The Effect of Bilateral Lending Relationships on Syndicated Loans: Evidence from Japan[1]

Fumio Akiyoshi[2] Naoaki Minamihashi[3]

Kwansei Gakuin University University of Gothenburg

Sep 2014

[1]We thank Jason Allen, Heng Chen, Masaharu Hanazaki, Maren Hansen, Scott Hendry, Chen Liu, Teodora Paligorova, Manju Puri, Sandra Ramirez, Marc Rysman, Katsutoshi Shimizu, Hirofumi Uchida, Iichiro Uesugi and Jonathan Witmer for helpful comments and suggestions. We also wish to thank the participants at Bank of Canada, Bank of Japan, Development Bank of Japan, Hitotsubashi University, Japan Society of Monetary Economics, Kobe University, Midwest Finance Association, Nagoya University, and Yokohama National University. This paper was previously circulated as "Arranger Choice and Information Asymmetry."

[2]Kwansei Gakuin University, School of Economics, 1-155 Uegahara-1bancho, Nishinomiya, Hyogo 662-8501 Japan

[3]Corresponding author. University of Gothenburg, Department of Economics, Centre for Finance, Vasagatan 1, SE 405 30, Gothenburg, Sweden, Email: naoaki.minamihashi@cff.gu.se Phone: +46-31-786 12 84 Fax: +46-31-786 51 14 Web: http://sites.google.com/site/minamihashi/

Abstract

This paper studies the effect of bilateral lending relationships on syndicated loans by matching syndicated loan data with unique bilateral loan data from Japan. We find that past bilateral lending relationships significantly affect the arranger choice of syndicated loans, particularly for informationally opaque firms. Additionally, a firm can secure a larger loan and more participants if the firm's largest bilateral lender becomes its arranger. Finally, those syndicated loans arranged by the largest bilateral lenders are less likely to default. Overall, our empirical results suggest that bilateral lending relationships can be used to mitigate information asymmetry in the syndicated loan market. (Keywords: Arranger, Syndicated loan, Bilateral loan, Bank-firm relationship, Asymmetric information; JEL classification: G21 G24 G32)

1 Introduction

Bank loans fall into two categories in terms of the number of creditors: bilateral loans, which are provided by a single lender, and syndicated loans, which are offered by a group of lenders. Young firms typically borrow from a single bank initially. As these firms become established and continue to grow, they can borrow from several banks bilaterally, and they can take advantage of the syndicated loan market and many, at times unknown, creditors. Globally, firms have increased their participation in the syndicated loan market; the US currently has a share of 25% to 45% of all business loan extensions though a large share of bank lending transactions, 55% to 75%, are still conducted on a bilateral basis.[1] Although both markets are important, to the best of our knowledge, the relationship between syndicated and bilateral loans has not yet been studied.

Previous papers reveal the existence of information asymmetry problems between borrowers and lenders in syndicated loan markets.[2] Further, the literature concerning universal banking establishes that bank lending relationships are used in bond issuance markets because past lenders have an informational advantage. These two findings lead us to a number of empirical questions about the bilateral-syndicate relationships. Are bilateral and syndicated loan markets highly connected and, if so, why? Do bilateral lenders also provide syndicate loans to their clients? If this is the case, can bilateral lenders decrease the asymmetric information in syndicated loans using knowledge obtained from private lending? Can borrowers derive benefits from the bilateral relationship in syndicated loan origination? Moreover, are the syndicated loans arranged by bilateral lenders less likely to default?

To address these questions, this paper studies the effect of bilateral lending relationships

[1] Reported by a survey of the Board of Governors of the Federal Reserve System. In Japan, syndicate lending represents approximately 15% of outstanding loans according to the Japanese Bankers Association. Note that we cannot directly compare the two statistics because the US data track the flow data of loans, whereas the Japanese data show the loan stock.

[2] Asymmetric information problems between borrowers and participant lenders arises in syndicated loans because credit providers unfamiliar with the firm will participate in the loan.

on syndicated loans. For the purpose of this study, we use a unique bilateral loan data set from Japan, and we hand match the data with syndicated loan data by firm name.[3] Our sample consists of 3,876 syndicated loans issued to 781 firms during the period January 2003 to April 2011, when syndicated loans grew rapidly in Japan. By examining the matched bilateral-syndicated loan data, we analyze how the bilateral lending relationships affect arranger choice, loan terms, and default rates of syndicated loans.

The literature on syndicate lending has mainly explored how information asymmetry is mitigated in syndicated loan markets. For example, Bharath, Dahiya, Saunders, and Srinivasan (2007; 2011) point out that long-term syndicated loan relationships between borrowers and arrangers do decrease asymmetric information. Additionally, Sufi (2007), Focarelli, Franco, and Casolar (2008), and Ivashina (2009) indicate that the loan share of arrangers is a positive signal to potential lenders. Still other papers also note that social networks (see, e.g., Engelberg, Gao, and Parsons, 2012) and an arranger's reputation (see, e.g., Ross, 2010; Gopalan, Nanda, and Yerramilli, 2011) decrease asymmetric information.

Our paper differs in that we demonstrate that previous private bilateral lending relationships are a main driving force in the selection of syndication arranger, and the choice of arranger effectively reduces asymmetric information in syndicated loans with real effects, such as preventing credit rationing and decreasing loan defaults.[4] If previous main bilateral lenders are chosen as arrangers of syndicated loans, those arrangers can fill the information gap between borrowers and other participant lenders using knowledge obtained from

[3] Japan's accounting system previously required each firm to disclose its borrowing amount at the bank level. While the requirement has been changed, firms still release loan shares by bank. Many papers have used this novel data, including Peek and Rosengren (2005), Yasuda (2007), Minamihashi (2011), Amiti and Weinstein (2011), and Giannetti and Simonov (2013). Because the data are publicly available, we can combine this data set with data on syndicated loans by firm name for the purposes of this study. In the US, Dealscan also provides bilateral loan data; however, these data are limited because bilateral loans are frequently transacted privately, whereas syndicated loans are often public.

[4] While Bharath, Dahiya, Saunders, and Srinivasan (2007; 2011) demonstrate the effects of repeated lending on syndicated loans, and Ferreira and Matos (2012) show the effects of equity ownership, our paper demonstrates the effects of bilateral lending relationships. Bank-firm relationships should be originally derived from private bilateral lending, and most firms have bilateral lending relationships although the syndicated and equity ownership relationships are less likely to have.

past private lending relationships. Additionally, because banks face reputational risk when the bilateral main lenders become the arrangers, the bilateral-lender arranger information itself is a positive signal to other participants that the syndicated loan is secure. Moreover, arrangers with a large share of bilateral loans should have the incentive to monitor the borrowers because of the substantial stakes involved. Consequently, firms can decrease asymmetric information if their bilateral lenders become the arrangers. The firm's position with respect to issuing syndicated loans will improve and the likelihood of default of the syndicated loan will decrease. We demonstrate and quantify these effects.

This paper also refines the literature that uses syndicated loan data to identify bank-firm relationships. For example, Schenone (2004), Yasuda (2005), and Chava and Purnanandam (2011) assume that the arrangers or largest lenders of syndicated loans represent a firm's primary lender.[5] However, this assumption is not always the case.[6] The exact bank-firm relationships could not be shown in the syndicated loan data because the transactions with the primary lender could be bilateral. Our study confirms the key assumption in the previous literature that the syndicate loan relationship is an accurate representation of a firm's bank-firm relationship, particularly for informationally opaque firms. We find that, for the whole firm sample, 63% of arrangers are chosen from the largest lenders of bilateral loans, that 31% are chosen from the non-largest lenders of bilateral loans, and that 6% are chosen from banks unrelated to the bilateral loans. Therefore, the majority of lead arrangers of syndicated loans are past bilateral lenders.

More generally, this study contributes to the literature on universal banking, which reports that bank-firm relationships are used in different financial services. For example, Yasuda (2005; 2007) and Drucker and Puri (2005) show that bank-firm relationships improve the firm's position with respect to issuing corporate bonds. Ferreira and Matos (2012) find

[5] Furthermore, Ivashina and Kovner (2011), Massa, Yasuda, and Zhang (2012), and many other papers assume that loan structures, relationships, and behaviors in the syndicated loan market represent general bank lending behavior.

[6] In Section 2.3, we outline an example in which primary lenders are different from syndicate lenders. In the case of Aichi Steel Corporation, for example, syndicate lenders do not represent their primary lenders.

that banks with an equity ownership relationship affect syndicated loan origination. Kodani (2008) and Fujiwara (2010) study the relationships between arranger loan shares and their reputations from the perspective of the main bank system. Extending to this literature, our findings provide evidence of strong connections between bilateral loans and syndicate loans markets and demonstrate that private bilateral lending relationships are indeed used in syndicate lending.

The main findings are as follows. First, we demonstrate that arrangers are chosen from banks with which the borrower has a previous bilateral lending relationship. The base-line estimations show that the probability of a bank being chosen as a lead arranger increases by 29% if the bank grants the greatest amount of bilateral loans. We also show that informationally opaque firms are more likely to obtain syndicated loans arranged by past bilateral lenders. Second, we investigate how the arrangers with past bilateral relationships will affect the terms of the syndicated loans. Our findings suggest that, if the largest lender of bilateral loans is a lead arranger, the amount of the syndicated loan and the number of the participant lenders increases by 10% to 15%, and 4% to 6%, respectively. Finally, we analyze the default rate of syndicated loans. If past main bilateral lenders become the arrangers of syndicated loans, the probability of loan default drops. These findings suggest that bilateral lending relationships play a key role in syndicated loans and effectively mitigate the information asymmetry between borrowers and syndicate participant lenders.

One concern with our findings is potential endogeneity of bilateral lending relationships between banks and firms. There is a possibility that bilateral lenders desire to become lead arrangers for quality firms and offer favorable loan terms to them. In that case, the observed desirable loan terms are not necessarily caused by the presence of bilateral lending relationships. Additionally, there is a possibility that quality banks extend loans simultaneously in bilateral and syndicated loans markets.

We address the endogeneity issue in several ways. In the analysis of lead arranger choice,

the results are robust to the inclusion of bank fixed effects and borrower firm variables. Additionally, we use an instrumental variable approach, in which bilateral lending relationships prior to the development in Japan's syndicated loan market are used as an instrument variable for current bilateral lending relationships. In the analysis of syndicated loan terms, we use the propensity score matching (PSM) method, which selects and compares syndicated loans with similar characteristics. Overall, we confirm that our results are robust to potential endogeneity of the bilateral lending relationship.

This paper is organized as follows: Section 2 describes the data and provides summary statistics. Section 3 analyzes the choice of arranger process in the syndicated loan market from the perspective of bilateral lending relationships. In Section 4, we analyze whether the terms of a syndicated loan change if a past bilateral lender becomes an arranger. We consider the default rates of syndicated loans arranged by bilateral lenders in Section 5, and Section 6 provides a conclusion.

2 Data

2.1 *Sample period*

Our sample period is from January 2003 to April 2011. Over this period, the syndicated loans market in Japan grew rapidly. The outstanding amount of syndicated loans increased from 24 trillion yen at the end of 2004 to 55 trillion yen at the end of 2011. The proportion of syndicated loans to total bank loans outstanding also rose from 6% to 13.1% during the period.[7] In 2000 to 2002, several large Japanese banks merged; we avoid the merger period. We assume that the bank-firm relationships of banks being acquired are inherited by the acquiring banks as does previous literature.

[7] We refer to statistics of the syndicated loan market provided by the Japanese Bankers Association. Note that the statistics only cover Japanese bank-arranged syndicated loans. We cannot obtain the data on the outstanding amount of syndicated loans before September 2004.

2.2 *Data source and data selection*

We construct the data set using three sources: Loan Pricing Corporation (LPC) Dealscan, Nikkei NEEDS Financial Quest, and the Teikoku Databank Bankruptcy Report.

Our first source of data for syndicated loans, the LPC Dealscan database, provides detailed information concerning individual syndicated loans such as loan contract terms, lead arrangers, and loan activation dates.[8] Some syndicated loan deals include multiple tranches with different maturity dates and pricing. Following Baharath, Dahiya, Saunders, and Srinivasan (2011) and Ferreira and Matos (2012), we use tranche-level data for the loan amount.

Consistent with Sufi (2007), we identify the lead arrangers of each syndicated loan based on the financial institution name listed in the "Lead Arranger" field. To trace lead arrangers, all financial institutions that belong to the same financial group are aggregated according to their parent companies. For example, Mizuho Bank, Mizuho Corporate Bank, Mizuho Trust and Banking, and Mizuho Securities are consolidated as the Mizuho Financial Group. As we will discuss, our syndicated loan sample is restricted to loans to publicly listed firms. Consequently, we identify 73 financial institutions that served as lead arrangers in syndicated loans borrowed by publicly listed firm for the period from 2003 to 2011. For tractability, we focus on the top 15 domestic banks that managed more than five syndicated loans as lead arrangers during that period.[9] Table 1 lists the 15 lead arrangers of the syndicated loans. If there are several lead arrangers in a syndicated loan, we count all of the arrangers. Japan's three major financial groups, Mizuho, Sumitomo Mitsui, and Mitsubishi UFJ, have dominant shares in our sample.[10]

[8] In Japanese syndicated loan data, pricing information, fees, and loan shares by each participant are limited; therefore, we do not use that data.

[9] Five foreign and two domestic financial institutions also managed more than five syndicated loans for that period. However, those institutions are excluded from our lead arranger set because the bilateral loan data are not available.

[10] The distribution of the syndicated loan shares in our sample is consistent with the distribution of Japan's syndicated loan market. The three dominant financial groups account for 86% of the total amount of syndicated loans during the period from 2003 to 2011. Refer to Table A1 in the Appendix for details.

[Insert Table 1 around here.]

Second, we identify bilateral lending relationships using the Nikkei NEEDS Financial Quest database. The Nikkei database details the outstanding balance of the loans that each bank grants to a publicly listed firm at the end of each fiscal year. Until 1999, the Japanese accounting system required publicly listed firms to report their outstanding loans from each bank in their annual reports. While this requirement has changed, many publicly listed firms still release loan amounts by bank. The outstanding loans include both bilateral and syndicated loan amounts.[11] We manually match this outstanding loan data from the Nikkei database by firm name with the syndicated loan data from Dealscan. We construct two measures of bank-firm bilateral loan relationships: (1) a dummy variable, *Largest Lender*, which takes a value of one if a bank has the largest outstanding amount of bilateral loans to a firm, and zero otherwise, and (2) the share of the outstanding amount of a bank's bilateral loans to a firm, defined by *Loan Share*. The Nikkei database also provides financial data for individual firms and banks.

Finally, the Teikoku Databank Bankruptcy Report (TDB Tousan Shukei) provides bankruptcy information on public firms. We define a syndicated loan as in default if the borrower files for bankruptcy procedures before or within a year of the loan maturity date.

We focus on syndicated loans issued to publicly listed firms in Japan to match them with bilateral loan data. Typically, asymmetric information problems are observed with private firms. However, Sufi (2007), Bharath, Dahiya, Saunders, and Srinivasan (2011), and others confirm the asymmetric information problem in syndicated loan markets using public firm data. Consistent with previous studies, financial and utility firms are excluded from our sample. We restrict the syndicated loan sample to loans with bilateral loan data available in 1995. As we will discuss later, information concerning bilateral loans in 1995 is central to

[11] Firms report their outstanding loans in three ways: 1. Bilateral and syndicated loans individually. 2. Syndicated loans as "others." 3. Merged bilateral and syndicated loans. To separate the merging effects, we conduct robustness checks with the first syndicated loans of the firms in a later section.

addressing potential endogeneity of bilateral lending relationships. We also exclude from our analysis loans that are predominantly composed of foreign currency, loans with more than five lead arrangers, and loans with missing or extreme values in a borrowing firm or loan data. In summary, our sample contains 3,876 syndicated loans issued to 781 firms arranged by 15 lead banks. Table 2 reports the summary statistics on syndicated loan, bilateral loan, bank, and borrower firm variables. Table A2 in the Appendix provides details concerning these variables.

[Insert Table 2 around here.]

2.3 *Example*

Table 3 provides an example of the data structure of matched Japanese bilateral-syndicated loans. Aichi Steel Corporation borrowed from both bilateral transactions and syndicate banks during the period 2010 to 2011: Table A shows the outstanding loan amount in March 2010, whereas Table B provides the information concerning the syndicated loan origination in January 2011. Mitsui Sumitomo Bank had the largest share of bilateral loans at 23%, and nine other banks lent the remainder to Aichi Steel Corporation. In 2011, the company borrowed from syndicate banks. The Bank of Tokyo Mitsubishi UFJ, which had no previous relationship in bilateral loans, was a lead bank. Only one of the bilateral lenders, Shiga Bank, joined the syndicate. In this example, the main lenders of this company were Mitsui Sumitomo Bank and others. However, these banks were not shown as syndicate banks because their transactions were conducted bilaterally. The majority of the previous literature only analyzes Table B information to identify bank-firm relationships, assuming that a lead arranger in a syndicated loan represents a firm's primary lender. Our contribution is to verify the key assumption in the literature by matching Table A information (bilateral loan information) with Table B information (syndicated loan information).

[Insert Table 3 around here.]

3 Do bank-firm bilateral lending relationships affect arranger choice?

3.1 *Bilateral lending and syndicate arranger choice*

Table 4 summarizes the relationship between bilateral lending and the choice of lead arranger in syndicated loans. We examine the arrangers' status in bilateral lending one year before the transaction of syndicated loans. In our sample, 3,452 syndicated loans are arranged by single lead arrangers (89% of 3,876 syndicated loans), whereas 424 syndicated loans are arranged by multiple lead arrangers (11%). The table separates the sample into two groups: (i) shows the arranger property of all sample loans including the cases of multiple lead arrangers, whereas (ii) shows the arranger property of single arranger loans. Note that most lead arrangers are the banks with bilateral lending relationships with firms. In the case of the full sample, the largest bilateral lenders, those with the greatest outstanding amount of bilateral loans, account for 63% of lead arrangers, whereas the remaining bilateral lenders account for 31%. The banks with no bilateral lending relationships account for only 6%. We also obtain similar results for single arranger loans. These facts suggest that bilateral lending relationships between banks and firms play a key role in the choice of lead arranger of syndicated loans.[12]

[Insert Table 4 around here.]

[12]The Bank of Japan (2007) describes that syndicated loans in Japan originate in smaller loan facilities and with greater opaqueness than in the U.S. Therefore, there is a possibility that there is a propensity for bilateral lenders to act as lead arrangers.

3.2 *Empirical methodology*

This section examines whether banks are more likely to arrange syndicated loans when they have a bilateral lending relationship with the firm. The above statistics show that bilateral lenders are likely to be appointed as lead arrangers of syndicated loans. However, the choice of arranger can also be affected by other factors such as past arranger reputation, geographical proximity to the borrower, and bank financial conditions. We control for such factors using multiple regression analysis and isolate the effects of bilateral lending relationships on the choice of lead arranger.

Following Bharath, Dahiya, Saunders, and Srinivasan (2007), and Ferreira and Matos (2012) we analyze the data set of potential bank-firm pairings for each loan, which includes both realized matches (a bank becomes a lead arranger for a firm) and unrealized matches (a bank does not become a lead arranger for a firm). To economize on the size of the data set, we restrict the choice set of lead arrangers to the top 15 domestic banks listed in Table 1. Therefore, for each of the 3,876 syndicated loans, firm j can choose lead arrangers from 15 banks. The total data size is 55,364 potential bank-firm pairings (3,876 loans $\times$ 15 potential banks). In each syndicated loan, at least one bank is chosen from among the top 15 banks. Also, in 2005, UFJ HD was merged with Mitsubishi Tokyo FG. As a result, potential banks decreased in number to 14 after the merger. We estimate a probit model:

$$Prob(Lead\ arranger)_{i,j,t} = \alpha_0 + \alpha_1 Bilateral\ loan_{i,j,t-1} + \alpha_2 \mathbf{X}_{i,t-1} + \varepsilon_{i,j,t}, \qquad (1)$$

where the dependent variable, *Lead arranger*, is a dummy variable that takes a value of one if bank i becomes a lead arranger in firm j's syndicated loan in year t, and zero otherwise.[13] Our model allows for the case in which multiple lead arrangers are chosen in one syndicated loan. In that case, the *Lead arranger* for several banks would take a value of

[13]It is likely that a firm has multiple syndicated loans in a year. However, the index for each syndicated loan is omitted for simplicity.

one in that syndicated loan. Our key explanatory variable is *Bilateral loan*, which denotes the bilateral lending relationship between banks and firms. We use two alternative measures for the strength of the bilateral lending relationships between banks and firms prior to the syndicated loan: (1) a dummy variable that takes a value of one if a bank has the largest outstanding amount of bilateral loans to a firm, and zero otherwise (*Largest lender*), and (2) the share of the outstanding amount of a bank's bilateral loans to a firm (*Loan share*).[14] The vector $\mathbf{X}$ represents the characteristics of the bank i that can affect the choice of lead arranger. The vector $\mathbf{X}$ includes bank characteristics and bank financial conditions. For bank characteristics, we include three dummies, *Same region*, *Market share*, and *Industry expertise*. *Same region* is a dummy variable that takes a value of one if a bank's headquarters are located in the same prefecture as a firm's headquarters. This variable is used as a proxy for geographical proximity between a bank and a borrowing firm. *Market share* is the ratio of the amount of syndicated loans arranged by a bank to the total amount of syndicated loans in each year. This variable is used as a proxy for the bank's reputation in the syndicated loan market. *Industry expertise* is the proportion of loans to a firm's industry in a bank's lending portfolio. A bank with a strong reputation for lending expertise in a certain industry (e.g., real estate) is more likely to be chosen as a lead arranger in a syndicated loan borrowed by a firm in that industry. Baharath, Dahiya, Saunders, and Srinivasan (2007) report that a bank's location, syndicated loan market share, and industry expertise affect the choice of lead arrangers. The variables for a bank's financial conditions are *Log(Assets)*, *Liquidity*, *ROA*, *Capital ratio*, and *Nonperforming loan ratio*. Our basic model also includes the set of dummies for firm industry, year, and bank fixed effects.[15] In alternative settings, we also add borrower firm variables (*Log(Assets), Debt asset ratio, Current ratio, ROA, Low interest coverage*, and *Low tangibility*) and syndicated loan variables (*Log (Loan amount),*

[14] In the estimation, we use the logarithm of one plus Loan share in percentage terms.

[15] We construct industry dummies by aggregating the Nikkei industry classification system (36 industries) into eight broad categories: manufacturing, mining, construction, wholesale/retail, real estate, transportation, telecommunications, and services. The base category is manufacturing.

Log (Maturity), Revolving loan, Corporate purpose, and *Working capital purpose*).[16]

3.3 *Basic results*

Table 5 shows probit estimates of Eq. (1). The table shows three specifications: (1) basic specification with firm industry dummies, year dummies, and bank fixed effects, (2) specification excluding bank fixed effects from the basic specification to check the robustness of the bank fixed effects estimates, (3) specification with borrower firm and syndicated loan variables added to the basic specification.[17] Columns (1) to (3) show the results using *Largest lender* as a measure of the bilateral lending relationships, whereas *Loan share* is used in columns (4) to (6). In all specifications, the coefficients of *Largest lender* or *Loan share* are positive and statistically significant. The estimates in column (1) illustrate the economic significance of a bilateral lending relationship on the probability that a bank becomes a lead arranger. The predicted probability that a bank is chosen as a lead arranger if the bank grants the largest amount of bilateral loans is 30% (keeping all other variables at their means), whereas the predicted probability that a bank is chosen as a lead arranger if the bank does not grant the largest amount of bilateral loans is 1%. Thus, the probability that a bank will be chosen as a lead arranger increases by 29% if the bank is the largest bilateral lender. These results suggest that lead arranger choice is strongly affected by bilateral lending relationships. We find that the coefficient of *Same region* is statistically significant in the majority of cases. Certain variables for a bank's financial conditions such as *Log(Assets)* and *Capital ratio* also have statistically significant effects in the majority of cases. A large or financially healthy bank is likely to be chosen as a firm's lead arranger.

[16] Originally, the LPC Dealscan database classifies the purposes of syndicated loans into 19 types. However, only two types (corporate purpose and working capital purpose) account for most syndicated loans in our sample. Thus, we reclassify the purpose of syndicated loans into three types: corporate purpose, working capital purpose, and others. The base category is others.

[17] With respect to the second specification, Wooldridge (2010, p. 612) notes that estimators can be inconsistent in a probit model with fixed effects.

[Insert Table 5 around here.]

3.4 *Robustness*

We find that previous bilateral lending relationships have a significant effect on the choice of lead arranger for the syndicated loan. However, there are some concerns with this finding. In this subsection, we check the robustness of previous results under alternative specifications.

3.4.1 *First deal*

First, we estimate Eq. (1) using the first syndicated loans for each firm. The basic results could be affected by our identification methodology of bilateral lending relationships. As previously mentioned in Section 2.2, we use the Nikkei NEEDS Financial Quest database to identify bilateral lending relationships between banks and firms. The database is based on the outstanding loan information reported in firms' financial statements. Unfortunately, we cannot isolate bilateral loans from syndicated loans for some firms that merged bilateral and syndicated loans and reported the combined amount of both loans. Such incomplete separation between bilateral and syndicated loans can overstate the effects of the bilateral lending relationships on the choice of lead arranger. However, we can avoid the overstatement problem by analyzing only the first syndicated loans of each firm because only bilateral loans exist prior to the first syndicated loan. Columns (1) and (2) of Table 6 report the estimation results. All coefficients of *Largest lender* and *Loan share* are positive and statistically significant, which is similar to the basic results using the full sample shown in Table 5. This result suggests that our finding is not driven by the identification methodology of bilateral lending relationships.

3.4.2 *Potential arrangers restricted to major banks*

Second, we restrict the set of potential lead arrangers to the three major financial groups. It is likely that our results are affected by the structure of Japan's syndicated loan market. Table 1 shows that the syndicated market is dominated by Japan's three major financial groups: Mizuho, Sumitomo Mitsui, and Mitsubishi UFJ. Our results could be biased by this market structure because the majority of our sample is unrealized bank-firm matches. Also, there is a possibility that some companies are not able to choose small banks as arrangers because those banks do not operate in a wide area. To address these concerns, we consider robustness when analyzing the restricted sample. Columns (3) and (4) of Table 6 highlight the significant effect of bilateral lending on the choice of lead arranger, even when the potential lead arrangers are restricted to the three major financial groups. Thus, our finding is robust to the structure of Japan's syndicated loan market.[18]

[Insert Table 6 around here.]

3.4.3 *Endogeneity*

Third, we address potential endogeneity of bilateral lending relationships between banks and firms. Unobservable factors such as bank quality can affect both bilateral and syndicated lending simultaneously, which would produce a spurious relationship between the bilateral lending relationship and the choice of lead arranger in syndicated loans. We use an instrumental variable method to handle this endogeneity issue. As an instrument for the current bilateral lending relationship, we use the bilateral lending relationship in 1995 when there were few syndicated loan transactions in Japan. Over time, many Japanese listed firms have maintained bilateral lending relationships with banks, which has produced a correlation be-

[18] We do not implement the analysis in which the three major financial groups are excluded from the potential arranger set. This is because such an analysis can substantially reduce the number of observations and lead to unreliable results.

tween the previous and current bilateral lending relationships. Contrastingly, the previous bilateral lending relationships observed in 1995 would have no correlation with the choice of lead arranger in current syndicated loans, except indirectly through the effect on the lending relationship during the sample period.[19] Table 7 shows the bivariate and IV probit estimation results using the full sample. The results are qualitatively similar to the basic results shown in Table 5.[20] All coefficients of *Largest lender* and *Loan share* are positive and statistically significant. Thus, we confirm the effects of the bilateral lending relationship on the choice of lead arranger, allowing for endogeneity of the bilateral lending relationship.

[Insert Table 7 around here.]

3.5 *Informationally opaque firms*

This subsection examines why a bank with strong bilateral lending relationship is more likely to become a lead arranger in a syndicated loan. As discussed in the Introduction, bilateral lending relationships can be used to mitigate asymmetric information in the syndicated loan market. The benefit of using a bilateral lending relationship would be greater for firms that suffer from severe information asymmetry. Thus, we conjecture that informationally opaque firms use bilateral lending relationships more frequently. To test this conjecture, we estimate the following probit model:

[19] Similar variables are used in Yasuda (2007). The author examines the effect of bank relationship on underwriter choice in the Japanese corporate bond market after the 1993 deregulation allowed banks to enter the underwriting market. In her analysis, the loan relationship between firms and banks that existed before the 1993 deregulation is treated as predetermined and exogenous to the underwriter choice.

[20] The lower panel of Table 6 reports the summary of the first stage estimation results. Our instruments, *Largest lender 1995* and *Loan share 1995*, are highly significantly correlated with *Largest lender* and *Loan share*.

$$Prob(Lead\ arranger)_{i,j,t} = \beta_0 + \beta_1 Bilateral\ loan_{i,j,t-1} + \beta_2 Bilateral\ loan_{i,j,t-1} * Firm\ opaqueness_{j,t-1} + \beta_3 Firm\ opaqueness_{j,t-1} + \beta_4 \mathbf{X}_{i,t-1} + \varepsilon_{i,j,t}. \quad (2)$$

This model is an extended version of Eq. (1), in which the variable *Firm opaqueness* and its interaction term with *Bilateral loan* are added. *Firm opaqueness* denotes a borrowing firm's opaqueness. We use four variables for *Firm opaqueness*: (1) *Firm size*, (2) *Number of past syndicated loans*, (3) *Bond market access*, and (4) *Nikkei 225*. These measures are available in the Japanese data and are used in previous studies such as Sufi (2007) and Baharath, Dahiya, Saunders, and Srinivasan (2007; 2011). *Firm size* and *Number of past syndicated loans* are expressed in logarithmic form. *Bond market access* is a dummy variable that takes a value of one if a firm has bonds outstanding. *Nikkei 225* is a dummy variable that takes a value of one if a firm is included in the Nikkei 225 stock price index, which is a benchmark for the Japanese stock market. Firms that comprise the stock price index attract substantial investor attention, which leads to a decrease in firm opaqueness. Table 8 shows probit estimates of Eq. (2). Columns (1) to (4) report the results using *Largest lender* as a measure of the bilateral lending relationships. In column (1), the coefficient of *Largest lender* is significantly positive, whereas the coefficient of the interaction term between *Largest lender* and *Firm opaqueness* (*Firm size*) is significantly negative. Columns (2) and (3) show similar results when the number of past syndicated loans and bond market access are used as proxies for *Firm opaqueness*. These results suggest that opaque firms (small firms or firms with little access to syndicated loan and bond markets) are likely to secure loans arranged by banks with bilateral lending relationships. For example, the probability that a bank will be chosen as a lead arranger increases by 34% if the bank is the largest lender for a small firm (a firm with book value of assets in the lower quartile) and by 27% for a large firm (a

firm with book value of assets in the upper quartile). Columns (5) to (8) report the results using *Loan share* as a measure of the bilateral lending relationships. The results are similar to those for *Largest lender*. We find that the positive effects of bilateral lending relationships on lead arranger choice become stronger for opaque firms when we use firm size, the number of previously syndicated loans, and Nikkei 225 as proxies for borrowing firm opaqueness.[21]

[Insert Table 8 around here.]

4 Do bank-firm bilateral lending relationships affect syndicated loan terms?

This section analyzes the effect of bank-firm bilateral loan relationships on syndicated loan terms. If a lead arranger is a previous main lender in bilateral lending, that arranger can provide information on firms to participant banks and is able to monitor the borrower using information accumulated from previous bilateral lending. The information that largest bilateral lenders become arrangers itself can be a positive signal to other banks.[22]

With respect to syndicated loan terms, we analyze the effects on the amount of loans and the number of lenders. If lead arrangers have bilateral lending relationships with borrowers and they support their clients' syndicated loans, they can mitigate credit rationing effects: firms can borrow larger amounts and a greater number of lenders will participate in those syndicated loans. As a caveat, we are unable to obtain sufficient samples of loan spreads and fees from the Japanese Dealscan database, and we do not analyze the effects on them.[23]

[21] Using the same instruments in Section 3.4.3, we confirmed that these results have robust to endogeneity.

[22] In other words, other banks think that the syndicated loan is risky if unrelated banks become a lead arranger.

[23] This is mainly because banks prefer not to reveal borrower information in their client relationships.

4.1 *Univariate test*

First, we compare the average values of key variables of syndicated loans arranged by largest bilateral lenders and others. Table 9 shows the results of univariate tests: the first column shows the mean values of syndicated loans and borrower characteristics when their lead arrangers are the largest lenders of bilateral loans (we call these syndicated loans the treatment group). The second column provides the mean values when their lead arrangers are not the largest lenders in the bilateral loans market (we call these syndicated loans the control group). Our interests are the effects on *Loan Amount* and *Number of Lenders*, and we observe that there are no significant differences in loan amount and the treatment group has more participant banks. However, this difference can be caused by sample bias between the treatment group and the control group.

Panel A and B show the difference between the treatment and control groups. We observe that larger firms with high profitability, tangibility, leverage, and interest coverage are more likely to obtain syndicated loans arranged from lead arrangers that are not their largest lenders of bilateral loans. Moreover, if firms obtain the syndicated loans arranged by their largest lenders of bilateral loans, then revolving style loans are easily assumed. Therefore, these results show the existence of sample bias in the two groups.

[Insert Table 9 around here.]

4.2 *Propensity score matching*

There is a limitation to the results in Section 4.1 because the decision to choose a bilateral loan lender as a lead arranger is endogenous. For example, bilateral lenders either desire to become lead arrangers for creditworthy borrowers or decline to act as lead arrangers for uncreditworthy borrowers. We use the propensity score matching (PSM) method to solve this endogeneity. Intuitively, this method selects similar characteristics of syndicated loans,

such as the size and profitability of the borrower firm and loan purpose. This method is described by Heckman, Ichimura, and Todd (1997; 1998), and was recently used in finance literature in studies such as Drucker and Puri (2005), Baharath, Dahiya, Saunders, and Srinivasan (2011), and Saunders and Steffen (2011).

We use variables consistent with previous studies such as Baharath, Dahiya, Saunders, and Srinivasan (2011) to construct a propensity score:

$$\begin{aligned} \textit{Largest-bilateral Arranger}_{i,j,k,t} = \beta_0 + \sum \beta_i(\textit{Loan characteristics}_{i,t-1}) \\ + \sum \beta_j(\textit{Borrower characteristics}_{j,t-1}) + \sum \beta_k(Control_{k,t-1}). \end{aligned} \tag{3}$$

The dependent variable, *Largest-bilateral Arranger*, is a dummy that takes a value of one if the syndicated loan is arranged by a previous largest bilateral lender, and zero otherwise. For borrower information, we take firm asset size, debt ratio, profitability, interest coverage, and tangibility. For loan information, we take the loan maturity, purpose dummies, and revolving dummies. Other control variables include industry and year dummies. For the estimation on *Loan amount*, we include *Number of lenders* and vice versa. We use these variables to construct a propensity score, and the overlap conditions of propensity scores are satisfied.[24] Table 10 shows the results of the propensity score matching estimation. Each column shows the results of different matching methods. For both loan amount and the number of lenders, all coefficients are significantly positive. These results suggest that if a lead arranger is a past major lender in the bilateral lending market, then firms can borrow larger amounts in the syndicated loan market and more lenders participate in the loans. Our estimation results suggest that if a largest lender of bilateral loans is a lead arranger, the amount of the syndicated loan and the number of the lenders is greater from 10% to 15% and from 4% to 6%, respectively.

[24] Figs. 1 and 2 in the Appendix illustrate the propensity density of the treated and control groups.

[Insert Table 10 around here.]

5 Do bank-firm bilateral lending relationships decrease syndicated loan defaults?

This section examines the likelihood that syndicated loan default is affected by the bilateral lending relationship between a lead arranger and a borrowing firm. If a bank with a strong bilateral lending relationship becomes a lead arranger, the bank can monitor a borrower effectively by using information accumulated from past bilateral lending. Additionally, the bank would suffer serious reputational damage if it cannot prevent the failure of a familiar borrower from past bilateral lending. Such reputational risk encourages the bank to intensify monitoring efforts. These factors can contribute to a lower default rate of syndicated loans arranged by a bank with a strong bilateral lending relationship. To test whether bilateral lending relationships affect syndicated loan defaults, we estimate the following probit model:

$$Prob(Default)_{j,k,t} = \gamma_0 + \gamma_1 Arranger's\ bilateral\ loan_{i,j,t-1} + \gamma_2 \mathbf{Y}_{j,t-1} + \gamma_3 \mathbf{Z}_k + \varepsilon_{j,k,t}, \quad (4)$$

where the dependent variable *Default* is a dummy variable that takes a value of one if firm j files for bankruptcy procedures in year t, the period before or within a year of the maturity date of the syndicated loan k. The key explanatory variable is *Arranger's bilateral loan*, which denotes the bilateral lending relationships between arrangers and firms. We use two alternative measures, *Arranger-largest lender* and *Arranger*'s *loan share*, for the strength of the bilateral lending relationships between arranger i and firm j. *Arranger-largest lender* is a dummy variable that takes a value of one if the syndicated loan is arranged by the firm's previous largest lender, and zero otherwise. *Arranger's loan share* is the share of the

outstanding amount of an arranger's bilateral loans to a firm. The vector $\mathbf{Y}$ includes variables for a borrowing firm j such as Log(*Assets*), *Debt asset ratio*, *Current ratio*, *ROA*, *Low interest coverage*, and *Low tangibility*. The vector $\mathbf{Z}$ includes variables for syndicated loan contract k, such as *Log (Loan amount)*, *Log (Maturity)*, *Revolving loan*, *Corporate purpose*, and *Working capital*.[25] We analyze 4,334 syndicated loans, which include 47 default loans to 16 firms.[26] Thus, the default rate is 1.08%.

Table 11 shows the estimation results for Eq. (4). Column (1) reports the probit estimate when we use *Arranger-largest lender* as a measure of the bilateral lending relationship. The coefficient of *Arranger-largest lender* is negative and statistically significant. The negative effect of the bilateral lending relationship is also economically significant. The predicted probability that a syndicated loan will default is 0.04% if the loan is arranged by the largest bilateral lender, whereas the predicted probability that a syndicated loan will default is 0.22% if the loan is not arranged by the largest bilateral lender.[27] Thus, the probability of loan default is decreased by 0.18% if the largest bilateral lender becomes a lead arranger. The magnitude of the effect is close to one-fifth of the loan default rate of 1.08%.

However, this result can be caused by endogeneity of the bilateral loan. The coefficient of the bilateral loan can be biased if an unobservable shock to a borrower's default probability affects the choice of lead arranger. Column (2) reports the bivariate probit estimate using the bilateral lending relationship in 1995 as an instrument for the current bilateral lending relationship.[28] We confirm the negative effect of *Arranger-largest lender* on the probability

[25] These variables are the same as those in Section 3.3. However, firm industry dummies and year dummies are excluded because the limited sample size of default loans leads to many industries and years with no default loans. These industry and year dummies would predict nondefault perfectly and thus be excluded from the probit estimation, which can distort the results.

[26] The number of syndicated loans in this section is 4,334, whereas the number of syndicated loans in Section 3.3 is 3,876. The difference in sample size arises because the sample in this section includes the loans with unavailable bilateral loan data for 1995. We do this procedure to obtain as many default loans as possible.

[27] The predicted probability of loan default is significantly lower than the actual default rate. This can be because a rare outcome such as loan default tends to be poorly predicted in a qualitative response model. See Greene (2012, p.741).

[28] The sample is restricted to the syndicated loan with bilateral loan data available in 1995, resulting in a substantial decrease in the sample size of defaulted syndicated loans. However, this analysis enables us to

of loan default, allowing for endogeneity of the bilateral lending relationship. Columns (3) and (4) present the estimation results using *Arranger's loan share* as a measure of the bilateral lending relationship. We obtain similar results for the effect of the bilateral lending relationship on the probability of loan default, although the coefficient of *Arranger's loan share* is not statistically significant in column (3). These results suggest that syndicated loans are less likely to default when a lead arranger possesses a bilateral lending relationship with the borrowing firm.

[Insert Table 11 around here.]

6 Conclusion

This paper empirically studies how bilateral lending relationships affect syndicated loan origination. We match novel bilateral loan data with syndicated loan data, and analyze the effects of bilateral loan relationships on (1) arranger choice, (2) loan terms, and (3) default of syndicated loans. We find that private lending relationships are indeed used in syndicated loan originations, changing the syndicated loan terms and actually affecting the probability of default. In syndicated loan markets, previous bilateral lenders are more likely to act as lead arrangers of syndicated loans. These arrangers play an active role in syndicated loan origination and are successful in increasing both loan amounts and lender participation. Similarly, because these arrangers monitor the firms effectively, the likelihood of syndicated loan default is reduced. Thus, our findings suggest that private bilateral lending relationships are used to mitigate information asymmetry in syndicated loans.

Our paper also has important implications with respect to the study of bank-firm relationships. Previously, researchers with no bilateral loan data have used syndicated loan data to identify bank-firm relationships and to analyze bank lending behaviors. The validity of

check whether the basic result is robust to endogeneity.

this approach is supported by our finding that there are no significant differences in bank-firm lending relationships between syndicate and bilateral lenders. As a caveat, we find that borrowers without asymmetric information complexities, such as firms with large assets, can possess different bank-firm relationships in the syndicated and bilateral loan markets.

Although the results of this paper are based on unique Japanese loan data, we believe that the basic findings are applicable to other countries that adopt a universal banking system. As Santos and Rumble (2006) find that the US banks have significant voting rights of firms similar to Japanese *Keiretsu*, countries with universal banks have many common features. Interesting extensions to our results include evaluating whether the bilateral loan relationships affect the pricing terms and fees of syndicated loans.

References

[1] Amiti, M., Weinstein, D., 2011. Exports and financial shocks. Quarterly Journal of Economics 126 (4), 1841-1877.

[2] Bank of Japan, 2007. Financial system report: March 2007 (in Japanese).

[3] Bharath, S., Dahiya, S., Saunders, A., Srinivasan, A., 2007. So what do I get? The bank's view of lending relationships. Journal of Financial Economics 85 (2), 368-419.

[4] Bharath, S., Dahiya, S., Saunders, A., Srinivasan, A., 2011. Lending relationships and loan contract terms. Review of Financial Studies 24 (4), 1141-1203.

[5] Chava, S., Purnanandam, A., 2011. The effect of banking crisis on bank-dependent borrowers. Journal of Financial Economics 99 (1), 116-135.

[6] Drucker, S., Puri, M., 2005. On the benefits of concurrent lending and underwriting. Journal of Finance 60 (6), 2763-2799.

[7] Engelberg, J., Gao, P., Parsons, C., 2012. Friends with money. Journal of Financial Economics 103 (1), 169-188.

[8] Ferreira, M., Matos, P., 2012. Universal banks and corporate control: evidence from the global syndicated loan market. Review of Financial Studies 25 (9), 2703-2744.

[9] Fujiwara, K., 2010. Honpou syndicated loan shijo no tenbou (in Japanese). Kokumin Keizai Zasshi 201 (5), 51-64.

[10] Focarelli, D., Pozzolo, A., Casolaro, L., 2008. The pricing effect of certification on syndicated loans. Journal of Monetary Economics 55 (2), 335-349.

[11] Giannetti, M., Simonov, A., 2013. On the real effects of bank bailouts: micro evidence from Japan. American Economic Journal: Macroeconomics 5 (1), 135-167.

[12] Gopalan, R., Nanda, V., Yerramilli, V., 2011. Does poor performance damage the reputation of financial intermediaries? Evidence from the loan syndication market. Journal of Finance 66 (6), 2083-2120.

[13] Greene, W., 2012. Econometric Analysis (Seventh Edition). Pearson Education, Harlow, Essex, England.

[14] Heckman, J., Ichimura, H., Todd, P., 1997. Matching as an econometric evaluation estimator: evidence from evaluating a job training programme. Review of Economic Studies 64 (4), 605-654.

[15] Heckman, J., Ichimura, H., Todd, P., 1998. Matching as an econometric evaluation estimator. Review of Economic Studies 65 (2), 261-294.

[16] Ivashina, V., 2009. Asymmetric information effects on loan spreads. Journal of Financial Economics 92 (2), 300-319.

[17] Ivashina, V., Kovner, A., 2011. The private equity advantage: leveraged buyout firms and relationship banking. Review of Financial Studies 24 (7), 2462-2498.

[18] Kodani, N., 2008. An analysis on the share of syndicated loan retained by the agent bank (in Japanese). Onomichi University Economic Infomation Bulletin Paper 8 (1), 217-232.

[19] Massa, M., Yasuda, A., Zhang, L., 2013. Supply uncertainty of the bond investor base and the leverage of the firm. Journal of Financial Economics 110 (1), 185-214.

[20] Minamihashi, N., 2011. Credit crunch caused by bank failures and self-selection behavior in lending markets. Journal of Money, Credit and Banking 43 (1), 133-161.

[21] Peek, J., Rosengren, E., 2005. Unnatural selection: perverse incentives and the misallocation of credit in Japan. American Economic Review 95 (4), 1144-1166.

[22] Ross, D., 2010. The dominant bank effect: how high lender reputation affects the information content and terms of bank loans. Review of Financial Studies 23 (7), 2730-2756.

[23] Saunders, A., Steffen S., 2011. The costs of being private: evidence from the loan market. Review of Financial Studies 24 (12), 4091-4122.

[24] Santos, J., Rumble, A., 2006. The American keiretsu and universal banks: investing, voting and sitting on nonfinancials' corporate boards. Journal of Financial Economics 80 (2), 419-454.

[25] Schenone, C., 2004. The effect of banking relationships on the firm's IPO underpricing. Journal of Finance 59 (6), 2903-2958.

[26] Sufi, A., 2007. Information asymmetry and financing arrangements: evidence from syndicated loans. Journal of Finance 62 (2), 629-668.

[27] Wooldridge, J., 2010. Econometric Analyisis of Cross Section and Panel Data (Second Edition). MIT Press, Cambridge.

[28] Yasuda, A., 2005. Do bank relationships affect the firm's underwriter choice in the corporate-bond underwriting market? Journal of Finance 60 (3), 1259-1292.

[29] Yasuda, A., 2007. Bank relationships and underwriter competition: evidence from Japan. Journal of Financial Economics 86 (2), 369-340.

Table 1

List of top 15 lead arrangers in our sample

This table lists the top 15 lead arrangers among 73 financial institutions that served as lead arrangers in syndicated loans borrowed by publicly listed firm from January 2003 to April 2011. Note that UFJ HD was merged by Mitsubishi Tokyo FG in 2005. All of the top 15 lead arrangers managed more than five syndicated loans for the sample period. Some financial institutions other than the top 15 lead arrangers (five foreign and two domestic financial institutions) also arranged more than five syndicated loans. However, those institutions are excluded from the list because the bilateral loan data are not available. The table also describes the number and amount of syndicated loans managed by each of the top 15 lead arrangers. Our sample of syndicated loans includes the loan with multiple arrangers. In that case, we treat each loan separately for each arranger. Thus, the total number of syndicated loans is reported to be 4,384, although the actual sample size of syndicated loans is 3,876.

Bank	Number of syndicated loans	Amount of syndicated loans (billion yen)	Share in terms of loan amount (%)
Mizuho FG	1,620	29,770	39.07
Sumitomo Mitsui FG	1,321	24,414	32.04
Mitsubishi UFJ FG	1,143	18,603	24.42
Resona HD	60	845	1.11
Chuo Mitsui Trust HD	40	830	1.09
UFJ HD	29	480	0.63
Sumitomo Trust Bank	58	418	0.55
Aozora Bank	25	222	0.29
Bank of Yokohama	39	178	0.23
Shinsei Bank	9	147	0.19
Hiroshima Bank	13	73	0.10
Chiba Bank	8	66	0.09
Daishi Bank	6	63	0.08
Shikoku Bank	7	54	0.07
Hokuhoku FG	6	31	0.04
Total	4,384	76,192	100.00

Table 2

Summary statistics for variables

This table reports the summary statistics on syndicated loan, bilateral loan, bank, and borrower firm variables. Refer to Table A2 in the Appendix for details regarding these variables. Our sample consists of 3,876 syndicated loans to 781 publicly listed firms from January 2003 to April 2011. Each syndicated loan in the sample is arranged by at least one bank among the top 15 lead arrangers shown in Table 1. Financial and utility firms are excluded from our sample. We exclude loans with bilateral loan data in 1995 not available, loans predominantly composed of foreign currency, loans with more than five lead arrangers, and loans with missing or extreme values in a borrowing firm or loan data. Note that the number of observations for *Default* is 4,334, whereas the number of observations for other loan variables is 3,876. The difference in sample size arises because we include loan observations with bilateral loan data in 1995 not available when we analyze loan default. We do this procedure to obtain as many default loans as possible. The number of observations for *Lead arranger, Largest lender, Loan share, Same region,* and *Industry expertise* is 55,364 (3,876 loans multiplied by 15 potential banks). Note that potential banks decreased in number to 14 after the merger between UFJ HD and Mitsubishi Tokyo FG in 2005.

	Mean	Standard deviation	Median	Min	Max	Observations
Syndicated Loan Variables						
Lead arranger	0.08	0.27	0	1	1	55,364
Number of past loans by firm	12.39	23.05	5	1	163	3,876
Loan maturity (months)	36.84	30.68	27	1	282	3,876
Number of lenders	5.11	3.88	4	1	35	3,876
Loan amount (billions yen)	17.06	34.06	6	0.1	330	3,876
Revolving loan	0.54	0.50	0	1	1	3,876
Corporate purpose	0.41	0.49	0	0	1	3,876
Working capital purpose	0.42	0.49	0	0	1	3,876
Default	0.01	0.10	0	0	1	4,334
Bilateral Loan Variables						
Largest lender	0.07	0.25	0	0	1	55,364
Loan share	0.03	0.08	0	0	1	55,364
Bank Variables						
Same region	0.33	0.47	0	0	1	55,364
Industry expertise	0.11	0.04	0.11	0.00	0.32	55,364
Market share	0.06	0.11	0.00	0.00	0.36	129
Asset (billion yen)	40,257	55,550	10,838	2,429	204,107	129
Liquidity	0.15	0.04	0.15	0.06	0.25	129
ROA	0.00	0.01	0.00	-0.04	0.01	129
Capital ratio	0.05	0.02	0.04	0.01	0.13	129
Nonperforming loan ratio	0.05	0.03	0.04	0.01	0.22	129

Table 2 (Continued)

	Mean	Standard deviation	Median	Min	Max	Observations
Borrower Firm Variables						
Asset (billion yen)	493.43	1,121	117.95	3.62	11,496	2,589
Debt asset ratio	0.31	0.17	0.30	0.00	0.83	2,589
Current ratio	1.27	0.51	1.19	0.10	3.52	2,589
ROA	0.08	0.04	0.07	-0.03	0.20	2,589
Low interest coverage	0.25	0.43	0	0	1	2,589
Low tangibility	0.25	0.43	0	0	1	2,589
Bond market access	0.62	0.48	1	0	1	2,589
Nikkei225	0.23	0.42	0	0	1	2,589

Table 3
Example: Aichi Steel Corporation

This table provides an example of the data structure of matched Japanese bilateral-syndicated loan. We take bilateral loan data from outstanding loan amount shown in Table A. The information on syndicated loans is taken from the LPC Dealscan shown in Table B. In this example, Aichi Steel Corporation borrowed both from bilateral transactions and syndicate banks. The company used bilateral loans by 95% and syndicated loans by 5% in 2010. In bilateral loans, Mitsui Sumitomo Bank had the largest share at 23%, and nine other banks lent the rest of the share to Aichi Steel Corporation. In 2011, the company borrowed from syndicate banks. Aichi Steel Corporation chose Bank of Tokyo Mitsubishi UFJ, who had no previous relationship in bilateral loans, as a lead bank. Only one of the bilateral lenders, Shiga Bank, just joined the syndicate. Note that Aichi Steel Corporation borrowed 5,000 million yen by a syndicated loan in 2011, but there is no available share information of the syndicate.

A. Outstanding loans in 2010 (million yen)	
Bilateral loans (Total)	43,000
1. Mitsui Sumitomo Bank	10,000
2. Nihon Seimei	8,000
3. Meiji Yasuda Seimei	5,000
4. Mizuho Bank	5,000
5. Aichi Bank	3,000
6. Juroku Bank	3,000
7. Yamaguchi Bank	3,000
8. Shiga Bank	2,000
9. Hyakugo Bank	2,000
10. Fukuoka Bank	2,000
Past syndicated loans	2,000
Total	45,000

B. Syndicated loan in 2011 (million yen)	
Lead arranger	
Bank of Tokyo Mitsubishi UFJ	
Participant banks	
1. Bank of Tokyo Mitsubishi UFJ	
2. Shiga Bank	
Total	5,000

Table 4
Summary of relationship between bilateral lending and lead arranger choice

This table presents the relationship between bilateral lending and the choice of lead arranger in syndicated loan. In our sample of 3,876 syndicated loans, 3,452 loans are arranged by single lead arranger, whereas 424 loans are arranged by multiple lead arrangers. Panel A shows arranger property of all sample including the cases of multiple lead arrangers, in which we treat each syndicated loan separately for each lead arranger. Thus, the total number of syndicated loans is reported to be 4,384, although the actual sample size of syndicated loans is 3,876. Panel B shows the property of single-arranger sample. Largest bilateral lenders are lenders that have the largest outstanding amount of bilateral loans to firms. Other bilateral lenders are bilateral lenders to firms but not the largest ones. Nonbilateral lenders are lenders with no bilateral relationships to firms.

	Number of observations	Proportions (%)
Panel A: All sample		
Largest bilateral lenders	2,746	62.6
Other bilateral lenders	1,364	31.1
Nonbilateral lenders	274	6.3
Total	4,384	100.0
Panel B: Single arranger sample		
Largest bilateral lenders	2,353	68.2
Other bilateral lenders	883	25.5
Nonbilateral lenders	216	6.3
Total	3,452	100.0

Table 5

The effect of bilateral loan relationships on the probability of becoming lead arrangers: basic results

This table presents probit estimates of Eq. (1) using the full sample. Eq. (1) is as follows:

$$\text{Prob}(\textit{Lead arranger})_{i,j,t} = \alpha_0 + \alpha_1 \textit{Bilateral loan}_{i,j,t-1} + \alpha_2 \boldsymbol{X}_{i,t-1} + \varepsilon_{i,j,t}.$$

The dependent variable is *Lead arranger* (a dummy variable that takes a value of one if bank *i* becomes a lead arranger in firm *j*'s syndicated loan in year *t*, and zero otherwise). Our key explanatory variable is *Bilateral loan*, which denotes the bilateral lending relationships between banks and firms. We use two alternative measures for the strength of the bilateral lending relationships: (1) *Largest lender* (a dummy variable that takes a value of one if a bank has the largest outstanding amount of bilateral loans to a firm, and zero otherwise), and (2) *Loan share* (the share of the outstanding amount of a bank's bilateral loans to a firm). *Largest lender* is used in columns (1) to (3), whereas *Loan share* is used in columns (4) to (6). The vector ***X*** includes bank *i*'s characteristics and financial conditions such as *Same region* and *Log(Assets)*. Refer to Table A2 for the definitions of those variables. The number of observations is 55,364 potential bank-firm pairings (3,876 loans multiplied by 15 potential banks) from January 2003 to April 2011. Note that potential banks decreased in number to 14 after the merger between UFJ HD and Mitsubishi Tokyo FG in 2005. Column (1) and (4) show the estimates of our base model with firm industry dummies, year dummies, and bank fixed effects. Columns (2) and (5) show the estimates of the model excluding bank fixed effects from the basic model. Columns (3) and (6) show the estimates of the model adding firm and syndicated loan variables to the basic model. Firm variables include *Log(assets)*, *Debt asset ratio*, *Current ratio*, *ROA*, *Low interest coverage*, and *Low tangibility*. Syndicated loan variables include *Log(Loan amount)*, *Log(Loan maturity)*, *Revolving loan*, *Corporate purpose*, and *Working capital purpose*. We use the specification in column (1) to estimate the probability of a bank being chosen as the lead arranger if all variables except the variables being examined are held equal to their mean. Robust standard errors adjusted for firm-level clustering are in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Bilateral Loan Variables						
Largest lender	1.882***	1.872***	1.894***			
	(0.072)	(0.072)	(0.073)			
Loan share				0.599***	0.598***	0.729***
				(0.031)	(0.030)	(0.033)
Bank Variables						
Same region	0.084**	0.101**	0.085**	0.166***	0.171***	0.056
	(0.043)	(0.043)	(0.042)	(0.050)	(0.049)	(0.046)
Market share	0.206	3.802***	0.235	-0.255	4.399***	-0.266
	(0.781)	(0.437)	(0.790)	(0.624)	(0.444)	(0.641)

Table 5 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Bank Variables (Continued)						
Industry expertise	3.174**	2.307**	3.171**	2.189	1.981	2.171
	(1.344)	(1.146)	(1.354)	(1.486)	(1.397)	(1.548)
Log(Assets)	0.330*	0.270***	0.329*	0.500***	0.096	0.447***
	(0.187)	(0.049)	(0.189)	(0.168)	(0.062)	(0.172)
Liquidity	1.163	0.248	1.141	1.274	0.346	1.521
	(0.972)	(0.870)	(0.968)	(0.994)	(0.879)	(1.036)
ROA	-0.378	9.016**	-0.223	-1.254	6.432	-0.151
	(3.998)	(4.320)	(3.978)	(4.604)	(4.631)	(4.776)
Capital ratio	7.295***	1.680	7.494***	8.912***	0.738	9.010***
	(2.824)	(1.949)	(2.853)	(3.039)	(2.193)	(3.124)
Nonperforming loan ratio	-0.469	-1.046	-0.393	-0.290	-0.868	0.028
	(1.911)	(1.540)	(1.911)	(1.732)	(1.759)	(1.764)
Firm industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	No	Yes	Yes	No	Yes
Firm variables	No	No	Yes	No	No	Yes
Syndicated loan variables	No	No	Yes	No	No	Yes
Observations	55,364	55,364	55,364	55,364	55,364	55,364
Pseudo-R^2	0.566	0.561	0.569	0.524	0.519	0.543

Impact of bilateral loan relationships on the probability of being chosen as the lead arranger using the specification in column (1)

	Probability of being chosen (%)
Largest lender = 0	0.8
Largest lender = 1	30.0
Change in probability	29.2

Table 6
The effect of bilateral loan relationships on the probability of becoming lead arrangers: robustness

This table presents probit estimates of Eq. (1) using only first syndicated loans and the set of potential lead arrangers restricted to the three major financial groups: Mizuho, Sumitomo Mitsui, and Mitsubishi UFJ. The dependent variable is *Lead arranger* (a dummy variable that takes a value of one if a bank becomes a lead arranger in a firm's syndicated loan, and zero otherwise). Our key explanatory variable is *Bilateral loan*, which denotes the bilateral lending relationships between banks and firms. We use two alternative measures for the strength of the bilateral lending relationships: (1) *Largest lender* (a dummy variable that takes a value of one if a bank has the largest outstanding amount of bilateral loans to a firm, and zero otherwise), and (2) *Loan share* (the share of the outstanding amount of a bank's bilateral loans to a firm). *Largest lender* is used in columns (1) and (3), whereas *Loan share* is used in columns (2) and (4). Refer to Table A2 for the definitions of other variables. We use the specification in column (1) and (3) to estimate the probability of a bank being chosen as the lead arranger if all variables except the variables being examined are held equal to their mean. Robust standard errors adjusted for firm-level clustering are in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	First syndicated loans		Top 3 banks	
Bilateral Loan Variables				
Largest lender	2.126***		1.842***	
	(0.101)		(0.079)	
Loan share		0.726***		0.560***
		(0.042)		(0.034)
Bank Variables				
Same region	0.036	-0.071	0.010	0.139***
	(0.058)	(0.060)	(0.039)	(0.052)
Market share	-4.523***	-3.691**	-0.216	-0.260
	(1.684)	(1.638)	(1.140)	(0.844)
Industry expertise	1.240	0.059	1.430	-0.556
	(1.981)	(2.241)	(2.552)	(2.314)
Log(Assets)	0.672**	0.686**	0.331	0.624***
	(0.334)	(0.342)	(0.286)	(0.233)
Liquidity	4.081*	5.496	-1.092	-2.923
	(2.158)	(2.389)	(3.126)	(2.569)
ROA	5.969	3.195	-10.221	-4.684
	(7.461)	(8.081)	(11.334)	(10.003)
Capital ratio	7.443	12.980*	17.779	7.763
	(6.056)	(6.775)	(14.739)	(12.675)
Nonperforming loan ratio	-4.325	-3.991	2.964	-0.552
	(2.969)	(3.120)	(5.729)	(4.973)
Firm industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Firm variables	No	No	No	No
Syndicated loan variables	No	No	No	No

Table 6 (Continued)

	(1)	(2)	(3)	(4)
	First syndicated loans		Top 3 banks	
Observations	6,929	6,929	11,628	11,628
Pseudo-R^2	0.570	0.540	0.289	0.182

Impact of bilateral loan relationships on the probability of being chosen as the lead arranger using

	the specification in column (1)	the specification in column (3)
	Probability of being chosen (%)	Probability of being chosen (%)
Largest lender = 0	0.8	17.2
Largest lender = 1	38.9	81.4
Change in probability	38.1	64.3

Table 7

The effect of bilateral loan relationships on the probability of becoming lead arrangers: results allowing for endogeneity of the bilateral lending relationship

This table presents bivariate and IV probit estimates of Eq. (1) to address potential endogeneity of bilateral lending relationships. The dependent variable is *Lead arranger* (a dummy variable that takes a value of one if a bank becomes a lead arranger in a firm's syndicated loan, and zero otherwise). Our key explanatory variable is *Bilateral loan*, which denotes the bilateral lending relationships between banks and firms. We use two alternative measures for the strength of the bilateral lending relationships: (1) *Largest lender* (a dummy variable that takes a value of one if a bank has the largest outstanding amount of bilateral loans to a firm, and zero otherwise), and (2) *Loan share* (the share of the outstanding amount of a bank's bilateral loans to a firm). In column (1), we use bivariate probit estimation allowing for endogeneity of *Largest lender*. The instrument of *Largest lender* is *Largest lender 1995* (a dummy variable that takes a value of one if a bank had the largest outstanding amount of bilateral loans to a firm in 1995, and zero otherwise). In column (2), we use IV probit estimation allowing for endogeneity of *Loan share*. The instrument of *Loan share* is *Loan share 1995* (the share of the outstanding amount of a bank's bilateral loans to a firm in 1995). We use the specification in column (1) to estimate the probability of a bank being chosen as the lead arranger if all variables except the variables being examined are held equal to their mean. Robust standard errors adjusted for firm-level clustering are in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	(1)	(2)
	Bivariate probit	IV probit
Bilateral Loan Variables		
Largest lender	2.582***	
	(0.089)	
Loan share		0.901***
		(0.039)
(Results for 1st stage regression)		
Instruments		
Largest lender 1995	2.564***	
	(0.084)	
Loan share 1995		0.508***
		(0.020)
Bank Variables	Yes	Yes
Firm industry dummies	Yes	Yes
Year dummies	Yes	Yes
Bank fixed effects	Yes	Yes
Firm variables	No	No
Syndicated loan variables	No	No
Observations	55,364	55,364

Impact of bilateral loan relationships on the probability of being chosen as the lead arranger using the specification in column (1)

	Probability of being chosen (%)
Largest lender = 0	0.80
Largest lender = 1	57.10
Change in probability	56.30

Table 8
Impact of firm opaqueness on the relationship between bilateral lending and lead arranger choice

This table presents probit estimates of Eq. (2) to test the conjecture that informationally opaque firms use bilateral lending relationships more frequently. Eq. (2) is as follows:

$$\text{Prob}(\textit{Lead arranger})_{i,j,t} = \beta_0 + \beta_1 \textit{Bilateral loan}_{i,j,t-1} + \beta_2 \textit{Bilateral loan}_{i,j,t-1} * \textit{Firm opaqueness}_{j,t-1} + \beta_3 \textit{Firm opaqueness}_{j,t-1} + \beta_4 \boldsymbol{X}_{i,t-1} + \varepsilon_{i,j,t}.$$

The dependent variable is *Lead arranger* (a dummy variable that takes a value of one if bank *i* becomes a lead arranger in firm *j*'s syndicated loan in year *t*, and zero otherwise). Eq. (2) is a extended version of Eq. (1), in which the variable *Firm opaqueness* and its interaction term with *Bilateral loan* are added. *Firm opaqueness* denotes a borrowing firm's opaqueness. We use four variables for *Firm opaqueness*: (1) *Firm size*, (2) *Number of past syndicated loans*, (3) *Bond market access* (a dummy variable that takes a value of one if a firm has bonds outstanding), and (4) *Nikkei 225* (a dummy variable that takes a value of one if a firm is included in the Nikkei 225 stock price index). *Firm size* and *Number of past syndicated loans* are expressed in logarithmic form. *Bilateral loan* denotes the bilateral lending relationships between banks and firms. We use two alternative measures for the strength of the bilateral lending relationships: (1) *Largest lender* (a dummy variable that takes a value of one if a bank has the largest outstanding amount of bilateral loans to a firm, and zero otherwise), and (2) *Loan share* (the share of the outstanding amount of a bank's bilateral loans to a firm). *Largest lender* is used in columns (1) to (4), whereas *Loan share* is used in columns (5) to (8). The vector ***X*** includes bank *i*'s characteristics and financial conditions such as *Same region* and *Log(Assets)*. Refer to Table A2 for the definitions of those variables. We use the specification in column (1) to estimate the probability of a bank being chosen as the lead arranger if all variables except the bilateral loan variable and the firm opaqueness measure (*Firm size*) are held equal to their mean. We set the value of a firm's asset to the lower quartile (46.4 billion yen) for small firms while we set the value of a firm's asset to the upper quartile (374 billion yen). Robust standard errors adjusted for firm-level clustering are in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Firm opaqueness				***Firm opaqueness***			
	Firm size	*Number of past syndicated loans*	*Bond market access*	*Nikkei225*	*Firm size*	*Number of past syndicated loans*	*Bond market access*	*Nikkei225*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bilateral Loan and Firm Opaqueness								
Largest lender	3.564***	2.198***	2.090***	1.935***				
	(0.505)	(0.099)	(0.121)	(0.077)				
Loan share					1.170***	0.721***	0.595***	0.698***
					(0.176)	(0.042)	(0.048)	(0.031)
Largest lender Firm opaqueness*	-0.137***	-0.179***	-0.315**	-0.179				
	(0.042)	(0.060)	(0.131)	(0.160)				
Loan share Firm opaqueness*					-0.036**	-0.048**	0.014	-0.124**
					(0.014)	(0.023)	(0.049)	(0.058)
Firm opaqueness	0.050***	0.025	0.073	0.036	0.248***	0.223***	0.075	0.628***
	(0.015)	(0.023)	(0.057)	(0.059)	(0.033)	(0.046)	(0.131)	(0.122)

Table 8 (Continued)

	Firm opaqueness				***Firm opaqueness***			
	Firm size	*Number of past syndicated loans*	*Bond market access*	*Nikkei225*	*Firm size*	*Number of past syndicated loans*	*Bond market access*	*Nikkei225*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Variables								
Same region	0.069	0.093**	0.083*	0.084*	0.046	0.109**	0.163***	0.067
	(0.043)	(0.043)	(0.043)	(0.046)	(0.047)	(0.046)	(0.050)	(0.048)
Market share	0.159	0.201	0.193	0.177	-0.268	-0.185	-0.254	-0.256
	(0.742)	(0.739)	(0.774)	(0.768)	(0.635)	(0.626)	(0.625)	(0.627)
Industry expertise	3.115**	3.046**	3.223**	3.213**	2.386	2.457	2.187	2.290
	(1.350)	(1.357)	(1.337)	(1.349)	(1.556)	(1.516)	(1.486)	(1.494)
Log(Assets)	0.347*	0.320*	0.331*	0.331*	0.439***	0.465***	0.500***	0.468***
	(0.182)	(0.184)	(0.186)	(0.186)	(0.171)	(0.167)	(0.169)	(0.169)
Liquidity	1.158	1.160	1.201	1.160	1.523	1.389	1.270	1.328
	(0.982)	(0.986)	(0.976)	(0.973)	(1.055)	(1.042)	(0.991)	(1.014)
ROA	0.118	0.441	-0.482	-0.269	-0.233	-0.536	-1.128	-0.282
	(4.084)	(4.157)	(3.976)	(3.995)	(4.800)	(4.810)	(4.585)	(4.517)
Capital ratio	6.973**	6.968**	7.170**	7.258***	8.839***	8.446***	8.939***	9.137***
	(2.833)	(2.860)	(2.813)	(2.814)	(3.072)	(3.042)	(3.042)	(3.028)
Nonperforming loan ratio	-0.792	-0.544	-0.542	-0.592	-0.205	-0.238	-0.235	-0.247
	(1.877)	(1.910)	(1.915)	(1.885)	(1.779)	(1.779)	(1.735)	(1.745)
Firm industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm variables	No	No	No	No	No	No	No	No
Syndicated loan variables	No	No	No	No	No	No	No	No
Observations	55,364	55,364	55,364	55,364	55,364	55,364	55,364	55,364
Pseudo-R^2	0.568	0.568	0.567	0.566	0.541	0.529	0.524	0.532

Impact of bilateral loan relationships on the probability of being chosen as the lead arranger using the specification in column (1)

	Probability of being chosen (%)	
	Small firm	Large firm
Largest lender = 0	0.6	0.8
Largest lender = 1	34.4	28.0
Change in probability	33.7	27.2

Table 9
Univariate test: borrower and loan characteristics

Panel A segregates the entire sample into (A) when arrangers are the largest lenders in bilateral loan markets and (B) otherwise. The first two columns report the mean (standard deviation in parentheses) values for information of loan contract. Panel B provides similar characteristics of borrowers. The last column provides the t-statistic for difference in means. ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(A) Arrangers = Largest lenders in bilateral lending markets	(B) Arrangers ≠ Largest lenders in bilateral lending markets	t-statistic (A)-(B)
Panel A: Syndicated Loan Information			
Loan amount (Trench amount) (billion yen)	16.9	17.5	0.505
	(0.662)	(0.969)	
Number of lenders	5.223	4.822	2.975***
	(0.076)	(0.106)	
Corporate purpose dummy	0.416	0.386	1.790*
	(0.009)	(0.014)	
Working capital dummy	0.422	0.408	0.829
	(0.009)	(0.014)	
Refinance dummy	0.124	0.120	0.320
	(0.006)	(0.010)	
Revolving dummy	0.581	0.449	7.579***
	(0.009)	(0.015)	
Panel B: Borrower Firm Information			
Firm asset size (billion yen)	812.4	1152.5	5.442***
	(32.00)	(59.46)	
ROA	0.081	0.094	6.887***
	(0.001)	(0.002)	
Tangible asset ratio	0.323	0.368	7.392***
	(0.003)	(0.006)	
Debt asset ratio	0.322	0.344	3.788***
	(0.003)	(0.005)	
Interest coverage ratio	21.21	24.82	2.275***
	(0.699)	(1.792)	
Current ratio	1.247	1.218	1.711*
	(0.009)	(0.015)	
Observations	2,714	1,162	

Table 10

The effect of bilateral loan relationships on loan terms: propensity score matching estimation

This table reports the average difference in loan amount (Tranche amount) and number of participants of syndicated loans arranged by previous largest bilateral lenders and loans arranged by nonlargest bilateral lenders. To examine the differences, we control both borrower and loan characteristics. In the first stage, we compute propensity scores using the following probit model: The dependent variable *Largest-bilateral Arranger* (a dummy variable that takes a value of one if the syndicated loan is arranged by a firm's previous largest lender, and zero otherwise). Explanatory variables consist of borrower firm variables, syndicated loan variables and other controls. Borrower firm variables include *Log(assets)*, *Debt asset ratio*, *Current ratio*, *ROA*, *Low interest coverage*, and *Low tangibility*. Syndicated loan variables include *Log(Loan maturity)*, *Revolving loan*, *Corporate purpose*, and *Working capital purpose*. For the estimation on *Log(Loan amount),* we include *Log(Number of lenders)* and vice versa. Other control variables include industry and year dummies. In the second stage, we use the following three matching methods; (i) Kernel-based matching (ii) Stratification matching and (iii) Nearest neighbor matching. All of the matching are conducted by using only common support samples. We report standard errors in parentheses. For the calculation on the standard errors, we used bootstrap method. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(i) Kernel-based matching	(ii) Stratification matching	(iii) Nearest neighbor matching
1. *Log(Loan amount)*	0.097***	0.140***	0.159***
	(0.041)	(0.045)	(0.065)
2. *Log(Number of lenders)*	0.064***	0.061***	0.077***
	(0.026)	(0.026)	(0.032)

Table11

The effect of bilateral loan relationships on the default probability of syndicated loans

This table presents estimates of Eq. (4). Eq. (4) is as follows:

$$\text{Prob}(\textit{Default})_{j,k,t} = \gamma_0 + \gamma_1 \textit{Arranger's bilateral loan}_{i,j,t-1} + \gamma_2 \boldsymbol{Y}_{j,t-1} + \gamma_3 \boldsymbol{Z}_k + \varepsilon_{j,k,t}.$$

The dependent variable is *Default* (a dummy variable that takes a value of one if borrower *j* files for bankruptcy procedures in year *t*, the period before or within a year of the maturity date of the syndicated loan *k*, and zero otherwise). Our key explanatory variable is *Arranger's bilateral loan*, which denotes the bilateral lending relationships between an arranger *i* and borrower *j*. We use two alternative measures for the strength of the bilateral lending relationships: (1) *Arranger-largest lender* (a dummy variable that takes a value of one if the syndicated loan is arranged by a firm's previous largest lender, and zero otherwise), and (2) *Arranger's loan share* (the share of the outstanding amount of an arranger's bilateral loans to a firm). The vector ***Y*** includes variables for borrower *j* such as *Log(Assets)*. The vector ***Z*** includes variables for syndicated loan contract *k* such as *Log(Loan amount)*. Refer to Table A2 for the definitions of those variables. Firm industry dummies and year dummies are excluded because the limited sample size of default loans leads to many industries and years with no default loans. These industry and year dummies would predict nondefault perfectly and thus be excluded from the probit estimation, which can distort the results. Column (1) reports probit estimates using *Arranger-largest lender*. Column (2) reports bivariate probit estimates, allowing for endogeneity of *Arranger-largest lender*. The instrument of *Arranger-largest lender* is *Arranger-largest lender 1995* (a dummy variable that takes a value of one if an arranger had the largest outstanding amount of bilateral loans to a firm in 1995, and zero otherwise). Column (3) reports probit estimates using *Arranger's loan share*. Column (4) reports IV probit estimates, allowing for endongeneity of *Arranger's loan share*. The instrument of *Arranger's loan share* is *Arranger's loan share 1995* (the share of the outstanding amount of an arranger's bilateral loans to a firm in 1995). Note that columns (1) and (3) report 4,334 observations whereas columns (2) and (4) report 3,876 observations. The difference in the number of observations arises because we include loan observations with bilateral loan data in 1995 not available in our sample when we conduct probit estimation in columns (1) and (3). We do this procedure to obtain as many default loans as possible. We use the specification in column (1) to estimate the probability that a syndicated loan will default if the loan is arranged by the largest bilateral lender (keeping all variables except the variable examined at their mean). Robust standard errors adjusted for firm-level clustering are in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Probit	Bivariate probit	Probit	IV probit
	(1)	(2)	(3)	(4)
Arranger's Bilateral Loan Variables				
Arranger-largest lender	-0.531***	-1.952***		
	(0.200)	(0.277)		
Arranger's loan share			-0.105	-0.684**
			(0.098)	(0.345)

Table11 (Continued)

	Probit	Bivariate probit	Probit	IV probit
	(1)	(2)	(3)	(4)
Firm Variables				
Log(Assets)	-0.197***	-0.240***	-0.208***	-0.499***
	(0.061)	(0.064)	(0.063)	(0.097)
Debt asset ratio	2.650***	2.349**	2.507***	2.357***
	(0.783)	(0.935)	(0.753)	(0.783)
Current ratio	0.245	0.373*	0.197	0.284
	(0.197)	(0.220)	(0.205)	(0.259)
ROA	-5.158	-2.611	-4.089	-4.123
	(3.952)	(2.665)	(4.091)	(3.100)
Low interest coverage	-0.436	-0.154	-0.345	-0.068
	(0.325)	(0.221)	(0.342)	(0.264)
Low tangibility	1.248***	1.218***	1.267***	1.299***
	(0.415)	(0.416)	(0.409)	(0.422)
Syndicated Loan Variables				
Log(Loan amount)	-0.033	0.051	-0.044	0.071
	(0.083)	(0.056)	(0.077)	(0.068)
Log(Maturity)	-0.049	-0.053	-0.046	-0.027
	(0.151)	(0.127)	(0.149)	(0.145)
Revolving loan	-0.706**	-0.743***	-0.708**	-0.781**
	(0.325)	(0.262)	(0.315)	(0.377)
Corporate purpose	-0.020	-0.112	-0.102	-0.121
	(0.188)	(0.161)	(0.194)	(0.159)
Working capital purpose	-0.071	-0.059	-0.171	0.010
	(0.284)	(0.271)	(0.299)	(0.277)
(Results for 1st stage regression)				
Instruments				
Arranger-largest lender 1995		0.941***		
		(0.103)		
Arranger's loan share 1995				0.158***
				(0.024)
Observations	4,334	3,876	4,334	3,876
Pseudo-R^2	0.379		0.360	

Impact of bilateral loan relationships on the probability of default using the specification in column (1)

	Probability of default (%)
Largest lender = 0	0.22
Largest lender = 1	0.04
Change in probability	-0.18

Appendix: Tables and Figures

Table A1
Top lead arrangers in Japan's syndicated loan market

This table lists the top lead arrangers in Japan's syndicated loan market, which includes both publicly listed firms and private firms. The number and amount of loans for each financial institution are cumulative total values from January 2003 to April 2011. The figures do not include loans predominantly composed of foreign currency or loans with more than five lead arrangers. We treat each loan separately for each arranger in the cases of a syndicated loan with multiple arrangers.

Bank	Number of syndicated loans	Amount of syndicated loans (billion yen)	Market share in terms of loan amount (%)
Mizuho FG	5,098	70,549	32.73
Sumitomo Mitsui FG	4,909	64,159	29.76
Mitsubishi UFJ FG	4,667	52,003	24.12
Resona HD	304	2,987	1.39
Citigroup	68	2,953	1.37
Sumitomo Trust Bank	262	2,788	1.29
Shinsei Bank	50	2,440	1.13
Development Bank of Japan	196	2,372	1.10
Shinkin Central Bank	41	2,021	0.94
UFJ HD	118	1,585	0.74
Aozora Bank	236	1,398	0.65
Chuo Mitsui Trust HD	101	1,307	0.61
BNP Paribas	25	1,149	0.53
JP Morgan	8	813	0.38
Goldman Sachs	17	792	0.37
Yokohama Bank	145	604	0.28
West LB	3	500	0.23
Royal Bank of Scotland	11	384	0.18
Deutsche Bank	10	278	0.13
Nomura Securities	13	246	0.11
Norinchukin Bank	16	242	0.11
Fukuoka FG	48	226	0.10
Hiroshima Bank	32	213	0.10
77 Bank	17	200	0.09
Hokuhoku FG	46	194	0.09
Others(116)	667	3,169	1.5
Total	17,108	215,574	100.0

Table A2
Variable definitions

Variable	Definition
Syndicated Loan Variables	
Lead arranger	Dummy variable that takes one if a bank becomes a lead arranger in a firm's syndicated loan.
Number of past syndicated loans	Number of past syndicated loans to a firm.
Loan maturity	Loan maturity in months.
Number of lenders	Number of lenders.
Loan amount	Loan tranche amount in million yen.
Revolving loan	Dummy variable that takes one if loan is a revolving credit loan.
Corporate purpose	Dummy variable that takes one if loan is for various operational activities.
Working capital purpose	Dummy variable that takes one if loan is to finance working capital.
Default	Dummy variable that takes one if a borrower files for bankruptcy procedures before or within a year
Bilateral Loan Variables	
Lender	Dummy variable that takes one if a bank has the outstanding amount of bilateral loans to a firm.
Largest lender	Dummy variable that takes one if a bank has the largest outstanding amount of bilateral loans to a firm.
Loan share	Share of the outstanding amount of a bank's bilateral loans to a firm.
Arranger-largest lender	Dummy variable that takes one if one if the syndicated loan is arranged by a firm's previous largest lender.
Arranger's loan share	Share of the outstanding amount of an arranger's bilateral loans to a firm.
Bank Variables	
Same region	Dummy variable that takes one if a bank's headquarter is located in the same prefecture as a borrower's headquarter.
Industry expertise	Proportion of loans to a firm's industry in a bank's lending portfolio.
Market share	Market share of the amount of syndicated loan arranged by a bank in each year.
Asset	Book value of total assets.
Liquidity	Ratio of cash and government bond to total assets.
ROA	Ratio of EBITDA to total assets.
Capital ratio	Ratio of book value of capital to total assets.
Nonperforming loan ratio	Ratio of nonperforming loans to total loans.

Table A2 (Continued)

Variable	Definition
Borrower Firm Variables	
Asset	Book value of total assets.
Debt asset ratio	Ratio of total debt to total assets.
Current ratio	Ratio of current assets to current liabilities.
ROA	Ratio of EBITDA to total assets.
Low interest coverage	Dummy variable that takes one if a firm has a ratio of EBITDA to interest expenses below the lower quartile.
Low tangibility	Dummy variable that takes one if a firm has a ratio of tangible assets to total assets below the lower quartile.
Bond market access	Dummy variable that takes one if a firm has bonds outstanding.
Nikkei225	Dummy variable that takes one if a firm is included in the Nikkei 225 stock price index.

Figure A1: Propensity density (Loan Size)

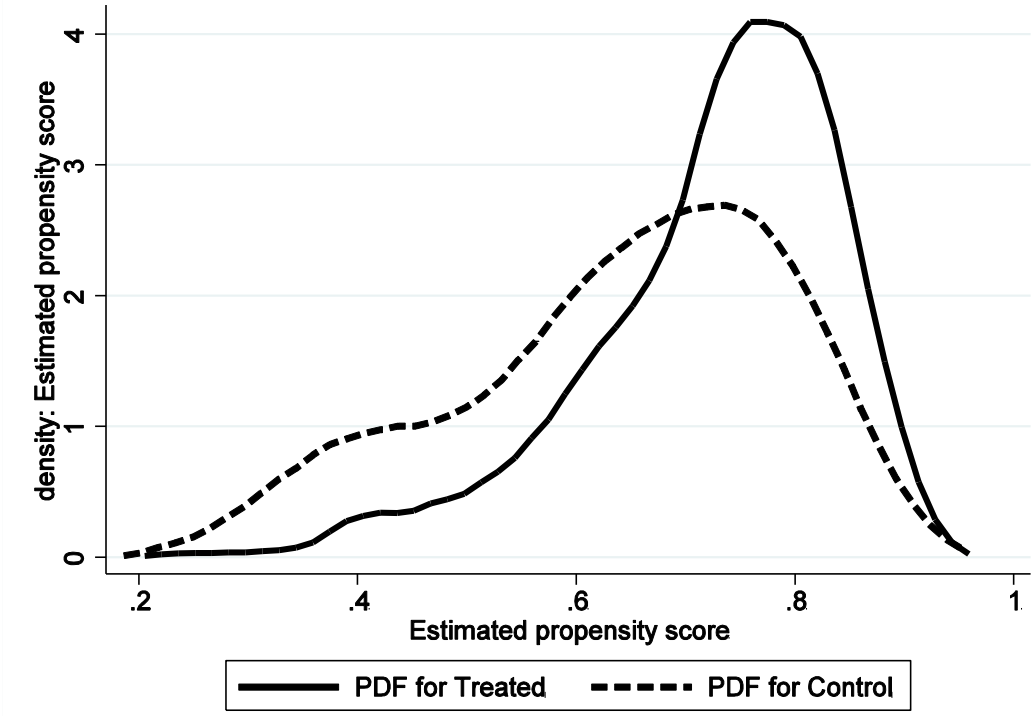

Figure A2: Propensity density (Number of Lenders)