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SME Financing and the Choice of Lending Technology

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SME financing and the choice of lending technology[†]

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Abstract

Using data from a unique survey in Japan, we investigate the relevance of different lending technologies which are utilized in lending to small- and medium-sized enterprises. We characterize loans from a technology point of view, and ask (i) to what extent different lending technologies are used, (ii) how complementary the technologies are, and (iii) what determines the choice of each technology. We find that although the financial statement lending technology is most commonly used, multiple lending technologies are usually used at the same time. This suggests the existence of complementarity among lending technologies. We also find that individual technologies have their distinct characteristics as well, and, among other findings, smaller banks and banks with a rich accumulation of soft information tend to lend using the relationship lending technology.

Keywords: Lending technology, Financial statement lending, Fixed-asset lending, Relationship lending, Small- and medium-sized enterprises

JEL classification code: G21, L14, D82, L22

1. Introduction

Lending technologies can be distinguished based on different dimensions such as the primary source of information, screening and underwriting policies/procedures, structure of the loan contracts, and monitoring strategies and mechanisms (Berger and Udell 2006, hereafter BU06). Among others, two main lending technologies used to finance small- and medium-sized enterprises (SMEs) can be primarily distinguished by the type of information that a bank uses in granting and monitoring the loan.

On the one hand, *transaction-based lending technologies* are primarily based on borrowers' hard quantitative information, such as the strength of the financial statement or the value of their assets, which are relatively easy to document and transfer.[1] On the other hand, *relationship lending* is extended primarily based on borrowers' soft qualitative information, such as the entrepreneurs' characteristics including skill and integrity, which are difficult to verify. Since soft information is accumulated through close bank-borrower relationships, long and broad banking relationships should accompany relationship lending.

Although this classification is quite useful and interesting from a theoretical and practical point of view, it has been based solely on casual observation and anecdotal evidence. We are not quite sure how, and to what extent, different lending technologies are actually chosen and deployed by commercial lenders. Conventionally, transaction-based lending has been viewed in academic literature as best-suited for relatively large and transparent borrowers, while relationship lending has been viewed as best-suited for small and opaque SMEs. However, recent work in this area has taken a different view (BU06). The work

[1] Berger and Udell (2006) classify six transaction-based lending technologies: (i) financial statement lending, (ii) small business credit scoring, (iii) asset-based lending, (iv) factoring, (v) fixed-asset lending, and (vi) leasing.

rejects this conventional view and argues that most (but not all) of the transaction-based lending technologies can be used to lend to opaque SMEs, based on available hard information on specific aspects of the firm. Again, however, this alternative has not been tested empirically.

A closely related issue that has also not been empirically tested is whether lending technologies are substitutes or complements of each other. As BU06 note, lending technologies are not necessarily mutually exclusive. Commercial lenders may provide SMEs with credit using a combination of lending technologies although BU06 argue that overall credit underwriting may focus on one *primary* lending technology. Nevertheless, we might observe in practice some mixture of lending technologies if some of them are complements.

Clarifying the issues raised above has substantial practical implications. Since SME access to external finance is limited, investigation of the appropriate or optimal choice of lending technologies may be valuable to practitioners. Recent academic work on SME financing has also argued that some types of banks may have comparative advantages in different lending technologies based on factors such as their size or organizational complexity (e.g., Stein 2002 and BU06). An investigation of lending technology choice could provide a useful reference point for banks when they consider the appropriateness of different lending technologies in different lending situations and when they try to innovate new loan products. Policy implications may also stem from such an investigation: for example, if SME lending by small banks is technologically different from that by large banks, it may be advisable to promote the small bank sector through legal, regulatory or tax initiatives. However, mostly due to the lack of appropriate data, our knowledge of how

lenders choose lending technologies in Japan and elsewhere is extremely limited – indeed, too limited to provide useful implications.

In the present paper, we utilize a new and unique data set based on a survey that we helped to develop that allows us to examine these issues concerning lending technology choice. The *Management Survey of Corporate Finance Issues in the Kansai Area*, which was conducted in Japan in June 2005, contains questions about factors that banks consider in screening and monitoring loans. Based on these questions, we created four *lending technology indices* which correspond to three transaction-based lending technologies and the one relationship lending technology: (1) financial statement lending, (2) real estate lending, (3) other fixed-asset lending; and (4) relationship lending. These indices represent the extent to which a bank loan bears the characteristics of each of the four lending technologies.

We first investigate (i) to what extent different lending technologies are used in terms of the presence in the loan market, i.e., the level of usage of the four lending technology. We then look into (ii) how complementary these technologies are. This analysis focuses on the degree of correlation among the four indices. Finally, we investigate by regression analysis (iii) what determines the choice of each technology. Our dependent variables in these regressions are the four lending technologies as measured by our indices. Our key independent variables of interest are the type of bank lender and the availability of different kinds of information.

Our findings are as follows. Regarding the extent to which different lending technologies are used financial statement lending technology was found to be the most frequently employed lending technology. Nevertheless, we also found that different lending technologies are highly complementary. We observed that financial statement lending and

relationship lending are often used in tandem, and so are real estate lending and other fixed-asset lending. However, we found no simultaneous use of the real estate lending technology and the relationship lending technology, which implies a lack of synergy in jointly deploying these lending technologies which differ widely in terms of monitoring intensity.

Finally, in the analysis of the determinants of the lending technology choice, we find additional evidence of complementarity. Although this complementarity makes it difficult to find clear determinants of the choice of individual lending technologies, the regression results still imply overall that the four lending technologies are distinct from each other, particularly with respect to the relationship lending technology. Another interesting results from regression analysis was that audited financial statements were associated with financial statement lending although this finding was limited to only smaller SMEs. This implies that the content of hard information in audited financial statements is *relatively* more important for smaller SMEs than larger SMEs. We also find that smaller banks and banks that accumulate significant amounts of soft information tend to lend based on the relationship lending technology as predicted in the recent literature (e.g., Stein 2002 and Berger and Udell 2002, 2006).

The main contribution of this paper is its direct test of the validity of lending technologies classification in BU06. As noted in BU06 there have been a number of studies on *each* individual technology in isolation – although the bulk of them have focused on just relationship lending Studies of the benefits from relationship lending began with Petersen and Rajan (1994) and Berger and Udell (1995).[2] Scott (2004) examined the production of soft information that is relevant in relationship lending. There are also some empirical studies

[2] See Boot (2000), Ongena and Smith (2000), and Elyasiani and Goldberg (2004) for survey.

on some of the transaction-based lending technologies individually: for example Berger and Frame (2006) for credit scoring, Udell (2004) for asset-based lending, and Bakker, Klapper, and Udell (2004) and Klapper (2006) for factoring. However, most of these studies focus only on one lending technology without consideration of other technologies.[3]

The remaining part of this paper is composed as follows. In the next section, we introduce the data. In Section 3, we construct the lending technology indices and examine their characteristics. Section 4 is devoted to the investigation of the determinants of the lending technology choice. The final section concludes the paper.

2. Data

The primary data source of this paper is the *Management Survey of Corporate Finance Issues in the Kansai Area*, which was conducted in June 2005 by the Regional Finance Workshop in the Research Institute of Economy, Trade, and Industry (RIETI).[4] The survey, hereafter the RIETI survey, asks SMEs about firm characteristics, management strategy, bank relationships, loan screening, and credit guarantees. The distribution, collection, and data aggregation of the survey were outsourced to Tokyo Shoko Research (TSR), a credit reporting and information provision company in Japan.

Questionnaires were sent out by hard mail to 9,000 firms in three prefectures, Osaka, Hyogo, and Kyoto, in the Kansai area of Japan.[5] These firms were chosen from those in

[3] Some studies consider – either implicitly or explicitly - relationship lending versus all other lending technologies together (e.g., Berger and Udell 1996, Cole, Goldberg and White 2004, Berger et al. (2005). Kano, Uchida, Udell, and Watanabe 2006 specifically focuses on the difference between two lending technologies, financial statement lending and relationship lending.

[4] The first and third authors of this paper are members of the workshop and had significant input into the design and structure of the RIETI survey.

[5] The Kansai area is located in the middle of the main island of Japan, and the three prefectures form

TSR's database. In proportion to the relative size of prefecture GDP and the number of enterprises in the prefectures, 5,000 firms were chosen from the Osaka prefecture, 2,500 firms from the Hyogo prefecture, and 1,500 firms from the Kyoto prefecture. In each prefecture, firms were evenly selected from four employee-size categories, 1) 1 to 20 persons, 2) 21 to 50 persons, 3) 51 to 100 persons, and 4) more than 100 persons. For example, in Osaka prefecture, 1250 (= 5000/4) firms were randomly chosen from firms with 1 to 20 employees.

2041 responses were received (by hard mail) yielding a response rate of 22.7%. Among the responses, 21 were not usable. For our analysis we eliminated firms for which their main bank was not one of seven types.[6] The resulting sample constitutes our base sample, which is composed of 1700 firms. The distribution by prefecture of the firms in the base sample is comparable to the proportion of the questionnaires sent out to the three prefectures.[7] The sample firms' industries include Construction (12.5% of the sample firms), Manufacturing (34.5%), Wholesale (19.7%), Retail (5.9%), Services (12.0%), and others (14.3%).[8] Summary statistics on the sample firms are shown in Table 1. The

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the focal point for the economy of western Japan. *Osaka* is the second largest prefecture in Japan with a population of 8.8 million (as of October 1, 2004). Its capital, Osaka, is considered the second biggest business center in Japan. *Hyogo* prefecture has a population of 5.6 million (October 1, 2004). The capital city Kobe, well-known as an international port, has a number of port-related industries such as steel production and shipbuilding, although the city's economy is still recovering from the devastation of the Hanshin-Awaji earthquake in 1995. The population of *Kyoto* prefecture is 2.6 million (October 1, 2004) and its capital is the historical city of Kyoto. There are many industries with a long tradition in the Kyoto prefecture, such as the traditional handcraft and textile industries -- but also a notable number of high-tech industries.

[6] Thus, firms that remained in the sample had a main bank that was either a city bank, a long-term credit bank, a trust bank, a regional bank, a second regional bank, a Shinkin bank, or a credit cooperative. See below for more details.

[7] Among the sample firms, 53.7% are located in Osaka prefecture, 26.7% are in Hyogo prefecture, and 18.7% are in Kyoto prefecture.

[8] Firms in Agriculture, Fisheries, Electricity, Gas, Finance, Insurance, Medicare, and Education industries were excluded in advance before the questionnaires were sent out.

average firm was established in 1967, employs 150 persons, has a capitalization of 764 million yen, and has 1.19 billion yen of sales.

3. Lending technology indices

3.1 Construction of lending technology indices

We first characterize actual loans from a lending technology point of view. We construct indices to represent to what extent the relevant loans have characteristics of different lending technologies. We capture these characteristics from questions in the RIETI survey about inputs or factors on which an SME's main bank made its lending decisions (in the opinion of the respondent SME). More specifically, 22 candidate (i.e., potential) factors (shown in Data Appendix A-1) are available based on how respondent SMEs answered this question: "*to what extent did the firm's main bank ACTUALLY focus on each of the factors in making loans to the firm*" (from the SME's perspective). Most of these factors are related to one of the lending technologies. For each factor, respondent firms were required to choose an answer from a five point scale (from 1 (very much) to 5 (not at all)). We then link the factors that we believe to be most closely associated with each lending technology based on the BU06 classification scheme. From this process we construct our *lending-technology indices* which attempt to capture the lending technologies that are used by the SME's main bank in extending its credit.

BU06 list six *transaction-based lending* technologies ((i) financial statement lending, (ii) small business credit scoring, (iii) asset-based lending, (iv) factoring, (v) fixed-asset lending, and (vi) leasing), together with *relationship lending*.[9] Based on our assessment of

[9] They also list up trade credit as the eighth important source of financing for SMEs. For more detailed explanations of lending technologies, see BU06.

these technologies in the Japanese context using various sources such as press articles and the practitioner literature, we narrow our focus to the four lending technologies below that seem to be particularly important in Japan.[10]

First, *financial statement lending* is a lending technology which is extended primarily based on hard information contained in financial statements. BU06 hypothesize that banks underwrite commercial loans using the financial statement lending technology for firms with a strong financial condition based on an assessment of verified (i.e., audited) financial statements. From the list of 22 factors shown in Data Appendix A-1, four appear to be closely related to financial statement lending, factors no. 3, 4, 5, and 6. For the most part these factors represent qualities that are best assessed by an analysis of firm's audited financial statements such as growth, leverage, profitability and debt service coverage. From these four factors we created the financial statement lending index, LT_FINSTAT, by calculating the *average* of the four dummy variables which take a value of one if the firm answered 1 (very much) to the four relevant lending factors, respectively.

The virtue of using an average index is that it can be directly compared with the other (averaged) indices, as we explain below, since all the indices are constructed from dummy variables and thus take a value in a [0,1] range. We also conducted preliminary analysis using the *summed* indices of the relevant dummy variables, or the *first principal component* of the principal component analysis over the dummy variables. Because the results were qualitatively the same, and because we cannot easily compare these indices with each other, we only report results with the averaged indices.

Next, we focus on fixed-asset lending. The primary underwriting criteria used by

[10] From the list of BU06, we dropped out (ii) small business credit scoring, (iii) asset-based lending, (iv) factoring, and (vi) leasing.

lenders in extending fixed-asset lending is the valuation of the fixed-assets which are taken as collateral. There are three factors from our list of 22 that are related to fixed-asset lending: items 7, 8, and 12. Keeping the Japanese context in mind, we make a clear distinction between *real estate lending* and *other fixed-asset lending*. Japanese banks have often been criticized as relying too much on real estate collateral and exerting insufficient screening and monitoring effort.[11] Loans to real estate firms and to firms in related industries increased during the bubble period in the late 1980s, but they became non-performing afterward (Hoshi et al. 2002 (ch.8)). Closely related to this problem was the "collateral principle," a well-known Japanese lending practice that involved the ubiquitous use of real estate as collateral in SME lending. In fact, based on data from the Survey of Corporate Procurement (2001) by the Small and Medium Enterprise Agency of Japan, Ono and Uesugi (2005) (Table 2) report that real estate consists of 95.9% of the assets pledged as collateral by SMEs in Japan.

With this background in mind we created two fixed-asset lending indices. The first is LT_REALESTATE, the *real-estate lending* index. This index is a dummy variable which takes a value of one if the firm answered 1 (very much) to lending factor no. 7. The pledgeability of the SME's real estate is the only thing that matters for this index. Second, we constructed the *other fixed-asset lending index*, LT_OTHERFAL. This variable is an *average* of the two dummy variables which take a value of one if the firm answered 1 (very much) to lending factors no. 8 and 12, respectively.[12] This index captures the pledgeability

[11] See, for example T. Sugiyama. "Loan Portfolio management: Reflect credit risk in loan interest rates and maximize profit opportunity (in Japanese)," the Nikkei Financial Daily, May 22, 1996.

[12] As for the other fixed-asset lending, we also tried an index created by the principal component analysis over the two dummies, or the sum of them. For the same reasons associated with our construction of the financial statement lending index, we only report results using the average index.

of an SME's tangible assets and the entrepreneur's personal assets as collateral. Note that the basic technology used in real estate lending and other fixed-asset lending is the same, and the distinction is solely based on the type of collateral..

Finally, we construct the *relationship lending* index, LT_RELATION. This index is constructed from the answers to the factors that seem most related to soft information accumulation by banks through close relationships. The index is an average of seven dummy variables which take a value of one if the firm answered 1 (very much) to lending factors, no. 11, 14, 15, 18, 19, 20, and 22, respectively.[13]

We admit that these indices are not likely to be perfect proxies for the use of different lending technologies, since they are based on the borrowers' perception of the lending factors used by the bank in underwriting its loans, and thus may not be precisely capturing banks' screening process. However, the indices are novel in the sense that they are created to represent criteria that banks *actually* focus on in the screening process. No such information has been available in the prior literature.

In the following analysis, we will investigate the use of the four lending technologies by comparing the levels of each lending index. We also try to find out correlations among indices to investigate complementarity and substitutability of lending technologies.

3.2 Results

3.2.1 The relative importance of individual lending technologies

Now we turn to our investigation of the use of lending technologies in loan underwriting.

[13] Again, we do not report the results using the sum of, or the first principal component of, the seven dummy variables.

We begin by directly comparing the magnitudes of the lending technology indices together with the dummy variables which constitute the indices. Table 2 shows the summary statistics of these variables.

We can see that the lending factors related to financial statement lending are on average relatively more frequently emphasized, so that the mean of the financial statement lending index is the largest among the four indices. This suggests that financial statement lending is the most frequently used lending technology. Further analysis indicates that this result is robust to differences in bank type.[14]

It is also interesting to observe that the mean of the real estate lending index is the next largest, so that the real estate lending technology appears to be the next most important technology. This may reflect the *collateral principle*, a lending practice in Japan mentioned above.

Relationship lending is the third most important technology. The other fixed-asset lending technology (the combination of the SMEs' tangible assets and the personal assets of the SMEs' entrepreneur) is the least frequently used lending technology. In our analysis below this may make it difficult to generate meaningful analytical results for this technology.

We can thus conclude that among our sample firms, the financial statement lending technology is the most important technology. However, this finding does not allow for the possibility that these lending technologies may not be strictly distinct from each other and, as a result, some complementarity might exist among them. In other words, it is quite possible

[14] The level of LT_FINATAT was 0.2704 for the firms for which the main bank is either a city bank, a long-term credit bank, or a trust bank, 0.2758 for those of for which the main bank is a regional or a second tier regional bank, and 0.2815 for those for which the main bank is either a Shinkin bank or a credit cooperative.. Similarly, the levels are comparable for the other three indices, and the ranking among the four indices are the same even if we compare by bank type.

that different technologies complement each other and loans contain characteristics of different technologies at the same time. We now proceed with the analysis of interrelationships between the four lending technologies.

3.2.2 Complementarity among the lending technologies

We first check the simple correlations among the four lending technology indices. Table 3 shows their coefficients of correlation. For any combination of indices there is a significant positive correlation. Interestingly, the magnitude of correlation is very high between LT_FINSTAT and LT_RELATION. This implies that the financial statement lending technology and the relationship lending technology are highly complementary and their technologies are used in tandem.

We also observe a high correlation between LT_REALESTATE and LT_OTHERFAL. This seems natural since they are both based on an underwriting process that focuses on assessing the liquidation value of a fixed-asset. For other combinations of technologies, a significant correlation is observed but the level of correlation is not comparable to the two aforementioned combinations.

Since all the combinations of indices reflect a significant positive correlation, a simple correlation might not be fully informative. Therefore, we run multivariate regression models among the four indices. This analysis should contain information about what combination of lending technologies is the most important when all the technologies are to some extent used at the same time.

The results, shown in Table 4, are generally consistent with the results in Table 3. Again, judging from the magnitudes of the coefficients, financial statement lending is closely

tied with relationship lending, and real estate lending is linked with other fixed-asset lending.

However, there is one significant difference between Table 3 and Table 4. Judging from the significance of the coefficient of LT_RELATION on LT_REALESTATE and that of LT_REALESTATE on LT_RELATION, we cannot reject the null hypothesis that LT_REALESTATE and LT_RELATION mutually have no impact each other. This means that taking into consideration the mutual interrelationship among the four lending technologies, the real estate lending technology and the relationship lending technology are not used at the same time. We can conclude that these two technologies are not complementary to each other.

This could be because these two technologies require screening and monitoring processes that are significantly different in nature and in intensity. On the one hand, for relationship lending, a bank must accumulate soft information that it uses to evaluate creditworthiness of the firm. On the other hand, for fixed-asset lending the bank is entirely focused on assessing the liquidation value of the asset. Unlike relationship lending, this underwriting process may produce little or no information about the value of the firm as a going concern.

As mentioned above, when the asset price bubble formed and collapsed, Japanese banks were criticized as having promoted the bubble formation by not exerting sufficient monitoring effort and, instead, lent primarily based on collateral value of land owned by the borrower**.** Our finding here is consistent with this anecdotal evidence as far as those SME for which the combination of LT_REALESTATE and LT_OTHERFAL is relevant are concerned. However, we also find that there are SMEs which are extensively monitored using the financial statement lending technology and the relationship lending technology.

4. The choice of lending technology

4.1 Independent variables

We now turn to an investigation of the determinants of lending technology choice. We run regressions in which the four lending technology indices introduced above are used as dependent variables. These technologies can be viewed as underwriting processes. Our independent variables explained below capture the characteristics of the lender and the borrowing SME that affect the feasibility and efficacy of each individual lending technology. Hence these variables proxy for the inputs of the technologies. We would expect lenders to choose the technologies where the most inputs are available. Descriptive statistics for all of our variables are shown in Table 5.[15]

Bank complexity

We first consider variables related to the organizational structure of the bank. Studies such as Stein (2002), Scott (2004), Liberti and Mian (2006), and BU06 predict that large banks with complex organizational hierarchies should have a relative advantage in extending transaction-based lending, while small banks with simple organizational structure should be good at granting relationship lending. To capture this difference, we classify banks into three types and create corresponding bank type dummies.

First, UNION takes a value of one if the lending bank is either a Shinkin bank or a credit cooperative. These are cooperative banks (financial institutions), usually small in size, and not-for-profit.

[15] See Table 1 as well.

Second, REGIONAL takes a value of one if the firm's lending bank is either a regional bank or a second tier regional bank. These banks are typically middle-sized and do not operate nationwide. Their business areas are usually in, or around, one of the 47 prefectures in Japan where their main branch office is located.

Third, LARGE takes a value of one if the firm's lending bank is either a city bank, a long-term credit bank, or a trust bank. Banks of these types are biggest in size, provide a broad range of services including investment and international banking, and have complex managerial organizations.[16]

The theoretical work discussed above predicts that LARGE (and REGIONAL) should have a positive influence on LT_FINSTAT, while the coefficient of UNION (and REGIONAL) is expected to be positive for LT_RELATION regression.

Note that there are also sample firms for which the main bank is not one of these three types. The main bank of these firms is either a government financial institution, a foreign bank, or a bank of other types. We excluded these firms because these banks are not private banks, or because the number of sample firms with such banks as their main bank is very small.

Hard financial information

The availability of hard verifiable information about financial performance is critical in financial statement lending. In particular, financial statement lending requires audited financial statements. An important advantage of our data is that we have information on whether the firm has audited financial statements. Our dummy variable AUDIT takes a

[16] In the regression analysis, we do not use LARGE to avoid the singularity problem.

value of one if the firm has its financial statements audited by a CPA.

We use two additional variables to capture other dimensions of information availability. FINSTAT is a dummy variable which equals to one if the firm has any financial statements (i.e., whether audited or unaudited). FREQ_FINSTAT indicates how many times a year the firm submits financial statements (both audited and unaudited) to its main bank. These variables are expected to have significant effect on LT_FINSTAT.

Soft information

Soft information, the basis for relationship lending, is information that is difficult to document and transfer. By definition, we cannot quantify soft information. To overcome this problem we utilize the methodology used by Scott (2004) who created an index to capture the extent to which the bank knows the firm in terms of soft information. The Scott index is a composite measure of soft information production based on the borrowing firm's ratings of bank performance characteristics obtained from the Credit, Banks and Small Business survey conducted by the National Federation of Independent Business in 2001 in the United States.

Eleven characteristics of lenders' knowledge are available from the RIETI survey that mirrored the composition of Scott's (2004) index (see Data Appendix A-2), that reflect how respondent firms rated their lender's knowledge about the borrower. Six of the 11 characteristics are related to soft information: characteristics no. 1 through 6.[17] Using these six characteristics and following a similar procedure to Scott (2004), we created our measure

[17] Instead of six characteristics, the CBSB survey contains *four* soft-information-related characteristics that reflect the SME's view of its bank: "knows you and your business," "knows your industry," "knows the local market and/or community," and "social contact with loan officer." The characteristics we have used (Data Appendix A-2) are elaborations on them.

of soft information production, SOFT.[18] We hypothesize that this index should have a positive effect on the choice of the relationship lending technology.

Firm/entrepreneur characteristics

We also use different variables to represent firm/entrepreneur characteristics as controls. ASSET is the size of the firm's asset, FIRMAGE is the age of the firm, and EMPLOYEE is the number of employees. LISTED is a dummy variable which takes a value of one if the firm is listed. These variables may have a positive impact on LT_FINSTAT in that they are likely associated with borrower transparency. Two dummy variables, HOMEOWNER and CEOAGE represent characteristics of the firm's CEO. The former takes a value of one if the CEO owns a house, and the latter is the CEO's age. We expect a positive signs for HOMEOWNER in the LT_OTHERFAL regression because the home may potentially be used as collateral. We also expect a positive sign for CEOAGE in the LT_RELATION regression because CEOAGE may proxy for soft information about the entrepreneur.

We also use four independent variables to represent the firm's performance. Three of them are created based on the firm's answer to questions about its performance. PERFORMANCE_DS is a dummy variable indicating that the firm first posted a deficit (D) and then in surplus (S) (i.e., unprofitable and then profitable) in the past two years. PERFORMANCE_SD and PERFORMANCE_DD are created similarly (surplus followed

[18] The survey asks (1) how important the firm rates each of the 11 characteristics in doing business with a financial institution (in general) based on a 5-point scale from 1 (very important) to 5 (not important). This captures the firm's perception of what it defines as a good lender. For each of the 11 characteristics, the firms are also asked to evaluate (2) to what extent the current main bank performs satisfactorily on a 5-point scale from 1 (very good) to 5 (very bad). This captures the firm's evaluation of the current main bank. For each of the six characteristics related to soft information, we constructed a dummy variable, which takes a value of one if the firm chose 1 for both questions (1) and (2). SOFT is the first principal component of the principal component analysis over the resulting six dummies.

next year by deficit/deficit followed next year by another deficit). The base case reflects two consecutive years of surplus.[19] The dividend dummy NODIVIDEND, which takes a value of one if the firm did not pay dividend in the last accounting year, also reflects the firm's performance. The expected signs of these performance measures are unclear. Naturally, improvement in these variables should have positive impact on LT_FINSTAT. However, it may also be possible that worse-performing firms can obtain financial statement lending when a bank adjusts its credit terms, e.g., raises the loan interest rate.

It is important to note here that our dependent variables represent *factors on which lenders attach particular importance* in the underwriting process. In contrast, our independent variables represent the *actual performance or characteristics of the firm*. We are thus testing which firms obtain financing through each of these lending technologies.

We also use three urban dummies, OSAKA, KOBE, and KYOTO, which take a value of one if the area code of the firm's telephone number is 06 (Osaka city fringe), 078 (Kobe city fringe), and 075 (Kyoto city fringe), respectively. These dummies represent various geographical differences. They may to some extent reflect the degree of bank competition. We use industry dummies for CONST (construction), MANUFAC (manufacturing), WHOLE (wholesale), RETAIL (retail), REALEST (real estate), RESTAU_HOTEL (restaurants and hotels), and SERVICES (other services). Thus, firms with zero values for all of these dummy variables (the base case) are in the Information, Telecommunication, or Transportation industry. SERVICES might have positive impact on LT_RELATION since firms in the service industry are more likely to have intangible assets and less likely to have sufficient assets to pledge. A positively significant coefficient is expected for REALEST on

[19] For such firms, we created a dummy, PERFORMANCE_SS, although it is not used in the regression analysis to avoid the singularity problem.

LT_REALEST, but it is also possible that there is no such impact if the firms with REALEST = 1 are mostly real estate brokers.

Bank Competition

The RIETI survey also asks about the intensity of bank competition (from a borrower's point of view). To capture actual intensity of bank competition, two bank competition dummies are created based on answers to targeted questions. Firstly, VISITINC_OTHER takes a value of one if the firm answered yes to a question, "whether the frequency of visit by banks other than the main bank increased in the past two years." Secondly, VISITINC_PA takes a value of one if the firm experienced an increase in the frequency of visits by the public affairs (PA) person (or loan officer) of the main bank in the past one or two years. An increase in these variables represents the intensification of competition between the main bank and other competing banks.[20] These variables capture the degree of competition in a manner that may differ from conventional measures such as the Herfindahl index or concentration ratio.[21]

The level of competition may not only affect the overall supply of credit from all types of lending technologies but may have a different effect on relationship lending. Theory provides mixed predictions. On the one hand, competitive loan markets may discourage

[20] Note that *other* banks include banks that currently lend to the firm but are not its main bank. For those banks, the dummy captures *competition to be the main bank.*

[21] Scott and Dunkelberg (2004) use a similar variable to capture bank competition, which is constructed from the information obtained from a question, "Have you noticed any change in competition for your firm's business among financial institutions now compared to 3 years ago," which is available from the Credit, Banks, and Small Business Survey conducted by the National Federation of Independent Business (NFIB). However, as they admit themselves, the respondent firms may not correctly understand what "change in competition" stands for. Although the question used in the present study does not directly mention about competition, it is more concrete and precisely captures the degree of competition.

relationship lending by making it more difficult for lenders to recoup their initial investment in the relationship (e.g., Petersen and Rajan 1995). On the other hand, banks under intensive competition may strengthen lending relationships to differentiate themselves from other banks (e.g., Boot and Thakor 2000).

4.2 Results

Financial statement lending

First, Table 6 reports the financial statement lending regression. The most important independent variable is AUDIT, i.e. the existence of audited financial statements. Looking at the first column (1), this variable has no significant effect on LT_FINSTAT. Indeed with only two interesting exceptions below, most of the variables, including the performance variables, have no significant impact on LT_FINSTAT in a manner that theory predicts.

The first exception is SOFT. The more soft information that is produced, the more likely that the financial statement lending technology is used in underwriting the loan. This implies that soft information is important in underwriting loans based on the financial statement lending technology, a finding that seems inconsistent with the theoretical predictions. The other exception is VISITINC_PA. If a firm experienced an increase in visits by banks other than its main bank, the firm is more likely to borrow based on financial statement lending. This might be because firms that have many banks competing for their business are relatively transparent and creditworthy. Thus, their main bank could use the financial statement lending technology.

It may not be appropriate to draw conclusions based on results that do not allow for the possibility of complementarities among lending technologies. Indeed the results in section

3.2 imply that different lending technologies are used at the same time. The results in column (1), especially for SOFT, may therefore be driven by indirect effects of independent variables through other lending technologies. To isolate the direct effects of the independent variables, we run the same regression but now include the other three lending technology indices as right-hand side variables.[22]

The results are in the right column (column (2)) of Table 6. As confirmed in Table 3 and 4, we see mutual dependence in this result as well. The coefficients on these three indices are all positively significant. Economically, the relationship lending index has the biggest impact on LT_FINSTAT.

Interestingly enough, after controlling for these indices, SOFT lost its explanatory power. We can thus conclude that the significance of SOFT in the regression in column (1) is mostly indirect, and probably operates through LT_RELATION. We note that like our earlier tests in column (1), these regressions do not show that AUDIT has an impact on LT_FINSTAT.

Based on the results of AUDIT, it is tempting to conclude that our findings are inconsistent with the hypothesis that financial statement lending is an identifiable lending technology in the sense that the key inputs (audited financial statements) are linked to the outputs (the choice of the financial statement lending technology). To explore this issue further we investigate whether there are differences in the use of financial statement lending between smaller and larger SMEs. We note that financial statement lending is likely to be used less frequently for smaller SMEs because they are less likely to have audited financial statements.[23] Nevertheless, given that a nontrivial fraction of smaller SMEs have audited

[22] The authors recognize that this is an econometrically rough technique. This should be elaborated by employing, for example, the instrumental variable method.

[23] The percentages of the sample firms with audited financial statements (i.e., AUDIT=1) by employee

financial statement, it is not obvious that financial statement lending would be deployed in the same way for these smaller SMEs versus larger SMEs. Arguments could be made going both ways. On the one hand, it may be the case that audits are less informative for small SMEs because the auditors are smaller and/or less reputable accounting firms. On the other hand, having audited financial statements versus unaudited financial statements may be less important for larger SMEs than smaller SMEs because it is easier to verify SME performance and the existence of assets for larger firms without an audit because more alternative sources of information are available.

We investigate this difference by splitting the sample. We ran separate regressions on larger and smaller SMEs based on employee size (less than 70 persons vs. equal to or more than 70 persons). The results are in Table 7. Interestingly we did not find substantial differences for our large SME subsample (column (2)) from our entire sample results (column (2) of Table 6). However, our results indicate that AUDIT matters only for smaller SMEs. This is consistent with the argument above that the content of hard information in audited financial statements is *relatively* more important for smaller SMEs than larger SMEs and that this seems to offset any counter-effect driven by potentially lower quality audits.

Real estate lending

Table 8 reports the results for the real estate lending regression. Similar to the financial statement lending regression, column (1) shows that soft information is important in employing the real estate lending technology. However column (2) represents no significance when the other three indices are incorporated. This indicates that the effect of

size are: 9.36% for firms with 1-19 employees, 11.49% for 20-39 employees, 9.62% for 40-59 employees, 12.15% for 60-99 employees, and 19.55% for over 100 employees.

SOFT is an indirect effect through other lending technologies. It is also worth mentioning that the relationship lending technology does not contribute to employ the real estate lending technology, which confirms the results in Table 4.

An important variable for this regression is an industry dummy REALEST. The variable represents no significant impact on LT_REALEST. This result is reasonable since our sample firms are SMEs, and SMEs in the real estate industry are likely to be mostly real estate brokers.

As for other variables, we can see that the older the firm becomes, the more frequently the real estate lending technology is employed. The relationship is, however, concave. Firms with improving performance (PERFORMANCE_DS) has greater tendency to be lent using the real estate lending technology than those with stably good performance. Finally, firms in the Osaka area tends to rely less on real estate lending.

Other fixed-asset lending

The results for the other fixed-asset lending technology are shown in Table 9. Almost all the independent variables have no significant impact on LT_OTHERFAL. In fact, the F-statistic in the left column is relatively large and the null hypothesis that all the coefficients are zero cannot be rejected at a 5 percent level of significance.

Once we introduce the three other lending technology indices, the regression has some explanatory power. However, the other independent variables are still insignificant except for LOG(ASSET). These results might be due to the infrequency of the other fixed-asset lending technology being employed. This can be inferred from the level of this index. As shown in Table 2, more than 90 percent of the firms consider that the technology is not

actually used.

Relationship lending

Finally, Table 10 reports the results for the relationship lending technology. In column (1), the most important variable SOFT has a positive and highly significant coefficient on LT_RELATION. The more soft information that is produced, the more likely the relationship lending technology is to be used. This result is consistent with the theoretical models of the bank-borrower relationship that emphasize the benefits associated with closer bank-borrower relationships. In particular, it is consistent with the notion that the closer the relationship becomes, the more soft information is accumulated in the bank, which in turn mitigates contracting inefficiency stemming from information asymmetry. Importantly, this result on SOFT is robust to the inclusion of the other three indices as shown in column (2).

Another important result is that in both columns, the coefficient of UNION is significantly positive indicating that smaller banks tend to lend using the relationship lending technology. This is consistent with the theoretical arguments and empirical evidence elsewhere that small banks have a comparative advantage in lending based on soft information (e.g. Stein 2002, Scott 2004, and Liberti and Mian 2006). This result is also consistent, at least partly, with an empirical finding in Kano, Uchida, Udell, and Watanabe (2006). They found that in Japan that a longer relationship with a lender leads to a lower loan interest rate, but only when a Shinkin bank in an uncompetitive market lends to a non-audited SME. This implies that relationship lending is used and is beneficial only between a small uncompetitive bank and an SME for which hard financial information is not available.

To check further for consistency with Kano, Uchida, Udell, and Watanabe (2006), we run the regression in Table 10 by adding a cross term, AUDIT*UNION as an additional independent variable.[24] The results are in Table 11. The coefficient of UNION is still positively significant, while that of UNION*AUDIT is not.[25] This means that relationship lending is employed only when an opaque (*non-audited*) SME borrows from a small bank (a Shinkin bank or credit cooperative). Since the present study and Kano, Uchida, Udell, and Watanabe (2006) use different data sets, this evidence should be reviewed as robust.

Finally, we can see from column (2) of Table 10 and Table 11 that the real estate lending index has nothing to do with the relationship lending index. This strengthens our earlier finding that real estate lending is not used with relationship lending. Another finding is also confirmed that there is synergy between financial statement lending and relationship lending.

4. Conclusion

In the present paper, using data from a unique survey in Japan, we investigated the deployment of different lending technologies which can be used in lending to small- and medium-sized enterprises in Japan. We asked (i) to what extent different lending technologies are used, (ii) how complementary the technologies are, and (iii) what determines the choice of each technologies.

Our findings can be summarized as follows. Regarding question (i), the financial statement lending technology is the most commonly used technology in our sample of Japanese SMEs. Results regarding our investigation of question (ii) suggest that we cannot

[24] Further consistency should be checked by interacting a bank competition proxy as well.
[25] Note that the inclusion of the cross term did not very much change the results for other independent variables

conclude that different lending technologies are perfectly distinct from each other. We find that multiple lending technologies are usually used at the same time. This complementarity is particularly significant between the financial statement lending technology and the relationship lending technology, and between the real estate lending technology and the other fixed-asset lending technology. In contrast, there was no synergy between the real estate lending technology and the relationship lending technology.

Finally, our findings on the complementary among different technologies were confirmed when we investigated question (iii). Due to this complementarity, we were not able to find clear determinants of the three transaction-based lending technologies. Nevertheless, the four lending technologies displayed some distinct characteristics. Among the most interesting of these was that audited financial statements were associated with financial statement lending although this finding was limited to only smaller SMEs. This implies that the content of hard information in audited financial statements is *relatively* more important for smaller SMEs than larger SMEs. Regarding relationship lending, we found that smaller banks and banks that accumulate soft information are more likely to underwrite loans using the relationship lending technology.

In summary, as a preliminary investigation of lending technologies, our analysis revealed some interesting findings, especially with respect to complementarity of lending technologies. However, we also note that further research in this area is certainly warranted. In particular, some methodological improvements to our analysis may prove fruitful. First, the regression analysis could be improved by explicitly taking into consideration the mutual dependence among the lending technologies. A simultaneous equation model and/or an instrumental variable model could be used to resolve potential endogeneity problems. Also

additional independent variables could be incorporated into the regression analysis. Currently, balance sheet figures/ratios and variables representing lending banks' characteristics have not been included as controls. The addition of these variables might also enable us to interpret the results in a wider context. We plan to pursue these improvements in future analysis.

Finally, our analysis can be viewed as the first comprehensive test of the SME lending technology paradigm hypothesized by Berger and Udell (2006). This paradigm argues that there are distinct lending technologies, one based on soft information (relationship lending) and a number of technologies based on hard information (transactions lending). Berger and Udell (2006) offer a taxonomy of these lending technologies and a description of the key inputs to each, although they also note that not all technologies exist in all countries. The lending technology paradigm emphasizes that, in contrast to much of the academic literature, lending to opaque SMEs is not likely confined to just relationship lending. That is, the transactions based technologies are well suited for many SMEs depending on their characteristics.

Our findings are consistent with the paradigm's view that lenders in Japan deploy different underwriting techniques in SME lending that correspond with the lending technologies described in Berger and Udell (2006) controlling for the availability of specific lending technologies in Japan. We also find some evidence mapping hypothesized inputs with specific lending technologies. For example, the accumulation of soft information appears to be associated with relationship lending and the use of audited financial statements appears to be associated with financial statement lending, although not in all circumstances. Interestingly, however, our analysis of the connection between the inputs to the technologies

and the outputs (the technologies themselves) is complicated by the fact that there appear to be considerable complementarities among the lending technologies suggesting that some of the technologies are used in conjunction although pairwise complementarity is quite specific.

Our finding of complementarities is not necessarily inconsistent with the lending technology paradigm in that Berger and Udell (2006) allow for the possibility that lending technologies may be used in conjunction with each other. Whether this degree of complementarity is unique to Japan is unknown because, to the best of our knowledge, this type of investigation has not been conducted elsewhere. Clearly more research is needed here particularly on the extent to which lending technologies are singularly employed in other countries or more often employed in conjunction with each other as appears to be the case in Japan.

Data Appendix

A-1 Lending Factors in the RIETI survey

1. SME's type of business
2. SME's size
3. SME's ability to make repayments (such as years to make repayment)
4. SME's soundness (capital asset ratio)
5. SME's profitability (current profit / sales ratio)
6. SME's growth (e.g. growth in sales)
7. SME's pledgeability of real estate collateral
8. SME's pledgeability of tangible assets collateral (other than real estate)
9. Guarantee by the Credit Guarantee Corporation (a government financial institution)
10. Personal guarantee
11. Personal managerial ability of the SME's representative
12. Personal assets of the SME's representative
13. Past record of the bankruptcy of the SME's representative
14. SME's operating base (customer pool, supply system)
15. SME's strength (e.g. creativity)
16. SME's frequency or quality of disclosure
17. Third party's evaluation of the SME

18. Length of relationships
19. Whether the bank is the SME’s main bank or not
20. Trust between your company and loan officer
21. Attitude of the potential lenders other than the main bank
22. The evaluation of the SME from a CPA or tax accountant

A-2 Characteristics to create Scott’s index, SOFT

1. Knows your business (the firm itself and its business)
2. Knows your managers and owners (the firm's managers and owners)
3. Knows your industry (the firm's industry)
4. Knows the local community (the local community the firm is in)
5. Know the market (the firm's market)
6. Social contact with loan officer (loan officer has frequent contact with the firm)
7. Stable provision of funds
8. Quick decision making
9. Provision of broad services
10. Provision of cheap money
11. Good location

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Table 1. Summary Statistics

	N	Mean	Median	Std. Dev.	Min	Max
Year of establishment (year)	1669	1,966.86	1967	16.69	1893	2004
# of employees (person)	1683	150.29	57	795.18	1	22,724
Capitalization (thousand yen)	1667	763,868.10	32,000	8,166,658.00	3,000	200,000,000
Sales (thousand yen)	1579	1,192,150.00	160,272	8,726,760.00	25	210,000,000

Table 2. Descriptive Statistics of Lending Technology Indices

Relevant Lending Technology	Indices/Factors	N	Mean	Median	Std. Dev.	Min	Max
Financial Statement Lending	LT_FINSTAT	1214	0.328	0.250	0.357	0	1
	#3	1214	0.326	0	0.469	0	1
	#4	1214	0.355	0	0.479	0	1
	#5	1214	0.390	0	0.488	0	1
	#6	1214	0.242	0	0.429	0	1
Real Estate Lending	LT_REALEST	1214	0.181	0	0.385	0	1
Other Fixed-Asset Lending	LT_OTHERFAL	1214	0.069	0	0.197	0	1
	#8	1214	0.054	0	0.225	0	1
	#12	1214	0.085	0	0.279	0	1
Relationship Lending	LT_RELATION	1214	0.119	0	0.187	0	1
	#11	1214	0.184	0	0.387	0	1
	#14	1214	0.160	0	0.367	0	1
	#15	1214	0.165	0	0.371	0	1
	#18	1214	0.068	0	0.252	0	1
	#19	1214	0.147	0	0.354	0	1
	#20	1214	0.092	0	0.290	0	1
	#22	1214	0.016	0	0.127	0	1

Note: Descriptive statistics of the lending technology indices and their components are shown. The components are dummy variables, which takes a value of one if the firm answered 1 (very much) to the question “to what extent did your main bank ACTUALLY focuses on each of the factors in making loans to the firm” with respect to the relevant factor.

Table 3. Correlation between Lending Technology Indices

	LT_FINSTAT	LT_REALESTATE	LT_OTHERFAL	LT_RELATION
LT_FINSTAT				
LT_REALESTATE	0.196 ***			
LT_OTHERFAL	0.205 ***	0.404 ***		
LT_RELATION	0.393 ***	0.124 ***	0.228 ***	

Note: Coefficients of correlation between lending technology indices are shown. *** represents statistical significance at a 1 % level.

Table 4. Multivariate Regression among Lending Technology Indices

Dependent Variable	Independent Variables				
	(Intercept)	LT_FINSTAT	LT_REALESTATE	LT_OTHERFAL	LT_RELATION
LT_FINSTAT	0.217 ***		0.113 ***	0.133 **	0.690 ***
	(0.000)		(0.000)	(0.012)	(0.000)
LT_REALESTATE	0.089 ***	0.132 ***		0.746 ***	-0.023
	(0.000)	(0.000)		(0.000)	(0.696)
LT_OTHERFAL	0.002	0.040 **	0.190 ***		0.162 ***
	(0.731)	(0.012)	(0.000)		(0.000)
LT_RELATION	0.047 ***	0.190 ***	-0.005	0.150 ***	
	(0.000)	(0.000)	(0.696)	(0.000)	

Number of observations: 1206.

Note: Estimated coefficients are in the upper columns. P-values are in the parenthesis. *** and ** represent statistical significance at a 1 % and a 5 % level, respectively.

Table 5. Descriptive Statistics

	N	Mean	Median	Std. Dev.	Min	Max
LARGE	1700	0.645	1	0.479	0	1
REGIONAL	1700	0.198	0	0.399	0	1
UNION	1700	0.156	0	0.363	0	1
AUDIT	1638	0.132	0	0.339	0	1
FREQ_FINSTAT	1483	2.483	1	2.974	1	13
NOFINSTAT	1662	0.030	0	0.171	0	1
ASSET (ten thousand yen)	1527	970,696	137470	7,320,619.000	-2,880	190,000,000
FIRMAGE (year)	1669	38.143	38	16.686	1	112
EMPLOYEE (person)	1683	150.285	57	795.179	1	22,724
LISTED	1641	0.040	0	0.197	0	1
HOMEOWNER	1442	0.947	1	0.224	0	1
CEOAGE (year)	1604	59.860	60	9.713	27	93
PERFORMANCE_SS	1663	0.750	1	0.433	0	1
PERFORMANCE_DS	1663	0.102	0	0.303	0	1
PERFORMANCE_SD	1663	0.081	0	0.272	0	1
PERFORMANCE_DD	1663	0.067	0	0.250	0	1
NODIVIDEND	1642	0.557	1	0.497	0	1
OSAKA	1700	0.422	0	0.494	0	1
KOBE	1700	0.096	0	0.295	0	1
KYOTO	1700	0.142	0	0.350	0	1
CONST	1700	0.125	0	0.330	0	1
MANUFAC	1683	0.357	0	0.479	0	1
IT_TRANS	1700	0.087	0	0.282	0	1
WHOLE	1700	0.209	0	0.407	0	1
RETAIL	1700	0.059	0	0.235	0	1
REALEST	1683	0.023	0	0.149	0	1
RESTAURANT	1683	0.019	0	0.137	0	1
SERVICES	1700	0.125	0	0.331	0	1
VISITINC_OTHER	1650	0.576	1	0.494	0	1
VISITINC_PA	1700	0.134	0	0.341	0	1

Table 6. Financial Statement Lending Regression
(Dependent variable = LT_FINSTAT)

	(1)			(2)		
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
Intercept	0.3595 **	0.1689	0.0336	0.3524 **	0.1628	0.0307
LT_REALESTATE				0.1133 ***	0.0339	0.0009
LT_OTHERFAL				0.2020 ***	0.0654	0.0021
LT_RELATION				0.5961 ***	0.0689	0.0000
REGIONAL	-0.0261	0.0347	0.4525	-0.0282	0.0337	0.4034
UNION	0.0244	0.0390	0.5316	-0.0155	0.0380	0.6825
AUDIT	0.0157	0.0364	0.6673	0.0236	0.0349	0.4992
FREQ_FINSTAT	-0.0325	0.0568	0.5667	-0.0110	0.0536	0.8370
FINSTAT	-0.1586	0.1093	0.1474	-0.1213	0.1022	0.2355
SOFT	0.0580 ***	0.0122	0.0000	0.0162	0.0124	0.1917
LOG(ASSET)	0.0135	0.0147	0.3591	0.0116	0.0141	0.4122
FIRMAGE	-0.0020	0.0026	0.4548	-0.0032	0.0025	0.1992
FIRMAGE^2	0.0000	0.0000	0.4329	0.0000	0.0000	0.3841
LOG(EMPLOYEE)	-0.0107	0.0183	0.5595	-0.0105	0.0175	0.5477
LISTED	-0.1195 *	0.0688	0.0829	-0.1106 *	0.0661	0.0946
HOMEOWNER	-0.0017	0.0581	0.9768	-0.0122	0.0550	0.8251
CEOAGE	-0.0021	0.0013	0.1070	-0.0023 *	0.0012	0.0618
PERFORMANCE_DS	-0.0336	0.0419	0.4232	-0.0301	0.0407	0.4601
PERFORMANCE_SD	-0.0248	0.0487	0.6115	0.0088	0.0466	0.8495
PERFORMANCE_DD	0.0133	0.0535	0.8043	-0.0054	0.0527	0.9184
NODIVIDEND	-0.0440	0.0281	0.1174	-0.0684 **	0.0271	0.0119
OSAKA	0.0031	0.0296	0.9163	0.0088	0.0286	0.7573
KOBE	0.0639	0.0468	0.1719	0.0341	0.0449	0.4471
KYOTO	-0.0170	0.0386	0.6598	-0.0353	0.0375	0.3469
CONST	0.0186	0.0565	0.7426	0.0276	0.0539	0.6094
MANUFAC	0.0051	0.0482	0.9165	0.0294	0.0457	0.5211
WHOLE	0.0332	0.0520	0.5229	0.0573	0.0493	0.2452
RETAIL	-0.0239	0.0648	0.7123	-0.0053	0.0620	0.9318
REALEST	-0.0455	0.1104	0.6801	0.0040	0.1060	0.9699
RESTAU_HOTEL	0.0661	0.0953	0.4883	0.0588	0.0912	0.5197
SERVICES	0.0272	0.0578	0.6377	0.0582	0.0553	0.2930
VISITINC_OTHER	0.0244	0.0255	0.3382	0.0140	0.0246	0.5700
VISITINC_PA	0.0757 **	0.0346	0.0289	0.0744 **	0.0333	0.0259
Adjusted R-squared	0.0286			0.1632		
F-statistic	1.8835			5.9981		
Prob (F-statistic)	0.0034 ***			0.0000 ***		
Number of observations	870			821		

Note: ***, **, or * means that the coefficient is statistically significant at 1%, 5%, or 10% level.

A bigger value of the dependent variable means greater likelihood of the lending bearing characteristics of financial statement lending.

Table 7. Financial Statement Lending Regression (2)
(Dependent variable = LT_FINSTAT, split sample)

	(1) EMLOYEE < 70				(2) EMPLOYEE >= 70			
Variable	Coefficient		Std. Error	Prob.	Coefficient		Std. Error	Prob.
Intercept	0.3546		0.2303	0.1244	0.3650		0.2639	0.1676
LT_REALESTATE	0.0924	**	0.0450	0.0404	0.1285	**	0.0539	0.0176
LT_OTHERFAL	0.2052	**	0.0839	0.0149	0.2864	**	0.1117	0.0108
LT_RELATION	0.4745	***	0.1049	0.0000	0.7246	***	0.0962	0.0000
REGIONAL	-0.0309		0.0471	0.5124	-0.0344		0.0504	0.4951
UNION	0.0177		0.0447	0.6916	-0.1348		0.0866	0.1204
AUDIT	**0.1021**	**	**0.0515**	**0.0482**	**-0.0365**		**0.0491**	**0.4573**
FREQ_FINSTAT	-0.0838		0.0690	0.2252	0.0761		0.0913	0.4051
FINSTAT	-0.1275		0.1176	0.2792	-0.0529		0.2334	0.8210
SOFT	0.0209		0.0181	0.2494	0.0110		0.0180	0.5420
LOG(ASSET)	0.0183		0.0198	0.3551	0.0044		0.0214	0.8380
FIRMAGE	-0.0072	*	0.0042	0.0878	-0.0039		0.0036	0.2782
FIRMAGE^2	0.0001	*	0.0001	0.0664	0.0000		0.0000	0.7463
LOG(EMPLOYEE)	-0.0071		0.0278	0.7979	0.0020		0.0336	0.9532
LISTED	-0.4916		0.3538	0.1655	-0.0386		0.0739	0.6022
HOMEOWNER	-0.0281		0.0780	0.7190	0.0017		0.0803	0.9834
CEOAGE	-0.0022		0.0018	0.2171	-0.0020		0.0018	0.2537
PERFORMANCE_DS	-0.0110		0.0507	0.8284	-0.0558		0.0728	0.4440
PERFORMANCE_SD	0.0644		0.0675	0.3408	-0.0449		0.0674	0.5054
PERFORMANCE_DD	-0.0425		0.0659	0.5190	0.1610		0.1021	0.1158
NODIVIDEND	-0.0723	*	0.0397	0.0692	-0.0663	*	0.0382	0.0838
OSAKA	0.0420		0.0397	0.2910	-0.0313		0.0433	0.4702
KOBE	0.0392		0.0638	0.5397	0.0013		0.0655	0.9847
KYOTO	-0.0448		0.0524	0.3927	-0.0313		0.0544	0.5647
CONST	-0.0268		0.0799	0.7375	0.0780		0.0784	0.3205
MANUFAC	-0.0325		0.0701	0.6430	0.0747		0.0627	0.2346
WHOLE	-0.0030		0.0749	0.9684	0.1354	*	0.0702	0.0544
RETAIL	-0.0167		0.0902	0.8536	-0.0038		0.0891	0.9661
REALEST	-0.0158		0.1407	0.9107	-0.0402		0.1790	0.8225
RESTAU_HOTEL	0.0587		0.1513	0.6984	0.0812		0.1174	0.4896
SERVICES	0.0133		0.0837	0.8742	0.1144		0.0767	0.1366
VISITINC_OTHER	0.0174		0.0359	0.6288	0.0108		0.0353	0.7600
VISITINC_PA	0.0231		0.0442	0.6026	0.1457	***	0.0535	0.0068
Adjusted R-squared	0.1180				0.2193			
F-statistic	2.8387				4.3269			
Prob (F-statistic)	0.0000	***			0.0000	**		
Number of observations	441				380			

Note: ***, **, or * means that the coefficient is statistically significant at 1%, 5%, or 10% level.

A bigger value of the dependent variable means greater likelihood of the lending bearing characteristics of financial statement lending.

Table 8. Real Estate Lending Regression
(Dependent variable = LT_REALESTATE)

	(1)			(2)		
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
Intercept	0.3371 *	0.1798	0.0612	0.1783	0.1701	0.2949
LT_FINSTAT				0.1231 ***	0.0369	0.0009
LT_OTHERFAL				0.7448 ***	0.0632	0.0000
LT_RELATE				-0.0279	0.0751	0.7100
REGIONAL	0.0112	0.0370	0.7626	0.0000	0.0352	0.9989
UNION	0.0154	0.0410	0.7067	-0.0301	0.0396	0.4474
AUDIT	0.0165	0.0391	0.6730	0.0244	0.0364	0.5031
FREQ_FINSTAT	-0.0629	0.0611	0.3031	-0.0521	0.0558	0.3509
FINSTAT	-0.0496	0.1177	0.6734	-0.0229	0.1066	0.8300
SOFT	0.0320 **	0.0129	0.0131	0.0127	0.0129	0.3261
LOG(ASSET)	-0.0050	0.0156	0.7483	-0.0005	0.0147	0.9754
FIRMAGE	0.0081 ***	0.0028	0.0037	0.0080 ***	0.0026	0.0022
FIRMAGE^2	-0.0001 *	0.0000	0.0765	-0.0001 **	0.0000	0.0470
LOG(EMPLOYEE)	-0.0342 *	0.0195	0.0794	-0.0247	0.0182	0.1765
LISTED	0.0048	0.0739	0.9485	0.0141	0.0690	0.8380
HOMEOWNER	-0.0365	0.0618	0.5552	-0.0455	0.0573	0.4280
CEOAGE	-0.0021	0.0014	0.1199	-0.0020	0.0013	0.1218
PERFORMANCE_DS	0.0892 **	0.0442	0.0440	0.0823 *	0.0423	0.0522
PERFORMANCE_SD	0.0273	0.0512	0.5937	-0.0015	0.0486	0.9747
PERFORMANCE_DD	0.0922	0.0588	0.1170	0.0694	0.0549	0.2067
NODIVIDEND	0.0264	0.0300	0.3798	0.0209	0.0284	0.4623
OSAKA	-0.0736 **	0.0315	0.0196	-0.0847 ***	0.0297	0.0044
KOBE	0.0056	0.0504	0.9109	-0.0237	0.0468	0.6131
KYOTO	-0.0245	0.0411	0.5512	-0.0346	0.0390	0.3752
CONST	-0.0159	0.0601	0.7910	0.0063	0.0562	0.9111
MANUFAC	-0.0273	0.0510	0.5934	-0.0146	0.0477	0.7602
WHOLE	-0.0159	0.0550	0.7725	-0.0033	0.0514	0.9484
RETAIL	0.0025	0.0685	0.9711	-0.0161	0.0646	0.8031
REALEST	0.0835	0.1183	0.4805	0.0996	0.1104	0.3673
RESTAU_HOTEL	0.0708	0.1022	0.4891	0.0467	0.0951	0.6233
SERVICES	0.0089	0.0606	0.8838	0.0262	0.0576	0.6496
VISITINC_OTHER	0.0060	0.0271	0.8250	0.0066	0.0256	0.7965
VISITINC_PA	-0.0203	0.0366	0.5798	-0.0243	0.0348	0.4850
Adjusted R-squared	0.0349			0.2101		
F-statistic	2.1101			7.8172		
Prob (F-statistic)	0.0006 ***			0.0000 ***		
Number of observations	891			821		

Note: ***, **, or * means that the coefficient is statistically significant at 1%, 5%, or 10% level.

A bigger value of the dependent variable means greater likelihood of the lending bearing characteristics of real estate lending.

Table 9. Other Fixed-Asset Lending Regression
(Dependent variable = LT_OTHERFAL)

	(1)			(2)		
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
Intercept	0.2086 **	0.0965	0.0310	0.1284	0.0883	0.1466
LT_FINSTAT				0.0593 ***	0.0192	0.0021
LT_REALESTATE				0.2012 ***	0.0171	0.0000
LT_RELATE				0.1524 ***	0.0387	0.0001
REGIONAL	0.0070	0.0198	0.7259	0.0017	0.0183	0.9247
UNION	0.0211	0.0222	0.3412	0.0164	0.0206	0.4260
AUDIT	0.0023	0.0210	0.9135	-0.0021	0.0189	0.9108
FREQ_FINSTAT	0.0131	0.0325	0.6862	0.0264	0.0290	0.3633
FINSTAT	-0.0032	0.0626	0.9591	0.0351	0.0554	0.5266
SOFT	0.0087	0.0069	0.2036	-0.0068	0.0067	0.3111
LOG(ASSET)	-0.0136	0.0084	0.1045	-0.0172 **	0.0076	0.0242
FIRMAGE	0.0012	0.0015	0.4253	0.0002	0.0014	0.8718
FIRMAGE^2	0.0000	0.0000	0.8574	0.0000	0.0000	0.9492
LOG(EMPLOYEE)	-0.0062	0.0105	0.5528	0.0076	0.0095	0.4234
LISTED	0.0083	0.0393	0.8336	0.0068	0.0359	0.8499
HOMEOWNER	0.0107	0.0333	0.7483	0.0134	0.0298	0.6520
CEOAGE	-0.0002	0.0007	0.7893	0.0002	0.0007	0.7450
PERFORMANCE_DS	0.0403 *	0.0240	0.0928	0.0139	0.0221	0.5298
PERFORMANCE_SD	0.0327	0.0276	0.2360	0.0175	0.0252	0.4895
PERFORMANCE_DD	0.0233	0.0316	0.4599	0.0166	0.0285	0.5619
NODIVIDEND	0.0187	0.0160	0.2433	0.0158	0.0148	0.2836
OSAKA	0.0029	0.0169	0.8657	0.0168	0.0155	0.2782
KOBE	-0.0006	0.0271	0.9838	-0.0025	0.0243	0.9193
KYOTO	0.0038	0.0223	0.8644	0.0038	0.0203	0.8535
CONST	-0.0228	0.0320	0.4764	-0.0133	0.0292	0.6486
MANUFAC	-0.0190	0.0272	0.4861	-0.0075	0.0248	0.7610
WHOLE	-0.0050	0.0293	0.8659	0.0035	0.0267	0.8948
RETAIL	0.0184	0.0367	0.6162	0.0032	0.0336	0.9234
REALEST	-0.0387	0.0644	0.5477	-0.0216	0.0574	0.7070
RESTAU_HOTEL	-0.0500	0.0543	0.3578	-0.0546	0.0494	0.2690
SERVICES	-0.0359	0.0325	0.2692	-0.0447	0.0299	0.1351
VISITINC_OTHER	0.0040	0.0146	0.7854	-0.0035	0.0133	0.7926
VISITINC_PA	-0.0154	0.0199	0.4393	-0.0203	0.0181	0.2628
Adjusted R-squared	0.0123			0.2129		
F-statistic	1.3742			7.9301		
Prob (F-statistic)	0.0914 *			0.0000 ***		
Number of observations	871			821		

Note: ***, **, or * means that the coefficient is statistically significant at 1%, 5%, or 10% level.

A bigger value of the dependent variable means greater likelihood of the lending bearing characteristics of other fixed-asset lending.

Table 10. Relationship Lending Regression
(Dependent variable = LT_RELATION)

	(1)			(2)		
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
Intercept	0.0354	0.0846	0.6759	-0.0607	0.0807	0.4523
LT_FINSTAT				0.1457 ***	0.0168	0.0000
LT_REALESTATE				-0.0063	0.0169	0.7100
LT_OTHERFAL				0.1270 ***	0.0322	0.0001
REGIONAL	-0.0031	0.0174	0.8593	-0.0017	0.0167	0.9207
UNION	0.0437 **	0.0195	0.0249	0.0421 **	0.0187	0.0249
AUDIT	0.0026	0.0182	0.8884	0.0022	0.0173	0.9008
FREQ_FINSTAT	-0.0378	0.0283	0.1815	-0.0320	0.0265	0.2276
FINSTAT	-0.0673	0.0540	0.2128	-0.0420	0.0505	0.4061
SOFT	0.0602 ***	0.0060	0.0000	0.0508 ***	0.0059	0.0000
LOG(ASSET)	0.0058	0.0073	0.4297	0.0053	0.0070	0.4478
FIRMAGE	-0.0011	0.0013	0.3996	-0.0009	0.0012	0.4693
FIRMAGE^2	0.0000	0.0000	0.1596	0.0000	0.0000	0.1943
LOG(EMPLOYEE)	-0.0007	0.0090	0.9360	0.0039	0.0087	0.6501
LISTED	0.0214	0.0348	0.5389	0.0317	0.0327	0.3325
HOMEOWNER	0.0106	0.0284	0.7081	0.0075	0.0272	0.7830
CEOAGE	0.0002	0.0006	0.7442	0.0006	0.0006	0.3324
PERFORMANCE_DS	-0.0217	0.0209	0.2978	-0.0211	0.0201	0.2941
PERFORMANCE_SD	-0.0554 **	0.0240	0.0213	-0.0553 **	0.0230	0.0162
PERFORMANCE_DD	-0.0351	0.0272	0.1980	-0.0340	0.0260	0.1923
NODIVIDEND	0.0159	0.0140	0.2582	0.0263 *	0.0134	0.0509
OSAKA	0.0002	0.0148	0.9892	0.0009	0.0141	0.9469
KOBE	0.0273	0.0232	0.2391	0.0209	0.0222	0.3470
KYOTO	0.0378 *	0.0193	0.0504	0.0411 **	0.0185	0.0263
CONST	-0.0212	0.0281	0.4511	-0.0146	0.0266	0.5836
MANUFAC	-0.0228	0.0238	0.3378	-0.0200	0.0226	0.3765
WHOLE	-0.0444 *	0.0256	0.0835	-0.0432 **	0.0244	0.0764
RETAIL	-0.0316	0.0322	0.3278	-0.0291	0.0306	0.3417
REALEST	-0.1136 **	0.0544	0.0372	-0.0888 *	0.0523	0.0901
RESTAU_HOTEL	-0.0085	0.0481	0.8593	-0.0065	0.0451	0.8853
SERVICES	-0.0131	0.0284	0.6452	-0.0169	0.0273	0.5361
VISITINC_OTHER	0.0174	0.0127	0.1705	0.0112	0.0121	0.3560
VISITINC_PA	0.0197	0.0171	0.2500	0.0071	0.0165	0.6694
Adjusted R-squared	0.1289			0.2388		
F-statistic	5.3612			9.0382		
Prob (F-statistic)	0.0000 ***			0.0000 ***		
Number of observations	856			821		

Note: ***, **, or * means that the coefficient is statistically significant at 1%, 5%, or 10% level.

A bigger value of the dependent variable means greater likelihood of the lending bearing characteristics of relationship lending.

Table 11. Relationship Lending Regression (2)
(Dependent variable = LT_RELATION)

	(1)			(2)		
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
Intercept	0.0315	0.0848	0.7108	-0.0662	0.0810	0.4136
LT_FINSTAT				0.1458 ***	0.0168	0.0000
LT_REALESTATE				-0.0064	0.0169	0.7047
LT_OTHERFAL				0.1283 ***	0.0322	0.0001
REGIONAL	-0.0034	0.0174	0.8442	-0.0021	0.0167	0.9004
UNION	0.0403 **	0.0203	0.0471	0.0372 *	0.0196	0.0575
UNION*AUDIT	0.0363	0.0590	0.5387	0.0476	0.0554	0.3911
AUDIT	-0.0011	0.0192	0.9524	-0.0028	0.0182	0.8771
FREQ_FINSTAT	-0.0374	0.0283	0.1861	-0.0315	0.0265	0.2353
FINSTAT	-0.0665	0.0540	0.2187	-0.0409	0.0506	0.4189
SOFT	0.0603 ***	0.0061	0.0000	0.0510 ***	0.0059	0.0000
LOG(ASSET)	0.0061	0.0073	0.4085	0.0057	0.0070	0.4150
FIRMAGE	-0.0010	0.0013	0.4203	-0.0008	0.0012	0.5017
FIRMAGE^2	0.0000	0.0000	0.1728	0.0000	0.0000	0.2164
LOG(EMPLOYEE)	-0.0010	0.0091	0.9165	0.0036	0.0087	0.6770
LISTED	0.0231	0.0349	0.5078	0.0340	0.0328	0.3003
HOMEOWNER	0.0101	0.0284	0.7208	0.0071	0.0272	0.7942
CEOAGE	0.0002	0.0006	0.7175	0.0006	0.0006	0.3114
PERFORMANCE_DS	-0.0215	0.0209	0.3037	-0.0210	0.0201	0.2978
PERFORMANCE_SD	-0.0571 **	0.0242	0.0185	-0.0575 **	0.0231	0.0130
PERFORMANCE_DD	-0.0352	0.0272	0.1968	-0.0342	0.0260	0.1892
NODIVIDEND	0.0163	0.0141	0.2458	0.0269 **	0.0135	0.0463
OSAKA	0.0001	0.0148	0.9945	0.0008	0.0141	0.9530
KOBE	0.0277	0.0232	0.2322	0.0213	0.0222	0.3374
KYOTO	0.0382 **	0.0193	0.0484	0.0416 **	0.0185	0.0248
CONST	-0.0217	0.0281	0.4406	-0.0154	0.0267	0.5648
MANUFAC	-0.0226	0.0238	0.3425	-0.0197	0.0226	0.3843
WHOLE	-0.0441 *	0.0257	0.0858	-0.0428 *	0.0244	0.0795
RETAIL	-0.0314	0.0323	0.3304	-0.0288	0.0306	0.3470
REALEST	-0.1135 **	0.0545	0.0374	-0.0888 *	0.0523	0.0901
RESTAU_HOTEL	-0.0073	0.0482	0.8798	-0.0047	0.0452	0.9171
SERVICES	-0.0129	0.0285	0.6506	-0.0166	0.0273	0.5444
VISITINC_OTHER	0.0174	0.0127	0.1694	0.0113	0.0121	0.3507
VISITINC_PA	0.0191	0.0172	0.2656	0.0062	0.0166	0.7106
Adjusted R-squared	0.1282			0.2385		
F-statistic	5.1912			8.7837		
Prob (F-statistic)	0.0000 ***			0.0000 ***		
Number of observations	856			821		

Note: ***, **, or * means that the coefficient is statistically significant at 1%, 5%, or 10% level.

A bigger value of the dependent variable means greater likelihood of the lending bearing characteristics of relationship lending.