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Current Status of Firm-Bank Relationships and the Use of Collateral
in Japan: An Overview of the Teikoku Databank Data

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Current Status of Firm-Bank Relationships and the Use of Collateral in Japan: An Overview of the Teikoku Databank Data[†]

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1. Introduction

This paper provides a detailed account of the current status of firm-bank relationships in Japan, with a special emphasis on the use of collateral. In doing so, we have constructed a unique data set of Japanese firms described later. Although a number of theoretical and empirical studies have examined the role of collateral in corporate financing, the literature has yet to reach decisive conclusions on many issues. For instance, the role of collateral can differ depending on whether the asset pledged is internal or external to the borrowing firm, the volatility of asset values, the loan-to-value ratio, and so on. We do not have definitive answers to these issues either, partly because most empirical studies can only distinguish whether a borrower pledges collateral or not. We believe our data set is useful in conducting more well-designed empirical analyses, which is our future goal. As a starting point, this paper provides the basic information (summary statistics) for the data set and conducts simple univariate analyses.

In cooperation with the Teikoku Databank Ltd., the largest credit information provider in Japan (hereafter called TDB), we the members of the research group of the Program for Promoting Social Science Research Aimed at Solutions of Near-Future Problems “Design of Interfirm Network to Achieve Sustainable Economic Growth” have constructed a very unique and huge data set of Japanese firms. The data set contains information on nearly 400,000 firms in Japan, including their basic characteristics and financial statements, transactions between suppliers and customers, and financial transactions between financial institutions. The companion paper (Uchida et al. 2010) describes the basic characteristics of firms in the TDB database and focuses on interfirm relationships, with special emphasis on the use of trade credits. In contrast, this paper focuses on firm-bank relationships and the use of collateral.

In terms of firm-bank relationships, the novel features of our data set are two-fold. First, for each firm in our data set, we can identify the financial institutions that a firm transacts with. Financial institutions include both deposit-taking financial institutions (hereinafter “banks”) and non-banks, and we can also identify which financial institution is a firm’s “main bank.” In addition, for each pair of firm-financial institutions, the amount of loans outstanding, bills discounted, and time deposits are also present. Second, and more importantly, our data set contains detailed information on firms’ use of collateral in their debt financing. For instance, we can identify types of collateral that a firm pledges to its financial institutions. In addition, for each property (most representative type of assets used for collateral in Japan) that a firm and its representative possess, we can identify its mortgagees and the amounts of loans provided by making use of real estate registry data.

The remaining part of the paper is organized as follows. In the next section, we briefly describe the original TDB data and our sample selection process. Section 3 and 4 provide descriptive statistics and univariate analyses of firm-bank relationships and the use of collateral, respectively. Section 5 concludes.

2. Data and sample characteristics¹

2.1. Data

2.1.1. Original data

The original data for our data set is the TDB's credit reports on Japanese firms. The TDB regularly conducts credit research by customer demand (i.e., in response to requests by customers on a paid basis) or unsolicited, the latter of which applies to important, established, and/or large firms in Japan.

For the purpose of our analysis, we have eliminated firms that belong to non-profit-oriented industries, such as religious and educational. "Firms" do not include financial firms, although they are included as financial institutions, of course. With respect to the legal form of firms, we only retain joint stock companies (*kabushiki-gaisha*), closely-held limited liability companies (*yuugen-gaisha*), limited partnership companies (*goudou-gaisha*), unlimited liability partnership companies (*goumei-gaisha*), limited liability partnership (*yuugen-sekinin-jigyo-kumiai*), medical associations (incorporated, *iryō-houjin*), cooperative partnerships (unincorporated, *kyoudou-* or *kyougyou-kumiai*), and sole proprietorships (*kojin*).

2.1.2. Sample period and our cross-sectional data

The original data include information from the TDB's credit reports from 2007 to 2010. During this period, TDB conducted credit researches on a number of firms several times in order to update their information. Thus, the original TDB data is a panel data set with a large "N" but small "T." However, throughout this paper, we report descriptive statistics in a cross-sectional manner because (i) the time span is relatively short, and (ii) the aim of this paper is to give a snapshot of our sample firms. That is, even if the original data include multiple records of a particular firm at different points in time during 2007–2010, we only use the latest record and discard others. In this sense, our data set is "cross-section like." As a result, we have about 380,000 firms as a base sample. We aim to construct a panel data set when we conduct deeper analyses in the future.

2.1.3. Treatment of missing data

As is shown in the main part of this paper, the number of observations for each variable differs depending on the number of missing values. The figure below briefly overviews the number of observations for each subset of variables, and describes the relations among them. The detailed description for each subsample will be provided in the relevant part.

¹ This section is based on subsection 2.1 of Uchida et al. (2010).

FIRM CHARACTERISTICS

[Characteristics data]

Legal form (N=386,826 firms), Employees (N=372,947 firms), TDB credit scores (N=367,224 firms), ...

[Financial statements data]

Sales (N=183,321 firms), Loans from FIs / Total assets (N=150,931 firms), ...

FIRM-BANK RELATIONSHIPS (Section 3)

[Financial institutions data]

Numbers of financial institutions in transactions (N=373,155 firms)

Main banks (N=310,097 firms; 345313 banks)

Switching dummy (N=373,599 firms)

Borrowing outstanding (N=92,489 firms; 102,640 banks)

Bills discounted outstanding (N=36,810 firms; 40,738 banks)

Time deposits outstanding (N=36,927 firms; 41,437 banks)

[Financial transactions data]

Total borrowing outstanding (N=323,847 firms)

From insiders (N=215,206 firms)

Corporate bonds (N=134,124 firms)

From financial institutions (N=306,295 firms)

Total bills discounted outstanding (N=57,538 firms)

Total time deposits outstanding (N=51,323 firms)

Main bank concentration ratios

Borrowing concentration ratio (91,733 firms)

Bills discounted concentration ratio (36,025 firms)

Time deposits concentration ratio (36,520 firms)

COLLATERAL (Section 4)

[Financial transactions data]

Type of collateral and guarantees (N=373,599 firms)

[Movable registry data]

Account receivables (N=27,310 firms)

Inventories (N=27,280 firms)

[Real estate registry data]

310,058 firms - 2,743,604 properties

257,829 firms with secured loans - 1,917,123 mortgaged properties

Secured creditors (N=258,012 firms, 520,006 creditors, 840,898 loans)

Seniority Index (N=200,614 firms, 1,695,925 mortgaged properties)

Pseudo LTV ratio (N=94,657 firm-bank matches)

2.1.4. Financial statement data and treatment of outliers

The credit reports are basically accompanied with financial statement data that TDB also compiles regularly on demand or on an unsolicited basis. However, the numbers of observation for financial statement data is significantly smaller than those for credit reports, because many small firms do not create financial statements. Also, financial statement data sometimes take extraordinary values. We have eliminated such data as outliers by dropping observations if their values fall into the largest and the smallest 0.1% ranges (0.1% tails).

2.1.5. Descriptive statistics

In the tables for descriptive statistics shown below, the basic statistics we present are: N (the number of observations), mean, sd (standard deviation), min (minimum), p1 (1st percentile), p50 (50th percentile, or median), p99 (99th percentile), and max (maximum). All the monetary variables are in Japanese yen. We sometimes present frequency tables and figures.

2.1.6. Univariate analysis

To better grasp the feature of firm-bank relationships and the use of collateral in Japan, we also conduct simple univariate analyses, i.e., we split sample firms into multiple categories based on a value of another variable, and calculate the descriptive statistics for each category. In some cases, variables used for univariate analyses are not present in this paper. For instance, we often refer to the number of employees and the TDB credit scores as proxies for the size and creditworthiness of firms, respectively, but definitions and summary statistics of these variables are not presented in this paper. Readers are referred to the companion paper, Uchida et al. (2010), for the description of basic characteristics of our sample firms.

It should be noted that when we interact two variables of our interest, the time at which these two variables are obtained may be different. In accordance with the “cross-section like” nature of our data set, we retain observations only if the time interval for which two variables are obtained is equal to, or less than, 36 months.

3. Firm-bank relationships

This section presents features of firms’ transactions with financial institutions with special emphasis put on relationships with “main banks.”

3.1. The number of financial institutions

Table 3-1 presents summary statistics of the number of financial institutions (FIs hereinafter) with which a firm has lending and/or deposit transactions. Financial institutions include city banks, regional banks, second-tier regional banks, shinkin banks (*shinyo-kinko*), credit cooperatives (*shinyo-kumiai*), long-term credit banks (LTCBs) and trust banks, other banks, government financial institutions, and non-banks (non-deposit taking private FIs such as finance companies, factoring companies, leasing companies, and so on). The mean

and median numbers of FIs are 3.11 and 3, respectively. With respect to its distribution, only 18 % of firms in our sample have sole FI-relations, and most firms fall within the range of 1 to 4. As noted in Table 4.4 of Degryse et al. (2009) that surveys existing empirical evidence on the number of bank relations around the world, multiple-bank relations are common in Japan as well.

Table 3-1. The number of financial institutions

# of financial institutions	N	mean	sd	min	p1	p50	p99	max
	373,155	3.114	1.971	1	1	3	10	48
Distribution	1	2	3	4	5	6	7	8 and more
Freq.	68,325	98,543	86,015	53,741	29,580	15,987	8,833	12,131
(% share)	(18.31)	(26.41)	(23.05)	(14.40)	(7.93)	(4.28)	(2.37)	(3.25)

The number of FIs depends on several firm characteristics (see Figure 3-1). First, small firms have fewer relationships than large firms. The average (mean) number of FIs for firms that do not have any employees at all is 2.1, whereas firms with more than 1,000 employees is 5.8. This finding is also in line with the casual observation found for other countries (Degryse et al. 2009). Second, firms whose TDB credit scores are lower, meaning whose credit risks are higher from the viewpoint of lenders, have a smaller number of transactional relations with FIs.² Third, firms that have financial transactions with the government tend to have transactions with a larger number of FIs than the others. The average number of FIs for firms whose main banks are government FIs is 4.2, and firms that use government-funded credit guarantees is 3.5. Note, however, firms whose main banks are government FIs need not be those with higher credit risks, as we shall see later. Taken together, these observations suggest that firms that transact with a large number of FIs are dispersed: creditworthy firms with high credit scores and firms that need credit enhancements such as credit guarantees in obtaining loans.

Interestingly, the average number of FIs does not significantly differ among various types of main banks. The Banking Law provides that a bank shall not extend a loan to a single entity in excess of 25% of the bank's capital stock nor to a group of affiliated entities as defined in the Cabinet Order in excess of 40% of the capital stock. Though not significant to large banks, this regulation can be relevant to smaller FIs such as credit cooperatives. If that is the case, we would observe that a firm has transactions with a larger number of FIs if its main bank is a smaller financial institution, *ceteris paribus*. However, Figure 3-1 suggests that the law is not a binding constraint in most cases even among cooperative institutions. Needless to say, we need to conduct at least simple multivariate analyses in order to examine whether the Banking Law affects the number of FIs that a firm transacts with.

² The TDB score is a metric that evaluates the creditworthiness of a firm. The score ranges from 1 to 100 points, and a higher score indicates a firm with better quality. See Uchida et al. (2010) for detail on the TDB score.

Figure 3-1. The number of financial institutions: univariate analyses



3.2. Main bank

3.2.1. Composition

The TDB database contains information on the main banks of firms. The definition of the main bank is somewhat subjective in that it is identified by each firm. There is a formal definition of the main bank given by the TDB, which is the bank that provides loans for working capital most.³ However, when there is an inconsistency between a firm’s response and the formal definition of the main bank by the TDB, the former will be prioritized.

Table 3-2 describes the composition of main banks for our sample firms. As for the number of main banks, 90.1% of sample firms (N=310,097) list one main bank and 8.6% of them list two main banks. Among our sample firms, regional banks account for 33.1% of all main banks (Table 3-2, left column). City banks

³ To be more precise, the main bank is a bank with which a firm has transactional deposit accounts and obtains loans (either short-term or long-term loans). When a bank with a deposit-relationship and a bank with a lending relationship are different, then the latter will be prioritized, although the firm is allowed to list multiple main banks. When banks that provide short-term and long-term loans are different, then the former will prevail.

(percentage: 24.7%), shinkin banks (18.9%), and second-tier regional banks (9.6%) also have sizable percentages. However, when we count the number of main banks for firms with multiple main banks (Table 3-2, center column), city banks account for the largest percentage (42.7%) because these firms are relatively larger and thus likely to have transactions with larger banks such as city banks.

Table 3-2. Composition of main banks

Main bank	All firms		Composition of multiple main banks		Composition of all main banks	
	Freq.	(% share)	Freq.	(% share)	Freq.	(% share)
City banks	76,666	(24.72)	28,095	(42.65)	104,761	(30.34)
Regional banks	102,647	(33.10)	17,121	(25.99)	119,768	(34.68)
Second-tier regional banks	29,685	(9.57)	5,603	(8.51)	35,288	(10.22)
Shinkin banks	58,545	(18.88)	9,855	(14.96)	68,400	(19.81)
Credit Cooperatives	6,985	(2.25)	1,351	(2.05)	8,336	(2.41)
Long-term credit & trust bank	420	(0.14)	778	(1.18)	1,198	(0.35)
Government FIs	2,786	(0.90)	2,586	(3.93)	5,372	(1.56)
Other banks	1,690	(0.54)	478	(0.73)	2,168	(0.63)
Non-banks	12	(0.00)	10	(0.02)	22	(0.01)
Multiple main banks	30,661	(9.89)	—	—	—	—
Total firms / main banks	310,097	(100.00)	65,877	(100.00)	345,313	(100.00)

3.2.2. Univariate analyses

The composition of main banks depends on the location (prefecture) of firms (Figure 3-2). For instance, for firms located in Tokyo and Osaka, city banks account for more than half of all main banks in these prefectures. In contrast, in rural areas such as Akita and Nagasaki where two dominant regional banks are competing, more than 80% of the firms identify regional banks as their main banks. Shinkin banks and credit cooperatives have a relatively higher percentage in Kyoto (40.8%) and Yamanashi (13.4%), respectively. Other than locations, two features are worth mentioning (Figure 3-3). First, large firms (in terms of number of employees) tend to have main bank relationships with city banks and LTCBs and trust banks, whereas shinkin banks and credit cooperatives are more likely to be the main banks for smaller firms. As noted above, firms that have multiple main bank relationships tend to be large as well. Second, the size of the main bank is positively associated with the TDB credit scores, implying that a firm with lower credit risk is more likely to have a larger bank as their main bank. Third, firms that have government financial institutions as main banks are relatively larger and have higher credit scores. For instance, their mean values for the number of employees and the TDB credit scores are comparable to those of city banks. These values suggest that direct lending by government financial institutions works as a substitute rather than a complement to loans extended by private financial institutions in Japan.

Figure 3-2. Composition of main banks, by prefectures of firms

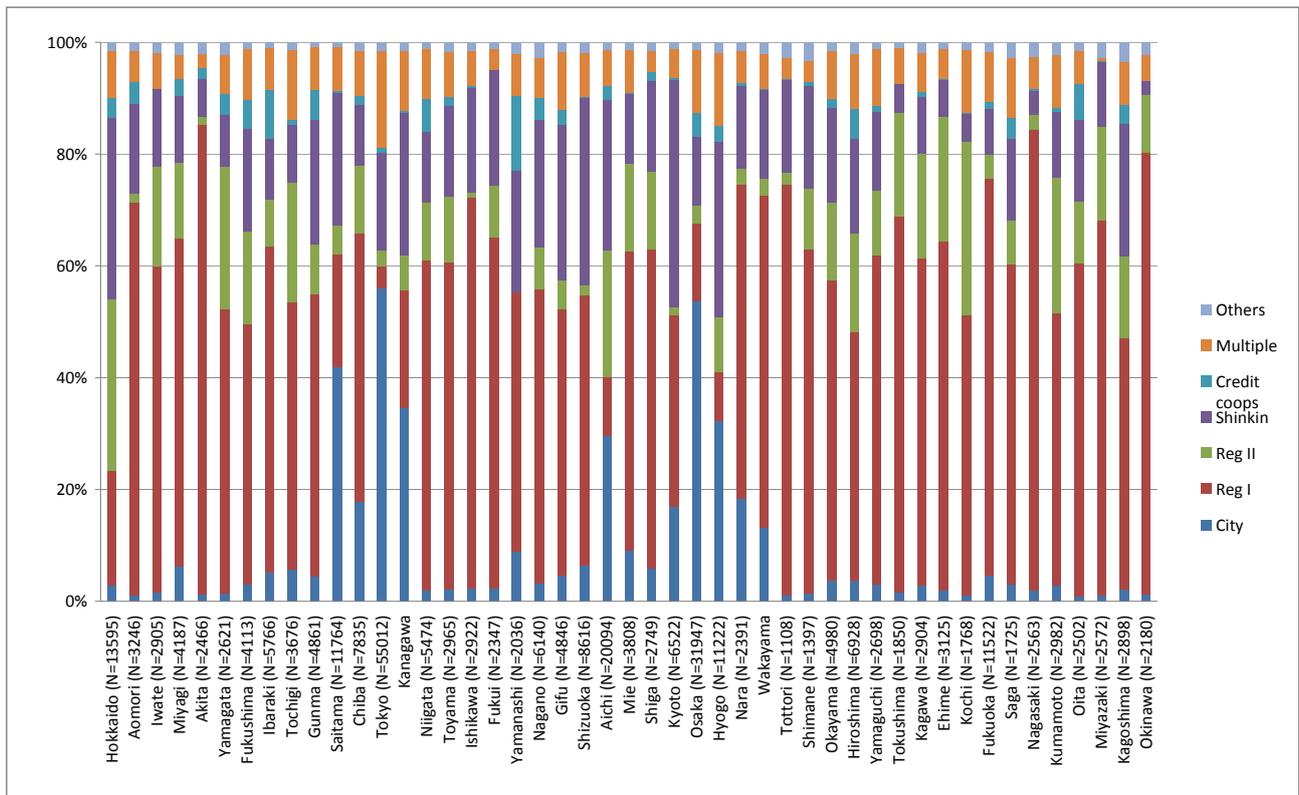
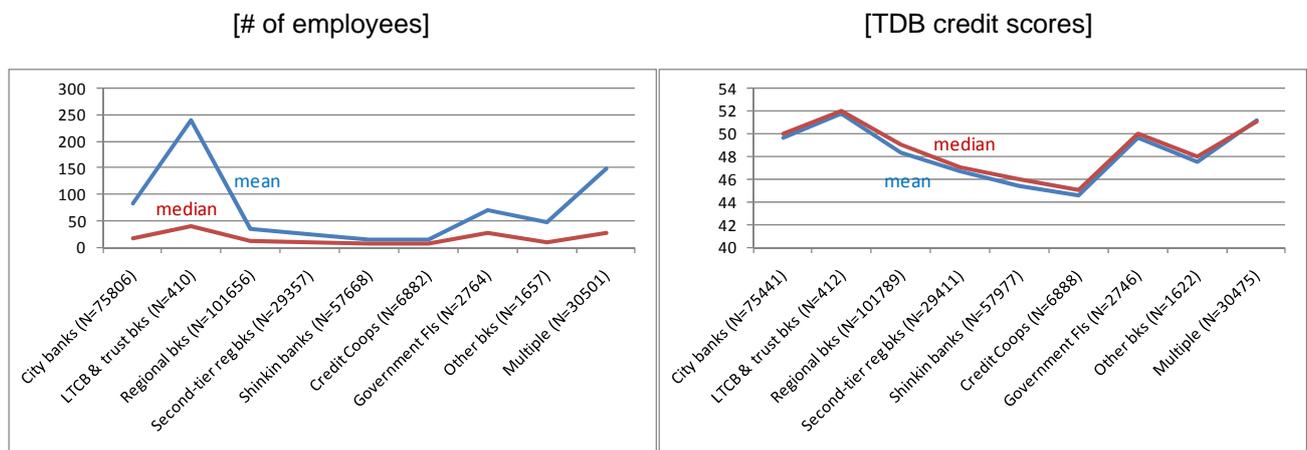


Figure 3-3. Types of main banks: univariate analyses



3.2.3. Switching of main banks

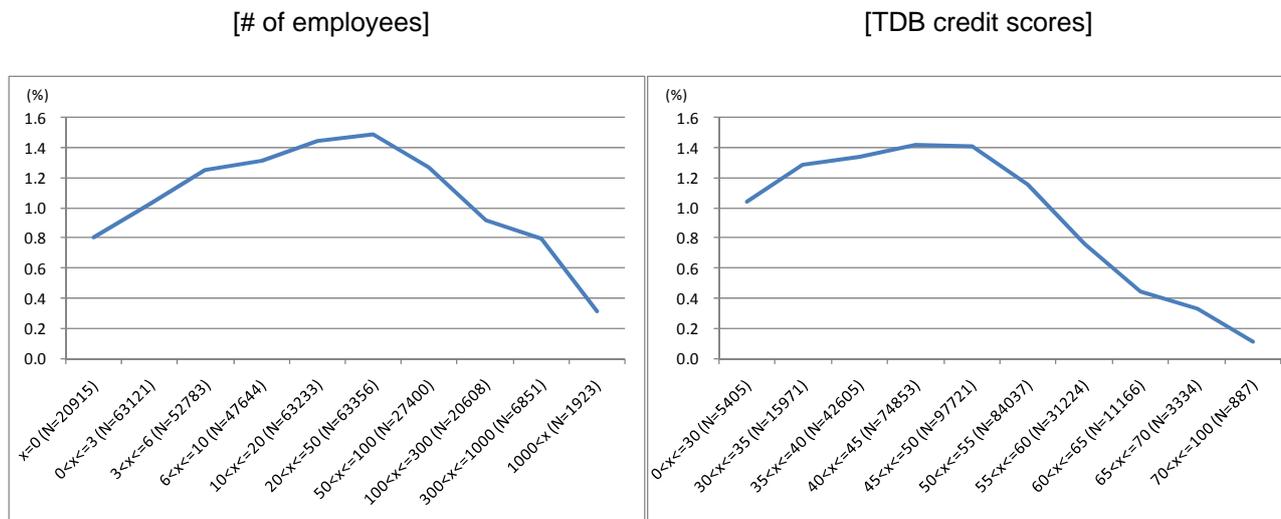
Previous studies on the main bank relationships in Japan find that firms rarely switch their main banks. Kano (2007) finds that only 15% of Japanese SMEs switch their main banks in a decade (1.5% per annum). Based on the probit estimation, Kano also finds that younger, smaller, and higher growth firms are more likely to switch. Regarding bank-firm relationships, he finds that the firm whose main bank's performance is worse, the firm that transacts with a larger number of banks, and the firm that is located in the prefecture where

banking competition is harsher, tend to switch.

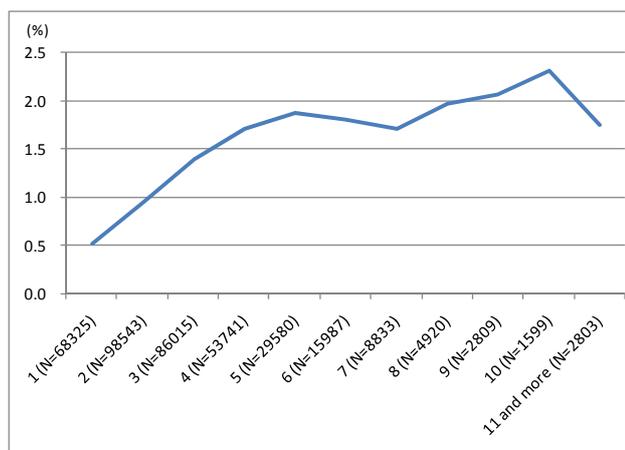
The TDB database identifies whether a firm has switched its main bank(s) within the past two years. Overall, 4,610 firms out of 373,599 firms (1.2%) in our sample have switched their main banks. The ratio of firms that switch main banks per annum, 0.6%, is smaller than the one obtained in Kano (2007).

Regarding the characteristics of switchers, two features emerge from the univariate analyses (Figure 3-4). First, riskier firms such as firms with lower TDB credit scores are more likely to switch their main banks. Interestingly, the size of a firm, as represented by the number of employees, does not have a monotonic relation with whether a firm has switched its main bank. It is firms whose number of employees ranges from 10 to 50 that switch the most. Second, firms that transact with a larger number of banks and whose *current* main banks are either government financial institutions or credit cooperatives tend to be switchers. Although our findings above are mostly consistent with those in Kano (2007), we have to note that we only know firms' characteristics *after* they have switched to their current main banks. Thus, the positive relation between the switch and the number of financial institutions might simply be a byproduct of switching itself. For instance, a firm that changes its main bank to a new bank might maintain its lending relationship with an old main bank. In this case, the number of financial institutions that the firm transacts with increases as a result of switching.

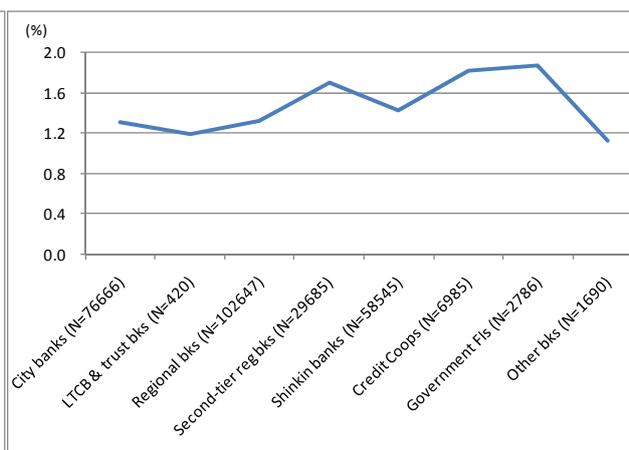
Figure 3-4. Percentages of firms that switch their main banks: univariate analyses



[# of financial institutions]



[Main banks]



3.3. Transactions between firms and financial institutions: Borrowing

3.3.1. Total amount of borrowing

The TDB database compiles firms' financial transactions on borrowing, bills discounted, and time deposits. With respect to the amount of borrowing, the mean and median amounts of borrowing are 2.97 billion yen and 79 million yen, respectively (N=323,847). If we drop firms that fall into both 0.1% tails of the sample distribution, the mean becomes much smaller at 596 million yen. A total of 27,739 firms (8.6% of the total firms) have no borrowing outstanding.

Borrowing comes from three sources (Table 3-3). The main source is borrowing from financial institutions. The mean and median amounts of borrowing from financial institutions are 2.46 billion yen and 72 million yen, respectively (N=306,295). Among these firms, 29,551 firms (9.7%) have no borrowing outstanding. Second, some firms obtain loans from "insiders," such as representatives, executives, and the firm's affiliates, including both subsidiaries and parents. Among 215,206 firms that disclose whether they rely on insider finances, more than half (54.3%) do have positive borrowing outstanding from insiders. In addition, looking at the ratio of the amount of borrowing from insiders to total borrowing, 17.5% of total firms are almost exclusively dependent on insider finances (the ratio is between 95–100%). The mean and median amounts of borrowing outstanding are 489 million yen and 2.4 million yen, respectively. Third, 134,124 firms disclose whether they obtain funds from corporate bonds, including both public bonds and private placements. The ratio of firms that use corporate bonds is 17.0%, and the average (mean) borrowing amount is 545 million yen. Again, the mean amounts of borrowing from insiders and corporate bonds are significantly smaller if we drop firms that fall into both 0.1% tails of the sample distribution (100 million yen for both). Below, we use the sample without 0.1% tails, unless otherwise noted.

Table 3-3. The amount of borrowing from FIs, insiders, and by bonds

	(million yen, except N)							
	N	mean	sd	min	p1	p50	p99	max
Total Borrowings	323,847	2,970	273,000	0	0	79	8,800	79,800,000
(w/o 0.1% tails)	(323,162)	(596)	(4,050)	(0)	(0)	(79)	(8,000)	(180,000)
Borrowing from FIs	306,295	2,460	245,000	0	0	72	7,490	78,700,000
(w/o 0.1% tails)	(305,669)	(512)	(3,240)	(0)	(0)	(72)	(6,870)	(140,000)
Borrowing from insiders	215,206	489	35,600	0	0	2	2,100	8,600,000
(w/o 0.1% tails)	(214,740)	(100)	(806)	(0)	(0)	(2)	(1,930)	(28,800)
Corporate bonds	134,124	545	69,400	0	0	0	1,230	25,100,000
(w/o 0.1% tails)	(133,850)	(100)	(1,390)	(0)	(0)	(0)	(1,100)	(71,000)

Note: "FIs" stands for financial institutions. "Insiders" include representatives, executives, and affiliates.

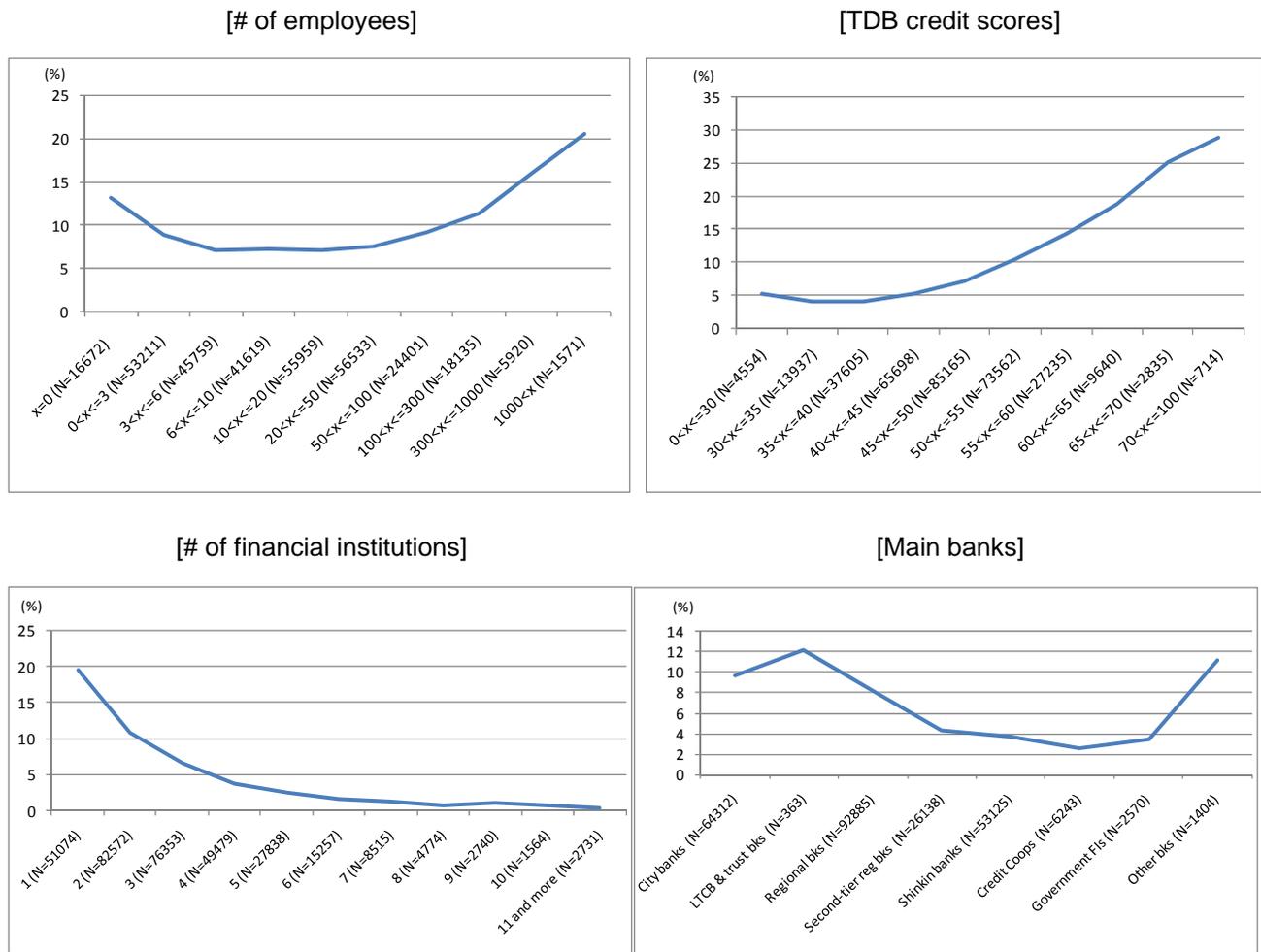
It is conceivable that the average borrowing amount is proportional to the size of firms and their main banks and the creditworthiness of firms (results not reported). One interesting thing to note is the characteristics of firms that do not have any borrowing outstanding. Figure 3-5 shows the relation between the percentage of firms with no borrowing outstanding and the firm's size (# of employees), its creditworthiness (TDB credit scores), the number of financial institutions transacting, and the type of its main bank.

For instance, among firms where the number of employees equals zero (N=16,672), 13.1% of them have no borrowing outstanding. In terms of the size of firms, the figure is U-shaped, implying that firms with no borrowing outstanding are densely populated at the smallest and the largest segments. For small firms, no borrowing outstanding, whether due to the difficulty in obtaining external funds or due to a lack of loan demand, might be an issue for further analysis. Regarding firms' creditworthiness, the figure shows that firms with higher credit scores tend not to borrow at all. The percentage of firms with no borrowing outstanding is somewhat higher for younger firms with firm ages equal to or less than ten (result not reported).

Turning to relations with financial institutions, the percentage of firms with no borrowing outstanding is negatively associated with the number of financial institutions. Among firms with sole-banking (i.e., that transacts with only main banks), nearly 20% of them do not have any borrowing outstanding. Presumably, these firms define their main banks by relations via other financial products, such as deposits.

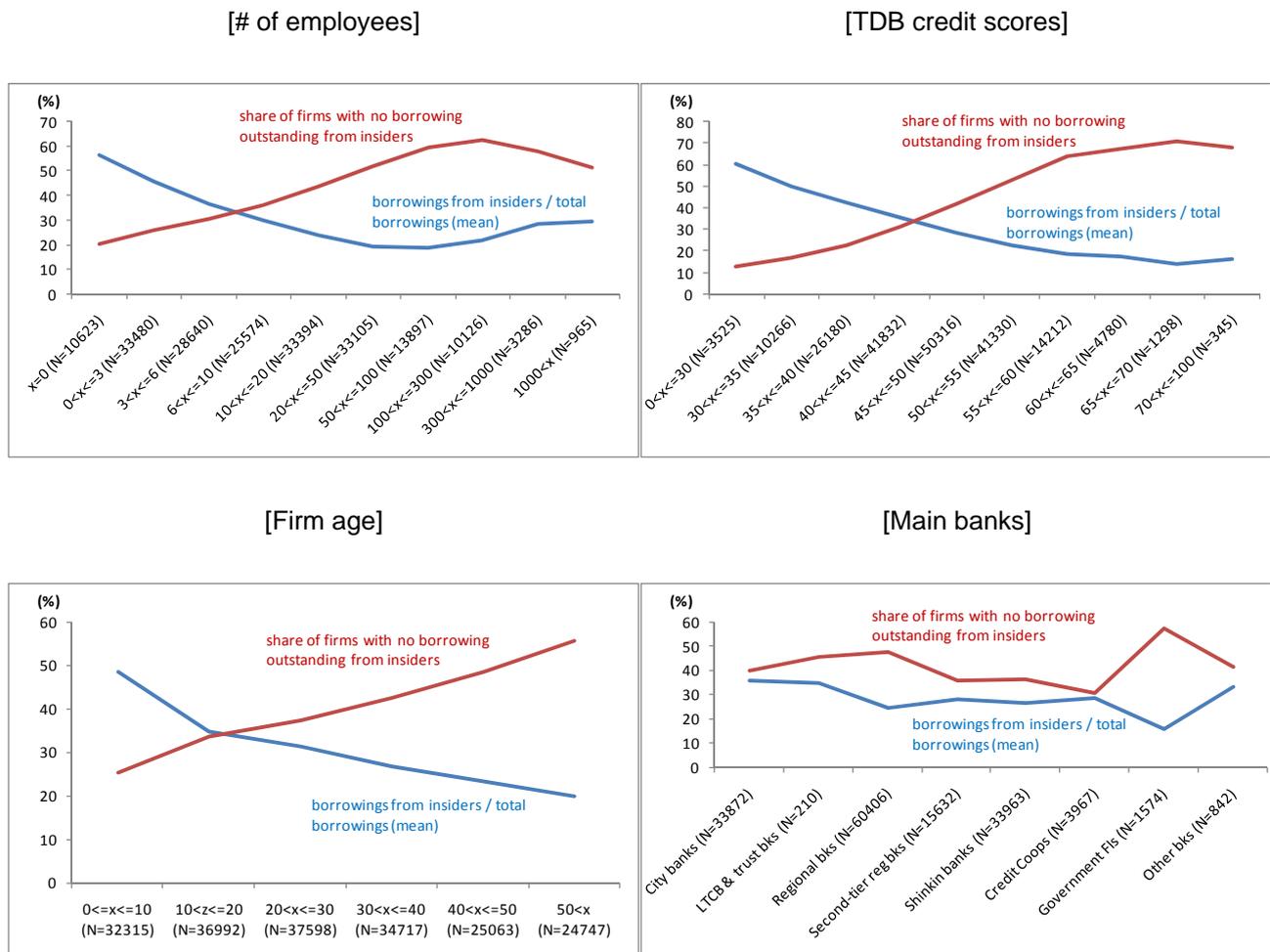
Finally, the percentage of firms with no borrowing outstanding is higher for firms whose main banks are city banks and LTCBs and trust banks, whereas it is lower for firms whose main banks are small financial institutions such as shinkin banks and credit cooperatives. This result is consistent with the casual observation that larger firms tend to rely on internal funds such as operational cash flows rather than debts. The figure also suggests that financial products and services that client-firms appreciate the most can vary depending on the type of their main banks. For instance, larger firms that have main bank relationships with city banks might think the provision of loans less important than other financial products and thus tend not to borrow.

Figure 3-5. Percentages of firms with no borrowing outstanding: univariate analyses



Regarding borrowing from insiders (representatives, executives, and affiliates), Figure 3-6 shows the percentages of firms with no borrowing outstanding and the ratio of borrowing from insiders to total borrowing (in mean). The figure shows that smaller, riskier, and younger firms tend to depend more heavily on loans from insiders, although the large firms are slightly more dependent on insider-financing than mid-sized firms, presumably because of loans from affiliates. Firms whose main banks are government financial institutions are less dependent on insider financing.

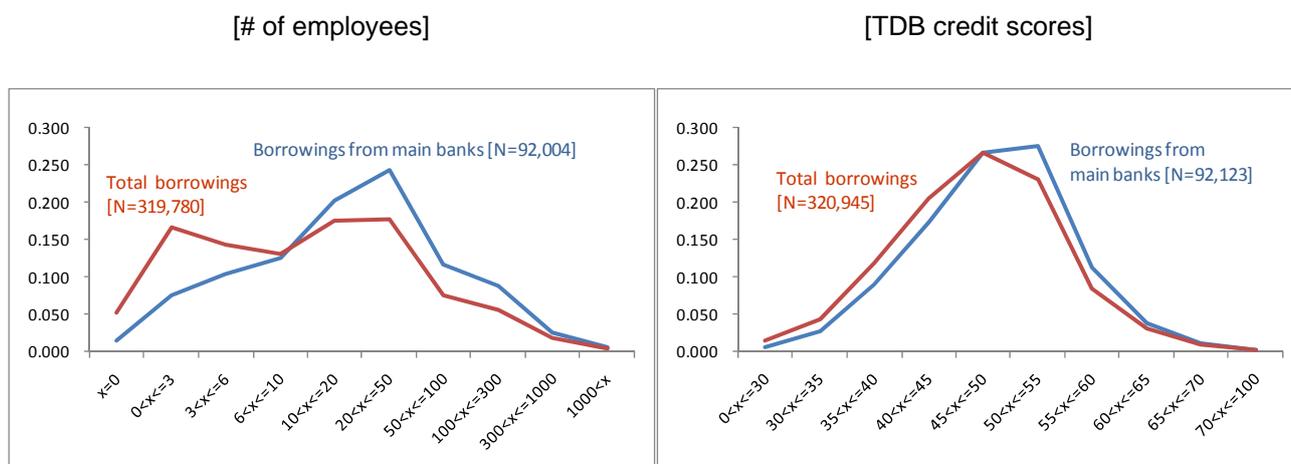
Figure 3-6. Percentages of firms with no borrowing outstanding from insiders: univariate analyses



3.3.2. Borrowing from main banks

Where possible, the TDB identifies financial institutions that a firm transacts with, including both main bank(s) and non-main banks, and the amount of borrowing outstanding from each financial institution. Regarding the amount of borrowing outstanding from main banks, the number of firms available for the analysis is 92,304 after dropping 0.1% tails observations. This is less than one-third of the number of observations that we can obtain for the amount of total borrowing (N=323,162), and there might be a concern for a sample selection bias. Figure 3-7 compares the distribution of two groups: the one where we can identify the amount of borrowing from main banks and the other where the total borrowing amount is identified. Clearly, the size of the firm and TDB credit scores are skewed toward the right in the former group, implying firms whose borrowing amount from main banks are identified are larger and more creditworthy.

Figure 3-7. Distribution of firms with borrowing from main banks



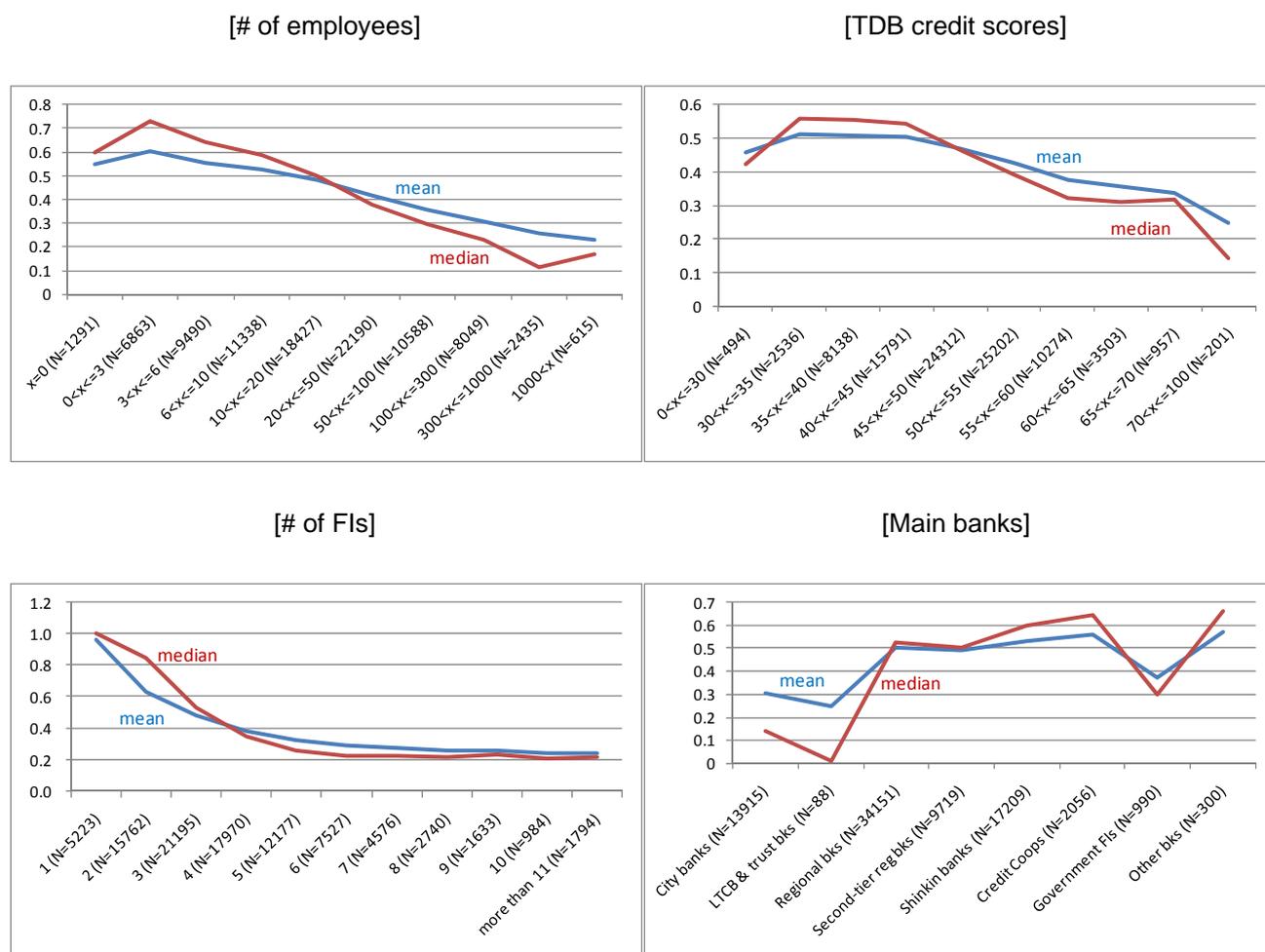
The mean and median values of the amount of borrowing outstanding from main bank(s) are 3.53 billion yen and 50 million yen, respectively. If we drop outliers (0.1% tail), the mean value is 274 million yen. More importantly, 31.5% of these firms do not have any borrowing outstanding from their main banks. On the other hand, the percentage of firms that do not borrow at all from any financial institution is only 0.3%, implying there are many firms that have lending relationships with only non-main banks. This sounds peculiar, given that the main bank is defined as the bank that provides loans for working capital to a firm. Although we cannot pin down the decisive reason for this discrepancy, there are several possible explanations. First, even if a firm does not borrow at all from its main bank, a firm might set up credit lines (including overdraft) and revolving mortgages with the main bank, as we will see in Section 4. Second, firms might not define their main banks solely by lending relations. It might be the case that firms take into account all financial transactions such as deposit-relations, or that they define main banks as ones that they think most trustworthy in times of difficulty.

Within the firms available for the analysis, we compute the concentration ratio of main banks, defined as the firm's borrowing amounts from the main bank(s) divided by the borrowing amounts from all financial institutions. The mean and median of the concentration ratio are 45% and 42.9%, respectively (N=91,610). The mean concentration ratio for short-term loans is 19.6%, whereas it is 26.5% for long-term loans. Looking at the distribution of the total borrowing concentration ratio, it is highly bipolarized. The percentage of firms without any borrowing outstanding is 31.2% as noted above, whereas the percentage of firms that depend almost exclusively on main banks (that is, whose concentration ratio is 95–100%) is 20%.

Conducting univariate analyses of the borrowing concentration ratio of the main bank, we find the following (Figure 3-8). First, smaller firms (in terms of number of employees) tend to depend on their main banks more heavily than larger firms. Looking at the percentage of firms that have no loans outstanding from main banks, the percentage is 22% for firms with less than 4 employees, while it is 45.1% for firms with more than 300 employees. Second, the concentration ratio is higher for firms with lower TDB credit scores, implying creditworthy firms depend less on their main bank. This ratio partly reflects the tendency that creditworthy firms do not borrow at all (Figure 3-5). Third, somewhat obviously, the concentration ratio is

negatively associated with the number of financial institutions that a firm transacts with. However, for firms that have relations with more than five financial institutions, there is little difference. Finally, firms whose main banks are large banks (city banks or LTCBs and trust banks) depend less on borrowing from their main banks, whereas firms that have main bank relations with regional financial institutions (including shinkin banks and credit cooperatives) tend to rely on their main banks more heavily. The borrowing concentration ratio is also small for firms whose main banks are government financial institutions.

Figure 3-8. Borrowing concentration ratio of main banks: univariate analyses



3.4. Transactions between firms and financial institutions: Bills discounted and deposits

3.4.1. Total amount of bills discounted and time deposits

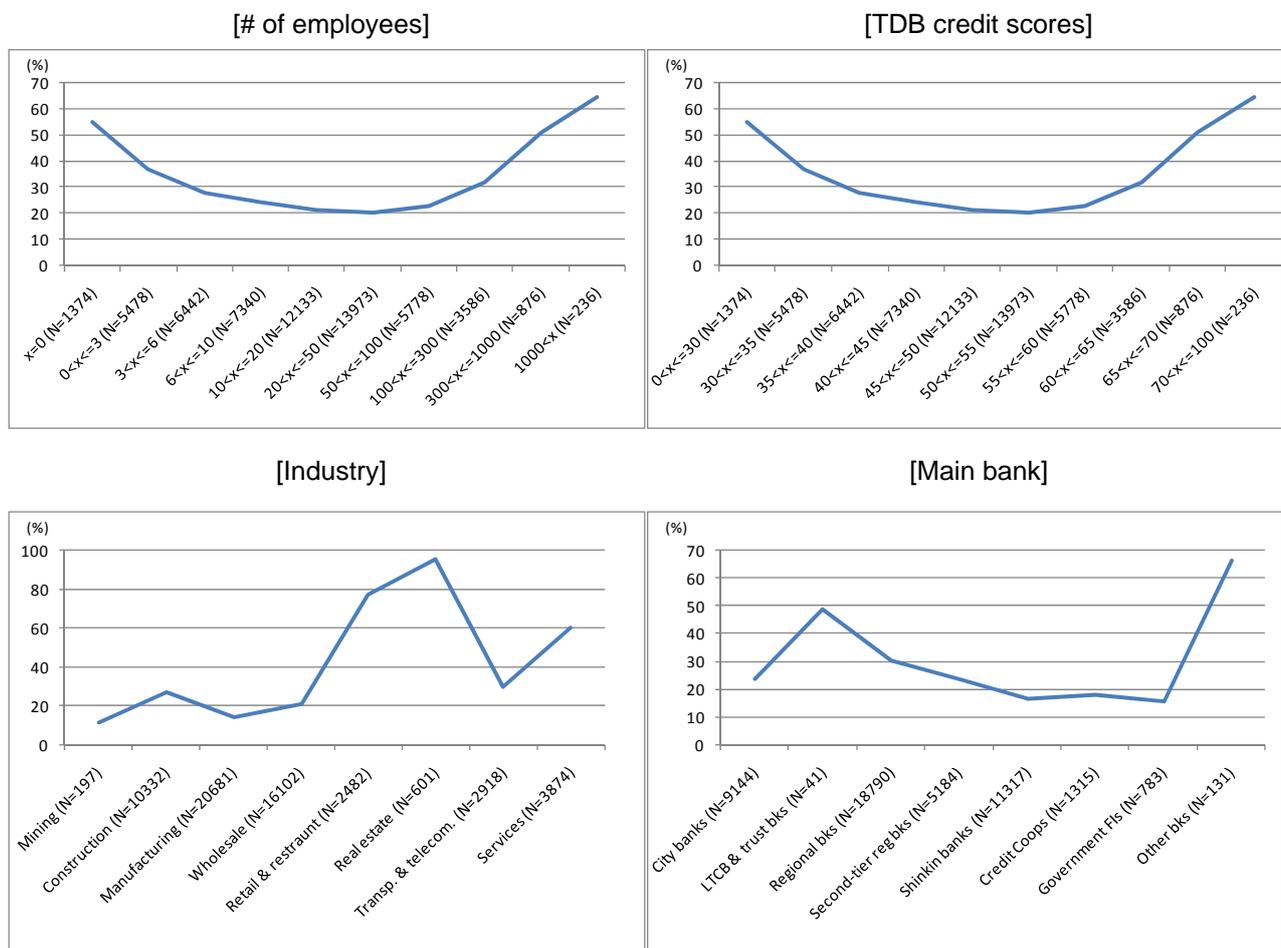
Bills discounted (*tegata-waribiki*) is a traditional method for short-term financing in Japan.⁴ A firm asks a bank to buy bills it has received from buyers of its products (drawers of bills) at a discounted price with recourse. When the drawer of a bill fails to make payments, the firm is obliged to repay the bill.

⁴ It should be noted, however, that the use of bills discounted might not be a prevalent way of financing today. Uchida et al. (2010) show that the use of bills themselves is in decline, presumably because of high transactional costs including stamp taxes.

For a limited number of firms, the TDB database contains the amount of bills discounted. The sample size is 57,538 (57,423 if we drop firms that fall into 0.1% tails of the entire distribution), which is less than one-fifth of the sample size for the borrowing amount. The mean and median amounts of bills discounted are 221 million yen and 14 million yen, respectively. The mean value is 60 million yen if we exclude outliers from the sample.

In our sample, 26.1% of the firms do not use bills discounted at all. Figure 3-9 shows how the non-use of bills discounted is related to firm characteristics. Regarding the firm size, the ratio is U-shaped and both small and large firms tend not to use bills discounted. Similarly, firms with the lowest and the higher credit scores are non-users. Regarding firms' industry, bills discounted is used by most manufacturing firms (the percentage of non-users is 14.3%), whereas it is rarely used in real estate (95.3%) and retail & restaurant (77.0%). Consistent with these findings, Uchida et al. (2010) show that the ratio of firms that use promissory bills as a means of payment is also inversely U-shaped with respect to the size and the TDB credit score of firms, and is higher for manufacturing. Relatedly, the percentage of non-user firms is low in Osaka (6.0%) and Aichi (2.9%) where both large and small manufacturing firms are agglomerated. Finally, firms whose main bank is either a shinkin bank, a credit cooperative, or a government financial institution use bills discounted more than firms whose main bank is a large bank such as a city bank.

Figure 3-9. Percentages of firms with no outstanding for bills discounted: univariate analyses



On the deposit transaction with financial institutions, the sample size is also very small, 51,323 (51,220 without firms that belong to 0.1% tails). The mean and median amounts of time deposits outstanding are 627 million yen and 25 million yen, respectively. The mean becomes 134 million yen if we exclude outliers from the sample.

For time deposits, the ratio of non-users is 13.8%. The ratio is higher for both the smallest and the largest firms (U-shape), and higher for firms with lower credit scores (results not reported). The latter might indicate that liquidity constrained firms (and hence with low credit scores) do not have time deposits outstanding.

Table 3-4 compares the average amount of borrowing, bills discounted, and time deposits. Although direct comparison is hard to make because numbers of observations significantly differ among these variables, we can infer that the average amount is the largest for borrowing.

Table 3-4. The amount of borrowing, bills discounted, and time deposits

	(million yen, except N)							
	N	mean	sd	min	p1	p50	p99	max
Borrowing from FIs	306,295	2,460	245,000	0	0	72	7,490	78,700,000
(w/o 0.1% tails)	(305,669)	(512)	(3,240)	(0)	(0)	(72)	(6,870)	(140,000)
Bills discounted	57,538	221	14,500	0	0	14	832	3,000,000
(w/o 0.1% tails)	(57,423)	(60)	(194)	(0)	(0)	(14)	(770)	(5,000)
Time deposits	51,323	627	63,600	0	0	25	1,800	14,000,000
(w/o 0.1% tails)	(51,220)	(134)	(683)	(0)	(0)	(25)	(1,640)	(25,100)

3.4.2. Transactions with main banks

Table 3-5 presents summary statistics for the amount of bills discounted and time deposits outstanding that a firm has with its main bank(s). For the sake of comparison, summary statistics for borrowing are also presented. The number of observations for main bank transactions is very limited, about 37,000, for both bills discounted and time deposits. Similar to what we find in Table 3-4, the average amount is the largest for borrowings outstanding.

Table 3-5 also compares the concentration ratio of three transactions. As we noted in subsection 3.2.1., the primary definition of the main bank in the TDB credit reports is based on lending relationships. However, the average concentration ratio of transactions with the main bank is the largest for time deposits (65.8%) and the smallest for borrowing (45.0%)⁵. These ratios seem to contradict the TDB's formal definition of the main bank.

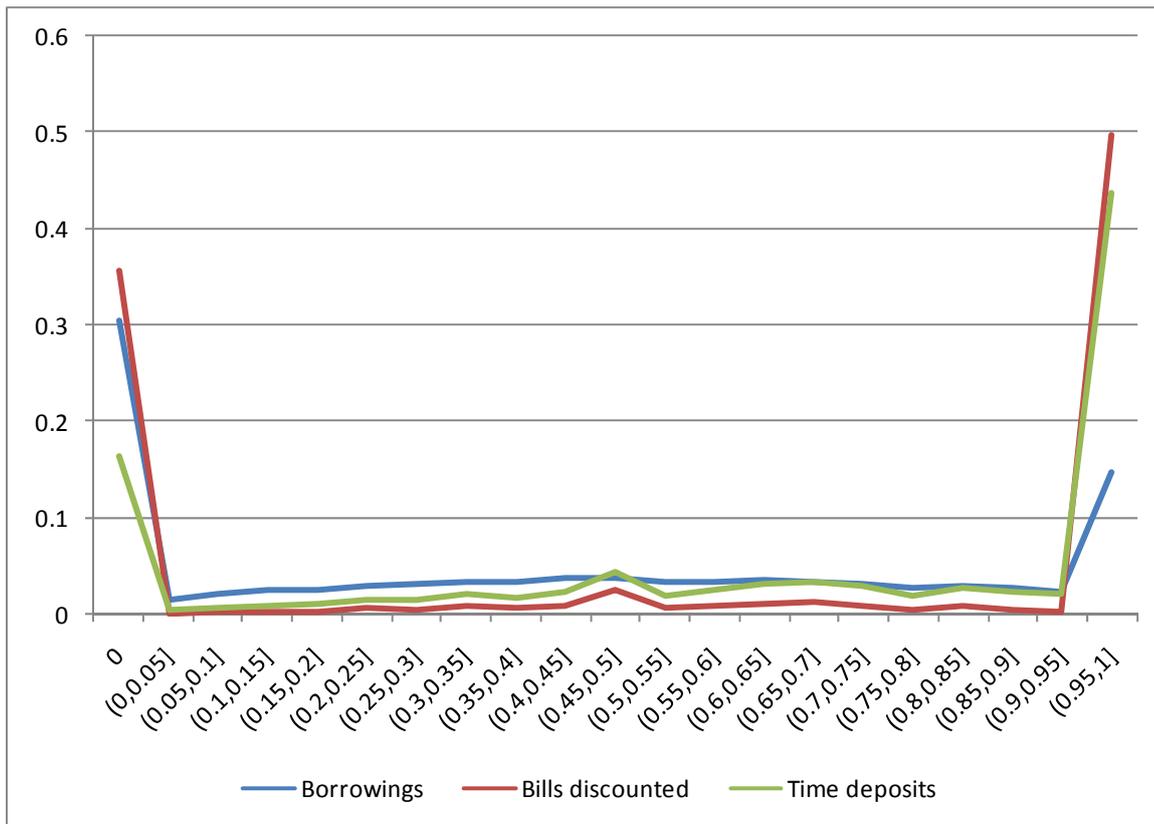
⁵ For the sake of direct comparison, we also compare the concentration ratios among firms for which we can obtain all three transactions (N=4,950). The mean concentration ratio is 52.8% for borrowing, 59.4% for bills discounted, and 60.6% for time deposits, respectively.

Table 3-5. Transactions with main banks: amount and concentration ratio

Transactions w/ main banks	N	mean	sd	min	p1	p50	p99	max
<i>Amount (in million yen)</i>								
Borrowings	92,489	3,530	424,000	0	0	50	3,810	81,900,000
(w/o 0.1% tails)	(92,304)	(274)	(1,450)	(0)	(0)	(50)	(3,500)	(63,000)
Bills discounted	36,810	149	16,100	0	0	6	359	3,000,000
(w/o 0.1% tails)	(36,737)	(29)	(73)	(0)	(0)	(6)	(350)	(1,350)
Time deposits	36,927	188	15,000	0	0	15	630	2,730,000
(w/o 0.1% tails)	(36,854)	(55)	(143)	(0)	(0)	(15)	(600)	(4,000)
<i>Concentration ratio (%)</i>								
Borrowings	91,733	0.450	0.396	0.000	0.000	0.429	1.000	1.000
(w/o 0.1% tails)	(91,610)	(0.450)	(0.396)	(0.000)	(0.000)	(0.429)	(1.000)	(1.000)
Bills discounted	36,025	0.575	0.463	0.000	0.000	0.908	1.000	1.000
(w/o 0.1% tails)	(35,952)	(0.575)	(0.463)	(0.000)	(0.000)	(0.907)	(1.000)	(1.000)
Time deposits	36,520	0.658	0.384	0.000	0.000	0.808	1.000	1.000
(w/o 0.1% tails)	(36,447)	(0.659)	(0.384)	(0.000)	(0.000)	(0.808)	(1.000)	(1.000)

To investigate this point further, Figure 3-10 compares the distribution of main bank concentration ratios. Distributions are all highly bipolarized, although the degree of bipolarization differs. It is most acute for bills discounted, as the percentage of firms that have positive bills discounted outstanding but do not use main banks (that is, the concentration ratio is zero) is 35.6%, whereas almost half (49.7%) of the firms exclusively rely on main banks (concentration ratio is 95–100%). The distribution of time deposits is asymmetric in the sense that the percentage of firms that have no time deposits outstanding with main banks (16.5%) is much smaller than the percentage of entirely main-bank-dependent firms (43.8% for firms with the concentration ratio equal to 95–100%). In contrast, the percentage of firms with no borrowing from main banks (30.4%) is higher than the percentage of main-bank-dependent firms (14.7%). Note also that, for time deposits, the percentage of firms whose concentration ratio is 50–95% is larger than the percentage of firms whose concentration ratio is 5–50%; the former is 22.9% whereas the latter is 16.9%. As a result, average main bank concentration ratio for time deposits is the highest among the three transactions.

Figure 3-10. Distribution of the main bank concentration ratio



To summarize, we find that the concentration of main bank relationships is the largest for deposit transactions. Although the literature on relationship banking mostly focuses on lending relationships, our finding suggests that future research on relationship banking in Japan should also seriously take into account deposit transactions. Worthwhile issues for further studies to investigate would be the determinants of the concentration ratio of main banks, and how they differ depending on the type of transactions.

We also conduct univariate analyses of the concentration ratio of main banks for bills discounted and time deposits, and we obtain the following findings (results not reported) that are very similar to what we find in the borrowing concentration ratio in Figure 3-8: concentration ratios are larger for smaller and riskier firms, for firms that transact with a smaller number of financial institutions, and firms whose main banks are shinkin banks and credit cooperative.

4. Collateral

This section presents the description of the TDB data regarding collateral.

4.1. Laws on secured transactions

Before reporting the statistics, we first describe the laws on secured transactions that are relevant for the

empirical analyses that follow. It should be pointed out that the law on secured transactions has been much discussed and analysed since the 1980's under the strong influence of the law and economics approach. The discussions originated in the United States, where the revision of Article 9 of the Uniform Commercial Code was going on throughout the 1990's. After its revision was completed in 1999, the theory on secured transactions continued to influence the law reform in other countries, especially in developing countries and countries in transition. For instance, the World Bank repeatedly made arguments that the efficient reform of the law on secured transactions leads to improvement in the economic productivity of a country (World Bank, 2005). With these backgrounds, The United Nations Commission on International Trade Law (UNCITRAL) adopted the Legislative Guide on Secured Transactions in 2007 (UNCITRAL, 2010).

4.1.1. Assets that can be secured: movables and account receivables

As regards the law on secured transactions in particular, one of the main points of reform in the global context are the range of assets that can be secured (especially the possibility to create a secured interest in movables in possession of the debtor) with the clear and predictable priority rule (UNCITRAL, 2007). Under the Japanese law, both immovable and movable assets can be the subject of secured transactions. However, while the immovable assets (real properties) can be easily mortgaged and the priority of the mortgages is clearly publicized through registration, creating a security interest in movable assets is more complicated. The Civil Code provides that the movable asset can be the subject of pawn (pledge) but not of mortgage. The pledgor of pawn must give the possession of the asset to the pledgee, which is not practical in the case of commercial transactions. Account receivables are treated under the Civil Code in a similar way as movables and can be pledged by way of pawn.

The practice of transfer of movables by way of security emerged from the need for creating security interests in a more practical manner. The courts have affirmed the validity of the agreement for a transfer by way of security. They also admitted that the collective goods can be transferred by way of security as long as the goods are sufficiently specified in the agreement, as, e.g., "all of the stocks in warehouse no.2." The case law has treated the transfer by way of security in a manner consistent with its nature as the security interest. A recent Supreme Court decision went a step further and even affirmed the second-rank transfer by way of security, subordinated to the first transfer by way of security.

When the debtor is in default, the creditor's interest created by the transfer by way of security can be enforced privately, i.e., without resorting to the court, if the agreement so allows. The creditor can seize the goods and can dispose of them according to the agreement. It is because of this possibility for private enforcement that the transfer by way of security is preferred to the pledge (pawn) in the case of account receivables. However, in the case where the value of the transferred goods (or account receivables) exceeds the amount of the credit secured, the creditor must pay the difference to the debtor. This rule derives from the idea of treating the transfer by way of security consistently with its nature as a security interest.

4.1.2. Filing of security interests in movables and account receivables

With the aim of enhancing the effectiveness of transfer by way of security of stocks and account receivables, the filing system was introduced first as regards receivables in 1998 and then extended to movables in 2004. However, the filing under the Law on Special Rules to the Civil Code Concerning the Perfection of the Transfer of Movables and Receivables does not provide for the definitive priority to the creditor that filed its interest. It merely has an evidentiary value that is equivalent to that of the physical possession. It neither ensures that the absence of the previous filing indicates the absence of a creditor protected by the preceding possession of the goods nor excludes the possibility that a third party appears after the filing, takes possession of the goods, and is protected as a bona fide acquirer. Also to be noted is the fact that the filing can be made only when the debtor (transferor) is a corporation. All these limitations of the filing indicate that the priority rule is not sufficiently clear and simple in Japan as regards the security interests in movables and account receivables (Kozuka and Fujisawa, 2009).

4.1.3. Enforcement of a security interest

Another focus of reform for secured transactions law is facilitating the enforcement of the security interest (UNCITRAL, 2007). It echoes the theoretical and empirical analyses in economics and the “law and economics” approach. For one, it has been argued that the security serves as the device to address the danger of opportunistic behavior (moral hazard) by the debtor, such as choosing risky projects and exerting insufficient managerial efforts, under the situation where lenders cannot observe the debtor’s actions after the loan is extended (Boot et al., 1991; Kanda and Levmore 1994; Stulz and Johnson, 1985; Triantis 1994). Another theory argues that the security serves as a screening or a signaling device. Bester (1985; 1987) theoretically shows that collateral can serve as a screening device to distinguish between borrowers and to mitigate the adverse selection problem when there is an ex ante informational asymmetry. Schwartz (1981) argues that security might be an effective “signal” for the debtor’s non-opportunistic behaviors, as security interests restrict future borrowing opportunities, give secured creditors greater leverage over firm behavior, and make it more difficult for a firm to reschedule debts in the event of hard times.

It should be noted, however, that whether the security can serve as an effective device depends on secured transactions law. If the enforcement of security interest is not easy in practice, its creation cannot be a credible commitment and the agency problem of the debtor remains. Under the Japanese law, the general rule, though not explicitly written in a statute, is that the mortgagee cannot foreclose the mortgage by itself. The enforcement procedure is administered by the court and implemented by the bailiff of the court. The sale of the mortgaged land is made through public auction, which tends to reduce the price realized by the enforcement procedure. Although the court and the bailiff in Japan are efficient and reliable, the requirement always subjecting the enforcement to the court procedure could limit the value of the security interest in mortgaged real property.

Similarly, in order to be an effective signal, the security interest must have a restrictive impact on the debtor, in particular as against future borrowing. It might be related to the priority given to the secured

creditor in insolvency proceedings. Under the Japanese law, secured creditors are generally given the priority viz-à-viz unsecured creditors. Still, the extent of the priority enjoyed by the secured creditor differs depending on the type of insolvency procedure. If it is bankruptcy, which is the procedure for liquidating the insolvent debtor, the secured creditor is not subjected to the procedure and the enforcement of its secured interest is not stayed by the commencement of the procedure. If, in contrast, the procedure is corporate reorganization that presumes the continuation of the debtor's business, the enforcement of the secured interest is stayed by the commencement of the procedure. Then the secured credit can be modified in its conditions or reduced in the amount according to the reorganization plan. The third type of procedure is civil rehabilitation, which is the procedure of debtor-in-possession and has the goal of enabling the debtor to continue its business without a change in management. The secured interest is not automatically stayed but is subject to the order of stay that the court has the discretion to issue. It can also be challenged for extinction in exchange for consideration when the secured asset is vital to the continuation of the business of the debtor. Thus the insolvency procedure in Japan is generally favourable to the debtor, which might reduce the meaning of security interest as a credible commitment.

4.1.4. Set-off

There are two other techniques that banks frequently rely on to protect their credit. The first is the set-off of their loans against the deposits in the current accounts. The right of set-off is reserved without exception in the standard contract for the current account, together with the acceleration clause in case of default by the firm. The courts have upheld the validity of set-off extensively. Under the current case law, a bank can collect its loans by exercising the right of set-off under a standard contract after calling up all the loans pursuant to the acceleration clause once the firm is in trouble and one of the listed events takes place. Therefore, credit for the daily operation of businesses, as opposed to a long-term loan for investment in a large amount, might not need to be protected by mortgage.

4.1.5. Personal guarantee

Another of the frequently used devices is the personal guarantee. It has long been customary for a bank to require the manager of the firm to offer a personal guarantee for the whole of the debts incurred by the company when extending a loan to small and medium companies. It is a blank guarantee without specifying the kind or amount of the guaranteed debt. Such reliance on a personal guarantee was necessary because incorporating a company had been relatively easy in Japan. Before 1992, the corporate law (then included in the Commercial Code) had no regulation as regards the minimum amount of capital for joint stock companies. The 1992 amendments introduced the minimum capital requirement of 10 million yen for every joint stock company but the requirement was again abandoned in 2005, subject to the restriction on distributing the dividends to shareholders when the net worth of the joint stock company is less than 3 million yen. As a result, it was easily foreseen that the managers of small and medium companies might divert the company's assets

The personal guarantee has a deterrent effect on such a possibility of diversion. However, against the

criticism that the blank guarantee could be abused, the Civil Code was amended in 2004. Under the amended Code, any guarantee without specification of the guaranteed debt must be for the term of five years or less. Therefore, it is suspected that the effectiveness of the personal guarantee in preventing the diversion of the company's assets by the manager has been reduced.

4.2. Data

Turning now to the data on collateral in the TDB database, they come from three sources of information. First, as a part of the research on firm-bank relationships that we report in Section 3, the TDB collects the information on what types of collateral a firm pledges for borrowing (Source 1). Second, the TDB also collects information on whether a firm registers its account receivables and inventories as collateral (Source 2). The number of observations from this source is quite small because the registration system on account receivables and inventories was set up very recently (1998 for account receivables and 2004 for inventories) in Japan, and they are rarely used as collateral since then. Third, and most importantly, the TDB database contains very detailed information on a firm's property registries (Source 3).

Although the rich information on collateral in the TDB database is remarkable in comparison with other databases in Japan, there are several caveats. First, except real estate registry data (Source 3), information on the secured lender of a particular type of collateral is not available. For instance, if a firm pledges its real estate to bank A and pledges securities to bank B, then the TDB database only shows us that the firm uses real estate and securities as collateral; we cannot identify secured lenders A for real estate and B for securities. Second, real estate registry data (Source 3) can suffer from several sample selection bias problems. The subject of credit research on real estate registries is mostly mid-sized and small businesses. For large firms with capital larger than 100 million yen and the number of employees larger than 100, the TDB conducts research on real estate registries based on customers' requests.⁶ Registries on a firm's headquarters and representative's residential real estate are always obtained, but the research on other real estate that a firm or its representative possesses is on demand. For representatives' real properties, residential mortgages as well as mortgages for business purposes are included.

4.3. Type of collateral

4.3.1. Composition

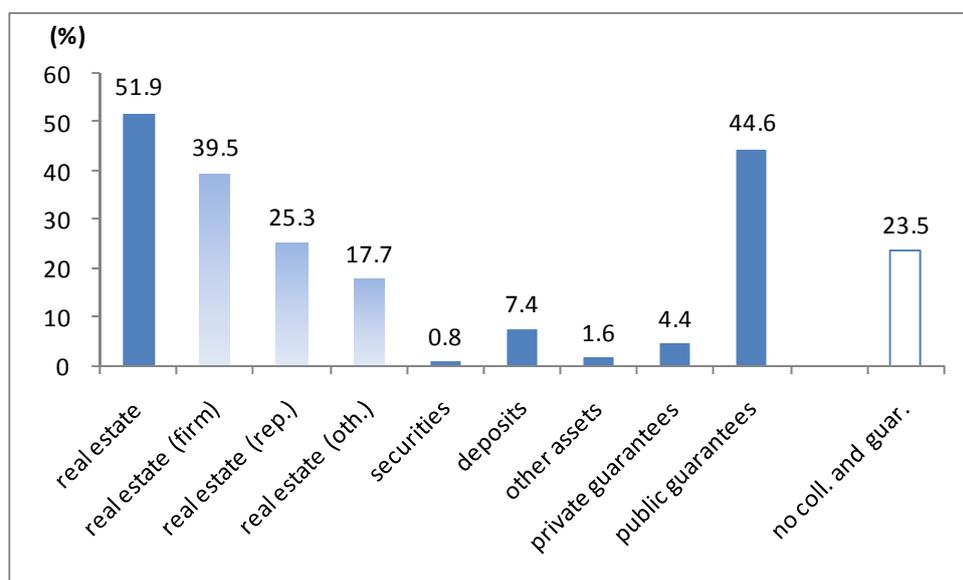
The TDB database contains information on whether a firm uses the following as securities (Source 1): real estate (either owned by a firm, real estate owned by representatives, or other real estate), securities, deposits, credit guarantees by private firms (such as parent companies and guarantee companies), government credit guarantees, and other assets (such as equipment, account receivables, and inventories). Note, however, that we do not have information on personal guarantees by individuals (representatives and executives), which

⁶ The percentage of firms with capital larger than 100 million yen in real estate registry data is about 3%, whereas it is 8% in our full sample. Similarly, the percentage of firms with the number of employees being larger than 100 in real estate registry data is about 6%, while it is 8% for the full sample.

are one of the most common forms of security in Japan.⁷

Figure 4-1 shows the percentage of firms that use each form of security (N=373,599). Of the total sample firms, 23.5% do not pledge any collateral or guarantees, and 51.9% pledge real estate as collateral. Among real estate, the property owned by a firm (that is, internal asset) is most widely used. A quarter of firms pledge representatives' properties (external assets) as collateral. Other than real estate, deposits are the second most frequently used. The prevalence of public credit guarantees is also noteworthy, as 44.6% of the total firms need securities by the government to obtain external debts.

Figure 4-1. The percentage of firms that pledge collateral and guarantees, by type of securities



In addition to Figure

4-1, for a limited number of firms, we have information on whether a firm registers its account receivables and inventories as collateral (Source 2).⁸ Because they are not mandatory items for the TDB researcher to cover, the number of observations (firms) is limited: 27,310 for account receivables and 27,280 for inventories.

Table 4-1 shows several figures for the use rate of account receivables and inventories as collateral, depending on various assumptions. In case 1, we exclude firms whose information on the registration for account receivables and inventories is not available. The percentages of firms that register account receivables and inventories as collateral are 3.3% and 0.9%, respectively. In case 2, we drop firms that are sole proprietorships in order to take into account the institutional constraint that sole proprietorships are not eligible for the registration systems (and yet classified as “0” in case 1). In comparison with case 1, the number of observations is nearly halved and the use rates nearly double. In cases 3 and 4, we assume firms that are classified as “N.A.” are “0,” meaning they do not register. The percentage of account receivables and inventories as collateral reduces to 0.2% and 0.1%, and these set the lower bounds. We suspect that the true

⁷ Ono and Uesugi (2009) shows that 66.7% of Japanese SMEs use personal guarantees.

⁸ In Figure 4-1, account receivables and inventories are included as “others.”

numbers lie somewhere between cases 1 and 3. The asset-based lending that uses account receivables and inventories as collateral is widely expected to augment lending technologies to businesses in Japan, but its usage is rare so far. Looking at the characteristics of firms that register account receivables and inventories, larger firms are more likely to pledge them as collateral. For instance, the percentage of firms that register account receivables is 2.5% (in case 3) for firms whose number of employees exceeds 300, whereas it is 0.2% for firms with the number of employees less than 300.

Table 4-1. The percentage of firms that pledge account receivables and inventories as collateral

		N	use rate (%)
Case 1:	account receivables	27,310	3.26
Exclude N.A.	inventories	27,280	0.91
Case 2:	account receivables	14,230	6.25
Exclude N.A. & sole proprietorship	inventories	14,200	1.75
Case 3:	account receivables	386,826	0.23
Include N.A. as 0	inventories	386,826	0.06
Case 4:	account receivables	373,707	0.24
Include N.A. as 0 & exclude sole propitirship	inventories	373,707	0.07

Combining information from Source 1 and Source 2, Table 4-2 presents the combination of assets jointly pledged. For account receivables and inventories, we use figures assuming “N.A.” is equivalent to zero (as in case 3 in Table 4-1).⁹ For example, in the first line of real estate owned by firms, there are about 345,000 cases where a firm’s real estate is pledged, and for 42.8% of all the cases, it is solely pledged. A firm’s real estate and representatives’ real estate are jointly pledged in 16.8% of all the cases. For each line, figures add up to 100%.

Table 4-2 again confirms that real estate, especially that owned by a firm itself, is the most widely used asset for collateral, either solely or jointly with other assets or credit enhancements. It is also interesting that, in cases where public guarantees are provided (last line), no physical properties are pledged as collateral in nearly half of all the cases.

Table 4-2. Cross-table for the percentage of collateral

	N	real est. (firm)	real est. (rep.)	real est. (oth.)	sec.	dep.	other assets	account rec.	invent.	public guar.	total
real estate (firm)	345,356	42.8%	16.8%	12.4%	0.6%	4.4%	0.9%	0.1%	0.1%	22.0%	100.0%
real estate (representatives)	255,987	22.6%	36.9%	14.8%	0.2%	2.9%	0.4%	0.1%	0.0%	22.0%	100.0%
real estate (others)	191,235	22.4%	19.8%	34.6%	0.2%	2.7%	0.4%	0.1%	0.0%	19.7%	100.0%
securities	8,093	25.5%	5.7%	5.3%	34.9%	10.5%	6.9%	1.3%	0.2%	9.7%	100.0%
deposits	71,287	21.2%	10.6%	7.4%	1.2%	39.0%	1.1%	0.2%	0.1%	19.4%	100.0%
other assets	14,341	21.3%	7.3%	5.1%	3.9%	5.6%	40.7%	1.6%	0.6%	13.9%	100.0%
account receivables	2,554	17.3%	7.8%	5.2%	4.2%	4.7%	8.7%	34.1%	3.7%	14.1%	100.0%
inventories	961	18.7%	8.8%	6.9%	1.5%	4.9%	9.2%	9.9%	25.6%	14.6%	100.0%
public guarantees	353,865	21.5%	15.9%	10.7%	0.2%	3.9%	0.6%	0.1%	0.0%	47.1%	100.0%

⁹ Qualitative results stated in the text hold when we drop observations in which the data for account receivables and inventories are not available (results not reported).

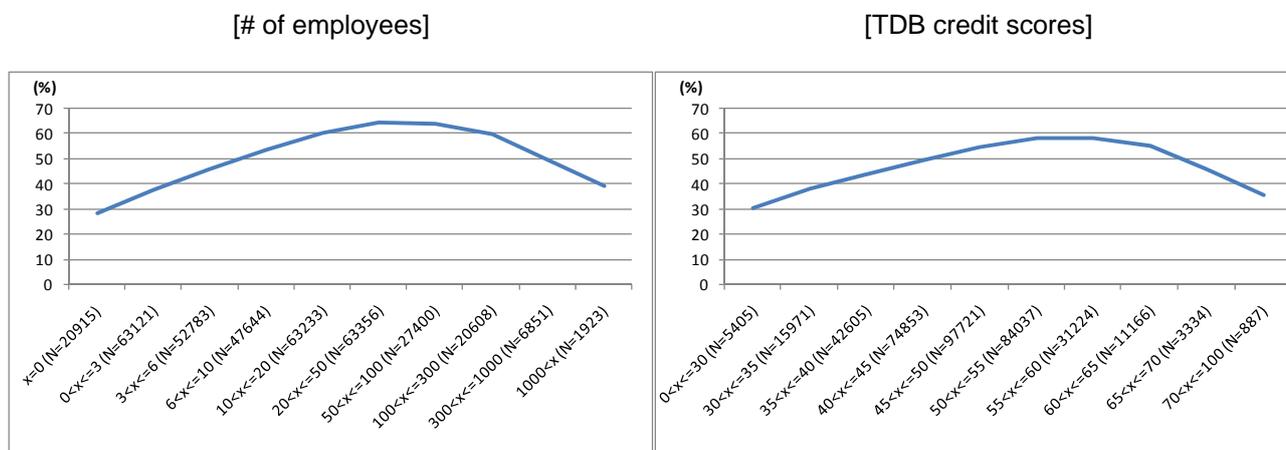
4.3.2. Univariate analyses

Figure 4-2 presents univariate analyses for the percentage of firms that use real estate collateral, the most representative form of collateral in Japan. Interestingly, the percentage is not monotonically associated with the size of a firm or a firm's credit risk. With respect to the firm size, the use rate increases with the number of employees until it is 50–100, and then decreases. The figure for the TDB credit score is also inversely U-shaped, and reaches the maximum when the score is 50–55. One possible interpretation would be that smaller and riskier firms do not have pledgeable real estate, whereas larger and more creditworthy firms do not need any security in obtaining loans. Regarding the industry of firms (figure not presented), manufacturing (66.3%) and real estate (61.5%) firms are more likely to pledge properties, whereas firms in the service industry (34.9%) are less likely to do so.

There is a positive relation between the use rate of real estate collateral and the number of financial institutions that a firm transacts with. This partly reflects the tendency that larger firms are more likely to pledge real estate and transact with a larger number of financial institutions. Possibly, it might also be because a firm that transacts with a larger number of financial institutions has less intimate relationships with the main bank, and thus is likely to obtain loans by securing them with real estate. Finally, the use rate of real estate collateral is roughly 40% for firms whose main bank is a large bank such as a city bank or a LTCBs and trust bank, while it is more than 60% for firms who have main bank relationships with regional and cooperative financial institutions. It is also noteworthy that less than 80% of firms whose main banks are government financial institutions pledge real estate.

Regarding the use of representatives' personal real estate as collateral (use ratio for the total sample: 25.3%), the percentages of firms that pledge personal real estate are higher for sole proprietorships (42.4%), unlimited liability partnership companies (48.3%), owner-managed firms whose majority of capital stock is held by someone with the same surname as the representative (30.5%), and firms whose main banks are credit cooperatives (40.3%).

Figure 4-2. Percentages of firms that pledge real estate: univariate analyses



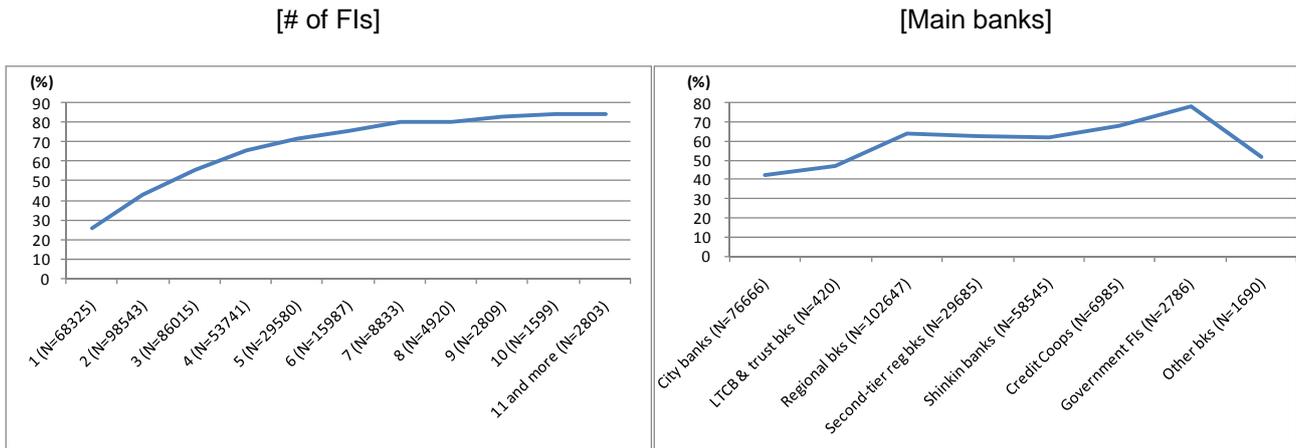
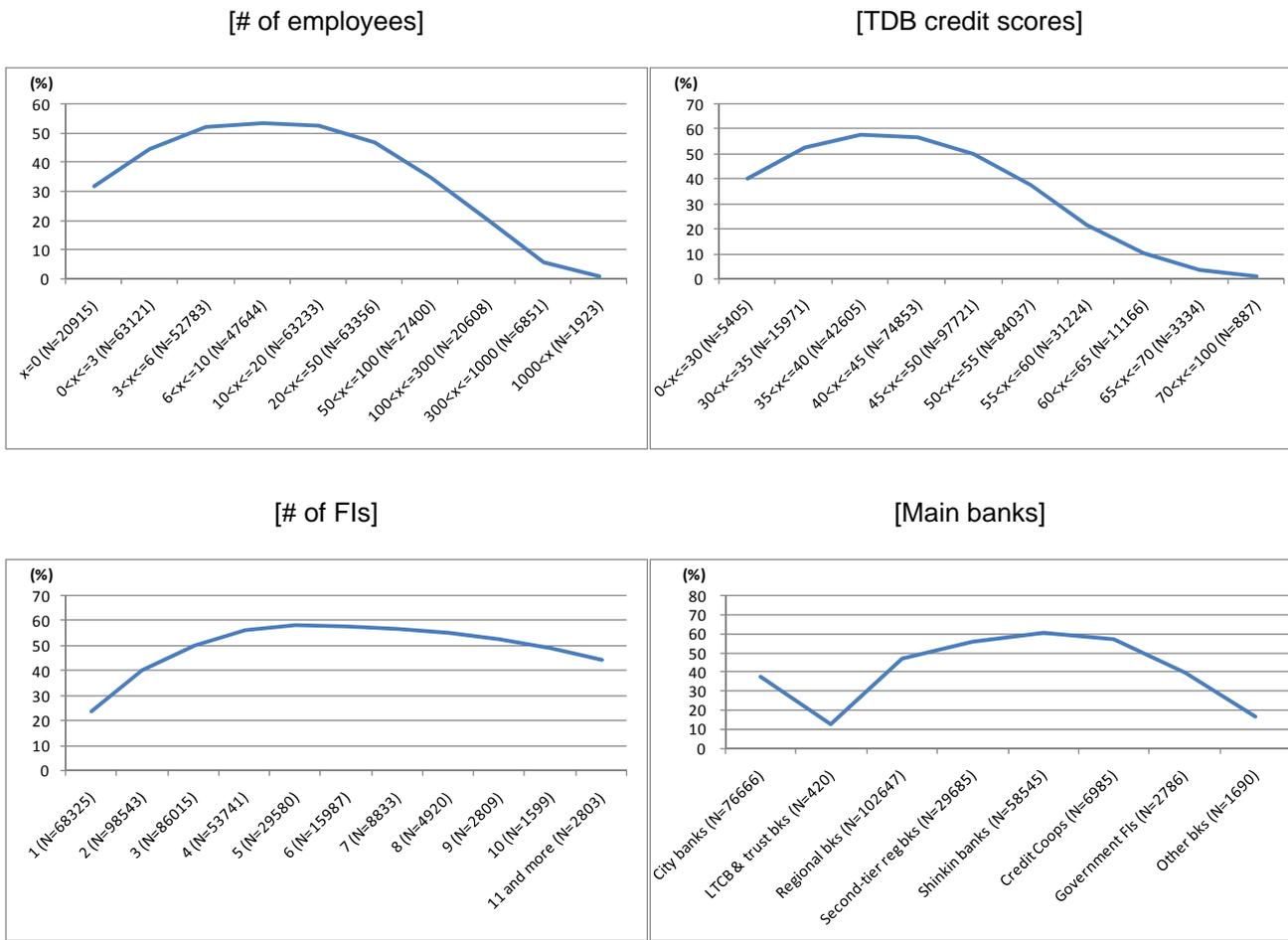


Figure 4-3 presents similar analyses for public credit guarantees. Compared with real estate collateral in Figure 4-2, the use of public guarantees is concentrated for smaller and riskier firms, although the percentages of the smallest and riskiest firms are somewhat lower. In terms of industry, 54.8% of construction firms use public guarantees. Use rates are also higher for firms whose main banks are either shinkin banks or credit cooperatives.

Figure 4-3. Percentages of firms that use public credit guarantees: univariate analyses



4.4. Real estate collateral

This section provides a detailed description of real estate collateral by using information obtained from real estate registries (Source 3). As noted in subsection 4.1, not all firms are subject to credit research by the TDB on real estate registries, and the composition of sample firms is skewed toward mid-sized and small firms. Note also that properties that a firm owns include its representative's residential properties.

4.4.1. Number of properties, mortgaged properties, and secured loans

Among 310,058 firms, the average number of properties that a firm owns is 8.8 in mean and 6 in median (Table 4-3, upper table). Because land and buildings are counted separately in real estate registries in most cases, the value two effectively means one.¹⁰ Looking at the distribution, the most frequent observation (mode) is two (17.3%) and the second one is four (9.7%). Presumably, less than 20% of firms only have one property, either the headquarters or the representative's residential real estate, and about 10% of firms have two properties, both the headquarters and the representative's residential real estate. Note, however, that the percentage of the number of properties equal to or less than four is overestimated, because the research on other properties might not be conducted even when a firm possesses them.

Out of 310,058 firms, 257,829 firms have at least one property on which a mortgage exists (mortgaged property). The mean and median numbers of mortgaged properties per firm are 7.4 and 5, respectively (Table 4-3, middle table). Taking the ratio of the number of mortgaged properties to the number of properties owned, the average is 78.3% in mean and 86.7% in median, implying 78–87% of the properties that a firm owns serve as collateral on average (Table 4-3, lower table). For 39.6% of the total firms, the ratio is 100%; that is, all the properties that the firms possess are pledged to lenders. Note that in the case of residential real estate, the figure might include both mortgages for business loans and residential loans.

¹⁰ In cases where land and building are not separable (for example, an apartment), it is counted as 1 real estate.

Table 4-3. Number of properties and mortgaged properties per firm

# of properties	N	mean	sd	min	p1	p50	p99	max
	310,058	8.849	9.167	1	1	6	44	257
Distribution	1	2	3	4	5	6	7	8
Freq.	5,053	53,572	26,118	30,028	24,753	22,166	19,395	17,595
(% share)	(1.63)	(17.28)	(8.42)	(9.68)	(7.98)	(7.15)	(6.26)	(5.67)
	9	10	11-20	21-30	more than 30			
Freq.	14,488	12,511	59,990	15,262	9,127			
(% share)	(4.67)	(4.04)	(19.35)	(4.92)	(2.94)			
# of mortgaged properties	N	mean	sd	min	p1	p50	p99	max
	257,829	7.436	8.336	1	1	5	40	238
Distribution	1	2	3	4	5	6	7	8
Freq.	17,275	49,203	27,873	26,406	20,813	17,727	14,661	12,157
(% share)	(6.70)	(19.08)	(10.81)	(10.24)	(8.07)	(6.88)	(5.69)	(4.72)
	9	10	11-20	21-30	more than 30			
Freq.	9,929	8,357	38,447	9,275	5,706			
(% share)	(3.20)	(2.70)	(12.40)	(2.99)	(1.84)			
# of mortgaged properties / # of properties	N	mean	sd	min	p1	p50	p99	max
	257,829	0.783	0.245	0.009	0.143	0.867	1.000	1.000

The mean and median numbers of secured loans per firm are 3.3 and 2, respectively (N=258,012, Table 4-4 upper table). Note that this is different from the number of secured creditors (in subsection 4.3.2), because a bank can have several security interests in the same firm. We can distinguish two types of secured loans (mortgages): revolving mortgages and non-revolving mortgages.¹¹ Revolving mortgages are typically used when a firm obtains working capital loans continuously from the same bank so as to save burdensome registration costs. Among 861,976 mortgages, 72.5% are revolving. In terms of the industry that a firm belongs to, manufacturing (77.8%) and wholesale (75.6%) firms have a higher use ratio for revolving mortgages, whereas the ratio is relatively smaller in service (64.6%) and construction (68.9%) industries. Regarding mortgagees, revolving mortgages are extensively used by city banks (92.9%), regional banks (87.9%), and second-tier regional banks (86.3%). In contrast, use ratios for revolving mortgages for government financial institutions (56.6%), non-banks (43.8%), and nonfinancial firms (43.7%) are relatively smaller.

31.0% of the total sample firms incur only one secured loan and 22.8% of the firms have two secured loans (Table 4-4). Compared with the distribution for the number of mortgaged properties per firm (Table 4-3 middle table), the number is smaller. For instance, the percentage of firms that have only one secured loans, 31.0%, corresponds to the percentage of firms that have either one or two mortgaged properties if effectively one property is pledged for one loan (note again that land and building are counted separately). However, the

¹¹ To be precise, the TDB database also distinguishes whether mortgages are provisionally registered or not. Because the number of observations for provisional registrations is small, we ignore whether the mortgage is provisionally registered or not.

sum of percentages for firms that have one or two mortgaged properties is 25.8%. This implies that the number of properties per secured loan is larger than two (effectively unity). Indeed, the average number of properties per secured loan is 5.5 in mean and 3 in median, although the mode is 2 (Table 4-4 middle table, N=840,898).

As the inverse of the number of mortgaged properties per secured loan, we can also calculate the number of secured loans per property (Table 4-4 lower table, N=2,743,604). Note that the value is zero for 30.4% of the total properties, meaning they do not serve as collateral. The percentage of one secured loan per property is 36.6%, whereas that of multiple secured loans per property is 33%.

Table 4-4. Number of secured loans per firm, mortgaged properties per secured loan, and secured loans per property

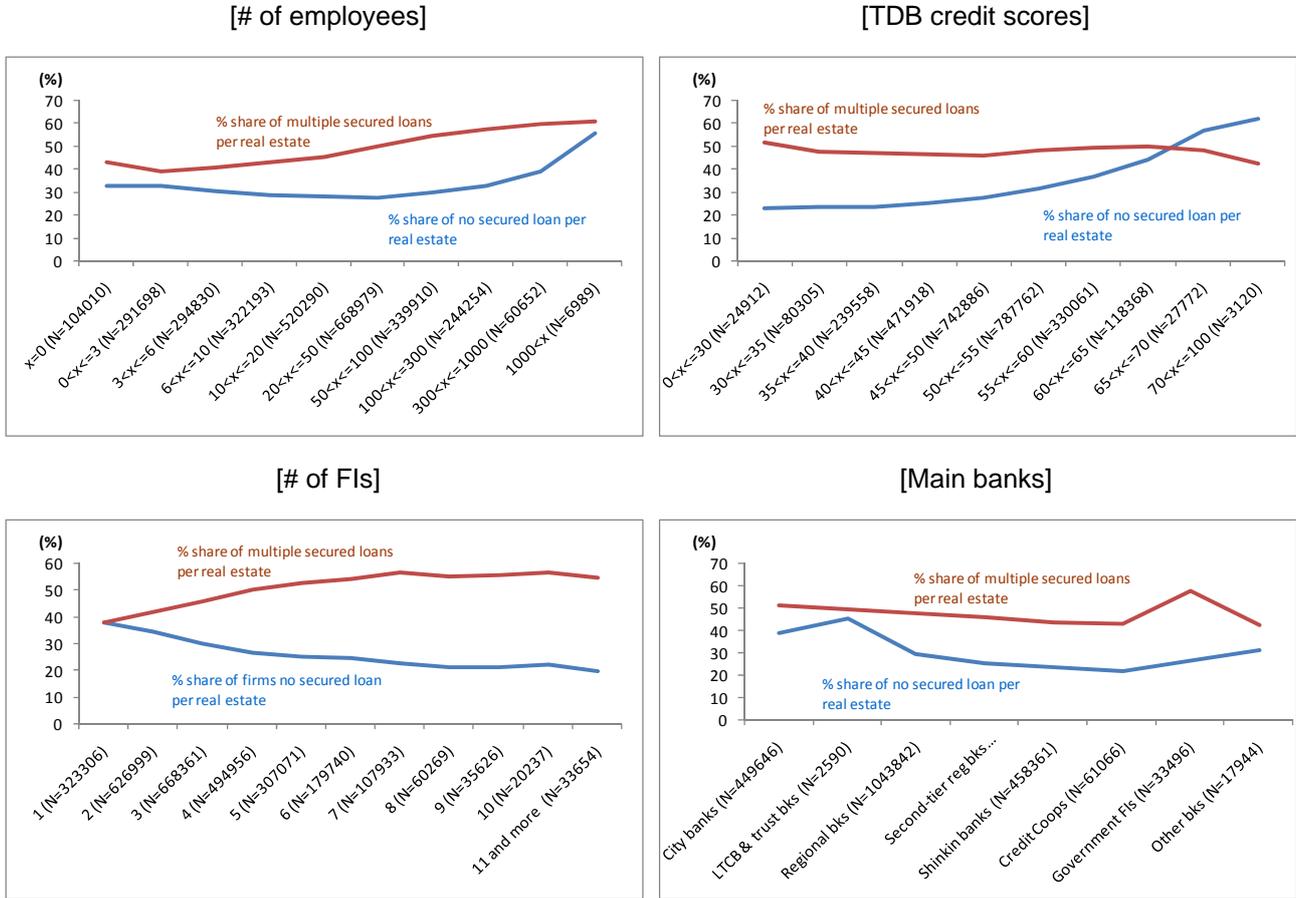
# of secured loans per firm	N	mean	sd	min	p1	p50	p99	max
	258,012	3.260	3.120	1	1	2	15	134
Distribution	1	2	3	4	5	6	7	8 and more
Freq. (% share)	80,025 (31.02)	58,826 (22.80)	38,611 (14.96)	24,952 (9.67)	16,725 (6.48)	11,132 (4.31)	7,773 (3.01)	19,968 (7.74)
# of mortgaged properties per secured loan	N	mean	sd	min	p1	p50	p99	max
	840,898	5.499	11.162	1	1	3	37	1,076
Distribution	1	2	3	4	5	6	7	8 and more
Freq. (% share)	82,483 (9.81)	248,322 (29.53)	137,634 (16.37)	89,476 (10.64)	61,263 (7.29)	43,271 (5.15)	31,759 (3.78)	146,690 (17.44)
# of secured loans per property	N	mean	sd	min	p1	p50	p99	max
	2,743,604	1.485	2.061	0	0	1	9	132
Distribution	0	1	2	3	4	5	6	7 and more
Freq. (% share)	833,419 (30.38)	1,005,248 (36.64)	435,340 (15.87)	203,184 (7.41)	104,129 (3.80)	59,176 (2.16)	34,309 (1.25)	68,799 (2.51)

Figure 4-4 illustrates how the number of secured loans per property depends on firm characteristics. The results are mostly consistent with the findings in Figure 4-2 for the percentages for firms that pledge properties. Note, however, that Figure 4-4 is based on real-estate-level data, while Figure 4-2 is based on firm-level data. First, the percentage of non-mortgaged properties increases with the number of employees, but at the same time, the percentage of properties that has multiple secured loans¹² also increases with firm size. This relation is not found when we conduct a similar exercise for the TDB credit scores. Presumably, larger firms are more likely to obtain non-secured loans than smaller firms. At the same time, larger firms are likely to have larger properties that can be pledged for obtaining several loans. Consistent with this conjecture, the percentage of properties that has multiple secured loans increases with the number of financial institutions that a firm transacts with. Finally, when a large bank (city bank and LTCB and trust bank) is the main bank, the percentage of firms whose properties are not used for secured loans is relatively larger. The percentage of

¹² The percentage of properties that has multiple secured loans is calculated as the ratio to total mortgaged properties.

multiple secured loans is the largest for firms whose main banks are government financial institutions.

Figure 4-4. Percentages of properties with no secured loan per property and multiple secured loans per property: univariate analyses



4.4.2. Secured creditors (mortgagees)

For firms that use properties as collateral, we can identify the number of secured creditors (mortgagees). Note that mortgagees include not only financial institutions but also nonfinancial firms and individuals.

The average number of secured creditors per firm is two, either in mean or median (Table 4-5). Among the total of 258,048 firms, 44.1% of them only have one secured creditor, and 29.6% have two creditors. The number of secured creditors increases with the size (# of employees) of a firm, but does not have monotonic relations with the creditworthiness (TDB credit scores) of a firm (results not reported). The number is larger for firms whose main banks are government financial institutions (mean: 2.58) or firms that have multiple main banks (mean: 2.55). It is also worth noting that mortgagees include nonfinancial firms for 46,700 of the firms (18.1% of total firms). The number of firms for which mortgagees consist of only nonfinancial firms is 8,010 (3.1%).

Table 4-5. Number of secured creditors (mortgagees) per firm

# of secured creditors (mortgagees) per firm	N	mean	sd	min	p1	p50	p99	max
	258,048	2.013	1.257	1	1	2	6	43
<i>Distribution</i>	1	2	3	4	5	6	7	8 and more
Freq. (% share)	113,702 (44.06)	76,411 (29.61)	39,222 (15.20)	17,081 (6.62)	6,929 (2.69)	2,710 (1.05)	1,088 (0.42)	905 (0.35)

Table 4-6 shows the composition of the secured creditors, either by a creditor basis or by a secured loan basis.¹³ On a creditor basis, it is not surprising that regional banks have the largest percentage (18.8%), given that one-third of main banks in our sample firms are regional banks (Table 3-2). It is noteworthy, however, that government financial institutions (17.5%), nonfinancials (11.3%), and private credit guarantee corporations (11.6%) occupy sizable percentages, although they are not likely to be firms' main banks in most cases.¹⁴ It is also interesting to see that the percentage of public credit guarantee corporations is 5%, while more than 40% of the firms in our data set use public guarantees. The percentages of government FIs, private and public credit guarantee corporations, and nonfinancials become a bit smaller when counting on a loan basis, suggesting they do not have multiple secured loans for a firm.

Table 4-6. Composition of secured creditors (mortgagees)

	by creditors		by loans	
	Freq.	(% share)	Freq.	(% share)
City banks	53,171	(10.23)	103,689	(12.33)
Long-term credit & trust bks	1,867	(0.36)	3,358	(0.40)
Regional banks	97,780	(18.80)	187,721	(22.32)
Second-tier regional banks	35,388	(6.81)	65,036	(7.73)
Shinkin banks	72,668	(13.97)	134,517	(16.00)
Credit Cooperatives	10,824	(2.08)	18,915	(2.25)
Government financial institutions	90,853	(17.47)	133,582	(15.89)
Other banks	5,867	(1.13)	8,013	(0.95)
Non-banks	6,197	(1.19)	7,167	(0.85)
Private Credit Guarantees Corporation	60,213	(11.58)	71,095	(8.45)
Public Credit Guarantees Corporation	26,396	(5.08)	34,474	(4.10)
Others (nonfinancials)	58,782	(11.30)	66,659	(7.93)
Multiple mortgagees	—	—	6,672	(0.79)
Total	520,006	(100.00)	840,898	(100.00)

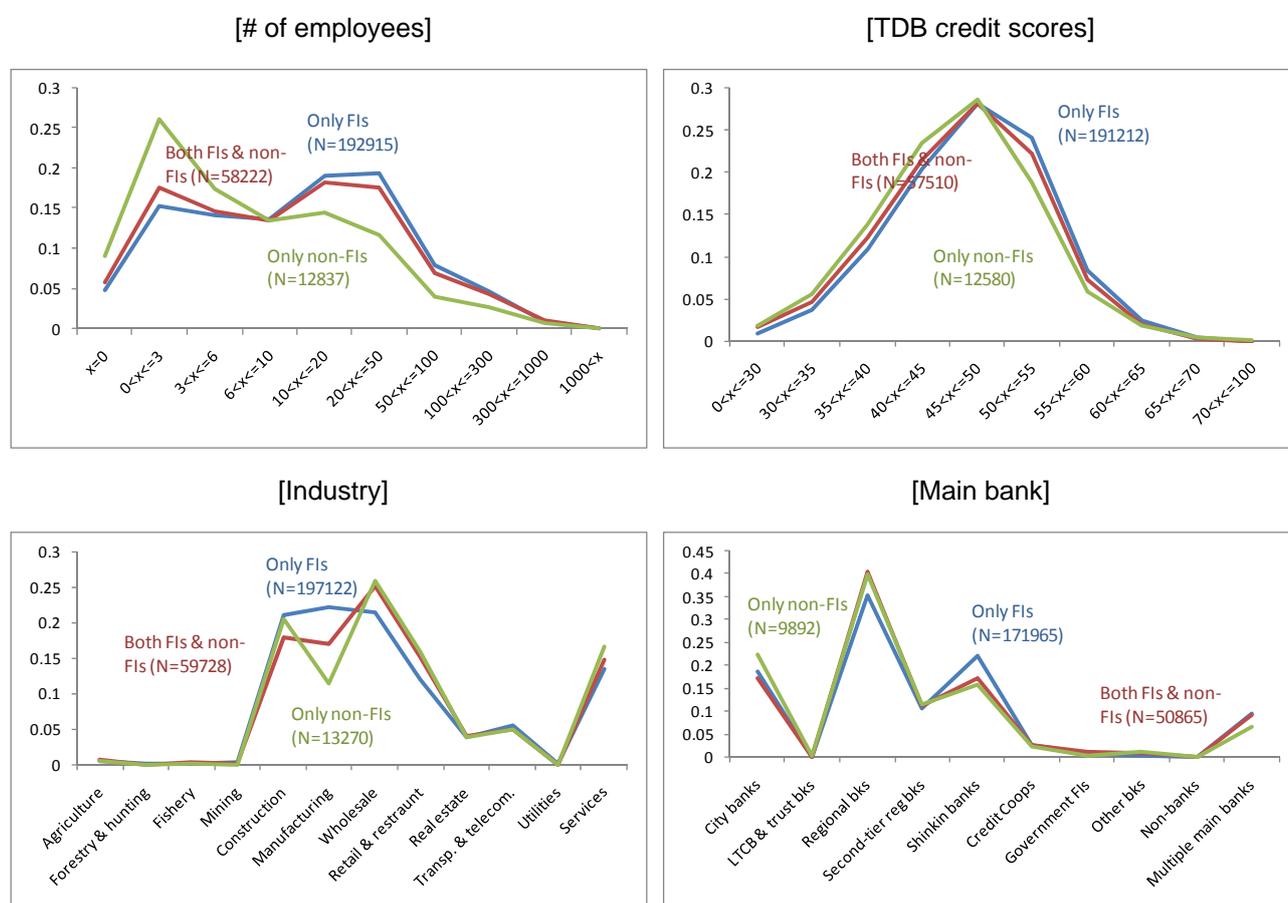
Figure 4-5 compares distributions of firms whose secured creditors consist of only financial institutions (blue line: about 190,000 firms in total), firms whose secured creditors include both financial institutions and

¹³ For example, consider the case where firm X obtains two mortgage loans from mortgagee A and one mortgage loan from mortgagee B. Both A and B are counted once when calculating on a creditor basis, but A will be counted twice when calculating on a secured loan basis.

¹⁴ Note that secured credits include mortgages for residential loans, for which bank-affiliated guarantee corporations are more likely to be mortgagees.

nonfinancial firms (red line: about 50,000–60,000 firms), and firms whose secured creditors consist of only nonfinancial firms (green line: about 10,000–13,000 firms). On the firm size (# of employees) and creditworthiness, the figure shows that the percentage of firms that obtain secured loans from nonfinancial firms is skewed toward smaller and riskier firms. Consistent with the distribution of firm size, the firms that have transactions with a smaller number of financial institutions are more likely to obtain secured loans from nonfinancial firms (result not reported). In terms of industry, manufacturing firms are less likely to obtain secured loans from nonfinancial firms, whereas wholesale and retail firms (including restaurants) are more likely to have ones. Finally, firms whose main banks are shinkin banks are less likely to have secured loans from nonfinancials, whereas firms whose main banks are regional banks are more likely to obtain secured loans extended by nonfinancials.

Figure 4-5. Distribution of firms, by the composition of secured creditors



4.4.3. Seniority among secured creditors

In order to see whether the security interest belongs to main banks or non-main creditors, we construct the seniority index for each mortgaged property as follows. If there is only one secured creditor for a particular property, then it is labeled “1” if the secured creditor is a main bank of the firm and “2” otherwise (i.e., a non-main creditor). If there are multiple secured creditors for a property, then we assume that the

secured creditor with the oldest registration date has the seniority.¹⁵ In cases where both a main bank and a non-main creditor are secured, the property is labeled “3” if both set the first priority security, “4” if a main bank sets the first priority security, and “5” if a non-main creditor sets the first priority security. Label “6” refers to the case where all multiple secured creditors are non-main creditors. The “7” refers to the case where multiple main banks are secured.

As we noted above, mortgaged properties in our sample include mortgages for residential loans. In order to remove these mortgages, we drop the property for which the mortgagor is the representative of a firm, and the firm replies to the TDB credit researcher that it does not pledge real estate owned by representatives to financial institutions. The latter condition is necessary because a firm’s representative might pledge his own properties to obtain business loans.¹⁶ We also remove real estate for which the mortgagee financial institution is not registered in the TDB’s updated list of financial institutions from our sample, because there might be inconsistency between the real estate registry data and the TDB’s financial institution data. As a result, we are left with 200,614 firms and 1,695,925 mortgaged properties. Finally, we divide these observations into two groups: one for which the firm’s amount of borrowing outstanding from at least one mortgagee is identified (subsample A) and the other that the borrowing outstanding from any mortgagee is unknown (subsample B). We presume that the identity of main banks is more solid in the former subsample A than in subsample B. The numbers of observations are 61,223 firms and 569,008 properties in the former and 162,693 firms and 1,126,917 properties in the latter, respectively.¹⁷

Table 4-7 shows that more than 40% of mortgaged properties are secured by the one main bank (index 1) using all observations (N=1,695,925 properties). Surprisingly, nearly 30% of all mortgaged properties are secured by a non-main bank (index 2), and this fact seems to be inconsistent with practitioners’ view that main banks possess senior security interests. For 12.9% of the total, properties are pledged to both main banks and non-main creditors and the main bank takes first priority. Similarly, looking at the firm level distribution that shows the combination of seniority indices for all properties that a firm possesses (N=200,614 firms), we find that the percentage of cases where non-main creditors are senior (30.9%; the sum of 2, 5, 2 & 5, and 2 & 6) are comparable to that in which main banks are senior (39.0%; the sum of 1, 4, 1 & 4, 1 & 7).

Dividing the sample into subsamples A and B, we see that the distribution of the seniority index is very different between the two groups. Regarding subsample A in which the amount of borrowing outstanding from at least one creditor is identified, we find that the number of observations for which main banks are senior significantly increases and that for which non-mains are senior decreases. In contrast, in subsample B, the percentage of cases where non-main creditors are senior is higher than those where main banks are senior. Because the definition of a main bank is somewhat obscure in subsample B, we put greater emphasis on the result obtained from subsample A. The table shows that 56.4% of properties are such that only the main bank

¹⁵ Although the real estate registry provides information about seniority among secured loans, the TDB does not collect such information.

¹⁶ This information is obtained from Source 1 as in Figure 4-1.

¹⁷ The sum of the numbers of observations for the two subgroups is 223,916, which exceeds 200,614. This is because some firms (23,302 firms) have multiple properties that belong to both subgroups.

has the security interest. In contrast, the percentage of properties in which only the non-main creditors are secured is 9.4%.

Table 4-7. Seniority among secured creditors

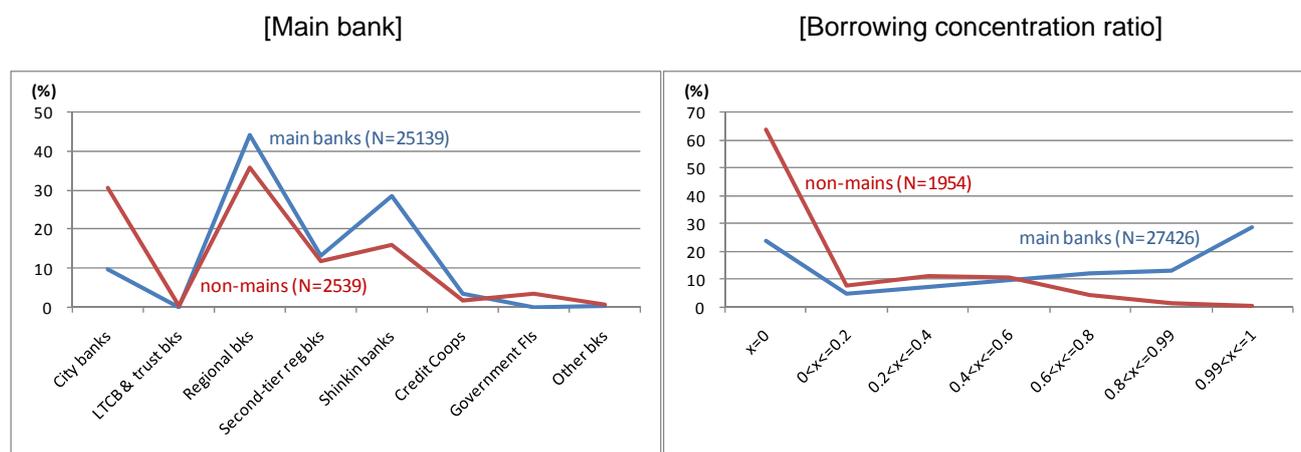
	All		Subsample A		Subsample B	
	Freq.	(% share)	Freq.	(% share)	Freq.	(% share)
<i>By real estate</i>						
1. One mortgagee, main bank	724,966	(42.75)	321,125	(56.44)	403,841	(35.84)
2. One mortgagee, non-main	506,471	(29.86)	53,454	(9.39)	453,017	(40.20)
3. Multiple mortgagees, main and non-main, both set first priority security	44,004	(2.59)	14,947	(2.63)	29,057	(2.58)
4. Multiple mortgagees, main and non-main, main bank set first priority security	218,155	(12.86)	104,222	(18.32)	113,933	(10.11)
5. Multiple mortgagees, main and non-main, non-main set first priority security	114,766	(6.77)	51,223	(9.00)	63,543	(5.64)
6. Multiple mortgagees, non-main creditors	67,837	(4.00)	13,539	(2.38)	54,298	(4.82)
7. Multiple mortgagees, main banks	19,726	(1.16)	10,498	(1.84)	9,228	(0.82)
Total	1,695,925	(100.00)	569,008	(100.00)	1,126,917	(100.00)
<i>By firms (all real estates of a firms)</i>						
1	61,310	(30.56)	27,632	(45.13)	42,353	(26.03)
4	8,455	(4.21)	4,959	(8.10)	6,949	(4.27)
1&4	7,413	(3.70)	5,652	(9.23)	3,770	(2.32)
1&7	1,096	(0.55)	660	(1.08)	—	—
2	50,618	(25.23)	4,044	(6.61)	61,619	(37.87)
5	4,060	(2.02)	1,870	(3.05)	3,532	(2.17)
2&5	2,014	(1.00)	—	—	1,622	(1.00)
2&6	5,264	(2.62)	763	(1.25)	5,555	(3.41)
1&2	16,587	(8.27)	1,632	(2.67)	10,106	(6.21)
2&4	5,626	(2.80)	651	(1.06)	3,846	(2.36)
1&5	5,253	(2.62)	3,451	(5.64)	2,866	(1.76)
Other combinations	32,918	(16.41)	9,909	(16.19)	20,475	(12.59)
Total	200,614	(100.00)	61,223	(100.00)	162,693	(100.00)

Note: Subsample A refers to properties / firms for which the amount of borrowing outstanding from at least one secured creditor is identified, and subsample B corresponds to those that the borrowing amount from any secured creditor is unknown.

Comparing firms whose secured creditors are only non-mains (seniority index = 2) and firms whose secured creditors are only main banks (seniority index = 1) in subsample A, their characteristics are similar in terms of the number of employees and the TDB credit scores. The mean numbers of employees are 36 in both groups, and the means for the TDB credit scores are 47.9 for firms with non-main secured creditors and 48.4 for firms whose secured creditors are main banks, respectively. However, there are significant differences between these two groups with respect to their borrowing behaviors. First, the average number of financial institutions in transaction is higher for firms with non-main secured creditors (mean: 4.04) than for firms with main bank secured creditors (mean: 3.56). Second, comparing the distribution of main banks between these two groups (Figure 4-6), the percentages of firms with non-main secured creditors are higher for firms whose main banks are city banks and lower for firms whose main banks are shinkin banks. That is, the probability that main banks do not have seniority is larger when a firm's main bank is a city bank, and is lower when a firm's main bank is a shinkin bank. Third, looking at the distribution of main banks' borrowing concentration

ratio, a firm is more likely to have non-main secured creditors when its percentage of borrowing from main banks is lower. This is especially the case when a firm does not borrow at all from its main bank (borrowing concentration ratio is zero). Note also that even among firms whose only secured creditors are main banks, nearly a quarter of firms report that their borrowing concentration ratio is zero.

Figure 4-6. Comparison between firms whose secured creditors are main banks and non-main



Note: The sample is limited to firms whose amount of borrowing outstanding from at least one secured creditor is identified (subsample A in Table 4-7). “Main banks” refers to firms whose seniority index is 1 and “non-mains” refers to firms whose seniority index is 2.

4.4.4. Pseudo loan-to-value ratio

The loan-to-value (LTV) ratio expresses the amount of a secured loan that a lender extends divided by the fair value of real estate pledged. This ratio is important because it conveys information about to what extent the loan is secured, whereas most studies on collateral use qualitative (binary) information about whether the loan is secured or not. We do not have information on the mark-to-market values of properties that a firm or its representative possesses, so that we cannot directly calculate the LTV ratios. However, the TDB database provides us with the amount of loans extended (in the case of non-revolving mortgages) and the amount of loans committed (in the case of revolving mortgages) for each secured loan. We also have information on the actual amount of short-term and long-term loans outstanding that each lender provides to a firm. Combining these two, we calculate what we call a “pseudo LTV ratio,” defined as the amount of actual loans outstanding by a lender (at the time of the TDB credit research) divided by the amount of loans committed to a firm by the same lender. When a firm has obtained several secured loans from the lender, we aggregate the amount of loans committed. Note that the pseudo LTV ratio is calculated for each pair of firm-financial institutions, whereas the true LTV ratio is calculated on a loan-by-loan basis.

Because of several extraordinary values in the database, we have eliminated such outliers by dropping observations that fall into both 0.1% tails of the entire distribution. In addition, as noted in subsection 3.3.2., the number of firms for which the lender and the amount of loans are identified is very small. As a result, we are left with 94,657 observations: 68,336 for firm-main bank matches and 27,197 for firm-other financial

institution matches.

Table 4-8 presents summary statistics for the pseudo LTV ratio. The average pseudo LTV ratio for all firm-financial institution matches is 0.99 in mean, implying that the amount of loans outstanding actually extended is roughly equal to the amount committed to secured loans by the same financial institution. However, the median value is 0.36, and 39.5 % of the total firms do not have any loan outstanding. The high percentages of non-borrowing firms might reflect the fact that more than 70% of firms use revolving mortgages, which remains valid even if all loans are repaid and covers any loan that arises afterwards as long as firms and financial institutions do not cancel the registration. Dividing financial institutions into main banks and non-main financial institutions, the pseudo LTV ratio is higher for the main bank subsample. The percentage of firms that do not have any borrowing outstanding from the main bank is 33.7%, which is similar to the one reported in subsection 3.3.2 (31.2%). Regarding transactions with non-main financial institutions, more than half (54.2%) of the sample firms do not have any borrowing outstanding from them.

Table 4-8. Pseudo LTV ratio

	N	mean	sd	min	p1	p50	p99	max
All financial institutions	94,657	0.986	2.431	0.000	0.000	0.355	10.050	64.571
Main banks	68,336	1.046	2.483	0.000	0.000	0.458	10.333	70.075
Non-main FIs	27,197	0.847	2.337	0.000	0.000	0.000	10.000	50.400
<i>Distribution</i>	x=0	0<x<=0.5	0.5<x<=0.8	0.8<x<=1	1<x<=1.5	1.5<x<=3	3<x	
All financial institutions	0.395	0.163	0.109	0.067	0.096	0.102	0.069	
Main banks	0.337	0.184	0.122	0.073	0.104	0.109	0.071	
Non-main FIs	0.542	0.109	0.075	0.051	0.074	0.086	0.063	

Figure 4-7 describes how the average pseudo LTV ratios depend on characteristics of firms and financial institutions, using the sample of all financial institutions. In terms of the firm size, the figure shows that firms with a larger number of employees have lower pseudo LTV ratios, especially in median. The relation between the pseudo LTV ratio and the TDB credit score is non-monotonic. For firms with the TDB credit scores equal to or larger than 60, mean pseudo LTV ratios are higher but the median ratios are smaller than the total average, suggesting there is a large variation in the pseudo LTV ratio among creditworthy firms: firms that do not borrow at all and firms that borrow a large amount in comparison with the collateral value. The number of financial institutions that a firm transacts with also has a non-monotonic, U-shaped, relation with the average pseudo LTV ratio. Finally, the average pseudo LTV ratio is very small when large banks such as city banks and LTCBs and trust banks and government financial institutions are mortgagees.

Figure 4-7. The average pseudo LTV ratio: univariate analyses



5. Conclusion

This paper presents a brief overview of firm-bank relationships and the use of collateral in Japan's corporate financing based on a newly established, huge data set. Among others, we have several novel findings that have not been remarked on much in the previous literature.

Regarding firm-bank relationships, we have confirmed that main bank relations in Japan are stable for most firms and that the ratio of firms that switch their main banks is less than 1 % per annum. At the same time, more than 80 % of firms establish relationships with multiple banks. Somewhat surprisingly, however, quite a few firms do not borrow at all from their main banks. This is especially so for larger and more creditworthy firms. We also find the importance of deposit transactions between firms and their main banks: for instance, the average main bank concentration ratio is larger for time deposits than for borrowing. Other than main bank relations, we find that more than half of our sample firms rely on borrowing from insiders such as representatives, executives, and affiliates. Insider financing is especially relevant for smaller, riskier, and younger firms. We also find that government financial institutions do not necessarily lend to small and less creditworthy firms that have financing difficulties, and that their client-firms pledge collateral more frequently than firms that borrows from private banks.

Our database also provides us with unique opportunities to investigate in detail how firms use their real properties as collateral. The firms that pledge property collateral the most are those with mid-sized and moderate credit risks. In terms of main banks, regional banks including cooperative financial institutions require borrowers to pledge collateral more frequently than larger banks such as city banks. On average, a firm has one or two properties for which a mortgage is created, but there are also many cases in which a firm has a number of secured loans and mortgaged properties. Looking at the distribution of secured creditors, we find that non-banks and nonfinancial firms occupy quite a sizable percentage. We also find some evidence that less intimate firm-bank relationships (such as having transactions with a larger number of financial institutions and a smaller borrowing concentration ratio with a main bank) coincide with only non-main creditors having security interests. For nearly 40% of our sample firms, financial institutions set revolving mortgages without having positive loans outstanding.

The findings in the paper suggest several future research topics that require more elaborate empirical analyses. On firm-bank relationships, these include, but are not limited to, the determinants of duration (switching) of main bank relationships, the role of deposit-relationships in corporate financing, and the relation (substitutability/complementarity) between bills discounted and other lending technologies; such as factoring, trade credits, and asset-based lending. On the use of collateral, our database provides ample opportunities for deeper empirical analyses that could not have been done in the existing literature. For instance, we might be able to investigate how the role of collateral differs depending on whether it is inside or outside collateral, the loan-to-value ratio, whether the security is of first priority or not, and interactions among these elements.

References

- Bester, H. "Screening vs. Rationing in Credit Markets with Imperfect Information." *American Economic Review* vol. 75, pp. 850–5, 1985.
- Bester, H. "The Role of Collateral in Credit Markets with Imperfect Information." *European Economic Review* vol. 31, pp. 887–99, 1987.
- Boot, A. W. A., A. V. Thakor, and G. F. Udell. "Secured Lending and Default Risk: Equilibrium Analysis, Policy Implications and Empirical Results." *Economic Journal* vol. 101, pp. 458–72, 1991.
- Degryse, H., M. Kim, and S. Ongena. *Microeconometrics of Banking: Methods, Applications, and Results*, New York: Oxford University Press, 2009.
- Kanda, H. and S. Levmore, "The Politics of Article 9: Explaining Creditor Priorities." *Virginia Law Review* vol. 80: 2103, 1993.
- Kano, M. "When does the relationship banking break up? An empirical analysis in Kansai area (*relationship banking ha dono youna baai ni chuudan sarerunoka: kansai-chiiki ni okeru jisshou bunseki*)." In Y. Tsutsui and S. Uemura eds., *Relationship banking and regional finance (relationship banking to chiiki*

kinyu), Tokyo: Nihon-Keizai Shimbun Shuppansha, 2007 (in Japanese).

Kozuka, S. and N. Fujisawa, “Old Ideas Die Hard?: An Analysis of the 2004 Reformation of Secured Transactions Law in Japan and Its Impact on Banking Practices.” *Thomas Jefferson Law Review* vol.31, pp. 293-315, 2009.

Ono, A. and I. Uesugi. “Role of collateral and personal guarantees in relationship lending: Evidence from Japan’s SME loan market.” *Journal of Money, Credit, and Banking* vol. 41, pp. 935–960, 2009.

Schwartz, A., “Security Interests and Bankruptcy Priorities: A Review of Current Theories.” *Journal of Legal Studies* vol. 10:1, 1981.

Stulz, R. M. and H. Johnson. “An Analysis of Secured Debt,” *Journal of Financial Economics* vol. 14, pp. 501–521, 1985.

Uchida, H., A. Ono, S. Kozuka, M. Hazama, and I. Uesugi. “Current status of interfirm relationships in Japan: An overview of the Teikoku Databank data,” mimeo, 2010.

UNCITRAL (United Nations Commission on International Trade Law), *UNCITRAL Legislative Guide on Secured Transactions*, New York: UNCITRAL, 2010.

World Bank. *Doing Business in 2005*, Washington, D.C.: World Bank, 2005.