022)	(0.024)
Capital asset ratio	0.0852	0.1913**	0.0852	0.1920**	0.0847	0.1914**
	(0.055)	(0.086)	(0.055)	(0.086)	(0.055)	(0.085)
Loan–deposit ratio	–0.0073	0.0053	–0.0074	0.0053	–0.0073	0.0054
	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Half-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank×Half-year fixed effects	No	No	No	No	No	No
Prefecture×Half-year fixed effects	No	No	No	No	No	No
Number of observations	1333	1080	1333	1080	1333	1080
R-squared	0.219	0.241	0.219	0.241	0.222	0.243

This table presents estimates from linear regressions (OLS) with default rate (= number of defaulting loans with credit guarantee/number of loans with guarantees) as the dependent variable. For the definitions of the other independent variables, see the notes for Table 3. Estimation results for the constant term omitted. Estimated robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.