Supply Chain Relationships and Bank Lending*

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Abstract

Supply chain relationships are believed to provide a certification of the quality of the borrower in the credit market. At the same time, the existing literature has shown that supply chain can expose lenders to additional risks because of spillover effects through the supply chain requiring more monitoring and increasing yield spread and fees. While we find evidence supporting both arguments, we also show that market segmentation in the syndicate loans market could offer one possible explanation for this puzzle. Firms with a supply chain link benefit from easier access to loans only in a concentrated syndicate where the lead bank retains a high fraction of the loan. Limited to this segment of the syndicate loans market, firms with a supply chain firms experience higher yield spread and fees. In this context, a diversification premium could be demanded by the lead. We run a battery of tests to address causality and other endogeneity concerns as well as to control for specific supplier-costumer relationship' characteristics and relationship lending.

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1. Introduction

Bank lending to borrowers with supply chain links has exploded in recent years. As shown in Figure 1, the volume of syndications for these borrowers has seen a sharp increase since the early 2000s, while the number of supply-chain link has remained relatively stable over time and the fraction of listed firms with supply chain links has even decreased over time (see Figure 2). Is the participation to a supply chain valuable to the borrower in the bank lending market?

The literature offers potential reasons why the supply chain matters for bank lending decisions, with mixed evidence. Cen, Dasgupta, Elkamhi and Pungaliya (2016) offer evidence that long-term relationships with principal customers lead to loan spreads and less restrictive covenants on bank loans. The authors explain their findings by arguing that supply chain provides an implicit certification with positive reputational consequences for the firms involved. They pointed out that the supply chain link enhances the reputation of the borrowers because of the relationship between the two non-financial parties, which often entails firm-specific investments. To put it another way, firms in a supply chain have been already vetted by another firm, which otherwise would not have invested so heavily in the relationship.[2] Lenders can thus observe these relationships and learn more about the borrower's characteristics than about borrowers without any supply chain relationship. This certification effect provides a valuable ex-ante screening process for a potential lender.

In contrast, other studies suggest that the existence of supply chain relationships expose lenders to additional risks because the financial distress of one firm may affect the entire supply chain. For example, Kale and Sharhur (2007) and Banerjee, Dasgupta, Kim (2008) observe that firms in buyer-supplier relationships have lower leverage because of their relationship specific-

[2] In the US, firms (henceforth called "suppliers") are in fact required to disclose the presence of these major customers that account for a significant part of their total sales.

investments. Dhaliwal, Judd, Serfling, and Shaikh (2016) show that the composition and concentration of a supplier's customer base significantly impact its financing costs, both equity and debt. Finally, Campello and Gao (2017) find that suppliers with a more concentrated customer base are riskier borrowers and are subject to a higher loan default rate. As a consequence, they tend to experience high interest rate spreads, more restrictive covenants, and short credit relationships, especially when customers in industries require specific assets as inputs and are in a worse financial condition,

In this paper, we show that both arguments contribute to explain the behaviour of borrowers and lenders in the syndicated loan markets. Our results point out the existence of a problem in the syndicate loans literature, which concerns the evaluation of the supply chain. On the one hand, supply chain seems to produce a certification effect that allows the borrower to easily enter the loan market. On the other hand, supply chain requires more monitoring activities from the main lead agent and yields to higher markups. We offer a possible explanation to this dilemma. Specifically, we argue that market segmentation in the loan market could help to reconcile the above results. To this end, we provide nuanced evidence that borrowers with a supply chain link are more likely to receive a loan only in concentrated syndicates where the lead agent retains a high fraction of the loan. Consistently, our results show that limited to this segment of the syndicate loans market, firms with a supply chain experience higher loan pricing. These findings suggest that more monitoring activities associated to supply chain depend on the fact that borrowers with supply chain are more likely to receive syndicate loans in the case of concentrated loans. By retaining a larger participation share, the lead bank is exposed to higher credit risk and consequently has to exercise more monitoring activities. Consistently with Ivashina (2009)'s arguments, we suggest that the diversification effect can explain the higher markups associated

with the supply chain. Specifically, we argue that the lead bank could demand higher spread and fees for holding a higher credit risk due to larger participation shares.

For our analysis, we gather information on supply chain relationship from Compustat's Segment Database, while the data on bank loan comes from LPC–Dealscan. We link all this information with accounting data on corporate customers retrieved from Compustat. Our data encompasses 44,621 facilities with 6,845 unique borrowers over the period 1987-2016.

In this paper, we initially examine whether banks are more willing to lend to borrowers with a supply chain relationship than to similar borrowers without any supply chain link. So far, there is still a lack of evidence on whether supply chain relationships help borrowers to enter the syndicate loans markets. We then investigate how the existence of these supply chain relationships affect how the structure and composition of syndicated loans. Finally, we examine whether borrowers with a supply chain relationship are exposed to different loan contract terms, including interest rate spreads, fees, and the number of restrictive covenants. Our results reveal that the existence of a supply chain relationship, also in the absence of any past relationship lending, matters for the borrower's access to the credit market. Firms in customer–supplier relationships are more likely to get access to the syndicated loan market than firms without any supply chain link. We find similar results also when the costumer and supplier share the same banks.

A firm could be willing to engage in a supply chain relationship to get access to the credit market and more favourable conditions from the lender. To control for this issue and mitigate endogeneity concerns, we run three tests. Our first test contemplates only suppliers of services and differentiated products.[3] This type of suppliers is hard to replace because they provide unique or highly customized inputs (Cunat 2007; Giannetti, Burkart and Ellingsen, 2011). Therefore, it is

[3] Industry classification is based on Rauch (1999). See also Giannetti, Burkart and Ellingsen (2011).

unlikely that the supply chain link is created to exploit potential advantages in the lending market. In addition, we employ an instrumental variable (IV) approach to address the endogeneity concern. Specifically, following Campello and Gao (2017), we create an instrument which captures the possibility of entering in a new supply chain link when industries are more concentrated following M&A waves. .We then use this instrument to assess the effect of having a supply chain link on the propensity to receive a syndicate loan.

In the last test, we exploit the regulatory rules. As mentioned before, firms are imposed to disclose large customers representing more than 10% of the total firm revenue. If benefits from this disclosure are expected in the form of an easier access to the credit market, then firms may deliberately create these supply chain links. We expect that this reverse causality issue to be more serious around the 10% threshold. To overcome this problem, we only consider borrowers with principal costumers that account for more than 15% of their total sales.[4] Overall, we find that the positive effect of a supply chain link on access to syndicated lending is confirmed by these tests.

Another key endogeneity-related challenge to the interpretation of our result could be related to omitted-variable concerns. To alleviate these issues, we run a battery of tests. Specifically, we exclude from the sample firms with a high customer base concentration by employing alternative measures of costumer concentration proposed by Campello and Gao (2016). Then, we drop from the samples cases in which suppliers and customers have a long-term relationship by using a similar measures introduced by Cen, Dasgupta, Elkamhi and Pungaliya (2016). In addition, we control for the eventuality that the supply chain effect is driven by the reputation of the firms engaged in the supply chain relationship. Finally, we consider whether banks value the supply

[4] Information on customer–supplier relationships are based on the Compustat segment customer file. This information is publicly available as SFAS No. 14 (before 1997) and SFAS No. 131 (after 1997) require firms to disclose the existence and sales to principal customers representing more than 10% of total firm revenues. A firm could just meet the requirement to share more information with the market and gain form the reputation effect.

chain link simply because all the firms in the supply chain repeatedly access the credit market. In this case, the supply chain firms could be already known and valued by potential leader and participants to the syndicate loans via relationship lending as hypothesized by Hasan, Minnick, and Raman (2017). Therefore, we remove the cases where the customer and the supplier share the same (lead) bank in loan syndication. We still find that having a supply chain link significantly increases the probability of receiving a loan in all these cases. In other words, the supply chain effect persists also when we control for costumer concentration, supplier-costumer relationship length, reputation, and relationship lending and customer base concentration (Bharath, Dahiya, Saunders, and Srinivasan, 2007; Campello and Gao, 2017; Cen, Dasgupta, Elkhami, Pungaliya, 2016; Hasan, Minnick, and Raman, 2017).

If the supply chain provides a certification effect, we should then also observe less intense monitoring for borrowers with supply chain relationship with respect to other borrowers. To perform this test, we rely on Sufi (2007) and we assess whether supply chain participation affects the structure of syndicated loans and the participations of the leader. According to Sufi (2007), the leading banks should hold a lesser portion of the loan when the borrower requires less severe due diligence and monitoring duties. After having identified a main lead agent following Chakraborty et al. (2018)'s procedure, we find that, *ceteris paribus*, a lead agent is more likely to retain a higher share of the loan and constitute a less diversified syndicate when the borrower has a supply chain link. Consistent findings are found also when we exclude from the sample firms with a high probability of default or when we consider the case of multiple lenders. Our results provide support for the view that, while informative, the existence of a supply chain link imposes more intense monitoring and due diligence from the lender's perspective.

As a further step of our analysis, we examine whether supply chain yields to higher or lower interest rate spreads, fees and number of restrictive covenants. We document that borrowers with supply chain partners incur higher yield spreads and fees compared to borrowers without supply chain relationships. These findings do not provide support for the certification effect. Instead, they are consistent with evidence that lenders price the default contagion risk and associated costs of the participation in the supply chain (Cohen and Frazzini, 2008, Hertzel, Li, Officer, and Rodgers, 2008, Dhaliwal, Judd, Serfling, and Shaikh, 2016, Campello and Gao, 2017).

In order to reconcile all the above results, we question whether borrowers with a supply chain relationship are more likely to access loan markets that are associated with more monitoring activities and high premiums. Specifically, we consider whether firms with a supply chain relationship are more likely to enter syndicate loans market where the lead agent retains a high participation share. Our findings show that firms with a supply chain relationship are more likely to receive a syndicate loan only in highly concentrated loan markets. The opposite effect, namely a lower probability to receive a syndicate loan, is instead found when the loans are not concentrated. Furthermore, we offer evidence that supply chain relationship(s) yields to high spread over LIBOR and fees only in the case of concentrated loans. All together, these results suggest that there is a loan market segmentation for borrowers with a supply chain relationship. Finally, we do not find any evidence that supply chain leads to more restricted covenants.

We provide several contributions to the existing literature. First, our study adds new understanding regarding the benefits and costs of supply chain relationships in the credit market adding to the already existing studies that focus on principal customers (Kale and Sharhur, 2007; Banerjee, Dasgupta, Kim, 2008; Cen, Dasgupta, Elkhami, Pungaliya, 2016; Dhaliwal, Judd, Serfling, and Shaikh, 2016; Campello and Gao, 2017; Hasan, Minnick, and Raman, 2017). This

line of research emphasizes how certain specific aspects of bank-firm relationships have important implications for financial stakeholders. We broaden this view by documenting the existence of a certification effect associated with a supply chain relationship. Furthermore, differently from previous papers, we do not restrict our analysis to the cases in which: 1) there already exists a lending relationship with the prospective borrower's supply chain partner (Bharath, Dahiya, Saunders, and Srinivasan, 2007); and 2) supplier-costumers are engaged in a long relationship (Cen, Dasgupta, Elkhami, Pungaliya, 2016). We find that the supply chain effect is not affected by the two points above (e.g. Bharath, Dahiya, Saunders, and Srinivasan, 2007).

Second, we contribute to the literature on syndicated loans (Bharath, Dahiya, Saunders and Srinivasan, 2011; Dennis and Mullineaux, 2000, Sufi, 2007) by showing that in general, the existence of supply chain relationships requires more severe monitoring and diligence actives. Therefore, the syndicate tends to be more concentrated and has a higher participation share of the leader banks. In other words, the syndicate loan takes a form more similar to sole-lender bank loans than to public debt.

Finally, our article contributes to the literature on the risk factors related to supplier-costumers relationship (Banerjee, Dasgupta, and Kim, 2008; Campello and Gao, 2017; Cohen and Frazzini, 2008; Kale and Shahrur, 2007; Kolay, Lemmon, and Tashjian, 2016; Titman and Wessels, 1988). Specifically, we propose a new angle of analysis by showing that supply chain is associated to more concentrated loans: this leads to increased monitoring activities and loan markups.

This paper is organized as follows. Section 2 reviews the relevant literature and develops the hypotheses based on the existing literature. Section 3 presents the methodology and the sample construction. Section 4 focuses on the access to the syndicated loan market and deals with

endogeneity concerns. Section 5 discusses changes to the syndicate structure focusing on the lead agents' participation; while Section 6 focuses on pricing and conditions of bank loans. Section 7 discusses the importance of market segmentation in the syndicate loans market and reconciles the previous results. Finally, Section 8 offers additional tests. Finally, Section 9 concludes.

2. Literature Review and Hypothesis development

Previous research on syndicated loans has acknowledged that borrowers' reputation can mitigate asymmetric information with the lender and affect the syndicate structure and lending conditions. The financial economic literature has widely investigated the role of reputation between players when they interact in the market (see Wilson, 1985). The idea associated with reputation is that past behaviour affects firms' future opportunities and allows them to derive economic benefits from it (Weigelt and Camerer, 1988). In the context of lending, firms enhance their reputation as borrowers by keeping a good record of accomplishment of debt repayments and through non-opportunistic behaviour (Diamond, 1989). This reputation mechanism can at least partly reduce the lender screening and monitoring activities and translates into better loan terms. Hasan, Minnick and Raman (2017) show that banks can use information acquired on the borrower from existing lending relationships also when they have decided to extend loans to other firms in the same supply chain. The reason is that through repeated interactions with the borrower, a bank could get access to more information about that firm's supply chain partners, such as factors of production as well as industry conditions and trends compared to banks without an existing lending relationship (e.g., Petersen and Rajan, 1994; Bharath, Dahiya, Saunders, and Srinivasan, 2007).

We further extent this literature by claiming that having a supply chain relationship *per se* can offer further certification of a firm's quality to the credit market independently of the fact that

a firm has a credit history with the banking system (*certification hypothesis*). This view is not new in the literature on supply chain and lending. Cen, Dasgupta, Elkamhi, and Pungaliya (2016) show that a continuing long-term relationship with a principal customer offers a certification about the supplier's quality, which in turns leads to lower loan pricing. The authors state that a longer relationship with a costumer represents an implicit certification on the suppliers' ability to meet the customer's standards for quality, reliability, and bankruptcy risk. By adopting a broader view, we claim that a firm can become informed about the quality of a potential supply chain partner by investing in initial screening and monitoring process.[5] One can further hypothesize that the chance for borrowers with a supply chain relationship to receive a syndicate loan, independently of the existence of relationship lending and *ceteris paribus*, is higher than for borrowers with a supply chain.

If the existence of a supply chain relationship embeds a quality certification effect, banks could exert lower screening and monitoring activities on borrowers with a supply chain relationship. As noted by Sufi (2007), the moral hazard problem between the lead agent and the other participants is less severe when the borrower is already known to the loan market. Therefore, the lead agent is relieved from increasing his stake on the syndicate loans. Under these circumstances, in line with Sufi (2007)'s arguments, a lead agent does not have to retain a higher stake to signal the quality of the borrower to the other participants in the syndicate loan. Instead, he could lower his stake in the loan and form a less concentrated syndicate. The certification effect provided by the supply chain could be even more relevant when the borrower is new to the loan market and therefore 'unknown' to the leaders and participants in a syndicate loan.

[5] The idea to become an informed agent in a market by undertaking monitoring costs is borrow from Boot and Thakor (1997).

Nonetheless, having a close and long association with fewer, larger customers could also expose firms to costs and risks (Campello and Gao, 2017). For example, a close relationship over time between a supplier and costumer could impose the suppliers to invest in relationship-specific assets (Allen and Phillips, 2000). This could require banks to put forward more monitoring and due diligence activities (*monitoring hypothesis*) to detect sources of risk associated to the supply chain relationship. Under these circumstances, if the supply chain link increases risks for lenders due to the spillover effects associated with the firm-specific investments that characterize supply chains, the lead agent will increase their share in the loan and form more concentrated syndicates.

In turns, this could generate "holdup" costs and risk for the suppliers, which in turn could negatively affect their lending opportunities. Banks could in fact require a higher premium for providing a loan to a borrower with a supply chain link in this way setting higher pricing costs (*risk hypothesis*). Overall, the effect of a supply chain relationship on the pricing of loans is more controversial. On the one hand, the quality certification effect provided by the supply chain relationship should induce a bank to decrease the pricing of loans (Cen, Dasgupta, Elkamhi, and Pungaliya, 2016). On the other hand, the existing literature shows that concentration in the customer base can expose the suppliers to several risks and costs (Campello and Gao, 2017; Hasan, Minnick and Raman, 2017). For example, it could lead to more relationship-specific investments that could prevent firms from resale options of the output to alternative users (Banerjee, Dasgupta, and Kim, 2008; Kale and Shahrur, 2007). Morever, large customers tend to exert a higher bargaining power with respect to prices and the timing of payments (Fee and Thomas, 2004). Firms are exposed to aggregate sales fluctuations, liquidity problems, and increased cash flow risks via supply chain (Cohen and Frazzini, 2008; Di Giovanni, Levchenko, Mejean, 2014; Kolay, Lemmon, and Tashjian, 2016). All these factors can enhance a firm’s default risk. Even tough

having a supply chain offers a certification of firm quality and possibly non-opportunistic behaviour ascribed from past actions, there is however a component of risk intrinsic to the supply chain that could overcome the benefits associated with the supply chain relationship. In other words, even though supply chain relationships can reduce moral hazard problem in lending, they could lead to higher mark-ups and stricter contract terms.

3. Methodology and Sample Construction

3.1 Empirical methodology

The first step in our empirical analysis is to determine whether the supply chain effect translates into an easier access the syndicate loan market. We investigate the influence of supply chain links by estimating the probability for borrowers with and without supply chain links in securing syndicate loan. We run the following conditional logit model[6].

$$\begin{aligned} Loan_{i,t} = {} & \text{Variable\_of\_interests}_{i,t-1}\beta + \text{Borrower\_Characteristics}_{i,t-1}\gamma \\ & + \text{Borrower}_i \times \text{Facility\_year}_t + \grave{o}_{i,t} \end{aligned} \tag{1}$$

where the dependent variable *Loan* takes value one if borrower *i* has received at least one syndicated loan at year *t*, and 0 otherwise. The main variables of interests are: 1) *Supply chain*, it is equal to 1 if the borrower has at least one supplier or customer in the last five years prior to receiving the loan, and 0 otherwise[7]; 2) *Supplier (Customer)*, it is equal to 1 if the borrower only has at least one supplier (borrower), and 0 otherwise. We control for borrower fundamentals including the logarithm of total asset, return on asset (ROA), cash holding, leverage, Tobin's Q

[6] McFadden (1974) offers an introduction to the conditional logit regression. For recent applications in finance, see for example Kuhnen (2009), Dyck, Morse, and Zingales (2010), Bena and Li (2014).

[7] Consistent with previous studies on lending (Bharath, S., S. Dahiya, A. Saunders, and A. Srinivasan, 2011), we consider a period of five years to define the supply chain dummy. In unreported tests, we also consider alternative horizon of 1 year and 3 year prior to the loan, the results are consistent.

and CAPEX. We also include the logarithm of the total number of loans received by the borrower.

The association between supply chain and the probability of receiving a syndicate loan could be due to endogenous selection of firms based on their fundamental characteristics. To address such selection concerns, we construct a control sample using a propensity score matching approach to identify the pseudo borrowers for each actual borrower. Specifically, we find up to five matching pseudo borrowers—first matched by industry, and then matched on propensity scores with the actual borrowers estimated using total assets, ROA, and leverage at year *t−1*.

The following step in our empirical analysis is to provide evidence whether supply chain relationships reduce the monitoring efforts exerted by banks. Sufi (2007) argues that if the borrower requires less intense monitoring and diligence duties, the lead bank can retain a smaller share of the loan and forms a less concentrated syndicate. Thus, if supply chain relationships indeed strengthen the borrowers' reputations and make monitoring easier for the lending bank, then we should observe a negative correlation between supply chain and the lead agent'sparticipation.

To determine the lead agent on a loan in the case of syndicated loans with multiple lenders, we closely follow the procedure suggested by Chakraborty, Goldstein and MacKinlay (2018). Lead agent are identified by the highest ranked agent for each facility following the ranking hierarchy suggested by Chakraborty et al. (2018). Specifically, we employ a panel regression model to infer whether supply chain relationship can influence syndicate structure in the case of new borrowers:

$$\begin{aligned} Synd_{i,t} = {} & \beta_1 \text{Supply\_Chain}_{i,[t-1,t-5]} + \text{Borrower\_Characteristics}_{i,t-1}\gamma \\ & + \text{Synd\_Characteristics}_{i,t-1}\theta + \text{Industry}_i + \text{Year}_t + \text{Bank}_i + \grave{o}_{i,t} \end{aligned} \tag{2}$$

where *Synd* indicates the percentage retained by the leader agent. We control for borrower-level fundamentals as in Eq (1). In addition, we also include facility-level characteristics, i.e. log facility amount, Log facility duration and Log number of banks.

The final step of the analysis consists of estimating the impact of the supply chain relationship on loan spreads, fees, and the number of covenants. The loan pricing consists of the spread over the LIBOR and fees that we both calculated following Berg, Saunders and Steffen (2016). We also control for borrower-level fundamentals and facility-level characteristics as in Eq (2). The test specification is the following:

$$\begin{aligned} \text{Pricing}_{i,t} = {} & \text{Variable\_of\_interests}_{i,t-1}\beta + \text{Borrower\_Characteristics}_{i,t-1}\gamma \\ & + \text{Synd\_Characteristics}_{i,t-1}\theta + \text{Industry}_i + \text{Year}_t + \text{Bank}_i + \grave{o}_{i,t} \end{aligned} \tag{3}$$

3.2 Sample and Data

We identify a supply chain relationship by using Compustat's Segment Customer database as common in the literature (Cen et al., 2016; Campello and Gao, 2017). According to Statement of Financial Accounting Standard (SFAS) No. 14, firms are required to disclose all customers that represent 10% or more of a firm's total sales. The Segment database reports the names of the customers and their assigned amount of sales. Using the link provided by WRDS, we link the segment database with Compustat by using the identifier GVKEY.[8]

We extract bank loan contract information from LPC–Dealscan and link loan-level data to Compustat firm data following Chava and Jarrow (2004) and then using the Dealscan-Compustat Link extended by Michael Roberts.[9] We consider each loan facility as an independent contract. Our dataset encompasses data on loan facilities from the DealScan database and publicly listed

[8] We consider a firm to have a supply chain link also when the name or GVKEY of the costumer is not reported but the firm is reported in the list of the suppliers.

[9] http://finance.wharton.upenn.edu/~mrrobert/styled-9/styled-12/index.html

borrowers from Compustat between 1987 and 2016. To be included in our sample, we require the availability of all financial variables from Compustat employed in the study.

In the LPC–Dealscan there is a field labelled "Lead Agent Credit," which can take values of "Yes" or "No" for every bank. Following the existing relevant literature (Sufi, 2007; Bharath, Dahiya, Saunders and Srinivasan, 2011), we classify as lead banks the banks that are conferred the role of lead agent credit by LPC. Firm characteristics come from the Compustat Fundamentals Annual database. Market information, including equity volatility, market volatility, and risk-free rate, are retrieved from CRSP Monthly and Daily Stock Files. Loan-related and bank-related information are retrieved from DealScan. Overall, our sample consists of 44,621 facilities with 6,845 unique borrowers. Table 1 presents summary statistics about the sample of syndicated loans used in the analysis, as well as some borrower characteristics. Table 1 reports the values of the variables included in this study.

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Insert Table 1 about here
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4. Access to the Syndicated Market and Supply Chain Relationship

4.1 Supply chain relationships and access to the syndicated loan market

In this section we examine whether the supply chain relationship improves the standing of the participating firms in the eyes of the lending banks, leading to an easier access to the loan market. To this end, we first create the sample of control firms as described in the Methodology section. Table 2 presents the comparison of the actual borrowers and the pseudo borrowers along several dimensions. As the table shows, the only significant different concern the cash held by the actual borrowers, which is lower than the level held by the matching firms. There is no other

statically significant difference in terms of size, profitability, leverage, Tobin's Q, and capital expenditure. Collectively, the picture from Table 2 provides a confirmation that borrowers and pseudo borrowers are similar.

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Insert Table 2 about here
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Actual and pseudo borrowers are used to estimate the regression model in Eq. 1 using a conditional logit model to determine the impact of the supply chain relationship on the decision to offer a syndicated loan to the firm. Table 3 reports the estimated results of the baseline model. Results in Column 1 of Table 3, which do not consider control variables, show that the supply chain link positively and significantly increases the likelihood of receiving a loan. The base regression in Column 2 suggests that the existence of a supply chain link is associated with an increase in the probability of receiving a loan. It also shows that the likelihood of receiving a loan is higher (1) when borrowers are smaller, less profitable, have lower book leverage and cash but a higher value, Tobin Q, and CAPX, (2), and stronger relationship lending with the leader bank. All these results are consistent with findings in the previous literature.

In column 3 we distinguish whether the borrower is a supplier or a costumer to examine if the position in the supply chain affects how the firm is perceived by the lenders. The Supplier dummy has an estimated coefficient of 0.133, which is statistically significant at the 1% level, while the Customer dummy has an estimated coefficient of 0.098, which is also statistically significant at the 1% level. We further perform a comparison between the coefficients of Supplier and Customer dummies and find strong evidence of a significant difference between the two coefficients (the chi-squares statistics is 7.56 with P-value to be 0.01), suggesting that the certification effect is stronger for suppliers than customers.

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Insert Table 3 about here
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We further examine whether the result we uncover is associated to an existing relationship between the supply chain firms and the lenders in the syndicated loan markets. To put it differently, the easier access to the loan market can be due to the knowledge of the borrowing firm via previous loans to the supply chain rather than a certification effect due to the supply chain. In fact, in line with Hasan, Minnick and Raman's (2017) arguments, the borrower could be already known to the potential leader and participants of the syndicate loans via the supply chain. Thus, it could be that a lender is more inclined to provide a loan to a borrower when the firms in its supply chain have also received a loan.

To establish the supply chain effect in Table 4, we use alternative definitions. We first start with the binary variable Supply chain loan, which takes the value of 1 if the actual (pseudo) borrower has a supply chain firm(s) that has already received a syndicate loan in the past five years, otherwise it is equal to 0. The second variable is Supply chain no-loan, which takes the value of 1 if the actual (pseudo) borrower does not have any supply chain firms(s) that has received a loan. It takes 0 if the actual (pseudo) borrower has at least one firm in the supply chain that received a loan or does not have a supply chain link at all. While these variables look at the overall syndicated loan market, we capture the direct relationship between the lead agent and the borrowers with Supply chain bank and Supply chain no bank. The first is a dummy that takes the value of 1 if the actual (pseudo) borrower has a supply in firm(s) that has received a syndicate loan from the same lender(s) in the past five years. It is equal to 0 if the actual (pseudo) borrower does not have any supply chain firm(s) that receive the syndicate loans from the same lender(s). It also takes the value of 0 if the actual (pseudo) borrower does not have any supply chain firm(s) that

receive loans or does not have a supply chain link at all. Supply chain no bank takes the value of 1 if the actual (pseudo) borrower does not have supply chain firm(s) that has received a loan from the same lender. Otherwise it is equal to 0. We present the results of these models in Table 5.

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Insert Table 4 about here
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Column 1 of Table 4 shows that both the dummies Supply chain loan and Supply chain no-loan have positive and statistically significant coefficients at the 1% level that are respectively equal to 0.183 and 0.100. In Column 2, both the dummies Supply chain no bank and Supply chain bank are positively and significantly at the 1% level related to the likelihood of receiving a loan with a coefficient of respectively 0.274 and 0.129. We also perform the comparison on the coefficients between *Supply chain loan* and *Supply chain no loan*, and between *Supply chain bank* and *Supply chain no bank.* For example, in model (1), the coefficient of *Supply chain loan* is significantly higher than the one of *Supply chain no loan* at 1% of significance level (Chi square statistics equal to 7.66 with P-value to be 0.01). In model (2), the coefficient of *Supply chain bank* is also significantly higher than that of *Supply chain no bank* (Chi square statistics equal to 8.18 with P-value to be 0.00). These results are in line with Hasan, Minnick and Raman (2017). In fact, we find that the effect of supply chain increases more when there is relationship lending between the lender and the borrower via the supply chain. However, as an important distinguishing feature, we find that such an effect appears to only partially explain the impact of supply chain on the likelihood of receiving a loan. Under all specifications of the supply chain dummy, we find that supply chain *per se* is associated with an increase of likelihood of receiving a loan. Therefore, there is a reputational effect of the supply chain that does not reflect the existing lending

relationship between the bank and the borrower's supply chain partner.[10].

4.2 Endogeneity and robustness tests

We address in this section a few concerns associated with the potentially endogenous nature of the relationship between access to the loan market and supply chain. The first concern we examine is related to reverse causality: an easier access to credit may push firms to form supply chains. For example, a firm could be willing to create in a supply chain relationship to get access to the credit market and more favourable conditions from the lender. To control for this issue and mitigate endogeneity concerns, we run a battery of tests.

We start only considering the supply chain cases in which the suppliers provide services and differentiated products that are unique or highly customized inputs, and where the customers need differentiated and service inputs (Rauch, 1999; Cunat 2007; Giannetti, Burkart and Ellingsen, 2011).[11] Both these suppliers and customers are more difficult to be replaced. Since these relationships are characterized by high switching costs, it is unlikely that firms create ad hoc supply chain links to get access to the lending market. Column 1 of Table 5 shows the results for this test, which are consistent with the original results.

Second, we employ an instrumental variable approach. Similarly to Campello and Gao (2017), we use M&A activities in downstream industries to create the instrument. We argue that M&A activities would allow firms to enter in a new supply chain link, but it would not necessarily affect the probability to obtain a loan. We retrieve information on M&A deals from SDC database. Then, we apply the filters to the data selection suggested by Ahern and Harford (2014). Specifically, we consider: 1) only completed deals where both the acquirer and target are U.S.

[10] As a further analysis, we also consider private firms. The results are consistent with those reported in Table 4.
[11] Industry classification is based on Rauch (1999). See also Giannetti, Burkart and Ellingsen (2011).

firms; 2) the acquirer can be matched with a Compustat identifier; 3) the acquirer purchases at least 20% of the target during the transaction, and owns at least 51% after the transaction; 3) the acquirer does not buy its suppliers and vice versa; 4) suppliers and customers do not belong to the same two-digit SIC industry.

As follows, we briefly describe how we calculate our instrumental variable for the test. First, we adapt the instrument proposed by Campello and Gao (2017) to our context. Specifically, instead of focusing on the M&A transactions in the costumer's industry, we examine the M&As activities in the partner industry of a borrower. The partner of a borrower can be either a supplier or a costumer depending on the role of the borrower in the supply chain (if the borrower is a supplier the partner will be a costumer and vice versa).

$$SC\_M\&A_i = \sum_{j=1}^{n_i} \%Sales_{i,j} \times Industry\_average\ (\frac{Acquisition_j}{Sales_j}) \quad (4)$$

where *Acquisition* is the transaction values of M&As scaled by the acquirers' total sales, *Sales*, as a proxy for acquisition activity*; Industry_average* is the average acquisition of firms in the industry over the past five years; *%Sales* measures the supplier's percentage sales to each customer. Each of the firms in our sample supplies products to a portfolio of customers, and those customers may be in different industries. In other words, *SC_M&A is* the weighted sum of the five-year acquisition activity across the industries to which the borrower's supply chain partners belong, weighted by the supplier's percentage sales to each customer. Results are shown in Column 2 of Table 5. Overall, we find that the positive effect of supply chain link on access to syndicated lending is confirmed by this IV approach.

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Insert Table 5 about here

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Finally, as the last test, westrengthen the definition of supply chain. SFAS No. 14 (before 1997) and SFAS No. 131 (after 1997) require firms to disclose large customers representing more than 10% of the total firm revenue. If benefits from this disclosure are expected in the form of an easier access to the credit market, then firms may deliberately create these supply chain links. We expect that this reverse causality issue to be more serious around the 10% threshold, where it is easier for firms to strategically create supply chains. To overcome this problem, we only consider borrowers with principal costumers that account for more than 15% of their total sales. In Column 1 of Table 5, the supply chain dummy takes a value equal to 1 only if the sales percentage from supplier *i* to customer *j* over *i* 's total sales is at least equal to 15%. Results are remarkably similar to those shown in Columns 2 of Table 3, providing support to the view that firms do not strategically create supply chain relationships because of the access to the syndicated loan market.

After addressing reverse causality, we direct our attention to the omitted variables problem[12]. Firms with large customers are vulnerable to costs and risks (for example delay of payment, relationship-specific investment, and default contagious risk) that can prevent them from getting access to the credit market (Campello and Gao, 2016; Murfin and Njoroge, 2014). We take this eventuality into account by excluding from the sample firms with a high customer base concentration. Specifically, following Campello and Gao (2016), we calculate alternative measures of costumer concentration, namely Costumer Concentration and Costumer Sales.[13] For each borrower we calculated its aggregated sales from all customers/suppliers against the

[12] We also study whether the supplier-customer relationship can alleviate the effect of market opacity for the access to the credit market. For this, we employ the market-based opacity measure suggested by Jin and Myers (2006) and the liquidity-based opacity measure proposed by Amihud (2002). Specifically, we set up an interaction between the market-based and liquidity-based opacity measures with the supply chain dummy. Supply chain dummy is always positively and significantly related to the probability of receiving a loan, while the coefficients of opacity measures are never significant (See Table A2 in the Appendix).

[13] They are respectively the sum of the percentage sales coming from the set of customers the firm reports as "major customers", and Herfindahl index of sales to large customers.

borrowers' total sales. Then we rank this scale by year in quintiles and drop those borrowers ranked in the top quintile (with the highest scale). Column 1 of Table 6 focuses on the costumer sales, while Column 2 of Table 6 focuses on the Herfindahl index of sales to large customers. The Supply chain dummy has an estimated coefficient respectively of 0.151 and 0.149 in Columns 1 and 2(statistically significant at the 1% level).

Cen, Dasgupta, Elkamhi and Pungaliya (2016) document the importance of long-term relationships of suppliers with principal customers. So, we further analyse if the length of the relationship is an important determinant of our results. To this end, we therefore consider only the supply chain relationships that last less than three years and the results hold as shown in Column 3 of Table 6. Furthermore, we exclude from the sample borrowers with a high concentrated customer base. On the one hand, analysts, management forecasts, and even IPO prospectuses positively value firms with large costumers because of related economies of scale and improvement of operating efficiency (Patatoukas, 2012).

Another concerns could be related to the fact that borrowers are more likely to access the loan market simply because the firms in its supply chain exert a reputation-signalling effect. To control for this issue, we consider a firm exerting a reputation-signalling effect if it belongs to S&P 500 index. We therefore add into the model a variable, *S&P inclusion,* which accounts for the percentage of firms in the supply chain that are listed in the S&P500 index. *S&P inclusion* takes a value only when supply chain dummy is equal to one. This can cause a perfect multicollinearity problem when interacting *S&P inclusion* with supply chain dummy. Therefore, we modified the definition of the supply chain dummy to take the value of 1 if the borrower has a supply chain firm that account for more than 20% of its total sales in the last five years, and 0 otherwise. Column 4 of Table 6 shows that supply chain dummy remains significantly and positively related to the

probability of receiving a loan. Instead, the coefficient of *S&P inclusion*Supply Chain* is not significant. As a further analysis presented in the Appendix (Table A3), we explicitly investigate the effect of borrower reputation on the likelihood to access the loan market. For this additional test, we follow Leary and Roberts (2014) and we create a dummy, *Industry leader*, which is equal to 1 if the borrower is ranked at the top third position among its peer firms from the same industry according to each of three ranking criteria: profitability, market share and stock return. We still find that *Supply chain* is positively and significantly related to the probability of receiving a loan, while *Industry leader is* almost never significant.

Finally, a further endogeneity related issue is that banks could value the supply chain link simply because all the firms in the supply chain repeatedly access the credit market, and therefore are already known to potential leader and participants to the syndicate loans. While we already account for this issue in Table 3, we provide an additional test where we remove the cases where the customer and the supplier share the same (lead) bank in loan syndication. In other words, this model does not consider the loan deals in which the leading lender provides a loan to the actual (pseudo) borrowers when firms in the supply chain have also received a loan. Specifically, Columns 5 and 6 of Table 6 focuses solely on the supply chain links where the supply chain's partners have not received a loan in the credit market (independently by the lender). Although the magnitude of our coefficient is slightly reduced to 0.101 (Column 4), we still find that having a supply chain link significantly increases the probability of receiving a loan. Even though both the coefficients of suppliers and customers are significantly and positively related to the likelihood of receiving a loan, Column 5 also shows that this effect is especially concentrated among suppliers.

To further address this familiarity issue, we also consider only new borrowers to the syndicated loans market by removing borrowers with repeated interactions with leaders or

participant banks. The results are presented in Columns 7 and 8 of Table 6. Again, our main results are confirmed.

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Insert Table 6 about here
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Finally, in unreported tests, we re-run our models using a linear probability model obtaining qualitatively similar results. We also exclude the years 2007-2009 of the financial crisis to make sure that our results are not due to the effect of the crisis in the supplier-customer relationships (Garcia-Appendini and Montorial-Garrica, 2013). We find that the coefficient of the supply chain dummy is similar to that of the baseline model.

5. Supply Chain and Syndicated Loan Composition

A supply chain relationship signals a dimension of firm quality hinges on the expectation that lead banks are required to exert less intense monitoring activities when they lend to a borrower with a supply chain link. According to Sufi (2007), if the borrower requires less intense monitoring and diligence duties, the lead bank retains a smaller share of the loan and forms a less concentrated syndicate. On the other hand, if a more intense monitoring is needed, the lead bank holds a larger share of the loan and the syndicate is concentrated. We test this hypothesis in Table 7.

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Insert Table 7 about here
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The results of Table 7 show that the lead agent retains a higher participation when a borrower has a supply chain relationship. While banks are willing to extend loans to supply chain firms as shown in previous tables, they keep a share of the loan high enough to overcome moral hazard problems and have incentive to monitor adequately the risks associated with the supply chain.

Column 2 replicates the same analysis of Panel A after we remove the riskier borrowers measured by Merton's (1974) Distance-to-Default measure, constructed following Bharath and Shumway (2008). Specifically, we dropped the observations with a probability of default that exceeds 25% at the beginning of the year.

Even if Sufi (2007) attributes the lower fraction of the loan held by lead agents to the lower monitoring needs, this lower share can also be explained by a higher risk of these loans. Finally, in Column 3, we consider the case of syndicated loans with multiple lenders. Instead of solely considering the participation share of the main lead agent, we average the participation shares of the agents ranked within the top six categories [14] of the ranking hierarchy proposed by Chakraborty, Goldstein and MacKinlay (2018).

Results in Columns 2 and 3 are remarkably similar to those of Column 1, indicating that borrower risk and the presence of multiple leaders are not driving the results.

8. Pricing and conditions of bank loans

After having analyzed how supply chain relationship affects the access to the syndicated loan market, we turn our attention to the financial and non-financial conditions of the loans. In fact, supply chain participation can affect the pricing of the loan, as well as the number and intensity of the covenants included in the debt contract.

8.1 Pricing of bank loans

[14] These six hierarchical categories encompass :1) "Admin Agent", 2) "Lead bank", 3) "Lead arranger", 4) "Mandated lead arranger", 5) "Mandated arranger", 6) either "Arranger" or "Agent" and has a "yes" for the lead arranger credit.

In this section, we estimate the impact of the supply chain relationship on loan spreads and fees using the model in Equation 3. In each regression, we control for the borrower's characteristics, relationship lending, loan-level characteristics, bank fixed-effects, year fixed-effects, industry-fixed effects, and firm-fixed effects. The control variable includes the logarithm of borrowing firms' total asset, ROA, cash holding, leverage, Tobin's Q, CAPEX, while the syndicate characteristics include: Log facility amount, Log facility duration and Log number of banks.

The loan pricing consists of the spread over the LIBOR and fees that we both calculated following Berg, Saunders and Steffen (2016). We use the full sample to estimate the results reported in Columns 1 and 4 of Table 8.

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Insert Table 8 about here
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Columns 1 and 4 of Table 8 show that firms that are suppliers in a supply chain incur higher yield spreads and fees compared to similar firms without any supply chain relationship. As explained by Campello and Gao (2016), suppliers are exposed to risk and costs via supply chain that the lender incorporates in the spread over LIBOR and fees. Consistently with Campello and Gao (2016), a high pricing loan cost could be driven by the borrowers that exhibit a high concentrated customer base. TIn unreported tests,, we remove the top 20% of the borrowers with the highest percentage sales coming from the set of large customers from the sample. Results show that the supply chain dummy has still a significant and positive coefficient, so the finding does not appear to be specific to high concentrated customer bases. These findings suggest that banks price contagion risk via supply chain by applying higher pricing costs to the borrower with a supply chain relationship.

7.2 Number of restrictive covenants

In this section, we consider whether the supply chain relationship affects the number of restrictive covenants imposed by the lender in the loan contract. The Dealscan database includes detailed covenant information. Following Bradley and Roberts (2003), we build a covenant index that considers equity sweeps, debt sweeps, asset sweeps, dividend restrictions, and secured debt. All five different covenants are coded as 1, and 0 otherwise, and then summed-up. Therefore, the index ranges from 0 to 5. For this analysis, we use the Eq. 3 but with the covenant index as dependent variable. Column 1 of Table 9 shows that borrowers with a supply chain relationship are not exposed to a higher number of restrictive covenants featured in bank loans compared to similar borrowers without any supply chain relationship. When we consider the role of the firm in the supply chain, by distinguishing the firms in suppliers and customers, we show that neither the suppliers nor the costumers incurred a higher number of restricted covenants (Column 2 of Table 9)

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Insert Table 9 about here

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7. Supply chain and Market Segmentation in the loan market

Our findings show that opposite dynamics appear to prevail in the syndicate loans market as concerns borrowers with a supply chain relationship. On the one hand, supply chain seems to produce a certification effect that allows the borrower to easily enter the loan market. On the other hand, supply chain requires more monitoring activities from the main lead agent and yields to higher markups. Given these contrasting results, we question whether supply chain is associated to specific loan markets that require more intensive due diligence and monitoring efforts.

Specifically, we split the syndicate loans in two categories: high concentrated loans where the lead agent retains a high participation share; and low or non-concentrated loans where the lead agent has a relative low participation share**.**

Table 10 reports the results of Table 3 relative to the propensity of receiving a loan by splitting the sample based on the loan concentration. In Columns 1 and 2, concentrated loans (non-concentrated loans) refer to the loans in which the participation of the lead agent is larger (or less) than the cross-sectional mean of lead agent participation. Columns 1 and 2 of Table 10 show that the supply chain increases the propensity of receiving a loan only in the case of concentrated loans. Instead, the supply chain exerts an opposite effect on the propensity of receiving a loan for non-concentrated loans. In Columns 3 and 4 of Table 10 we repeat the analysis by introducing an alternative definition of loan concentration. More specifically, we focus on the participation share of the lead agent larger (smaller) than 50% for concentrated loans (non-concentrated loans). The results of Columns 3 and 4 are consistent with those reported in Columns 1 and 2.

We then rerun Equation 3 relative to the loan pricing by splitting the sample according to the first definition of loan concentration. Columns 2 and 3 of Table 8 show that supply chain yields to higher spread over LIBOR only in the case of concentrated loans, while supply chain does not lead to any additional markups in the case of non-concentrated loans. Similar findings are obtained when focusing on the amount of fees as a dependent variable.

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Insert Table 10 about here

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8. Additional analysis

In Table 11, we have run our analysis by using the linear probability model (LPM) (Columns 1 and 2) and the entire universe of Compustat without the matching procedure (Columns 3 and 4). The results are consistent with those in Table 3.

Finally, we question whether firms with a supply chain relationship are more likely to enter other debt markets or equity market compared to other borrowers. To conduct this further test, we collect data on additional types of non-bank debts and preferred stocks from Thomson Reuters. We follow the Master_Deal_Type code in Thomson Reuters and we identify the following categories of non-bank debt: bonds, program debts, mortgage debts. Specifically, the dependent variable for this analysis consists of the proceeds of each category of debt and preferred stocks for companies located in the US over the period 1985-2016. Equity refers to net stock issues calculated following Hirshleifer, Hsu and Li (2013)'s procedure. The data for net equity issues is retrieved from Compustat and CRSP. To compute this additional analysis, we use the same model specification (control variables and fixed effects) of Eq. 1.

With the exception of mortgage (for which we found a negative coefficient, but almost equal to zero), our results suggest that borrowers with supply chain relationships are also more likely to get non-bank debts and preferred stocks than borrowers without a supply chain relationship. Instead borrowers with a supply chain relationship are less likely to issue equity. Overall, the existence of a supply chain relationship seems to favour the access to various debt markets.

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Insert Table 11 about here

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9. Conclusions

Supply chain relationships are becoming more and more relevant (Campello and Gao, 2017). This paper examines and provides new evidence about how the existence of these links impacts

the loan market, in terms of both access to credit and pricing. There are several reasons to expect that supply chain relationships matter. We argue that being part of such chains provides a reputational advantage to the firms involved. This reputational advantage derives from the firm-specific investments that customers and suppliers make to build and foster this continuous relationship. This can be interpreted as a signal about the quality of the firms, providing a valuable ex-ante screening process to banks when these firms access the loan market.

Using data from the syndicated loan market in the US, we document a large beneficial effect of supply chain links in accessing the syndicated loan markets, in particular when the costumer and supplier share the same banks. These results are confirmed in a battery of tests to mitigate endogeneity concerns. Some of these tests are designed to exclude that the supply chain effect is mainly driven by lending relationship phenomena (Bharath, Dahiya, Saunders, and Srinivasan, 2007; Hasan, Minnick, and Raman, 2017); the length of the supply chain relationship, reputation (Cen, Dasgupta, Elkhami, Pungaliya, 2016), and customer base concentration (Campello and Gao, 2017). We also provide evidence that the lead agent holds a larger portion of the loan, suggesting that a supply-chain borrower requires more severe due diligence and monitoring duties.

Finally, we document that borrowers with supply chain partners incur higher yield spreads, fees compared to borrowers with similar characteristics but without supply chain relationships. Thus, while supply chain links make it easier for firms to access the syndicated loan market, they also increase the cost of doing it. This effect is more accentuated for suppliers than for costumers which is consistent with the previous literature (Cohen and Frazzini, 2008, Hertzel, Li, Officer, and Rodgers, 2008). This increase in the cost of borrowing is not explained by banks exercising their market power on the supply chain. To reconcile these opposite results, we explore whether supply chain is associated to specific loan markets that require more intensive due diligence and

monitoring efforts. On this respect, this paper provides nuance evidence that there is a market segmentation phenomenon associated to firms with the supply chain relationship. Specifically, borrowers with supply chain relationships are more likely to receive a loan in the case of concentrated loans where the lead agent retains a high participation share. In these syndicates, the lead agent incurs in higher credit-risk exposure and therefore exerts more monitoring activities. Furthermore, our results show that supply chain is associated to higher markups only in the case of concentrated loans. This would suggest that the lead bank could demand higher spread and fees for holding larger participation shares and being less diversified at the loan level. Overall, our findings indicate that the effect of supply chain in the lending market requires better understanding and may give new insights into important research areas such as market segmentation, optimum lead's participation share.

References

Allen, J., and G. Phillips. 2000. Corporate equity ownership, strategic alliances, and product market relationships. Journal of Finance, 55, 2791–2815.

Almeida, H., M. Campello, and M. S. Weisbach. 2004. The Cash Flow Sensitivity of Cash. *Journal of Finance*, 59, 1777–804.

Amihud, Y. 2002. Illiquidity and Stock Returns: Cross-Section and Time-Series Effects. *Journal of Financial Markets*, 5, 31–56.

Banerjee, S. , Dasgupta, S., and Y. Kim. 2008. Buyer-supplier relationships and the stakeholder theory of capital structure. *Journal of Finance*, 63, 2507–2552.

Berg, T., A. Saunders, and S. Steffen. 2015, The total cost of corporate borrowing in the loan market: Don't ignore the fees. *The Journal of Finance*, 71, 1357–1392.

Bharath, S., S. Dahiya, A. Saunders, and A. Srinivasan. 2007. So What Do I Get? The Bank's View of Lending Relationships. *Journal of Financial Economics*, 85(2), 368–419.

Bharath, S., S. Dahiya, A. Saunders, and A. Srinivasan. 2011. Lending Relationships and Loan Contract Terms, *Review of Financial Studies*, 24 (4), 1141–1203.

Bharath, S., and T. Shumway. 2008. Forecasting default with the Merton distance to default model. *Review of Financial Studies*, 21, 1339–69.

Bena, J., and K. Li. 2014. Corporate Innovations and Mergers and Acquisitions. *The Journal of Finance, 69(5),* 1923-1960.

Boot, A.W.A. 2000. Relationship banking: what do we know?" *Journal of Financial Intermediation*, 9, 7-25.

Boot A.W.A., and A.V. Thakor. 1997. Financial System Architecture. *The Review of Financial Studies*, 10(3), 693–733.

Bradley, M., and M. Roberts. 2015. The structure and pricing of corporate debt covenants, *Quarterly Journal of Finance*, 5(2).

Campello, M, and J. Gao. 2016. Customer concentration and loan contract terms. *Journal of Financial Economics*, 123, 108-136.

Cen, L., S. Dasgupta, R. Elkamhi, and R. Pungaliya. 2016. Reputation and Loan Contract Terms: the role of Principal Customers. *Review of Finance*, 20 (2), 501-533.

Chakraborty, I., Goldstein, I., Mackinlay, A., 2018. Do Asset Price Bubbles have Negative Real Effects? *The Review of Financial Studies* 31(7), 2806–2853,

Chava, S., and R. A. Jarrow. 2004. Bankruptcy Prediction with Industry Effects. *Review of Finance*, 8, 537–569.

Cohen, L., and A., Frazzini. 2008. Economic links and predictable returns. *Journal of Financial Economics* 63(4), 1977–2011.

Cunat, V. M. 2007. Trade Credit: Suppliers as Debt Collectors and Insurance Providers. *Review of Financial Studies*, 20, 491–527.

Demiroglu, C., and C. M. James. 2010, The Information Content of Bank Loan Covenants, *Review of Financial Studies*, 23(10), 3700–3737.

Dennis, S.A., and D.J. Mullineaux. 2000. Syndicated loans. *Journal of Financial Intermediation*, 9, 404-426.

Diamond, D.W. 1989. Reputation acquisition in debt markets. *Journal Political Economy*, 97(4), 828–862.

Di Giovanni, J., A. A. Levchenko, and I. Mejean. 2014. Firms, Destinations, and Aggregate Fluctuations. *Econometrica*, 82, 1303– 1340.

Dyck, A., A. Morse, and L, Zingales. 2010. Who blows the whistle on corporate fraud? *Journal of Finance*, 65, 2213-2253.

Farre-Mensa, J., and A. Ljungqvist. 2016. Do measures of financial constraints measure financial constraints? *Review of Financial Studies* 29 (2), 271–308.

Fee, E., and S. Thomas. 2004. Sources of gains in horizontal mergers: evidence from customer, supplier, and rival firms. *Journal of Financial Economics*, 74, 423–460.

Garcia-Appendini, E., Montoriol-Garriga, J., 2013. Firms as liquidity providers: Evidence from the 2007–2008 financial crisis. *Journal of Financial Economics*, 109, 272-291.

Giannetti, M., Burkart, M., and T. Ellingsen. 2011. What You Sell Is What You Lend? Explaining Trade Credit Contracts. *Review of Financial Studies*, 24, 1261-1298.

Gilchrist, S., and C. P. Himmelberg. 1995. Evidence on the Role of Cash Flow for Investment. *Journal of Monetary Economics*, 36, 541–72.

Hasan, I., Minnick, K., and K. Raman. 2017. Supply Chain Characteristics and Bank Lending Decisions. Available at http://dx.doi.org/10.2139/ssrn.294276.

Hertzel, M.G., Z. Li, M.S. Officer, and K.J. Rodgers, 2008. Inter-firm Linkages and the Wealth Effects of Financial Distress along the Supply Chain. *Journal of Financial Economics*, 87(2), 374–387.

Hirshleifer D., Hsu P.H., Li D. 2013. Innovative efficiency and stock returns. *Journal of Financial Economics*, 107, 632–654.

Hoberg, G., and V. Maksimovic. 2015. Redefining financial constraints: A text-based analysis. *Review of Financial Studies*, 28,1312–52.

Ivashina, V., 2009. Asymmetric information effects on loan spreads. *Journal of Financial Economics*, 92, 300–319.

Jin, L. and S. Myers. 2006. R^2around the World: New Theory and New Tests. *Journal of Financial Economics*, 79, 257–292.

Kale, J., and H. Shahrur 2007. Corporate capital structure and the characteristics of suppliers and customers. *Journal of Financial Economics*, 83, 321–365.

Kolay, M., M. Lemmon, M., and E. Tashjian. 2016. Spreading the misery? sources of bankruptcy spillover in the supply chain. *Journal of Financial and Quantitative Analysis*, 51(6), 1955-1990.

Kuhnen, C. M. 2009. Business networks, corporate governance, and contracting in the mutual fund industry. *Journal of Finance*, 64, 2185-2220.

Ioannidou, V. P., and S. Ongena. 2010. Time for a Change: Loan Conditions and Bank Behavior When Firms Switch Banks. *Journal of Finance*, 65, 1847-1878.

McFadden, D. 1974. Conditional logit analysis of qualitative choice behavior, in Zarembka, P., ed.: *Frontiers of Econometrics* (Academic Press).

Merton, R. 1974. On the pricing of corporate debt: The risk structure of interest rates. Journal of Finance, 29, 449–70.

Murfin, J., and K. Njoroge. 2014. The implicit costs of trade credit borrowing by large firms. *Review of Financial Studies*, 28, 112–145.

Patatoukas, P.N. 2012. Customer-base concentration: implications for firm performance and capital markets. The Accounting Review, 87, 363–392.

Petersen, M.A., and R.G. Rajan, 1994. The Benefits of Lending Relationships: Evidence from Small Business Data. Journal of Finance, 49, 3–37.

Rauch, J. E. 1999. Networks versus Markets in International Trade. *Journal of International Economics,* 48, 7–35.

Sufi, A. 2007. Information asymmetry and financing arrangements: Evidence from syndicated loans. *Journal of Finance*, 62(2), 629-6.

Weigelt K., and C. Camerer 1988. Reputation and corporate strategy: A review of recent theory and applications. *Strategic Management Journal*, 9(5), 443–454.

Wilson R. 1985. Reputations in Games and Markets (from Game-Theoretical Models of Bargaining) (Cambridge University Press, Cambridge, UK).

Whited, T. M. 1992. Debt, Liquidity Constraints, and Corporate Investment: Evidence from Panel Data. *Journal of Finance*, 47, 1425–60.

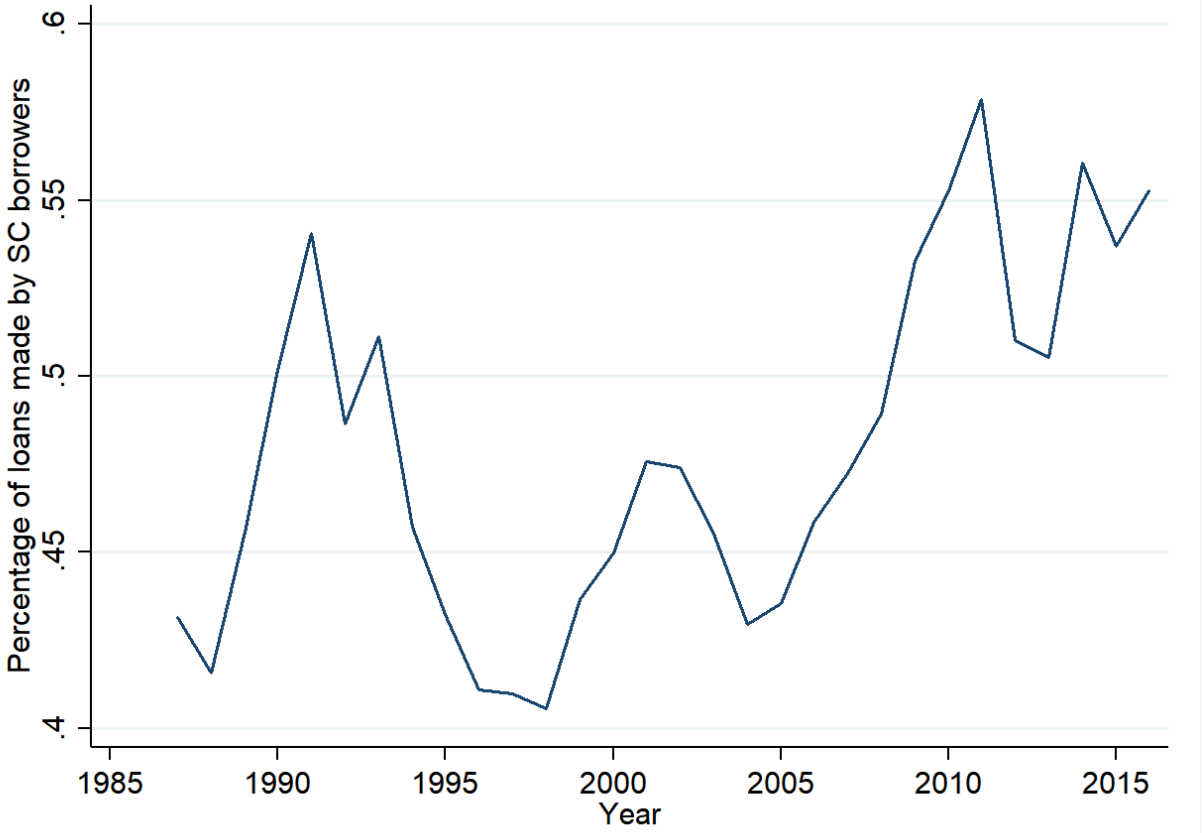

Figure 1: Percentage of loans made by borrowers with supply chain links

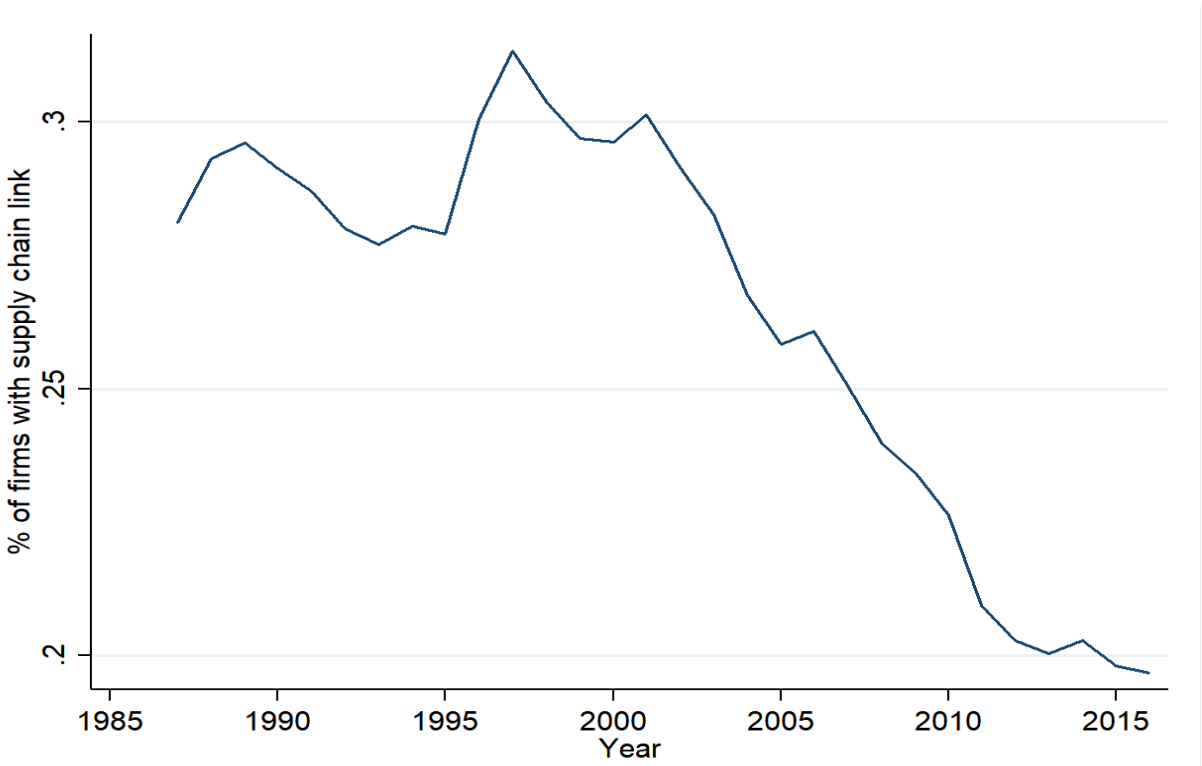

Figure 2: Percentage of firms with supply chain links

Table 1: Summary statistics

This table presents the summary statistics of all variable in this study. The sample spans the 1987-2016 window. All continuous variables are winsorized within 1st and 99th percentiles. See Table A1 of the Appendix for variable definitions.

Variables	Mean	Std. Dev.	Median	#Obs.
Loan characteristics				
Facility Amount (mil.)	397.39	946.17	134.74	44,620
Facility Maturity	47.08	25.26	51.00	41,333
Syndicate Size	7.84	8.54	5	44,551
Syndicate structure				
Percentage retained by lead arranger	0.27	0.23	0.18	10,690
HHI	0.37	0.31	0.25	12,990
Price terms				
Spread (%)	1.85	1.33	1.75	37,046
Fees	92.46	137.76	28.75	40,020
Covenant Index	1.04	1.58	0	44,621
Borrower characteristics				
Total asset	8,220.57	25,542.80	1,060.50	21,653
ROA	0.07	0.10	0.08	21,653
Cash	0.09	0.13	0.04	21,644
Leverage	0.31	0.23	0.29	21,653
Tobin's Q	1.46	0.69	1.26	21,653
CAPX	263.87	732.27	31.19	21,177
Past lending	3.00	3.29	2	21,653
New borrower (Leader side 5yrs)	0.44	0.50	0	31,600
New borrower (NonLeader side 5yrs)	0.59	0.49	1	31,600
Opacity				
Ln R2	-1.26	1.08	-1.21	16,983
Skew	-0.22	1.35	0.01	16,983
Crash	0.06	0.57	0	16,983
Amihud				

Table 2: Matching quality

This table compares the firm-level characteristics of the actual and the pseudo borrowers. The pseudo borrowers are identified as firms within the same 2-digit SIC code and having the highest propensity of receiving loans but do not receive any loan in reality. Each of the actual borrowers is matched with up to five pseudo borrowers. Column 1 and 2 reports the average value of each firm fundamental. Column 3 reports the mean difference between the actual and pseudo borrowers. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Sector-propensity score matching		
	Actual borrower	Pseudo borrower	Diff.
Total asset	11,024.32	11,685.08	660.75
ROA %	6.466	7.061	-0.595
Leverage	0.322	0.309	0.014
Cash %	9.288	12.015	-2.727***
Tobin's Q	1.487	1.474	0.013
CAPX	361.76	359.82	1.937
Obs.	21,653	108,265	

Table 3: Access to the Syndicated Loan Market

This table reports the estimation results of the baseline model (1). For all columns the dependent variable is the propensity of receiving syndicate loans. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Supply chain	0.316***	0.154***	
	(0.02)	(0.02)	
Supplier			0.133***
			(0.02)
Customer			0.098***
			(0.02)
Log past lending		2.329***	2.329***
		(0.03)	(0.03)
Log total asset		-0.274***	-0.270***
		(0.03)	(0.03)
ROA		-0.383***	-0.372***
		(0.11)	(0.11)
Cash		-1.188***	-1.198***
		(0.08)	(0.08)
Leverage		-0.387***	-0.387***
		(0.05)	(0.05)
Tobin's Q		0.091***	0.092***
		(0.01)	(0.01)
Log CAPX		0.089***	0.090***
		(0.02)	(0.02)
Borrower*Year FE	Yes	Yes	Yes
Pseudo R2	0.01	0.14	0.14
Obs.	112,477	112,477	112,477

Table 4: Access to the Syndicated Loan Market and Relationship Lending

This table reports the estimation results of the baseline model (1). For all columns the dependent variable is the propensity of receiving syndicate loans. Supply chain loan takes the value of 1 if the actual (pseudo) borrower has supply chain firm(s) who receive the syndicate loans in the past 5 years. It is equal to 0 if the actual (pseudo) borrower do not have any supply chain firm(s) who receive the syndicate loans or do not have a supply chain link at all. Supply chain no loan, it takes the value of 1 if the actual (pseudo) borrower do not have any supply chain firms(s) who receive loans. It takes 0 if the actual (pseudo) borrower have at least one firm in the supply chain received loan or do not have supply chain link at all. Supply chain bank takes the value of 1 if the actual (pseudo) borrower has supply chain firm(s) who receive the syndicate loans from the same lender(s) in the past 5 years. It is equal to 0 if the actual (pseudo) borrower do not have any supply chain firm(s) who receive the syndicate loans from the same lender(s). It also takes the value of 0 if the actual (pseudo) borrower do not have any supply chain firm(s) who receive loans or do not have a supply chain link at all. Supply chain no bank, to take the value of 1 if the actual (pseudo) borrower does not have supply chain firm(s) who receive loans from the same lender. It takes the value of 0 for the rest of the cases. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Sector-propensity score matching	
	(1)	(2)
Supply chain loan	0.183***	
	(0.02)	
Supply chain no loan	0.100***	
	(0.03)	
Supply chain bank		0.274***
		(0.03)
Supply chain no bank		0.129***
		(0.02)
Log past lending	2.309***	2.309***
	(0.03)	(0.03)
Log total asset	-0.240***	-0.240***
	(0.03)	(0.03)
ROA	-0.135***	-0.136***
	(0.04)	(0.04)
Cash	-1.059***	-1.060***
	(0.08)	(0.08)
Leverage	-0.199***	-0.201***
	(0.04)	(0.04)
Tobin's Q	0.074***	0.075***
	(0.01)	(0.01)
Log CAPX	0.081***	0.079***
	(0.02)	(0.02)
Supply chain loan=Supply chain noloan Chi-square test statistics	9.24	
p-value	0.00	
Supply chain bank=Supply chain nobank Chi-square test statistics		21.73
p-value		0.00
Borrower*Year FE	Yes	Yes
Pseudo R2	0.14	0.14

Obs.	112,477	112,477

Table 5: Reverse Causality Tests

This table reports the estimation results of the baseline model (1). For columns (1) and (3) the dependent variable is the propensity of receiving syndicate loans. Column (1) only considers the supply chain cases in which: the suppliers provide services and differentiated products that are unique or highly customized inputs, and where the customers need differentiated and service inputs. Column (2) reports the first stage and second stage results from a 2SLS estimation with an instrument variable, respectively. In column (3), borrowers with less than 15% of customer sales are defined as borrowers with no supply chain link. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

Dep. Var.:	SC Dep.	IV approach		Cus 15%
	(1)	(2)		(3)
		1st stage	*2nd stage*	
Supply chain	0.174***		0.048**	0.143***
	(0.05)		(0.02)	(0.03)
Supply chain M&A		0.001***		
		(0.00)		
Log past lending	2.064***	0.168***	0.389***	2.328***
	(0.08)	(0.00)	(0.01)	(0.03)
Log total asset	-0.048	0.106***	-0.033***	-0.213***
	(0.10)	(0.01)	(0.01)	(0.03)
ROA	-0.486**	-0.024***	-0.011	-0.139***
	(0.22)	(0.01)	(0.01)	(0.04)
Cash	-1.333***	0.229***	-0.140***	-1.041***
	(0.23)	(0.01)	(0.01)	(0.08)
Leverage	-0.370***	-0.004***	-0.002*	-0.203***
	(0.12)	(0.00)	(0.00)	(0.04)
Tobin's Q	0.084**	0.035***	0.008***	0.079***
	(0.04)	(0.00)	(0.00)	(0.01)
Log CAPX	-0.035	0.045***	0.012***	0.088***
	(0.07)	(0.00)	(0.00)	(0.02)
Borrower*Year FE	Yes	Yes	Yes	Yes
R2	0.11	0.11	0.07	0.13
Kleibergen-Paap test statistics		1542.03		
p-value		0.00		
Obs.	15,072	112,477	112,477	112,477

Table 6: Tests for Omitted Variables

This table reports the estimation results of the baseline model (1). For all columns the dependent variable is the propensity of receiving syndicate loans. Column (1) and (2) exclude the borrowers with the top-quintiles ranks of supplier (customer) concentration proxy by percentage of customer sales against total sales and the Herfindahl index of customer sales, respectively. In Column (3), borrowers with more than 3 years of supply-customer relationship are excluded from the estimation sample. In Column (4), the supply chain dummy is equal to 1 if the borrower has a supply chain firm that account for more than 20% of its total sales in the last five years, and 0 otherwise. Results of Column (5) and (6) are based on the estimation using the sample of borrowers with supply chain link firms receiving no loans in past 5 years. Column (7) to (8) are based on the estimation using the sample of borrowers with supply chain link firms receiving no loans from the same bank as the borrowers in past 5 years. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

	Cus sales	Cus HHI	Cus relation	SC reputation	Supply chain loan=0		Supply chain bank=0	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Supply chain	0.151***	0.149***	0.147***	0.016***	0.101***		0.135***	
	(0.02)	(0.02)	(0.02)	(0.00)	(0.03)		(0.02)	
S&P inclusion				0.020***				
				(0.00)				
Supply chain × S&P inclusion				-0.006				
				(0.01)				
Supplier						0.137***		0.129***
						(0.04)		(0.02)
Customer						0.058*		0.072***
						(0.03)		(0.02)
Log past lending	2.336***	2.334***	2.385***	0.322***	2.480***	2.482***	2.349***	2.351***
	(0.03)	(0.03)	(0.03)	(0.00)	(0.04)	(0.04)	(0.03)	(0.03)
Log total asset	-0.239***	-0.232***	-0.233***	-0.049***	-0.192***	-0.188***	-0.267***	-0.261***
	(0.03)	(0.03)	(0.03)	(0.00)	(0.04)	(0.04)	(0.03)	(0.03)
ROA	-0.142***	-0.143***	-0.110***	-0.085***	-0.096**	-0.096**	-0.116***	-0.116***
	(0.04)	(0.04)	(0.04)	(0.01)	(0.04)	(0.04)	(0.04)	(0.04)
Cash	-1.005***	-1.013***	-0.956***	-0.122***	-0.877***	-0.881***	-1.032***	-1.039***
	(0.08)	(0.08)	(0.08)	(0.01)	(0.10)	(0.10)	(0.08)	(0.08)
Leverage	-0.199***	-0.197***	-0.158***	-0.045***	-0.106**	-0.107**	-0.151***	-0.151***
	(0.04)	(0.04)	(0.04)	(0.01)	(0.04)	(0.04)	(0.04)	(0.04)
Tobin's Q	0.074***	0.076***	0.068***	0.008***	0.057***	0.058***	0.064***	0.065***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)
Log CAPX	0.073***	0.071***	0.079***	0.009***	0.040	0.041	0.066***	0.068***
	(0.02)	(0.02)	(0.02)	(0.00)	(0.03)	(0.03)	(0.02)	(0.02)
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.14	0.14	0.14	0.08	0.14	0.14	0.14	0.14
Obs.	104,508	104,527	90,173	116,728	51,972	51,972	90,275	90,275

Table 7: Supply chain and bank participation

This table investigate the influence of supply chain on syndicate loan structure as presented by model (2). The dependent variable in Column (1) and (2) are participations of the lead agent. Lead agent are identified by the highest ranked agent for each facility following the ranking hierarchy suggested by Chakraborty et al. (2018). In Column (2) borrowers with a probability of default, calculated based on the Merton's (1974) Distance-to-Default measure, that exceeds 25% at the beginning of the year are removed from the sample. In Column (3) the dependent variable is average participation rate of the agents ranked within the top six categories of the ranking hierarchy. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

Dep. Var.:	Lead agent allocation	Lead agent allocation	Mean lead agent allocation
	(1)	(2)	(3)
Supply chain	0.008***	0.008***	0.008***
	(0.00)	(0.00)	(0.00)
Log past lending	0.004	0.002	0.004
	(0.00)	(0.00)	(0.00)
Log total asset	0.017***	0.019***	0.016***
	(0.00)	(0.00)	(0.00)
ROA	-0.042**	-0.053***	-0.055***
	(0.02)	(0.02)	(0.02)
Log CAPX	-0.003	-0.005	-0.003
	(0.00)	(0.00)	(0.00)
Cash	0.035**	0.037**	0.035**
	(0.01)	(0.01)	(0.01)
Leverage	0.037***	0.035***	0.033***
	(0.01)	(0.01)	(0.01)
Tobin's Q	-0.003	-0.003	-0.002
	(0.00)	(0.00)	(0.00)
Log facility amount	0.007*	0.007*	0.012***
	(0.00)	(0.00)	(0.00)
Log facility duration	0.002	-0.000	0.001
	(0.01)	(0.01)	(0.01)
Log number of banks	-0.518***	-0.517***	-0.521***
	(0.01)	(0.01)	(0.01)
R2	0.76	0.76	0.76
Bank FE	Yes	Yes	Yes
Borrower sector FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	9,760	9,377	9,625

Table 8: Supply chain and loan pricing

This table reports the results of the influence of supply chain link on loan pricing as presented by model (3). The dependent variables from Column (1) to (3) are the LIBOR rates (in %) of the syndicate loans. In Column (4) to (6) the dependent variable are the logarithm of fees associated with the syndicate loans. Column (2) and (4) are estimated using a refined sample of concentrated loans whereas non-concentrated loans are used for the estimations in Column (3) and (6). Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

Dep. Var.:	LIBOR (%)			Log(Fees)		
	All	Concentrated loan	Non-concentrated loan	All	Concentrated loan	Non-concentrated loan
	(1)	(2)	(3)	(4)	(5)	(6)
Supply chain	0.043**	0.096**	0.008	0.022**	0.039*	0.020
	(0.02)	(0.04)	(0.02)	(0.01)	(0.02)	(0.01)
Log past lending	0.172***	0.319***	0.101***	0.062***	0.136***	0.012
	(0.03)	(0.07)	(0.04)	(0.02)	(0.04)	(0.02)
Log total asset	-0.426***	-0.318***	-0.482***	-0.308***	-0.258***	-0.319***
	(0.03)	(0.07)	(0.04)	(0.02)	(0.04)	(0.02)
ROA	-2.130***	-2.059***	-2.185***	-0.640***	-0.383***	-0.957***
	(0.17)	(0.30)	(0.20)	(0.08)	(0.11)	(0.12)
Log CAPX	-0.062**	-0.110**	-0.011	-0.039***	-0.037	-0.046***
	(0.02)	(0.05)	(0.03)	(0.01)	(0.02)	(0.02)
Cash	0.593***	0.465**	0.676***	0.249***	0.216**	0.254***
	(0.10)	(0.20)	(0.11)	(0.06)	(0.10)	(0.07)
Leverage	1.007***	1.012***	0.915***	0.272***	0.208***	0.307***
	(0.05)	(0.11)	(0.06)	(0.03)	(0.05)	(0.04)
Tobin's Q	-0.120***	-0.118***	-0.115***	-0.089***	-0.086***	-0.078***
	(0.02)	(0.03)	(0.02)	(0.01)	(0.02)	(0.01)
Log facility amount	-0.339***	-0.270***	-0.386***	0.061***	0.117***	0.022
	(0.03)	(0.06)	(0.04)	(0.02)	(0.03)	(0.02)
Log facility duration	0.188***	0.104	0.241***	0.281***	0.198***	0.315***
	(0.04)	(0.10)	(0.04)	(0.02)	(0.04)	(0.03)
Log number of banks	0.055	0.245**	0.296***	0.036	-0.002	0.103***
	(0.05)	(0.10)	(0.06)	(0.02)	(0.05)	(0.04)
R2	0.55	0.51	0.56	0.38	0.29	0.41
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8,762	2,893	5,869	8,030	2,687	5,343

Table 9: Supply chain and covenant

This table reports the results of the influence of supply chain link on loan pricing. The dependent variable for all columns is the covenant index following Bradley and Roberts (2004) which assumes the value 0-5 with the presence of each of five different covenants coded as 1, and 0 otherwise, and then summed-up. The index includes the following variables from the dataset: asset sales weep; debt issuance sweep; equity issuance sweep; dividend restrictions and insurance proceeds sweep. Column (3) and (4) are estimated using a refined sample of concentrated and non-concentrated loans, respectively. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

Dep. Var.:	Covenant index			
	All sample	All sample	Concentrated loan	Non-concentrated loan
	(1)	(2)	(3)	(4)
Supply chain	0.000		0.001	0.038
	(0.05)		(0.07)	(0.06)
Supplier		0.040		
		(0.05)		
Customer		-0.027		
		(0.05)		
Log past lending	0.329***	0.330***	0.399***	0.263***
	(0.08)	(0.08)	(0.13)	(0.09)
Log total asset	-0.634***	-0.624***	-0.330***	-0.749***
	(0.07)	(0.07)	(0.10)	(0.08)
ROA	-0.667**	-0.664**	-0.461	-1.079***
	(0.28)	(0.28)	(0.36)	(0.41)
Log CAPX	-0.059	-0.059	-0.078	-0.067
	(0.05)	(0.05)	(0.08)	(0.07)
Cash	0.334	0.334	0.016	0.210
	(0.22)	(0.22)	(0.31)	(0.29)
Leverage	0.576***	0.575***	0.412**	0.535***
	(0.11)	(0.11)	(0.16)	(0.14)
Tobin's Q	-0.146***	-0.147***	-0.051	-0.176***
	(0.03)	(0.03)	(0.05)	(0.05)
Log facility amount	-0.250***	-0.249***	-0.079	-0.393***
	(0.05)	(0.05)	(0.07)	(0.08)
Log facility duration	0.371***	0.372***	0.440***	0.346***
	(0.07)	(0.07)	(0.11)	(0.08)
Log number of banks	0.577***	0.576***	0.846***	1.050***
	(0.09)	(0.09)	(0.16)	(0.15)
R2	0.36	0.36	0.43	0.36
Borrower sector FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	9,760	9,760	3,507	6,253

Table 10: Does supply chain affect access to concentrated loans

This table investigate the effect of supply chain on the access to loan types segmented by the participation of the lead agent. In all columns the dependent variable are the propensity of receiving loans. In columns (1) and (2) concentrated and non-concentrated loans are defined by whether the participation of the lead agent is larger or less than the cross-sectional mean of lead agent participation, respectively. In columns (3) and (4) concentrated and non-concentrated loans are defined by whether the participation of the lead agent is larger or less than 50%, respectively. Lead agent are identified by the highest ranked agent for each facility following the ranking hierarchy suggested by Chakraborty et al. (2018). Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

Dep. Var.:	Concentrated loan	Non-concentrated loan	Concentrated loan	Non-concentrated loan
	(1)	(2)	(3)	(4)
Supply chain	0.029***	-0.024**	0.022***	-0.016*
	(0.01)	(0.01)	(0.01)	(0.01)
Log past lending	-0.075***	0.069***	-0.069***	0.063***
	(0.02)	(0.02)	(0.01)	(0.02)
Log total asset	-0.217***	0.188***	-0.130***	0.101***
	(0.01)	(0.01)	(0.01)	(0.01)
ROA	-0.316***	0.237***	-0.324***	0.246***
	(0.06)	(0.06)	(0.06)	(0.06)
Log CAPX	-0.032***	0.032***	-0.023**	0.022**
	(0.01)	(0.01)	(0.01)	(0.01)
Cash	0.088*	-0.086*	0.107**	-0.105**
	(0.05)	(0.05)	(0.04)	(0.04)
Leverage	-0.067***	0.052**	-0.028	0.014
	(0.02)	(0.02)	(0.02)	(0.02)
Tobin's Q	-0.023***	0.031***	-0.007	0.015**
	(0.01)	(0.01)	(0.01)	(0.01)
R2	0.42	0.38	0.39	0.33
Bank FE	Yes	Yes	Yes	Yes
Borrower sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	9,373	9,373	9,373	9,373

Table 11: Access to the Syndicated Loan Market

This table reports the estimation results of the baseline model (1). For all columns the dependent variable is the propensity of receiving syndicate loans. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

	LPM estimation			All sample LPM estimation			Equity	Bond	Mortgage	Preferred Stock	Program debt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Supply chain	0.040***	0.017***		0.061***	0.024***		-0.008***	0.063***	-0.000*	0.004***	0.032***
	(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Supplier			0.014***			0.014***					
			(0.00)			(0.00)					
Customer			0.008***			0.039***					
			(0.00)			(0.00)					
Log past lending		0.322***	0.323***		0.657***	0.654***	-0.007	0.522***	0.001***	0.007***	0.270***
		(0.00)	(0.00)		(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)
Log total asset		-0.050***	-0.049***		0.038***	0.035***	-0.079***	0.087***	0.000***	0.007***	0.050***
		(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ROA		-0.086***	-0.086***		-0.000	0.001	-0.078***	-0.024***	-0.000	-0.004***	-0.013***
		(0.01)	(0.01)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cash		-0.122***	-0.122***		-0.069***	-0.069***	0.052***	-0.051***	0.000*	0.001	0.028***
		(0.01)	(0.01)		(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Leverage		-0.045***	-0.045***		0.003*	0.003*	0.090***	0.012***	0.000	0.001*	0.004*
		(0.01)	(0.01)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tobin's Q		0.007***	0.008***		0.007***	0.006***	-0.030***	0.016***	0.000	-0.000	0.009***
		(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log CAPX		0.009***	0.009***		0.003***	0.003***	0.025***	0.007***	-0.000***	-0.001***	-0.006***
		(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.00	0.08	0.08	0.05	0.16	0.17	0.04	0.10	0.00	0.01	0.04
Obs.	116,728	116,728	116,728	261,038	261,038	261,038	254,038	261,038	261,038	261,038	261,038

Appendix

Table A1: Explanation of Variables

Variable	Source	Description
General		
Leader arranger	Dealscan	Following the existing relevant literature (Sufi, 2007; Bharath, Dahiya, Saunders and Srinivasan, 2011), we define a lender as a lead arranger if the following conditions is met: LeadArrangerCredit = "Yes" in the *LenderShares* table of Dealscan.
Loan	Dealscan	It is the propensity of receiving a loan. It is equal to 1 when a firm has received a syndicated loan as indicated in the facility table in Dealscan. Otherwise it is equal to zero.
Price terms		
Spread	Dealscan	Spread over LIBOR (non-LIBOR-based loans are excluded from the sample) paid on drawn amounts on credit lines.
Fees	Dealscan	Following Berg et al. (2016), we sum-up amount of fees under the following categories: Commitment fee, Facility fee, Utilization fee, Cancellation fee, Upfront fee
Covenant Index	Dealscan	Following Bradley and Roberts (2003), we build a covenant index that considers equity sweeps, debt sweeps, asset sweeps, dividend restrictions, and secured debt. All five different covenants are coded as 1, and 0 otherwise, and then summed-up.
Loan characteristics		
Facility Amount	Dealscan	Facility amount in USD million as indicated in the field FacilityAmt in the facility table in Dealscan, adjusted for inflation in 2005 dollars.
Facility Maturity	Dealscan	Facility maturity in months as indicated in the field Maturity in the facility table in Dealscan.
Syndicate Size	Dealscan	Following Berg et al. (2016), number of lenders (lead arranger and participants) of a syndicated loan facility as indicated by the LenderShares table in Dealscan.
Syndicate Structure		
Percentage retained by the lead arranger	Dealscan	Following Sufi (2007), percentage retained by the leader lender of a syndicated loan facility as indicated by the LenderShares table in Dealscan.
Herfindahl Index (HHI)	Dealscan	Following Sufi (2007), Herfindahl Index (HHI) calculated based on the percentage retained by the leader and all the participants of a syndicated loan facility as indicated by the LenderShares table in Dealscan.
Supply chain		

Supply chain link	Dealscan/ Compustat	It is a dummy that takes the value of 1 if the borrower has at least one supply chain partner over the last previous five years; otherwise it is zero. The data on supply chain is retrieved from Compustat's Segment Customer database.
Supply chain loan	Dealscan/ Compustat	It is a dummy that takes the value of 1 under two criteria: if the borrower has at least one supply chain partner over the last previous five years and 2) at least one supply chain's partner has received a loan over the last five years. The dummy is equal to zero if at least one of the above two criteria is not satisfied. The data on supply chain is retrieved from Compustat's Segment Customer database.
Supply chain bank	Dealscan/ Compustat	It is a dummy that takes the value of 1 under two criteria: if the borrower has at least one supply chain partner over the last previous five years; 2) at least one supply chain's partner has received a loan over the last five years from the same bank. The dummy is equal to zero if at least one of the above two criteria is not satisfied. The data on supply chain is retrieved from Compustat's Segment Customer database.
Borrower characteristics		
Total assets	Compustat	Total assets in USD millions of dollars.
Leverage	Compustat	Ratio of book value of total debt to book value of assets.
Profitability (ROA)	Compustat	Ratio of net income to total assets.
Cash	Compustat	Cash is equal to the sum of cash and short-term investments to total assets.
CAPX	Compustat	CAPX is the logarithm of capital expenditures.
Tobin's Q	Compustat	It is the ratio of (book value of assets – book value of equity + market value of equity) to book value of assets.
New borrower (Leader side 5yrs)	Dealscan	New borrower (Leader side 5yrs), is a dummy equal to 1 if the borrower did not have a lending relationship over the last five years with the leader bank, otherwise it is zero
New borrower (NonLeader side 5yrs)	Dealscan	New borrower (NonLeader side 5yrs) if the borrower did not have a lending relationship over the last five years with the participant banks, otherwise it is zero
Relationship Lending		
Past Lending	Dealscan	It is the logarithm of number of loans received in the last 5 years.
Market opacity		

Ln_R2	Compustat/CRSP	Defined as $\ln\left(\frac{R^2}{1-R^2}\right)$ where R^2 is computed by running a standard Carhart four-factor model on weekly returns within the fiscal year of each listed borrower (Jin and Myers, 2006).
Skew	Compustat/CRSP	Skew is calculated as $\left(\frac{\epsilon_i-\mu(\epsilon_i)}{\sigma(\epsilon_i)}\right)^3$, where ϵ_i is the residual from a standard Carhart four-factor regression model from firm i using weekly returns for each fiscal year (Jin and Myers, 2006).
Crash	Compustat/CRSP	Crash is the difference between the number of extremely low and extremely high residual returns in the fiscal year.
Liquidity opacity		
Amihud	CRSP	The illiquidity measure introduced by Amihud (2002). The measure is calculated as the average (over the fiscal year) of the ratio between the absolute daily return and the daily dollar volume.
Supply Chain's Reputation		
S&P inclusion,	Compustat	This variable accounts for the percentage of firms in the supply chain that are listed in the S&P500 index.

Table A3: Firm opacity and supply chain

This table reports the estimation results of model (2). For all columns the dependent variable is the propensity of receiving syndicate loans. All results are estimated using the conditional logit model. Ln_R2 is estimated through $\ln\left(\frac{R^2}{1-R^2}\right)$ where R2 is computed by running a standard Carhart four-factor model on weekly returns within the fiscal year of each listed borrower. Skew is calculated as $\left(\frac{\epsilon_i-\mu(\epsilon_i)}{\sigma(\epsilon_i)}\right)^3$, where ϵ_i is the residual from a standard Carhart four-factor regression model from firm i using weekly returns for each fiscal year. Crash is the difference between the number of extremely low and extremely high residual returns in the fiscal year. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Conditional logit model			
	(1)	(2)	(3)	(4)
Supply chain	0.099**	0.082**	0.085**	0.190***
	(0.05)	(0.03)	(0.03)	(0.03)
Supply chain	0.011			
×Ln_R2	(0.03)			
Supply chain		-0.000		
×Skew		(0.02)		
Supply chain			-0.029	
×Crash			(0.07)	
Supply chain				-0.000
×Amihud				(0.00)
Ln_R2	0.036			
	(0.02)			
Skew		0.006		
		(0.02)		
Crash			-0.030	
			(0.05)	
Amihud				0.000
				(0.00)
Controls	Yes	Yes	Yes	Yes
Borrower*Year FE	Yes	Yes	Yes	Yes
Obs.	59,973	59,973	59,973	59,973

Table A3: Tests for Omitted Variables

The dependent variables of all columns are the propensity of receiving loans. The industry leader is equal to 1 if the borrower is ranked at the top third position among its peer firms from the same industry according to each of three ranking criteria, i.e. profitability, market share and stock return, at the year prior of receiving the loan. Variable definitions are provided in Table A1 of the Appendix. Standard errors reported in parentheses, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at borrower level.

	(1)	(2)	(3)
	Profitability	Market share	Stock return
Supply chain	0.015***	0.017***	0.018***
	(0.00)	(0.00)	(0.00)
Supply chain	0.008*	0.003	0.001
× Industry leader	(0.00)	(0.00)	(0.00)
Industry leader	-0.005	0.001	0.006*
	(0.00)	(0.00)	(0.00)
Log past lending	0.340***	0.339***	0.339***
	(0.00)	(0.00)	(0.00)
Log total asset	-0.038***	-0.038***	-0.038***
	(0.00)	(0.00)	(0.00)
ROA	-0.056***	-0.058***	-0.059***
	(0.01)	(0.01)	(0.01)
Cash	-0.138***	-0.137***	-0.137***
	(0.01)	(0.01)	(0.01)
Leverage	-0.038***	-0.038***	-0.037***
	(0.01)	(0.01)	(0.01)
Tobin's Q	0.009***	0.009***	0.008***
	(0.00)	(0.00)	(0.00)
Log CAPX	0.010***	0.010***	0.010***
	(0.00)	(0.00)	(0.00)
FE	Yes	Yes	Yes
R2	0.05	0.05	0.05
Obs.	116,728	116,728	116,728