Lending along the Supply Chain

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ABSTRACT

Despite the fact that economic interconnections among firms are very common, there is little research that examines the equilibrium outcome of such interconnections in credit markets. We examine how supply chain interconnections among borrowers within a lender's loan portfolio affect equilibrium loan spread and lead arranger share in the syndicated loan market. We find that both loan spread and lead arranger share are significantly lower when the lead arranger has a pre-existing loan with the borrower's major customer. This finding suggests that such "supply chain loans" ease syndicate participants' moral hazard concerns more than they exacerbate concerns about adverse selection. We further document that these effects are stronger where syndicate participants' information asymmetry concerns are more pronounced. Consistent with supply chain loans providing benefits to both the borrower and lead arranger, we provide evidence that a borrower is more likely to obtain a loan from a lender who already has an existing loan with its key customer. Our findings provide insights into the mechanisms through which supply chain interdependencies, and more generally, economic relationships, affect debt markets.

Keywords: Debt contracts; supply chain, moral hazard, adverse selection

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I. Introduction

Firms do not operate in isolation. As a nexus of contracts, firms are inherently related to numerous other parties such as capital providers, employees, customers and suppliers. Therefore, the economy is filled with companies that are economically linked through their transactions. As a result, banks are likely continuously faced with decisions about whether and how to lend to such interdependent parties where one of the parties is already a borrower (e.g., Gong and Luo 2018). Despite the fact that these relationships are very common, there is little research that examines the equilibrium outcome of such relationships in the syndicated loan market, and existing research typically treats loans to different borrowers within a lender's portfolio as if they are independent. Research into interdependent loans is important because lending to interconnected parties unleashes several forces in the syndicated lending process compared to lending to firms that are economically independent. This study addresses this gap.

Due to standard data limitations, it is challenging to identify whether Firm X is economically interconnected with Firm Y. However, the existing segment disclosure requirement, i.e., FASB Accounting Standards Codification Topic 280 (ASC 280), gives researchers a unique opportunity to identify firms that are interconnected through a supplier-customer relationship. This disclosure requirement mandates that firms must disclose information about any customer which represents more than 10% of their revenue in a particular year. Using this setting, we consider how the equilibrium loan outcome to a borrower is affected if the lender already has a pre-existing loan to that borrower's major customer (hereafter, we refer to the new borrower as the "supplier", and the loan to the new borrower as a "supply chain loan").

When considering a supply chain loan, there are a few forces that the lead arranger needs to account for that may affect the lending outcome. On one hand, because of the correlated

economics of the supplier and borrower, a supply chain loan adds risk to the lead arranger's portfolio ("interdependency risk"). Consistent with economic interdependence of borrowers introducing a stand-alone risk, in its handbook on Concentrations of Credit, the Office of the Comptroller of the Currency explicitly expresses concerns about positive correlation between firms in the same supply chain in the context of bank risk. Specifically, the OCC discusses an example in the Auto Manufacturing and Fabricated Metal Product Manufacturing industries: "a downturn in auto sales would negatively affect the performance of both industries" (p. 10).[1] On the other hand, lead arrangers can plausibly better understand the economics of the new borrower by virtue of the fact that they have an existing loan to an economically interconnected firm, which may reduce risk associated with estimating default probability and/or loss given default (i.e., estimation risk) with respect to the new borrower (e.g., Barry and Brown 1985).

A supply chain loan may also affect the equilibrium loan outcome through two additional countervailing forces that are of concern to syndicate participants. Syndicate participants depend on the lead arranger to screen borrowers before loan syndication, and monitor borrowers throughout the life of the loan. Because screening and monitoring efforts are costly and unobservable and the lead arranger will offload much of the loan to syndicate participants, the loan syndication process is characterized by two key information frictions that are of concern to the syndicate participants. First, information asymmetry between the lead arranger and syndicate participants creates an adverse selection problem in which the lead arranger may have an incentive to misrepresent the quality of syndicated loans (i.e., the lead arranger may not disclose its true beliefs to the syndicate participants in cases where the lead arranger assesses the borrower as being of poor quality during its screening). Second, information asymmetry between the borrower and

[1] https://www.occ.gov/publications/publications-by-type/comptrollers-handbook/Concentration-HB-Final.pdf

lead arranger creates a moral hazard problem in which the lead arranger has an incentive to shirk on its screening and/or monitoring (i.e., ex ante screening of the borrower is costly, so the lead arranger underinvests in its screening efforts and doesn't accurately assess borrower quality).

To protect themselves against these concerns, syndicate participants require the lead arranger to retain a larger share of a loan than would otherwise be optimal from a pure risk-sharing perspective. This provides incentives to the lead arranger to set loan terms that accurately reflect the riskiness of the loan and to exert monitoring effort after loan origination. In the case of lending to an economically interconnected firm, the lead arranger already has some information for screening and monitoring the new borrower coming from the prior loan to the interconnected firm. Thus, screening and monitoring require less effort, which may mitigate the moral hazard problem. However, the fact that the lead arranger has the prior loan gives them an additional information advantage over the syndicate participants with respect to the new borrower, which may tempt the lead arranger to retain a lower share of the new loan if their private information is negative, thus exacerbating the adverse selection problem (e.g., Sufi 2007).

We extend a framework outlined in Ivashina (2009) to develop predictions about how supply chain connections of the lead arranger and/or syndicate participants may affect equilibrium loan spread and loan share. Ivashina (2009) develops an equilibrium model of loan syndication in which the observed loan spread and a lead arranger's share of a loan correspond to the intersection of two pricing schedules representing the syndicate participants' demand for a proportional share of a loan and the lead arranger's willingness to retain a proportional share of a loan. Extending this framework allows us to consider numerous possible equilibrium outcomes of loan spread and lead arranger share that may result from changes in portfolio interdependency risk and estimation risk, as well as changes in adverse selection and moral hazard, introduced by lending to economically

interconnected firms. Importantly for our research design, an examination of changes in either lead arranger share or loan spread alone following a supply chain loan is not sufficient to provide evidence of changes in adverse selection, moral hazard, or risk. Accordingly, we must examine changes in both loan share retained and loan spread in conjunction with one another to draw our inferences.

To examine these dynamics, we first identify a sample of firms (i.e., "suppliers") who disclose key customers in their SEC filings. Next, we obtain a sample of syndicated loans issued to these suppliers at times when their key customers have pre-existing syndicated loans in place (i.e., we retain in our sample only the suppliers who enter the syndicated loan market and major customers of those suppliers who have existing syndicated loans). Then, we examine the propensity of a supplier to obtain a loan from an existing lender to the supplier's key customer vs. an unrelated bank, and we examine differences in certain loan characteristics when the supplier obtains its loan from its key customer's lender vs. an unrelated bank. Specifically, we estimate cross-sectional models using (alternatively) loan spread and lead arranger share as dependent variables, where the key independent variable is an indicator that captures whether the supplier's lender already has an existing loan to the supplier's key customer.

We further depict this setting and our identification strategy in Appendix B. Referring to the hypothetical example in Appendix B, suppose (1) Supplier A has Customer B, and (2) Customer B has an existing loan from Bank X (i.e., both the economic interdependency between Supplier A and Customer B, and Customer B's lending relationship with Bank X are already predetermined when Supplier A enters the syndicated loan market). We then (3) examine the propensity of Supplier A to choose a loan either from Bank X (i.e., a "supply chain loan") versus Bank Y (which serves as a "non-supply chain loan" control observation), along with differences

in associated loan spread and lead arranger share. To be clear, unlike many studies wherein selection and non-random assignment to the treatment group confound inferences, in our study the supplier's choice (3) between Bank X and Bank Y (where choices (1) and (2) are already predetermined) is precisely the choice we wish to examine, and is exactly our explanation for the different outcomes we observe between supply chain versus non-supply chain loans.

We find that both loan spread and lead arranger share are significantly lower for loans issued to suppliers when the lead arranger has a pre-existing loan with the supplier's major customer. In the context of our extension of the Ivashina (2009) framework, this finding suggests that the supply chain loan eases syndicate participants' moral hazard concerns more than it exacerbates any concerns about adverse selection. Given that supply chain loans indeed provide benefits to both the borrower (i.e., lower spread) and lead arranger (i.e., lower share), we predict that borrowers will be more likely to obtain a loan from a lender who already has an existing loan with their key customers. We provide evidence that supports this prediction. Moreover, we predict and find that the effects of a supply chain loan on spread and lead arranger share are more pronounced where the participants' information asymmetry concerns are likely to be more pronounced: 1) when the lead arranger has a relatively poor reputation in the syndicated loan market; 2) the lead arranger does not have previous relationship with the borrower; and 3) there is relatively high information asymmetry between the borrower (i.e., the supplier) and lead arranger.

Our study contributes to the literature that examines determinants of syndicated lending outcomes. While extant literature provides a basic understanding of the forces that affect equilibrium loan spread and share held by the lead arranger(s), our understanding of how various business phenomena affect the lending syndicate (and the resulting equilibria) is still developing. Our study provides evidence that common business interdependencies among borrowers of a given

lender influence these dynamics. A key point here is that unlike most papers in the literature which treat borrowers within a bank portfolio as independent, we shed light on how economic interconnectedness among borrowers within a particular lender's portfolio affects loan outcomes. Note that our research question is separate and distinct from the literature that examines borrower customer concentration risk on loan outcomes (i.e., how loan terms are affected when a borrower has a key customer) (e.g., Kim et al. 2015; Dhaliwal et al. 2016). In contrast, in a sample of borrowers who *all* have key customers, we examine how such interdependencies affect loan terms when a lender has outstanding loans to both of the interconnected firms.

Further, our study contributes to the general literature that examines the capital market effects of economic interdependencies among firms. Extant literature provides evidence that such interdependencies can affect equity market outcomes. For example, Hertzel et al. (2008) provide evidence that supplier abnormal returns around the financial distress of a major customer are significantly negative. Consistent with this, Pandit et al. (2011) find that abnormal returns of suppliers and customers are positively correlated on days when the customer releases an earnings announcement, which suggests that information about a customer can revise investors' expectations about the future economics of the supplier. Gong and Luo (2018) focus on the effect of supply chain loans on borrower accounting conservatism and find that such loans reduce the demand for accounting conservatism. Our study is the first to provide evidence on the equilibrium combination of loan spread and lead arranger retained share in the syndicated loan market. Our findings therefore provide novel insights into the mechanisms through which these supply chain interdependencies affect debt markets.

2. Background and Predictions

2.1. Syndicated loan market

An important friction in the syndicated loan market is information asymmetry, which exists at two levels (e.g., Sufi 2007). First, information asymmetry exists between the lead arranger (who originates the loan with a borrower) and the borrower, which makes it costlier (i.e., more effort intensive) for the lead arranger to screen and monitor the borrower, and therefore gives rise to moral hazard concerns from the perspective of the syndicate participants. Second, information asymmetry exists between the lead arranger and the participants within the syndicate (because the syndicate participants generally rely on the lead arranger to provide relevant information about the borrower, and the lead arranger may have private information), which gives rise to adverse selection concerns from the perspective of the syndicate participants.

Ivashina (2009) develops an equilibrium model of loan syndication in which the observed loan spread and the lead arranger's share of a loan correspond to the intersection of two pricing schedules representing the syndicate participants' demand for a proportional share of a loan and the lead arranger's willingness to retain a proportional share of a loan. Figure 1, which plots loan spread and share retained by the lead arranger, illustrates the baseline model. In the presence of adverse selection (arising from syndicate participants' reliance on the lead arranger for borrower information and credit evaluation) and moral hazard (arising from syndicate participants' inability to assess whether the lead arranger performs adequate ex ante screening and/or ex-post monitoring of the borrower's activities throughout the life of the loan), the syndicate participants' demand curve (DSynd) is downward-sloping. Other things equal, syndicate participants demand that the lead arranger retain a greater share of the loan when their information asymmetry concerns are

greater. The downward slope of their demand curve (DSynd) reflects their willingness to accept a lower loan spread when the lead arranger retains a larger share of the loan.

However, because of the lead arranger's desire to diversify loan portfolio risk, as its share retained increases the lead arranger requires a higher loan spread to compensate for its increased risk exposure. Hence, the lead arranger's demand curve (DLead), is upward-sloping. The intersection of the two demand curves yields the baseline equilibrium loan spread and share retained by the lead arranger indicated by E(0).

2.2. Supply chain interdependencies

The economy is replete with firms that have key supply chain relationships – both suppliers who have key customers, and customers who have key suppliers. Extant literature has studied several capital market effects related to these linkages. For example, Hertzel et al. (2008) provide evidence that supplier abnormal returns around the financial distress of a major customer are significantly negative, which provides evidence that impairment at one firm can ripple through other layers of the supply chain. Pandit et al. (2011) find that abnormal returns of suppliers and customers are positively correlated on days when the customer releases an earnings announcement, which suggests that information about a customer can revise investors' expectations about the future economics of the supplier. These supply chain interdependencies represent a unique type of risk to a lender who holds loans to both a supplier and that supplier's major customer (hereafter referred to as "supply chain interdependency risk").

If a bank has "normal" industry concentration risk in its portfolio (i.e., multiple loans to borrowers in the same industry), there is a risk that a downturn in that one industry could adversely affect both loans at the same time. In contrast, if a bank has "supply chain interdependencies" in its portfolio (e.g., loans to two companies where Company A is a major customer of Company B),

the lender's portfolio risk is magnified. If the two companies are in the same industry, an industry downturn can affect both companies negatively (as in the "normal" industry concentration case), and also present an *independent* spiraling effect, because the declining fortunes of one company directly affect the other company, incremental to the declining industry conditions. If the two companies are not in the same industry (as is often the case among firms that are interconnected within a supply chain relationship), a downturn in *either* one of the two industries has the potential to negatively affect both loans (whereas in the case of "normal" industry concentration, only a downturn in a single industry can trigger correlated performance of the two borrowers).

2.3. Effect of supply chain loans on lead arranger portfolio risk

Next, we discuss how the interdependencies between suppliers and customers lead to predictions about syndicated loan equilibria when a lender is considering making a supply chain loan, which will increase the lender's "interdependency risk."

As illustrated in Figure 2, the location of DLead is determined by the risk that the supply chain loan adds to the lead arranger's portfolio, which is dictated by two primary forces. Because of the economic interdependencies between the supplier and customer, the supply chain loan will add interdependency risk to the lender's portfolio, thereby shifting DLead to the left, ceteris paribus (i.e., for a given share of the supply chain loan retained by the lead arranger, she will demand higher spread to compensate for the additional portfolio risk). On the other hand, because the lead arranger knows a lot about the supplier's major customer (by virtue of the lead arranger's existing loan to the customer), the lead arranger is better able to estimate the supplier's credit risk. This decrease in estimation risk (e.g., Barry and Brown 1985; Bharath et al. 2008) will shift DLead to the right, ceteris paribus (i.e., for a given share of the new loan, the lead arranger will demand lower spread). The on-average net effect of these two forces (and their relative strength) on the

location of DLead is an empirical question—if interdependency risk concerns (estimation risk relief) dominate(s), DLead will shift to the left (right).

2.4. Effect of supply chain loans on moral hazard and adverse selection

Referring back to Figure 1, a supply chain loan not only has the potential to affect the location of DLead, but also may affect the location of DSynd through the interaction of two opposing forces. First, the location of DSynd is affected by the lead arranger's screening and monitoring efforts. In general, syndicate participants require the lead arranger to hold a higher loan share when screening and monitoring are costly, because of the moral hazard problem. In the case of a supply chain loan, as the lead arranger already has information for screening and monitoring coming from the existing loan to the supplier's major customer, screening and monitoring require less effort. Therefore, the participants do not need to incentivize screening and monitoring as much (i.e., they can lower the lead arranger retained share requirement), and DSynd will shift to the left, as shown in Figure 3.

Second, the location of DSynd is affected by the adverse selection problem, which may be exacerbated in a supply chain loan. Specifically, the adverse selection problem arises within the syndicate when the lead arranger has private information about the borrower—participants are concerned that the lead arranger will want to hold less of loans that it knows are "bad" (e.g., Sufi 2007). The fact that the lead arranger has an existing loan with the borrower's key customer gives them an additional information advantage over the syndicate participants, who may require the lead arranger to hold more of the loan as a result, which will shift DSynd to the right. The net of these two forces will determine the new location of DSynd—if adverse selection concerns (moral hazard relief) dominate(s), DSynd will shift to the right (left).

2.5. Combining the four effects

Figure 4 illustrates representative share-spread equilibria that may arise from consolidating the above discussion. Recall from above that two opposing forces affect the lead arranger's demand curve (interdependency risk increase and estimation risk decrease), and two opposing forces that affect the syndicate participants' demand curve (moral hazard decrease and averse selection increase). Consideration of these four forces together leads to nine possible spread-share equilibria of the supply chain loan across the four quadrants, relative to a baseline non-supply-chain loan (i.e., E0 from Figure 1).

As outlined in Figure 4, if a supply chain loan results in a change to *both* spread *and* share (i.e., the new equilibrium lies in the field of one of the four quadrants of the graph in Figure 4 Panel A), we can only make conclusive inferences about the movement of one of the two curves. For example, if our subsequent analysis indicates that a supply chain loan results in a decrease in both share and spread (i.e., the new equilibrium is in QIII), we know that DSynd shifted to the left, but DLead could have shifted to the left (E6c), right (E6b), or not at all (E6). In this case, we would know that the moral hazard decrease dominates the adverse selection increase, but we cannot determine the relative strengths of the interdependency risk increase vs. the estimation risk decrease). In contrast, if at least one of the terms (i.e., share and spread) does *not* change in a supply chain loan, we can make inferences about the movement of *both* curves. For example, if our subsequent analysis indicates that a supply chain loan results in an increase in spread with no significant change in lead arranger share (relative to a baseline non-supply-chain loan, as indicated by point E1), we will conclude that the interdependency risk increase dominates the estimation risk decrease (for the lead arranger) and that the adverse selection increase dominates the moral

hazard decrease (for the participants), because that combination is necessary to observe the new equilibrium represented by point E1. It is an empirical question which equilibrium we will observe.

3. Research Design

3.1. Overview of empirical setting

We first identify a sample of firms (i.e., "suppliers") who disclose key customers in their SEC filings. Next, we obtain a sample of syndicated loans issued to these suppliers at times when their key customers have pre-existing syndicated loans in place (i.e., we retain in our sample only the suppliers who enter the syndicated loan market and major customers of those suppliers who have existing syndicated loans). Then, we examine the propensity of a supplier to obtain a loan from an existing lender to the supplier's key customer vs. an unrelated bank, and we examine differences in certain associated loan characteristics. Specifically, we estimate cross-sectional models using (alternatively) loan spread and lead arranger share as dependent variables, where the key independent variable is an indicator that captures whether the supplier's lender already has an existing loan to the supplier's key customer.

We further depict this setting and our identification strategy in Appendix B. Referring to the hypothetical example in Appendix B, suppose (1) Supplier A has Customer B, and (2) Customer B has an existing loan from Bank X (i.e., both the economic interdependency between Supplier A and Customer B, and Customer B's lending relationship with Bank X are already predetermined when Supplier A enters the syndicated loan market). We then (3) examine the propensity of Supplier A to choose a loan either from Bank X (i.e., a "supply chain loan") versus Bank Y (which serves as a "non-supply chain loan" control observation), along with differences in associated loan spread and lead arranger share. To be clear, unlike many studies wherein selection and non-random assignment to the treatment group confound inferences, in our study the

supplier's choice (3) between Bank X and Bank Y (where choices (1) and (2) are already predetermined) is precisely the choice we wish to examine, and is exactly our explanation for the different outcomes we observe between supply chain loans and control loans.

3.2. Empirical models

As discussed above, supply chain lending has the potential to affect both syndicated loan spread and the share retained by the lead arranger. We analyze each in turn, following the empirical strategy in Amiram et al. (2017). First, to examine the association between supply chain lending and lead arranger retained share, we use OLS to estimate the following regression model, with standard errors clustered by firm:

$$\begin{aligned} LeadShare_l = \beta_0 + \beta_1 CustLoanOut_l + BorrowerControls + LoanControls \\ + IndustryFE + YearFE + \varepsilon_l \end{aligned} \quad (1)$$

where *LeadShare* is the average lead arranger share on loan *l*. Our key independent variable of interest, *CustLoanOut*, is an indicator variable that equals one if at least one lead arranger on loan *l* already has a loan outstanding (as either a lead arranger or a participant) with a major customer of the borrower as of the inception date of loan *l*, and equals zero otherwise.

BorrowerControls is a vector of borrower-specific determinants of syndicated loan outcomes, as used in prior literature. Specifically, we include borrower size (*Size*), return on assets (*ROA*), leverage (*Leverage*), market-to-book (*MktToBook*), asset tangibility (*Tangibility*), and default probability (*HighBSMProb*). As is standard in prior literature, we also include *LoanControls*, a vector of other terms attached to the loan. Specifically, we include an indicator for whether the borrower (i.e., the supplier) and its major customer are in different two-digit SIC industries (*DiffIndustry*), loan amount (*LoanAmt*), an indicator for whether the loan is collateralized (*Secured*), loan maturity (*Maturity*), loan spread (*Spread*), covenant violation

probability (*PViol*), and an indicator for whether lender has previously lent to the borrower (*RelationshipLender*). All variables are defined in detail in Appendix A.

Second, to examine the association between supply chain lending and loan spread, we use OLS to estimate the following regression model, with standard errors clustered by firm:

$$Spread_l = \alpha_0 + \alpha_1 CustLoanOut_l + BorrowerControls + LoanControls + IndustryFE + YearFE + \varepsilon_l \quad (2)$$

where *Spread* is the amount a borrower pays in basis points over LIBOR for each dollar drawn down (including any annual fees) on loan *l*. *CustLoanOut* and all *BorrowerControls* are defined as above. For *LoanControls*, we add number of lenders (*NoOfLenders*) and omit loan spread (*Spread*)[2]. Finally, in both Eqs. (1) and (2) we include industry and year fixed effects to control for time-invariant unobservable industry and year characteristics that may systematically affect equilibrium outcomes in the syndicated lending market.[3] In these analyses, we use loan-package-level observations, where loan-level variables are taken from the largest facility in the package (e.g., Ivashina 2009).

4. Sample Selection and Descriptive Statistics

SFAS No.14 (1975-1997) and SFAS No. 131 (after 1997) require firms to disclose principal customers contributing more than 10% of total firm revenues. We begin by identifying supplier-customer relationships using the Compustat Segments Customer File from 1987-2017 with available supplier GVKEY and customer GVKEY using the Compustat Segment Link Data provided by Cen et al. (2017) and Cohen and Frazzini (2008). We begin our sample in 1987

[2] We drop number of lenders (*NoOfLenders*) in Eq. (1) because mechanically, there is relatively high correlation between lead arranger share and the number of lenders (i.e., correlation of -0.722 in Table 2). This empirical strategy is consistent with Amiram et al. (2017).

[3] We do not estimate a specification that includes firm fixed effects, because among the 1,175 unique firms in our sample with 3,882 loans, 450 firms (38.30%) have only one loan, 228 firms (19.40%) have two loans, and only 497 firms (42.30%) have more than two loans.

because the coverage of syndicated loans in Dealscan is sparse prior to 1987. After deleting suppliers and customers from the financial industry (sic=6000-6999), we are left with 78,063 supplier-customer-year observations, in which there are 22,777 unique supplier-customer pairs, for 7,205 unique suppliers and 3,642 unique customers.

We next identify syndicated loans issued to these suppliers and their customers in Dealscan by matching their GVKEYs to borrowers in Dealscan following Chava and Roberts (2008). Out of the 7,205 unique suppliers, 1,875 suppliers have 6,740 syndicated loans initiated during our sample period with necessary loan information (e.g., loan spread, loan amount, etc.) and customer information available.[4] Importantly for our identification strategy, we retain in the sample only those customer-supplier pairs where the customer had an outstanding loan at the time of the supplier's loan initiation. We identify the associated lenders for the supplier and customer loans, and identify lead arrangers by lead arranger credit augmented by lender role (e.g., Ivashina 2009).[5] We then define a supplier's loan as a "supply-chain loan" if a lead arranger on the supplier's loan has an existing loan (as either a lead arranger or syndicate participant) with any one of the supplier's major customers at the time of the supplier's loan initiation. For the 6,740 loans issued to suppliers, there are 2,720 supply chain loans (40.36%). After requiring borrower-level control variables, we are left with a sample of 3,882 loans issued to 1,175 unique suppliers, out of which 2,364 loans (i.e., 60.9%) are supply chain loans. Further, the sample of 3,882 loans yields 7,276 loan-lead arranger pairs (i.e., it is not uncommon for a loan to have more than one lender designated as a lead arranger). For analyses that require lead arranger share data, our sample is further reduced

[4] Lead arranger share data are often missing in Dealscan. If we require lead arranger share data, the number of loans drops from 6,740 to 2,513. Accordingly, we only require non-missing loan share data for our loan share analyses.
[5] Specifically, we identify lenders as lead arrangers if the variable lead arranger credit equals to 'Yes' (95% of loans). For the remaining 5% of loans without a lead arranger identified using this method, we identify a lender as a lead arranger when the lender role is 'Admin agent', 'Mandated lead arranger', 'Arranger', 'Agent', 'Syndications agent', or 'Bookrunner', as these are the six most frequent roles associated with lead arranger credit equal to 'Yes'.

to 1,440 loans issued to 725 unique suppliers, out of which 802 loans (i.e., 55.7%) are supply chain loans.

We present descriptive statistics for the variables we use in our analyses in Table 1. As shown, mean *LeadShare* is 24.04, indicating that on average the lead arranger(s) retains approximately one-quarter of the loan amounts in our sample. Average *Spread* is 176.51 basis points, consistent with the typical Dealscan samples in prior literature. Average *CustLoanOut* is 0.609, indicating that 60.9% of our sample loans are supply chain loans. We present the correlation table in Table 2. In terms of our primary research questions, these correlations suggest that, if anything, supply chain loans are associated with both lower lead arranger share (i.e., correlation of -0.314) and lower loan spread (i.e., correlation of -0.108). Mechanically, there is relatively high correlation between lead arranger share and the number of lenders (i.e., correlation of -0.722). Consistent with prior literature, borrower size is correlated with many loan characteristics.

5. Empirical Results

5.1. Primary analyses

Column (2) of Table 3 reports the results from estimating Eq. (1). As reported, there is a significantly negative coefficient on *CustLoanOut* (coefficient -4.696; t-statistic -5.39), which indicates that the share of the loan retained by lead arrangers is lower if the loan is a supply chain loan. Column (2) of Table 4 reports the results from estimating Eq. (2). As reported, there is a statistically significant negative coefficient on *CustLoanOut* (coefficient -14.147; t-statistic -3.85), which indicates that loan spread is lower if the loan is a supply chain loan.

As discussed in Section 2 and in Figure 4, the observed decrease in lead arranger share combined with the observed decrease in loan spread suggests that, for a supply chain loan, the reduction in moral hazard dominates any increase in adverse selection concerns from the syndicate

participants' perspective (i.e., DSynd shifts to the left). However, we cannot determine whether the interdependency risk increase or estimation risk decrease dominates from the lead arranger's perspective (i.e., DLead technically could not shift, shift to the right, or shift to the left, as represented by example points E6, E6b, and E6c in Panel A of Figure 4, respectively).

5.2. Lender-borrower matching

Our primary analyses above provide evidence that, on average, a supply chain loan is associated with lower share retained by the lead arranger, and lower spread charged to the borrower—i.e., both the lender and borrower enjoy benefits from a supply chain loan. Accordingly, we would expect to see, on average, that when a supplier firm (i.e., firm with major customers) enters the private loan market, it will seek out a lender who already has an existing loan with the supplier's major customer.

To test this prediction, we follow prior literature (e.g., Zhao 2016; Cai et al. 2018) and conduct an analysis that focuses on any bank *j*'s likelihood of winning a loan for borrower *i*. To do so, we must consider both realized borrower-lender matches (i.e., where a bank grants a loan to a specific firm), and unrealized borrower-lender matches (i.e., where a bank does not grant a loan to a specific firm). This suggests that the relevant observation is a *potential* pairing between a borrower and each bank that is operating in the loan market at the time the borrower is seeking a loan. Following prior literature, we limit the potential pairings to the top 100 lead arrangers in our sample, because the top 100 lead arrangers account for the bulk of the lending volume in the market (i.e., approximately 99% of aggregate market share). Therefore, for each of our 7,276 loan -lead arranger level observations from the 3,882 loans, we create a choice set of 100 potential lead arrangers, thereby expanding the number of observations in this analysis to 727,600 loan-lead

arranger-bank pairs. Then, we estimate the following linear probability regression model, with standard errors clustered by firm:

$$RealizedLender_{j,l} = \delta_0 + \delta_1 CustLoanLender_j + \delta_2 RelationshipLender_j + \delta_3 TopLender_j + \delta_4 IndustryExpert_j + PackageFE + \varepsilon_{j,l} \quad (3)$$

RealizedLender is an indicator variable that equals one if bank *j* serves as the lead arranger on loan *l* for borrower *i*, and equals zero otherwise. Our key independent variable is *CustLoanLender*, an indicator variable that equals one if bank *j* has an existing loan (as either a lead arranger or a participant) with a key customer of borrower *i* as of loan *l* issuance date, and equals zero otherwise. If a borrower is more likely to obtain a loan from a bank that already has an existing loan with that borrower's major customer, we expect the coefficient on *CustLoanLender* to be positive and significant.

Following prior literature, we also include controls for other variables that determine bank *j*'s likelihood of originating a loan to a borrower (e.g., Cai et al., 2016; Zhao 2016). *RelationshipLender* is an indicator variable that equals one if bank *j* has previously lent to borrower *i* as the lead arranger within the five years preceding the inception date of loan *l*, and equals zero otherwise. *TopLender* is an indicator variable that equals one if bank *j* is among the top ten lenders in terms of lending volume in the previous year, and equals zero otherwise. This captures the prominence of bank *j* in the syndicated loan market. *IndustryExpert* is an indicator variable that equals one if the industry of borrower *i* is among the top three two-digit SIC industries in terms of the number of loans issued by bank *j* within the previous three years, and equals zero otherwise. *PackageFE* is a vector of loan package fixed effects, which are included to control for other time-invariant determinants of lender choice. All variables are defined in detail in Appendix A.

Table 5 reports the results from estimating Eq. (3). As reported, there is indeed a positive and significant coefficient on *CustLoanLender* (coefficient 0.008; t-statistic 14.64). Consistent

with our prediction, the positive coefficient implies that the mutual benefits of supply chain loans to the borrower and lender (i.e., lower spread and lower retained share, respectively) result in a higher propensity for supply chain loans to take place in the syndicated loan market.

5.3. Cross-sectional tests

In order to enhance our confidence that the forces we describe above are indeed the relevant forces in determining the equilibrium we observe, we next design empirical tests that attempt to isolate cross-sectional variation in our main results. Recall from our discussion above that the supply chain loan equilibrium (i.e., lower spread and lower lead arranger share) is primarily driven by movement in the syndicate participants' demand curve, which is driven by information asymmetry dynamics (i.e., the QIII equilibrium suggests that a dominant force in supply chain lending is a reduction in moral hazard vis-à-vis the syndicate participants). Stated differently, a key "benefit" of supply chain loans (which accrues to both the borrower and lenders) is a reduction in information asymmetry between the borrower and lead arranger, which lowers the cost/effort associated with screening and monitoring by the lead arranger, which eases syndicate participants' concerns about moral hazard. Accordingly, we predict that the reduction in spread and share that we document above is more pronounced in supply chain loans characterized by relatively high information asymmetry between the borrower and lead arranger (i.e., where syndicate participants' moral hazard concerns would be most acute).

To examine this prediction, we estimate the following variation of Eqs. (1) and (2):

$$\begin{aligned} LeadShare_l = {} & \beta_0 + \beta_1 CustLoanOut_l + \beta_2 InfoAsymmetry_{i,t} \\ & + \beta_3 CustLoanOut * InfoAsymmetry \\ & + BorrowerControls + LoanControls + IndustryFE + YearFE + \varepsilon_l \end{aligned} \tag{4}$$

$$\begin{aligned} Spread_l = {} & \alpha_0 + \alpha_1 CustLoanOut_l + \alpha_2 InfoAsymmetry_{i,t} \\ & + \alpha_3 CustLoanOut * InfoAsymmetry \\ & + BorrowerControls + LoanControls + IndustryFE + YearFE + \varepsilon_l \end{aligned} \tag{5}$$

InfoAsymmetry is an indicator variable that proxies for relatively high information asymmetry between the lead arranger and borrower *i*, which we alternately measure using several proxies. Specifically, *NonTopLender* is an indicator variable that equals one if the lead arranger on loan *l* is not among the top ten lenders in terms of lending volume (e.g., Ross 2010), and equals zero otherwise; *NonRelationshipLender* is an indicator variable that equals one if the lead arranger on loan *l* has not previously lent to the borrower on loan *l* within the five years preceding the inception date of loan *l*, and equals zero otherwise[6] (e.g., Bharath et al. 2011); *NoCredRating* is an indicator variable that equals one if the borrower does not have a S&P long-term credit rating, and equals zero otherwise (e.g., Sufi 2007). All variables are further defined in Appendix A. If our primary results are indeed more pronounced in loans with relatively high information asymmetry between borrowers and lead arrangers, we expect a negative coefficient estimate on the *CustLoanOut*InfoAsymmetry* interaction.

Table 6 reports the results from estimating Eq. (4). Consistent with our prediction, the coefficient estimates on the interaction term are significantly negative across all three proxies. Specifically, the effects of supply chain loans on lead arranger share are more pronounced when (i) lead arrangers are not among the top ten lenders in the previous year (coefficient on *CustLoanOut*NonTopLender* -3.189; t-statistic 1.82), (ii) lead arrangers are not relationship lenders (coefficient on *CustLoanOut*NonRelationshipLender* -3.649; t-statistic -2.31) and (iii) the borrower has no credit rating available (coefficient on *CustLoanOut*NoCredRating* -4.254; t-statistic -2.54).

Table 7 reports the results from estimating Eq. (5). Consistent with our prediction, the coefficient estimates on the interaction term are negative across all three proxies, although

[6] If there are more than one lead arranger on loan *l*, we define *NonTopLender (NonRelationshipLender)* as one if none of the lead arrangers is among top ten lenders (has previously lent to the borrower), and zero otherwise.

statistically significant so in only two of the three cases. We find that the effects of supply chain loans on loan spread are more pronounced when (i) lead arrangers are not among the top ten lenders in the previous year (coefficient on *CustLoanOut*NonTopLender* -19.900; t-statistic -2.80) and (ii) lead arrangers are not relationship lenders (coefficient on *CustLoanOut*NonRelationshipLender* -18.091; t-statistic -2.84).

Taken together, these results suggest that the beneficial effects of supply chain lending in reducing intra-syndicate information asymmetry are indeed stronger for loans with relatively high information asymmetry between the borrower and lead arranger. In sum, our cross-sectional analyses suggest that information asymmetry between the borrower and lead arranger is indeed a key determinant of the equilibrium effect of supply chain lending in the syndicated loan market. These results corroborate our interpretation of the forces that characterize this supply chain lending equilibrium.

6. Conclusion

As a nexus of contracts, firms are inherently related to numerous other parties such as capital providers, employees, customers and suppliers. Despite the fact that these relationships are very common, there is little research that examines the equilibrium outcome of such relationships in the syndicated loan market. Such research is important because lending to economically interconnected parties unleashes several forces in the syndicated lending process compared to lending to firms that are economically independent. In this paper, we examine how the equilibrium loan outcome to a borrower is affected if the lender already has an existing loan to that borrower's major customer (i.e., a supply chain loan).

Specifically, we extend the framework developed in Ivashina (2009) to develop predictions about how supply chain lending affects equilibrium loan spread and lead arranger retained share.

We find that both loan spread and lead arranger share are significantly lower for supply chain loans. This finding suggests that the supply chain loan eases syndicate participants' moral hazard concerns more than it exacerbates any concerns about adverse selection. Given that supply chain loans indeed provide benefits to both the borrower (lower spread) and lead arranger (lower retained share), we further predict that borrowers will be more likely to obtain a loan from a lender who already has an existing loan with their key customers. We provide evidence that supports this prediction.

Our study contributes to the literature that examines determinants of syndicated lending outcomes by providing evidence that common business interdependencies among borrowers of a given lender influence the equilibrium loan spread and lead arranger share in syndicated loans. Further, our study contributes to the general literature that examines the capital market effects of economic interdependencies among firms by providing initial evidence on their effects on the equilibrium combination of loan spread and lead arranger retained share in the syndicated loan market. Our findings therefore provide insights into the mechanisms through which supply chain interdependencies, and more generally, economic relationships, affect debt markets.

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Appendix A: Variable Definitions

Variables	Definition
Key outcome variables	
LeadShare	The average lead arranger share (in percentage points) on loan *l* (taken from the largest facility in the loan package). (Dealscan)
Spread	The amount the borrower on loan *l* pays in basis points over LIBOR for each dollar drawn down including any annual fees (from the largest facility in the loan package). (Dealscan)
Key variable of Interest	
CustLoanOut	An indicator variable that equals one if at least one lead arranger on loan *l* also has an existing loan (as either a lead arranger or a participant) with a key customer of the borrower on loan *l* as of loan *l* issuance date, and equals zero otherwise. (Dealscan)
Borrower Characteristics	
Size	The natural logarithm of borrower's market value of equity (*prcc_f*csho*), measured at the end of the most recent fiscal year before loan origination. (Compustat)
ROA	The ratio of the borrower's net income before extraordinary items (*ib*) to total assets (*at*), measured at the end of the most recent fiscal year prior to loan origination. (Compustat)
Leverage	The ratio of the borrower's long-term debt (*dltt*) to total assets (*at*), measured at the end of the most recent fiscal year before loan *l* inception. (Compustat)
MktToBook	The ratio of the borrower's market value of equity (*prcc_f*csho*) to book value of equity (*at-lt*), measured at the end of the most recent fiscal year before loan *l* inception. (Compustat)
Tangibility	The ratio of net PP&E (*ppent*) to total assets (*at*) of the borrower on loan *l*, measured at the end of the most recent fiscal year before loan origination. (Compustat)
HighBSMProb	An indicator variable that equals one if the borrower on loan *l* has high default probability, i.e., if the the borrower's Black-Scholes-Merton default probability (estimated following Hillegeist et al. 2004) as of the end of the month immediately preceding the inception of loan *l* is above the sample median, and equals zero otherwise. (Compustat, CRSP)
DiffIndustry	An indicator variable that equals one if the borrower on loan *l* (i.e., the supplier) and its major customer are in different two-digit SIC industries. (Compustat)

Loan Characteristics

LoanAmt	The actual dollar amount of loan *l* in millions (from the largest facility in the loan package). (Dealscan)
Secured	An indicator variable that equals one if a facility is secured by collateral, and equals zero otherwise (from the largest facility in the loan package). (Dealscan)
Maturity	The number of months loan *l* will be outstanding from inception date to maturity date (from the largest facility in the loan package). (Dealscan)
PViol	The one-quarter ahead probability of financial covenant violation at the inception of loan *l*, as computed in Demerjian and Owens (2016).
RelationshipLender	An indicator variable that equals one if the lender on loan *l* has previously lent to the borrower on loan *l* within the five years preceding the inception date of loan *l*, and equals zero otherwise. (Dealscan)
NoOfLenders	The number of lenders on loan *l* (from the largest facility in the loan package). (Dealscan)

Lender Characteristics (Table 5)

RealizedLender	An indicator variable that equals one if bank *j* serves as the lead arranger on loan *l* for borrower *i*, and equals zero otherwise.
CustLoanLender	An indicator variable that equals one if bank *j* has an existing loan (as either a lead arranger or a participant) with a key customer of borrower *i* as of loan *l* issuance date, and equals zero otherwise.
RelationshipLender	An indicator variable that equals one if bank *j* has previously lent to borrower *i* as the lead arranger within the five years preceding the inception date of loan *l*, and equals zero otherwise. (Dealscan)
TopLender	An indicator variable that equals one if bank *j* is among the top ten lenders in terms of lending volume in the previous year, and equals zero otherwise. (Dealscan)
IndustryExpert	An indicator variable that equals one if the industry of borrower *i* is among the top three two-digit SIC industries in terms of the number of loans issued by bank *j* within the previous three years, and equals zero otherwise. (Compustat)

Information Asymmetry measures (Table 6 and 7)

NonTopLender	An indicator variable that equals one if the lender on loan *l* is not among the top ten lenders in terms of lending volume in the previous year, and equals zero otherwise. (Dealscan)
NonRelationshipLender	An indicator variable that equals one if the lender on loan *l* has not previously lent to borrower *i* as the lead arranger within the five

	years preceding the inception date of loan *l*, and equals zero otherwise. (Dealscan)
NoCredRating	An indicator variable that equals one if the borrower doesn't have a S&P long-term credit rating (*splticrm*), and equals zero otherwise. (Compustat)

Appendix B: Illustration of the setting

Appendix B depicts a stylized example that illustrates our identification strategy. In our setting, connections (1) and (2) are pre-determined when Supplier A makes choice (3) (i.e., whether to obtain a loan from their customer's existing lender versus from an unassociated lender).

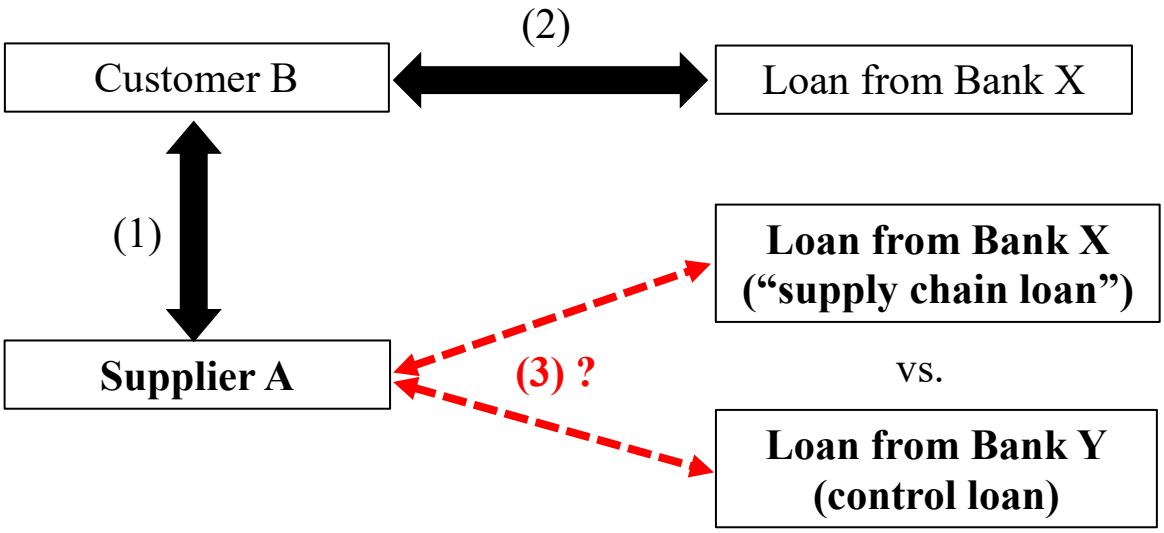


Figure 1 – Baseline syndicated loan dynamics

The share retained by the lead arranger and loan spread are simultaneously determined as the result of an interaction between the syndicate participants' demand curve (adverse selection and moral hazard effects) (DSynd), and the lead arranger's demand curve (diversification effect) (DLead). E(0) (i.e., the intersection of DSynd and DLead) represents the baseline equilibrium outcome before considering supply chain lending dynamics.

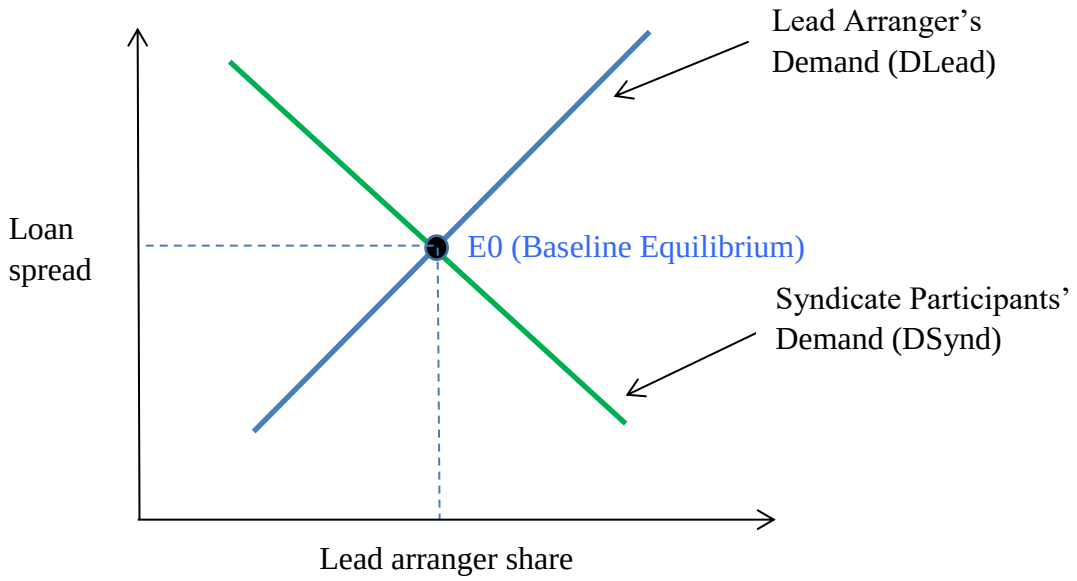


Figure 2 – Effect of supply chain loan on lead arranger's demand curve

E(0) represents the baseline equilibrium outcome before considering supply chain lending dynamics, i.e., the intersection of the syndicate participants' demand curve (DSynd) and the lead arranger's demand curve (DLead). When the lead arranger considers a supply chain loan, DLead can shift to the left if interdependency risk dominates (leading to an increase in spread and decrease in share, ceteris paribus), or can shift to the right if estimation risk dominates (leading to a decrease in spread and increase in share, ceteris paribus).

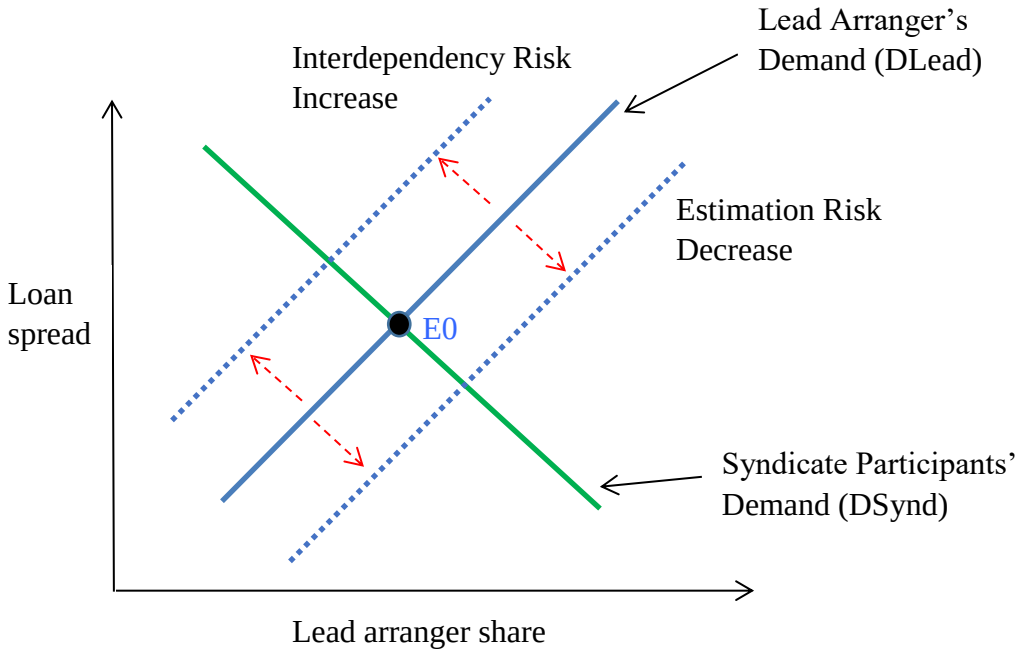


Figure 3 – Effect of supply chain loan on syndicate participants' demand curve

E(0) represents the baseline equilibrium outcome before considering supply chain lending dynamics, i.e., the intersection of the syndicate participants' demand curve (DSynd) and the lead arranger's demand curve (DLead). When the syndicate participants consider the effect of a supply chain loan on the lead arranger, DSynd can shift to the right if adverse selection concerns dominate (leading to an increase in spread and increase in share, ceteris paribus), or can shift to the left if moral hazard reduction dominates (leading to a decrease in spread and decrease in share, ceteris paribus).

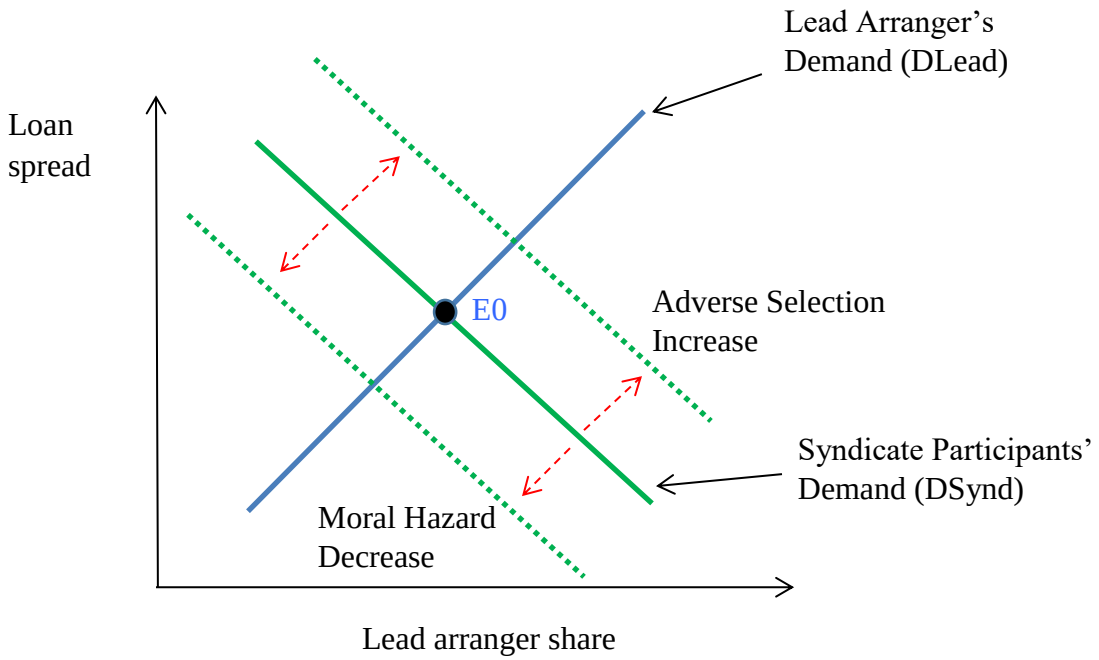
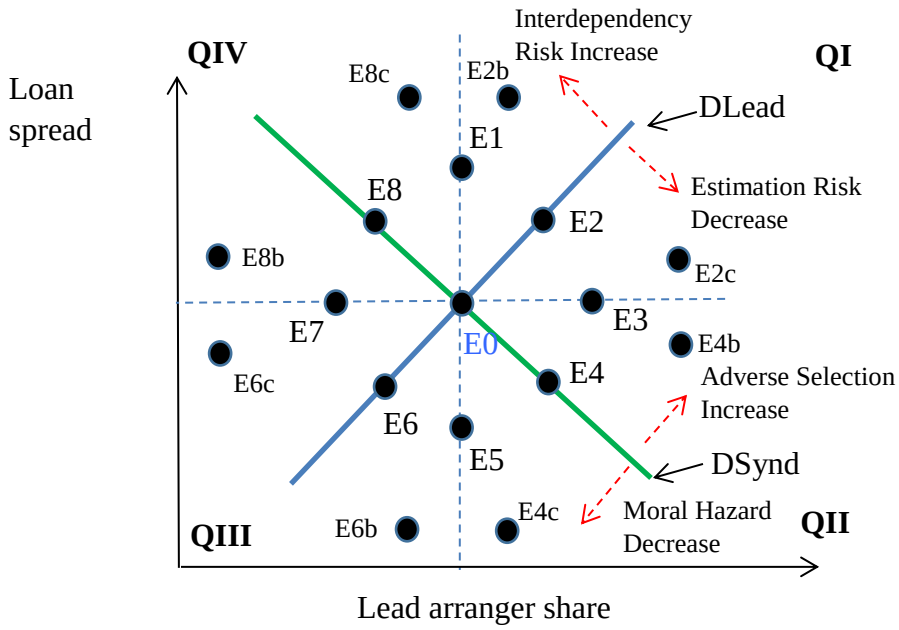


Figure 4 – Effect of supply chain loan on syndicated loan equilibrium

E(0) represents the baseline equilibrium outcome before considering supply chain lending dynamics, i.e., the intersection of the syndicate participants' demand curve (DSynd) and the lead arranger's demand curve (DLead). Joint consideration of possible movements in both DLead (i.e., Figure 2) and DSynd (i.e., Figure 3) leads to numerous possible equilibria, as shown in Panel A and further characterized in Panel B.

Panel A:



Panel B:

Example Equilibrium	Spread	Share	Dominant Lead Arranger Force	Dominant Synd. Participant Force
E0	No change	No change	Neither	Neither
E1	Increase	No change	Interdependency Risk	Adverse Selection
E2, 2b, 2c	Increase	Increase	?	Adverse Selection
E3	No change	Increase	Estimation Risk	Adverse Selection
E4, 4b, 4c	Decrease	Increase	Estimation Risk	?
E5	Decrease	No change	Estimation Risk	Moral Hazard
E6, 6b, 6c	Decrease	Decrease	?	Moral Hazard
E7	No change	Decrease	Interdependency Risk	Moral Hazard
E8, 8b, 8c	Increase	Decrease	Interdependency Risk	?

Table 1: Descriptive statistics

Table 1 presents descriptive statistics for variables used in our analyses. Variables are defined in Appendix A.

Variable	N	Mean	Std. Dev.	P10	P50	P90
LeadShare	1,440	24.042	17.318	7.691	17.909	50
Spread	3,882	176.514	116.136	45	150	325
CustLoanOut	3,882	0.609	0.488	0	1	1
Size (in millions)	3,882	6,262.247	16,380.390	137.202	1,275.707	13,468.894
ROA	3,882	0.036	0.080	-0.040	0.043	0.112
Leverage	3,882	0.260	0.186	0.010	0.244	0.507
MktToBook	3,882	2.830	3.284	0.820	2.055	5.508
Tangibility	3,882	0.350	0.266	0.069	0.265	0.807
HighBSMProb	3,882	0.500	0.500	0	0.500	1
DiffIndustry	3,882	0.782	0.413	0	1	1
LoanAmt	3,882	510.032	653.346	50	265	1,250
Secured	3,882	0.469	0.499	0	0	1
Maturity	3,882	48.734	19.921	12	60	65
PViol	3,882	0.169	0.336	0	0	0.944
RelationshipLender	3,882	0.555	0.497	0	1	1
NoOfLenders	3,882	9.135	6.772	2	7	19

Table 2: Correlation matrix

Table 2 presents Pearson correlations among variables used in our analyses. Variables are defined in Appendix A.

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*
LeadShare (1)															
Spread (2)	0.256														
CustLoanOut (3)	-0.314	-0.108													
Size (4)	-0.567	-0.362	0.256												
ROA (5)	-0.118	-0.342	0.043	0.287											
Leverage (6)	-0.184	0.215	0.073	-0.070	-0.232										
MktToBook (7)	-0.136	-0.095	0.052	0.291	0.196	0.055									
Tangibility (8)	-0.115	-0.010	-0.034	-0.047	-0.085	0.259	-0.109								
HighBSMProb (9)	0.246	0.270	-0.120	-0.384	-0.284	0.106	-0.160	0.045							
DiffIndustry (10)	0.034	-0.045	-0.010	0.027	0.022	-0.008	0.057	-0.146	-0.031						
LoanAmt (11)	-0.393	-0.192	0.227	0.607	0.108	0.073	0.147	0.0450	-0.224	0.023					
Secured (12)	0.217	0.421	-0.100	-0.389	-0.220	0.157	-0.090	0.016	0.212	-0.010	-0.213				
Maturity (13)	-0.137	0.091	0.068	-0.011	0.060	0.116	0.002	0.005	-0.141	-0.019	0.010	0.165			
PViol (14)	0.084	0.179	-0.064	-0.234	-0.222	0.140	-0.080	0.103	0.146	0.001	-0.093	0.311	-0.040		
RelationshipLender (15)	-0.320	-0.108	0.254	0.276	0.039	0.133	0.034	0.063	-0.086	-0.001	0.252	-0.092	0.006	-0.018	
NoOfLenders (16)	-0.722	-0.240	0.191	0.399	0.088	0.085	0.064	0.108	-0.158	-0.015	0.467	-0.132	0.058	0.001	0.198

Table 3: The effect of supply chain lending on lead arranger share

Table 3 presents results of OLS estimation of Eq. (1). *LeadShare* is the average lead arranger share for the largest facility on loan package *l*. *CustLoanOut* is an indicator variable that equals one if at least one lead arranger on loan *l* also has an existing loan (as either a lead arranger or a participant) with a key customer of the borrower on loan *l* as of loan *l* issuance date, and equals zero otherwise. All variable definitions are presented in Appendix A. *, **, and *** indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively, with standard errors clustered by firm. Intercepts and fixed effects coefficients are included but not reported for fixed effects estimations, where I and Y refer to industry (two-digit SIC) and year (of loan inception) fixed effects, respectively.

Dep. Var.:	*LeadShare*	*LeadShare*
Column:	(1)	(2)
CustLoanOut	**-8.672*** **	**-4.696*** **
	(-8.36)	**(-5.39)**
Size		-4.550***
		(-10.69)
ROA		-1.933
		(-0.33)
Leverage		-14.003***
		(-5.21)
MktToBook		0.225*
		(1.68)
Tangibility		-0.121
		(-0.04)
HighBSMProb		1.450*
		(1.65)
DiffIndustry		1.567
		(1.43)
LoanAmt		-0.001
		(-1.01)
Secured		-0.525
		(-0.57)
Maturity		-0.110***
		(-4.33)
Spread		0.016***
		(2.68)
PViol		-0.046
		(-0.04)
RelationshipLender		-4.085***
		(-5.20)
Fixed Effects	I, Y	I, Y
N	1,440	1,440
Adj. R^2	0.215	0.448

Table 4: The effect of supply chain lending on loan spread

Table 4 presents results of OLS estimation of Eq. (2). *Spread* is the amount the borrower pays in basis points over LIBOR for each dollar drawn down on the largest facility in the loan package *l*. *CustLoanOut* is an indicator variable that equals one if at least one lead arranger on loan *l* also has an existing loan (as either a lead arranger or a participant) with a key customer of the borrower on loan *l* as of loan *l* issuance date, and equals zero otherwise. All variable definitions are presented in Appendix A. *, **, and *** indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively, with standard errors clustered by firm. Intercepts and fixed effects coefficients are included but not reported for fixed effects estimations, where I and Y refer to industry (two-digit SIC) and year (of loan inception) fixed effects, respectively.

Dep. Var.:	*Spread*	*Spread*
Column:	(1)	(2)
CustLoanOut	**-34.826*** **	**-14.147*** **
	(-7.42)	**(-3.85)**
Size		-15.599***
		(-8.53)
ROA		-220.084***
		(-7.00)
Leverage		80.098***
		(6.32)
MktToBook		1.268**
		(2.08)
Tangibility		-49.148***
		(-3.34)
HighBSMProb		15.146***
		(4.01)
DiffIndustry		-1.659
		(-0.31)
LoanAmt		0.002
		(0.61)
Secured		51.304***
		(12.09)
Maturity		0.298***
		(2.91)
PViol		4.824
		(0.79)
RelationshipLender		-8.147**
		(-2.57)
NoOfLenders		-1.814***
		(-6.64)
Fixed Effects	I, Y	I, Y
N	3,882	3,882
Adj. R^2	0.155	0.430

Table 5: Lender-borrower matching

Table 5 presents results of OLS estimation of Eq. (3). *RealizedLender* is an indicator variable that equals one if bank *j* serves as the lead arranger on loan *l* for borrower *i*, and equals zero otherwise. *CustLoanLender* is an indicator variable that equals one if bank *j* has an existing loan (as either a lead arranger or a participant) with a key customer of borrower *i* as of loan *l* issuance date, and equals zero otherwise. All variable definitions are presented in Appendix A. *, **, and *** indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively, with standard errors clustered by firm. Intercepts and fixed effects coefficients are included but not reported.

Dep.Var.:	*RealizedLender*
Column:	(1)
CustLoanLender	**0.008***** **(14.64)**
RelationshipLender	0.134*** (17.92)
TopLender	0.017*** (23.71)
IndustryExpert	0.005*** (7.47)
Fixed Effects	Package
N	727,600
Adj. R^2	0.0728

Table 6: Lead arranger share and information asymmetry

Table 6 presents results of OLS estimation of Eq. (4). *LeadShare* is the average lead arranger share for the largest facility on loan package *l*. *CustLoanOut* is an indicator variable that equals one if at least one lead arranger on loan *l* also has an existing loan (as either a lead arranger or a participant) with a key customer of the borrower on loan *l* as of loan *l* issuance date, and equals zero otherwise. *InfoAsymmetry* is an indicator variable that equals one if the lead arranger or borrower on loan *l* has relatively high information asymmetry, and equals zero otherwise. We examine three situations where information asymmetry is high: (i) the lender on loan *l* is not among the top ten lenders in terms of lending volume in the previous year (*NonTopLender)*, (ii) the lender on loan *l* has not previously lent to the borrower on loan *l* within the five years preceding the inception date of loan *l* (*NonRelationshipLender*), and (iii) the borrower doesn't have a S&P long-term credit rating (*NoCredRating*). All variable definitions are presented in Appendix A. *, **, and *** indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively, with standard errors clustered by firm. Intercepts and fixed effects coefficients are included but not reported for fixed effects estimations, where I and Y refer to industry (two-digit SIC) and year (of loan inception) fixed effects, respectively.

Dep. Var.:	*LeadShare*	*LeadShare*	*LeadShare*
InfoAsymmetry:	*NonTopLender*	*NonRelationshipLender*	*NoCredRating*
Column:	(1)	(2)	(3)
CustLoanOut	-1.156	-2.850**	-2.531**
	(-0.88)	(-2.40)	(-2.19)
CustLoanOut*InfoAsymmetry	**-3.189***	**-3.649****	**-4.254****
	(-1.82)	**(-2.31)**	**(-2.54)**
InfoAsymmetry	6.388***	6.008***	4.320***
	(4.30)	(4.63)	(2.73)
Size	-4.423***	-4.700***	-4.332***
	(-10.51)	(-11.09)	(-9.81)
ROA	-2.128	-1.133	-2.650
	(-0.37)	(-0.19)	(-0.45)
Leverage	-13.661***	-14.229***	-12.001***
	(-4.97)	(-5.19)	(-4.04)
MktToBook	0.299**	0.318**	0.269*
	(2.07)	(2.11)	(1.78)
Tangibility	-0.026	0.125	-0.128
	(-0.01)	(0.04)	(-0.05)
HighBSMProb	1.364	1.556*	1.645*
	(1.57)	(1.78)	(1.89)
DiffIndustry	1.820*	1.588	1.613
	(1.72)	(1.46)	(1.48)
LoanAmt	-0.001	-0.001	-0.001
	(-0.89)	(-0.95)	(-0.95)
Secured	-0.675	-0.557	-0.684
	(-0.74)	(-0.61)	(-0.74)
Maturity	-0.106***	-0.107***	-0.106***
	(-4.28)	(-4.21)	(-4.18)
Spread	0.015**	0.015**	0.016**
	(2.52)	(2.44)	(2.54)
PViol	0.007	-0.051	-0.184
	(0.01)	(-0.04)	(-0.15)
RelationshipLender	-3.574***		-4.019***
	(-4.48)		(-5.16)
Fixed Effects	I, Y	I, Y	I, Y
N	1,440	1,440	1,440
Adj. R^2	0.462	0.452	0.454

Table 7: Loan spread and information asymmetry

Table 7 presents results of OLS estimation of Eq. (5). *Spread* is the amount the borrower pays in basis points over LIBOR for each dollar drawn down on the largest facility in the loan package *l*. *CustLoanOut* is an indicator variable that equals one if at least one lead arranger on loan *l* also has an existing loan (as either a lead arranger or a participant) with a key customer of the borrower on loan *l* as of loan *l* issuance date, and equals zero otherwise. *InfoAsymmetry* is an indicator variable that equals one if the lead arranger or borrower on loan *l* has relatively high information asymmetry, and equals zero otherwise. We examine three situations where information asymmetry is high: (i) the lender on loan *l* is not among the top ten lenders in terms of lending volume in the previous year (*NonTopLender),* (ii) the lender on loan *l* has not previously lent to the borrower on loan *l* within the five years preceding the inception date of loan *l* (*NonRelationshipLender*), and (iii) the borrower doesn't have a S&P long-term credit rating (*NoCredRating*). All variable definitions are presented in Appendix A. *, **, and *** indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively, with standard errors clustered by firm. Intercepts and fixed effects coefficients are included but not reported for fixed effects estimations, where I and Y refer to industry (two-digit SIC) and year (of loan inception) fixed effects, respectively.

Dep. Var.:	*Spread*	*Spread*	*Spread*
InfoAsymmetry:	*NonTopLender*	*NonRelationshipLender*	*NoCredRating*
Column:	(1)	(2)	(3)
CustLoanOut	-0.167	-4.925	-11.051**
	(-0.03)	(-1.00)	(-2.28)
CustLoanOut*InfoAsymmetry	**-19.900*** **	**-18.091*** **	**-7.299**
	(-2.80)	**(-2.84)**	**(-1.03)**
InfoAsymmetry	20.144***	18.606***	-0.779
	(3.53)	(3.62)	(-0.12)
Size	-15.210***	-15.699***	-16.327***
	(-8.38)	(-8.63)	(-8.35)
ROA	-219.018***	-218.940***	-217.531***
	(-7.02)	(-7.00)	(-6.94)
Leverage	80.847***	79.642***	76.578***
	(6.39)	(6.30)	(5.70)
MktToBook	1.262**	1.265**	1.327**
	(2.09)	(2.07)	(2.16)
Tangibility	-47.631***	-48.529***	-49.391***
	(-3.26)	(-3.29)	(-3.34)
HighBSMProb	15.257***	15.218***	14.736***
	(4.06)	(4.04)	(3.90)
DiffIndustry	-0.944	-1.570	-1.718
	(-0.18)	(-0.29)	(-0.32)
LoanAmt	0.002	0.002	0.002
	(0.55)	(0.53)	(0.55)
Secured	50.861***	51.241***	51.188***
	(11.98)	(12.11)	(12.02)
Maturity	0.295***	0.306***	0.300***
	(2.88)	(2.99)	(2.93)
PViol	4.572	4.760	4.656
	(0.75)	(0.78)	(0.76)
RelationshipLender	-7.094**		-8.398***
	(-2.25)		(-2.65)
NoOfLenders	-1.750***	-1.811***	-1.829***
	(-6.38)	(-6.64)	(-6.68)
Fixed Effects	I, Y	I, Y	I, Y
N	3,882	3,882	3,882
Adj. R^2	0.432	0.432	0.431