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Syndicated Lending: The Role of Relationships for the Retained Share

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Abstract

The finance literature offers ambiguous predictions about the impact of lending relationships on the share retained by lead arrangers in syndicated loans. While some literature indicates that lending relationships can help to alleviate postcontractual agency conflicts, others imply that relationship lead arrangers may use their information advantage to exploit syndicate participants. Using syndicated loans made to U.S. firms, this article shows that lead arrangers retain a smaller share in lending relationships with firms. This result suggests that the agency-conflict-mitigating feature of a lending relationship outweighs the information-exploitation-facilitating feature. Consistent with the view that reputational concerns mitigate agency conflicts and make relationships less relevant, the impact on the retained share is stronger for non–top-tier and smaller lead arrangers. This article also shows that the effect of lending relationships is concentrated in loan contracts that include covenants.

JEL codes: *D82, G21, G32*
Keywords—*Syndicated lending; Relationships; Retained share*

1 Introduction

Syndicated lending arrangements have become a major source of external corporate finance (Dennis and Mullineaux, 2000; Chui et al., 2010). An interesting element of such a multilender financing arrangement is that it involves aspects of relationship lending. That is, lead arrangers often have lending relationships with the firms (Bharath et al., 2007; Gadanecza et al., 2012; Akiyoshi and Minamihashi, 2014), while participants essentially engage in an arm's-length transaction. Through this relationship, lead arrangers can learn the firm's inside information that may be unavailable to the other lenders. However, such access to a firm's soft information has raised concerns about whether the information asymmetry creates arranger–participant agency conflicts (Jones et al.,

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2005; Panyagometh and Roberts, 2010; Gadanecza et al., 2012). The literature predicts that the role of relationships in fostering the lead arranger's particular behavior has consequences for the share it retains in the loan. The literature's prediction on the impact of lending relationships on the retained share is less clear.

The predictions are associated with the tasks of screening and monitoring firms, which traditionally occupy a central position in the theory of financial intermediation (see, e.g., Townsend, 1979; Campbell and Kracaw, 1980; Diamond, 1984; Williamson, 1987). With regard to this, syndicated lending may be viewed as a special contractual arrangement mainly in the sense that these tasks are delegated to lead arrangers instead of being executed by members of a syndicate as a team. A very classic benefit of the delegation of such activities is that of avoiding the duplication of costs and free-riding associated with multiple creditors (Holmstrom, 1982; Diamond, 1984; Krasa and Villamil, 1992; Welch and Bris, 2005). Coupling syndication, in which the lead arrangers retain less than 100% of the claim on the loan, with delegation may, however, erode the lead arranger's incentive to efficiently perform the tasks in accordance with participants' best interests. To limit such a dilution of incentives—i.e., a potential drift toward a diverging interest in pursuit of private benefits—participants request the lead arranger to contribute a larger share than the lead arranger would otherwise prefer to hold for optimal risk diversification.

One prediction emphasizes the role of relationships as fostering commitment to monitoring, which enables lead arrangers to hold a smaller share. The argument is that firms require some level of monitoring for the information-compatibility constraints to be satisfied (Diamond, 1984; Dye, 1986; Demski and Sappington, 1987; Baliga, 1999). Monitoring borrowers, however, involves nonzero costs, suggesting that the lead arrangers' monitoring quality is a function of costly investments made in monitoring. As a delegated monitor, lead arrangers bear the entire monitoring costs while only a fraction of the monitoring benefits accrue to them. The reduction of the benefit is not unproblematic and may encourage shirking. Hence, for a lead arranger to choose an optimal monitoring effort in a way that is socially beneficial to syndicate members, monitoring must be cheap. By lowering the costs of producing firm-specific information (Haubrich, 1989; Petersen, 1999; Boot, 2000), lending relationships enhance monitoring efforts. With increased monitoring activities and the accompanying amelioration of agency conflicts, participants are encouraged to buy more of the loan.

A competing prediction in the banking literature emphasizes the perspective that relationships facilitate lead arrangers' exploitation of syndicate participants (e.g., Sharpe, 1990; Rajan, 1992; Schenone, 2010). In the context of syndicated financing arrangements, one could argue that lead arrangers may pursue self-interest in their syndication activities, perhaps because they have outstanding loans with the firm or they care about long-term business relationships. As such, the risk of exploitation becomes high in syndicate arrangements in which informational discrepancies between members are greater. The dissemination of an information memorandum—which contains details

about the borrower and the transaction—during the syndication process may thus be construed as the lead arranger's attempt to remove the discrepancies. However, one cannot expect lead arrangers to divulge the entire soft information about their borrowers simply because it could invite a profit-dissipating competition that affects their ability to capture firms in long-term relationships and extract the associated relationship rent (Von Thadden, 1995; Boot and Thakor, 2000; Schenone, 2010). With less information about the firm, participants are unwilling to buy more of the loan, as they rationally anticipate that lead arrangers may take advantage of their information superiority by syndicating out low-quality loans.

This paper's objective is to help resolve these conflicting hypotheses by empirically examining the association between a lead arranger's relationship with a firm and its retained share in the loan to that firm. These competing views, however, may not be mutually exclusive, and the agency-conflict-reducing and information-exploitation-facilitating features of a lending relationship could operate simultaneously. In this case, the result could be interpreted that one feature of a lending relationship is more important than the other. The analysis is conducted using syndicated loans made to nonfinancial U.S. firms. Following the argument maintained in the theoretical literature that relationships emanate from repeated interactions, the present study measures lending relationships by tracking the history of lending interactions between lead arrangers and their borrowers.

The analysis shows that relationships are negatively and significantly related to the share retained by lead arrangers. This negative empirical association suggests that lead arrangers retain a smaller share when syndicated loans are made to borrowers with whom they have a prior relationship. Therefore, it can be argued that participant lenders believe the agency-problem-alleviating feature of a relationship outweighs the information-exploitation-facilitating aspect. As such, they do not require relationship lead arrangers to hold a substantial fraction of financial stakes to fend off the temptation to become lenient in their screening and monitoring tasks. The reduction in the retained share is also economically nonnegligible. A prior lending relationship reduces the retained share by 8.1%.

The analysis further provides new evidence that the reduction in the retained share is more pronounced in syndicated arrangements headed by lead arrangers whose reputation lies at the bottom of the lead arrangers' reputation spectrum. The variation of the impact of lending relationships on the retained share with a lead arranger's reputation can be understood in light of the theory of corporate reputation advanced by Diamond (1989, 1991), Schaffer (1989), Hirshleifer and Thakor (1992) and Chemmanur and Fulghieri (1994). In the context of syndicated lending, the implication of this literature is that lead arrangers seeking to maintain their reputation restrain themselves from skimping on screening and monitoring. Such self-restraining behavior makes the importance of relationships less relevant. This finding is reinforced by the fact that the reduction of the retained share is stronger for small lead arrangers.

Further analysis shows that the effect of lending relationships on the retained share is not limited to certain syndicated contract arrangements with a particular class of borrowers. That is, the negative retained-share effect is at work irrespective of how borrowing firms are grouped—i.e., whether they are sorted into opaque–transparent, small–large, or speculative–nonspeculative groups. Of particular interest is a reduction in the retained share in loans made to informationally opaque firms, small firms, and firms with low ratings. This is interesting simply because these are classes of firms for which monitoring is expected to be intensive, and, hence, at greater risk for agency problems. While the result does not provide evidence that the effect is stronger in loans made to some class of borrowers than the others, the analysis does, however, document that the effect of lending relationships on the retained share is more pronounced in loan contracts that include covenants than those that do not.

The results of this analysis are subjected to different robustness checks to address some potential concerns. One concern is related to endogeneity, which could stem from the possible nonrandom match between a lead arranger and a borrowing firm. One might argue that the endogeneity problem confounds the effect of lending relationships and results in erroneous conclusions. To check this estimation-related concern, the present study employees two estimation methods. Using Mahalanobis and propensity-score matching methods (Rubin, 1973, 1980; Rosenbaum and Rubin, 1983; Heckman et al., 1997, 1998), this paper presents results that are qualitatively comparable to estimates from ordinary least squares (OLS) regressions. Additionally, working with binary endogenous treatment models (Heckman, 1978; Maddala, 1983; Wooldridge, 2002), the result is also robust to the control of unobservable (and observable) factors that could affect lead-arranger–borrower relationship formation. With these robustness results, the endogeneity problems appear less important.

However, other concerns may still stem from the procedure adopted to construct a relationship measure. One concern is related to the presence of multiple lead arrangers in a syndicated loan, which would increase the likelihood of the loan being organized by a relationship lead arranger. By estimating the effect of lending relationships on the retained share in a sample of facilities arranged by a single lead arranger, this paper observes that the previous results continue to hold.

With the above results, the present study contributes to a recently growing literature that investigates the impact of lending relationships in syndicated financing arrangements. Often the focus of these empirical studies is to examine the impact of lending relationships on syndicated contract terms. Some of this literature establishes a positive association between lending relationships and loan amount (e.g., Bharath et al., 2011), suggesting that previously built lending relationships enable firms to obtain a large loan amount. Other studies establish a negative link between relationships and syndicated loan pricing (e.g., Bharath et al., 2011; Alexandre et al., 2014), suggesting that building relationships with lenders helps firms obtain less expensive loans. The present study departs from this literature by investigating how lending relationships affect the retained-share aspect of the syndicated loan structure. The analysis

adds to the above mentioned literature by showing that establishing relationships with firms enable lead arrangers to retain a smaller share in loans to one firm.

2 Theoretical Arguments and Empirical Predictions

2.1 *Why Syndicate Loans?*

The theoretical perspectives in the finance literature offer an array of rationales for loan syndication. One popular rationale behind the formation of an intercreditor lending alliance may be called the *risk-exposure-diversification rationale*. This rationale emphasizes the risk-sharing motive as the explanation for lenders' involvement in cooperative teams (Wilson, 1968; Amershi and Stoeckenius, 1983; Chowdhry and Nanda, 1983; Schure et al., 2005). This motive emerges when a creditor's internal prudential lending model restrains the lender's willingness to take up the entire amount of the loan. In such situations, syndication can endogenously arise as an intercreditors' club in which a loan is allotted among the syndicate members. By permitting the division of risks associated with a loan, syndication enables lenders that have inadequate risk tolerance to reduce their exposure to the risks. Empirically, this risk-sharing-based argument appears to explain the formation of a syndicate (see, e.g., Lockett and Wright, 2001; Brander et al., 2002, in the context of venture capital).

Another rationale for lenders to come together may be called the *capital-adequacy-requirement rationale*. This argument holds that a lender is unable to take up the entire amount of a particular loan. Constraints could arise when the size of a loan exceeds the amount a single lender is able to provide (Nitani and Riding, 2013). Thus capital constraints can foster lenders' interests in the establishment of an intercreditor consortium through which they can raise the necessary funds. Lenders could also be constrained by regulations that limit the size of a loan a lender makes to a firm. In this situation, a syndicate facilitates financing too large for a single lender. Empirically, the capital-constraint-based perspective also appears to have wide support (see, e.g., Simons, 1993; Jones et al., 2005).

The other rationale for the formation of a syndicated arrangement may be called the *specialization rationale*. The literature argues that lenders tend to specialize their activities based on the different functions they perform (Benston, 1994; Santos, 1998; Das and Nanda, 1999). Since large loans presumably involve the design of complex contractual terms, and perhaps also require joint monitoring of collateral and covenants, syndication might thus be sought to bring together lenders with the necessary expertise. Syndicate formation can thus be attributed to the lead arranger's desire to influence the mix of the syndicate members' skills and competencies. This can be justified on efficiency grounds: The formation of a syndicate can offer an arrangement in which lenders use their comparative advantages to enhance loan performance. Empirically, François and Missonier-Piera (2007) provide evidence of how spe-

cialization affects the structure of loan syndication by influencing coagent selection.

Expanding relationship networks can also provide another rationale for involvement in loan syndication. Involvement in syndicated loans gives borrowing firms greater exposure to a large number of lenders. One potential benefit from such exposure is that it enables firms to establish multiple relationships that introduce competition among lenders, thereby curbing rent extractions associated with a single relationship lender (Von Thadden, 1995; Detragiache et al., 2000; Gopalan, Udell and Yerramilli, 2011). From the standpoint of participating lenders, studies show that young and inexperienced lenders participate in syndicated loans to gain know-how transfer from experienced lead arrangers (Tykvová, 2007). Involvement in syndicated lending would thus introduce these participants to new business areas and industrial sectors they may not otherwise enter due to a lack of proper arranging know-how and expertise.

2.2 *Syndication Process and Lead-Arranger Award Mechanisms*

The process by which a borrower and a group of lenders enter into a syndicated credit agreement is initiated in different ways (Allen, 1990; Esty, 2001). In most syndicated loan arrangements, the process begins with the prospective borrowers, who use different mechanisms by which they award the leadership role. One such mechanism might be called *competitive bidding*—a process by which lenders that possess the necessary execution competence in syndicated finance submit proposals. The borrower then awards the mandate of organizing a syndicate to the lender (or lenders) with the most favorable terms. Another method of awarding the lead-arranger mandate is *negotiation*, which is often used when the borrowers decide to contact and appoint a particular lender or group of lenders. The syndication process can also be initiated by the lead arrangers. In either case, after receiving the mandate, the lead arranger will negotiate with the borrower and enter into a preliminary agreement on the contract terms.

The mandated lead arrangers can undertake the syndication activities in different ways (Allen, 1990; Esty, 2001; Armstrong, 2003). One way is to organize a syndicate on a *fully underwritten* basis. That is, lead arrangers agree to provide the entire loan amount and subsequently invite potential participating lenders to syndicate out the loan. This form of syndication, however, involves a syndication risk mainly in the sense that the lead arrangers will be compelled to keep on their balance sheets the remaining loan amounts that are not financed by the participants. Lead arrangers can also undertake the syndication activity on a *best-effort* basis. That is, the lead arranger agrees to finance a fraction of the loan and works to bring together participants willing to fund the remainder of the loan.

The composition of that group is influenced by the complexity involved in the transaction and the underlying rationale for syndication. The available evidence shows that lead arrangers choose participating lenders geographically close to the borrower when intensive monitoring is required (Sufi, 2007).

As the level of the required monitoring becomes less intensive, lead arrangers increasingly include foreign participants in the composition (Lim et al., 2014). Research also shows that loan renegotiations and restructuring are common features of private loan (e.g., bank loan) agreements (Roberts and Sufi, 2009*b*), suggesting that this consideration may also influence the number of participants. In this regard, one would expect lead arrangers to choose a more dispersed syndicate (i.e., increase the number of participants) when they want to make renegotiation more difficult so as to reduce the borrower's strategic default incentives (Gertner and Scharfstein, 1991; Bolton and Scharfstein, 1996).

A prior relationships may influence a borrower's lead-arranger choice. That is, a relationship may affect the lead-arranger award mechanisms in that it may encourage (especially) troubled borrowing firms to appoint a lead arranger through negotiations with existing relational lenders who may share common interests with the borrower and are likely to have strong incentives to shirk.[1] This creates some concern for participants because, in a typical syndicated loan arrangement, the lead arranger owes no fiduciary responsibilities to the participants (Qu, 2000; Ryan, 2009).[2] This concern may also be stoked further as participant lenders may not observe the lead arranger's screening and monitoring activities, which is in line with the imperfect monitoring model mentioned by Holmstrom (1979). Since monitoring the monitor (i.e., the lead arranger) cannot be done at zero cost, no individual syndicate member would be prepared to bear monitoring costs to conduct the monitoring. It is also hard to expect the formation of an *ad hoc* committee to monitor the monitor because of the well-established serious coordination and motivation problems associated with team formation.

2.3 *Lead Arrangers' Retained Share*

The syndication literature (see, e.g., Jones et al., 2005; Sufi, 2007; Panyagometh and Roberts, 2010) portrays a lead arranger's shirking behavior as stemming from insufficient internal motivating factors. This literature thus maintains that a lead arranger's retained share serves as an incentive for contract compliance and suggests that syndicates should be structured such that the lead arranger retains a share in the loan. Such structure is expected to be dictated to a great extent by the participants' level of concern, which stems largely from information asymmetries.

The above perspective is in the spirit of the informed–uninformed-investor theory advanced by Leland and Pyle (1977). In the context of syndicated lend-

[1] In fact, previous lending relationships can also confer competitive advantage on relational lenders by enabling them to design specific transaction terms that are appropriate for the firm and also acceptable to participants. In this way, previous lending relationships can help win the lead-arranger mandate and the substantial compensation fees for organizing a syndicated loan (Gadanecz, 2004; Berg et al., 2016).

[2] Lead arrangers normally assume the role of an agent after syndicating out a loan. Therefore, it follows that the lead arranger should owe fiduciary obligations to the participants. But in a syndicated arrangement, the lead arranger often includes certain clauses that preclude the lead arranger from acting as a fiduciary to the participant lenders.

ing, this literature implies that relatively informed lead arrangers should retain a share in the loan to alleviate agency concerns and thereby encourage participants to join the syndicate. Retaining an especially large share can initiate a contractually induced self-deterring incentive on the part of those lead arrangers who might otherwise be predisposed to wrongdoing with respect to screening and monitoring. This follows primarily because the increased retained share also increases the cost of shirking borne by the lead arranger. In essence, a retained share can serve as a lead arranger's signaling instrument that the lead arranger's incentives are aligned with those of the participating lenders. A conclusion from this discussion is that participants can use the share retained by lead arranger to control the lead arranger's shirking motives.

One would expect that when the agency-conflict-moderating feature of a lending relationship predominates, syndicated arrangements headed by lead arrangers who have lending relationships with the firm should be more attractive to participants. Such an aspect of a lending relationship dictates against requiring lead arrangers to hold a large financial stake in the loan. One would thus expect to observe a negative empirical link between the share retained by lead arrangers and their lending relationship with the firm. In contrast, when the information-exploitation-facilitating aspect of a lending relationship outweighs other features, syndicated-loan arrangements whose lead arrangers have lending relationships with the borrowers should be less attractive to potential participants. With the increased wrongdoing implied by this aspect of a lending relationship, participants would respond by requiring the lead arranger to take on a larger fraction of the loan. This suggests a positive empirical association between lending relationships and the retained share. In essence, the impact of lending relationships on the retained share depends on the relative feature balance of the lending relationship in the syndicated-loan market.

2.4 *Lead Arrangers' Reputation*

The syndication literature (see, e.g., Sufi, 2007; Ivashina, 2009; Cai, 2010) also argues that a lead arranger's reputation serves as a noncontractual device to deter lead arrangers' opportunistic wrongdoings. As such, a lead arranger's reputation certifies to potential participants that the lead arranger is credible in implementing mechanisms that attenuate conflicts of interest that may impact participants. This argument is consistent with the evidence that lead arrangers' reputation is significantly associated with improved borrower performance subsequent to loan syndication (Ross, 2010; Bushman and Wittenberg-Moerman, 2012).

There are several good reasons why reputational concerns could induce lead arrangers not to shirk. One explanation is related to the fact that the syndicated-loan market involves considerable reciprocity (Cai, 2010). That is, it is highly probable for the lead arranger of a current syndicated loan to be involved as a participant in future syndicated loans arranged by its current participants. This reciprocal arrangement could create a two-way disciplining process by which participants can credibly threat to punish those lead

arrangers with bad reputations by not inviting them to loans they arrange. In anticipation of the loss of rents associated with participating in syndicated loans, lead arrangers would refrain from taking actions that impair their reputation.

The other explanation is more likely associated with the very fact that loan syndication is a team-lending activity: The success of a loan syndicate is closely tied to the existence of stable interlender networks (Champagne and Kryzanowski, 2007; Godlewski et al., 2012). The literature contends that maintaining the stability of the intercreditor network depends on lenders' reputation in financial markets (Pichler and Wilhelm, 2001). This suggests that events that damage a lead arranger's reputation—such as the borrowing firm declaring bankruptcy (Gopalan, Nanda and Yerramilli, 2011) and corporate fraud (Wang et al., 2010)—introduce instability to the intercreditor network. The consequence may be reputational problems for lead arrangers, and, as a result, with a fractured lead–participant past alliance may experience difficulty in finding new lenders willing to participate in subsequent syndicates organized by the same lead arranger. In essence, considerations about preserving previous lead–participant alliances offer lead arrangers self-disciplining incentives to keep their reputation untarnished.

The literature, however, maintains that reputation has a threshold mainly in the sense that reputational concerns have effects for lenders with greater reputation (Chemmanur and Fulghieri, 1994; Ordoñez, 2013; Chaudhry and Kleimeier, 2013). It therefore follows that reputational concerns should present strong motivational incentives for lead arrangers who have reputation at the very top of the lead arrangers' reputational spectrum. Since more reputable lead arrangers have a high reputational stake attached to the performance of the syndicated loans, a loss of reputation has a substantial effect on them. One would thus expect considerations of losing reputation to motivate reputable lead arrangers to commit to due diligent screening and more intensive monitoring. Such commitment to avoid lenient behavior, in turn, facilitates loan syndication activities, as supported by empirical studies that suggesting that reputable lead arrangers sell off more of their loans (Dennis and Mullineaux, 2000; Sufi, 2007; Demiroglu and James, 2010) at low interest rates (Ivashina, 2009; Ross, 2010). The present study thus expects the lead arranger's reputation to weaken the empirical association between lending relationships and the retained share.

2.5 *Informationally Opaque and Transparent Firms*

The literature argues that a firm's information environment affects the degree to which participants face agency problems. The widespread perspective in the corporate-governance literature is that firms with publicly available information are more likely to be subjected to the scrutiny of outside investors (Shleifer and Vishny, 1997). One would thus expect participants to be exposed to fewer agency problems in a sample of syndicate arrangements with transparent firms. In contrast, opaque firms have only limited exposure to outsiders' scrutiny that might discipline the management because, for firms with

limited publicly available information, high transaction and information costs makes monitoring by outsiders more difficult (Demsetz and Lehn, 1985). This may suggest that participants are more likely to face the classic agency problems identified by Jensen and Meckling (1976) in a sample of syndicated arrangements with opaque firms. Participants should therefore benefit more from lead arrangers' monitoring, which means that a firm's information environment influences the need to provide lead arrangers with monitoring incentives through the retained share.

Several previous studies have examined the degree to which the availability of information (or lack thereof) about the borrower is an important determinant of the retained-share aspect of the syndicated-loan structure. The available evidence is broadly consistent with the above theoretical predictions in that it documents a sharp difference between the retained share in a loan to opaque and transparent firms. Some have found that the probability of syndicating a loan increases as the borrower becomes informationally more transparent (Dennis and Mullineaux, 2000; Jones et al., 2005; Panyagometh and Roberts, 2010). Others have found that lead arrangers retain a larger share and form a more concentrated syndicate when the borrower is informationally opaque (Bosch and Steffen, 2007; Sufi, 2007; Chaudhry and Kleimeier, 2013). A plausible explanation behind these empirical regularities would be that opacity exacerbates the participants' incentive conflicts, which exist on both side of the loan contract.

The above literature thus shows that participants are clearly more concerned with loans to opaque than transparent firms. But one would expect participants not to require relationship lead arrangers to retain a larger share, simply because they have already acquired knowledge of the borrower, which reduces the necessary monitoring costs and thereby mitigates the risks of shirking. The literature, however, is less clear about whether relationships have similar or differential effects on the retained share in loans to opaque and transparent firms.

2.6 *Covenanted Loans*

A large body of the corporate-finance literature show that, in a manner consistent with the prediction of the theory of incomplete financial contracting, lenders impose covenants in loan contracts. Covenants are restrictions incorporated into contracts designed to curb the borrowers' incentives to expropriate wealth from lenders by prohibiting them from taking actions that facilitate the transfer of the lenders' wealth (Jensen and Meckling, 1976; Smith and Warner, 1979). Any violation of the loan covenants may therefore suggest that the borrower is not complying with the imposed restriction. In fact, a covenant breach is often considered a technical default (Beneish and Press, 1993, 1995). Since covenants normally allocate control rights between lenders and borrowers on a state-contingent basis (Berlin and Mester, 1992; Gârleanu and Zwiebel, 2009), upon the violation of covenants control rights shift to the lenders.

The shift of control rights justifies the lenders' intervention in corporate decisions when triggered by covenant violations. The available evidence shows that lenders often find it optimal to waive the consequences of covenant violations or renegotiate the initial contracts rather than enforce the covenants by terminating the loan agreement (Chen and Wei, 1993; Denis and Wang, 2014). Nevertheless, a growing number of studies show that such lenders' intervention has serious consequences for the firm's financing (Roberts and Sufi, 2009*a*), investment (Chava and Roberts, 2008) and governance policies (Nini et al., 2012). Borrowers' considerations when facing these consequences expectedly induce them to develop self-disciplining behavior, which mitigates one layer of agency problems in loan syndication. One can thus argue that participants are exposed to fewer agency problems in contractual arrangements that impose covenants.

However, since covenants are often based on noisy indicators of the firm's true financial health, studies suggest that more intensive monitoring of the firm's compliance with the imposed restrictions is required to determine the real cause of the covenant violation (Berlin and Loeys, 1988). As the empirical literature documents, covenants are often set tightly in loan agreements, so near the violation threshold that they are easily breached (Smith, 1993; DeFond and Jiambalvo, 1994; Chava and Roberts, 2008). It thus follows that a covenant violation may not necessarily indicate that the borrower is extracting wealth from the lender. This suggests that contracts that impose covenants require monitoring in the first place. Hence, in the context of syndicated loans, agency conflicts might be even more acute in arrangements in which contracts include covenants. Since relationship lead arrangers have monitoring-cost advantages, participants may not demand they take on a larger fraction of the loan.

3 Data, Measurements and Preliminary Analysis

3.1 *Sources and Sample Selection*

This analysis is based on information gathered from various data sources. The information on syndicated loans is extracted from the DealScan database. This data file provides detailed information on contract terms, such as the amount and maturity of the loan, the type and purpose of the loan, the loan-facility origination date and covenants. DealScan also provides information on the identity of the lenders offering the financing and some information on the identity of the borrowers, including the borrower's name, geographic location, parent and ultimate parent ID, standard industrial classification (SIC), and sales at close. DealScan, however, has limited accounting information. Thus, the borrower's and lead arranger's financial information is extracted from the Compustat database. To avoid the loan arrangements affecting the accounting information, the Compustat variables used correspond to the end of the year prior to the loan-agreement date.

A problem with combining information from DealScan and Compustat is the lack of a common identifying code between the two datasets. The present

study thus uses the DealScan–Compustat link table constructed by Michael Roberts and Wharton Research Data Services[3] to merge the information collected from the two data sources. This link table combines the two data files on the basis of the borrowing firms' names. Loans for which the corresponding financial information of the firm is absent using this link are excluded from the analysis.

The sample construction begins with all loan facilities in the combined data file. Following previous empirical studies, loans made to firms in the financial industry (i.e., firms with SIC code between 6000 and 6999) are excluded from the sample. Since the interest of this analysis is syndicated loans, all loan facilities distributed by nonsyndication methods are removed from the sample. This paper also requires that the loan be made to a U.S. firm and be initiated between 1987 and 2013. A further restriction is also imposed by removing from the sample all facilities that do not include information on the lead arranger. The few loan facilities for which the borrowing firms report negative values for their sales at close are also excluded from the sample. This process of cleaning the data yields a sample containing 43,651 syndicated loan facilities.

3.2 *Measuring Lead Arrangers' Retained Share*

The dependent variable of interest is the share retained by lead arrangers, and the DealScan data provides information on the allocation made by some lenders. However, prior to using this variable, it is important to determine whether the lender in a loan facility is the lead arranger or a participating lender. DealScan contains a field that describes the role of the lenders, Lead Arranger Credit, that takes the values *Yes* or *No* for each lender. This study uses this field to classify lenders such that a lender is designated as a lead arranger if the Lead Arranger Credit field takes the value *Yes*, and as a participant lender if the field takes the value *No*. This method of sorting lenders into lead and participant groups is consistent with the procedure used by previous studies (see, e.g., Bharath et al., 2007, 2011). After lenders are sorted, the allocations made by the lead arrangers are used as the dependent variable. For syndicated loans headed by multiple lead arrangers, the retained share at a facility level is calculated as the average of the proportion held by each lead arranger.

3.3 *Measuring Lending Relationships*

Information on whether the borrowing firms obtain loans from lenders with whom they have previous lending relationships is not available in the DealScan database. The measure of a lending relationship therefore needs to be constructed. The theoretical relationship literature (e.g., Haubrich, 1989; Petersen, 1999; Boot, 2000) appears to be instructive in this regard. This literature argues that lending relationships are built over time through engagements involving

[3] See Chava and Roberts (2008) for details on the DealScan–Compustat link table.

repeated interactions between a firm and a lender. This theoretical guidance is closely followed in the present study to construct a lending-relationship measure. Indeed, the repeated interaction argument is central to what now appears to be a standard methodology for measuring lending relationships in the strand of research that combines the literature on lending relationships and loan syndication (see, e.g., Dahiya et al., 2003; Schenone, 2004; Bharath et al., 2007, 2011).

The procedure adopted in this study involves tracking the history of previous interactions between the lead arranger and the borrower of a loan to identify whether they are involved in lending interactions in the past. Since the sample in this study has a median loan maturity of 57 months, the present study uses a five-year history window to search for previous lending interactions. It is also important to note that the sample is left-tail trimmed. That is, the first loan facility of any borrower has no prior loan experience. Thus, to avoid erroneously sorting the first loan of all borrowers into a relationship or nonrelationship group, this study excludes the first loan of each borrower from the analysis. Following this procedure, three lending-relationship measures are constructed for each loan facility.

One measure of lending relationships is denoted by *Relation Binary*. This dummy is constructed to identify whether a lending relationship exists between the lead arranger of a current loan and the borrowing firm in the last five years. Accordingly, the dummy variable takes the value one if the lead arranger and the firm engaged in lending interactions in the past and zero otherwise. For syndicated loan facilities involving more than one lead arranger, the indicator variable takes the value one if at least one lead arranger interacted with the borrower in the past.

The other measures are constructed to reflect the intensity of previous lending interactions. *Relation Number* is constructed by dividing the number of loans that a lead arranger, i, has lent to a borrower, j, in the last five years by the total number of loans that the borrower, j, has taken over the same time period. To show how this number-based measure is computed using the DealScan data, let $(N)_t^{i\to j}$ denote the number of times lead arranger i has organized loans for borrower j as of time t. Likewise, let $(N)_t^{\text{all}\to j}$ denote the number of times that all lead arrangers have lent to borrower j as of time t. Then, the number-based measure of lending relationships between lead arranger i and borrower j as of loan facility l is given as

$$\textit{Relation Number}_{i,j,l} = \sum_{t-1}^{t-5}(N)_t^{i\to j} \Big/ \sum_{t-1}^{t-5}(N)_t^{\text{all}\to j}. \tag{1}$$

The other measure, *Relation Amount*, is computed by dividing the sum of the amounts of loans that lead arranger i has lent to borrower j in the last five years by the total amount of loans that borrower j has borrowed during the same period. To represent this idea in a formula, let $(A)_t^{i\to j}$ denote the amount that lead arranger i has made to borrower j as of time t. Again, let $(A)_t^{\text{all}\to j}$ denote the amount borrower j has borrowed from all lenders in the same period. The amount-based measure of prior lending relationships between lead arranger i

and borrower j at a time when they enter into a new agreement for loan facility l is given by

$$\textit{Relation Amount}_{i,j,l} = \sum_{t-1}^{t-5}(A)_t^{i\to j} \Big/ \sum_{t-1}^{t-5}(A)_t^{\text{all}\to j} \tag{2}$$

The values that *Relation Number* and *Relation Amount* take range from zero to one. Zero indicates the absence of lending interactions prior to the current loan. One corresponds to a situation where the borrower engaged in lending interaction only with the lead arranger of the current loan. Thus, larger values of the measures correspond to more intensive involvement in lending relationships. For syndicated loan facilities in which multiple lead arrangers are involved, this study allows the measures to take the largest value, the value corresponding to the lead arranger with whom the borrower is most involved in lending relationships.

3.4 *Measuring Lead Arrangers' Reputation*

A commonly employed methodology in the empirical syndication literature to measure a lead arranger's reputation is to use the lead arranger's previous market share in the loan-syndication market (see, e.g., Bharath et al., 2007; Sufi, 2007). Computing a lead arranger's market share involves dividing the sum the amount of syndicated loans arranged by the lead arranger at a given time by the total amount of syndicated loans arranged by all lead arrangers in the same period. Following these prior studies, the present paper also applies the same methodology. For arrangements in which more than one lead arranger organizes the syndicate, this paper shares the loan amount equally among the lead arrangers and then calculate the market share for each. To compute the market share using the DealScan data, let LA_{lt}^{i} denote the amount of syndicated loan l arranged by lead arranger i at time t. The market share, $\textit{Market Share}_{i,t}$ for lead arranger i at time t is then given as

$$\textit{Market Share}_{i,t} = \sum_{l}^{L}(LA)_{lt}^{i} \Big/ \sum_{i}^{I}\sum_{l}^{L}(LA)_{lt}^{i} \tag{3}$$

For each time period, the market share given by the above equation reflects the proportion of syndicated loans arranged by a particular lead arranger. The numerator of the right-hand term aggregates the dollar value of syndicated loans (where $l = 1, \ldots, L$) that lead arranger i arranged at time t. The denominator aggregates the dollar amount of all syndicated loans organized by all lead arrangers (where $i = 1, \ldots, I$) at time t.

After the market share is computed, lead arrangers are then ranked according to their market share. The ranking helps to identify top-tier lead arrangers, those that dominate the syndicated-loan market. It is becoming a tradition in the empirical literature to use a binary measure to distinguish dominant lead arrangers from the others (see, e.g., Ross, 2010; McCahery and Schwienbacher, 2010). The binary-based classification of the differences between lead arrangers seems consistent with the literature suggesting that reputation has

a threshold. Following that literature, this paper uses a dummy variable that identifies lead arrangers in the top 3 percentile (*Top 3 Arranger*) and top 10 percentile (*Top 10 Arranger*) in terms of their market share. When a facility is arranged by multiple lead arrangers, this paper designate a loan as arranged by a dominant lead arranger if at least one of its lead arrangers is in the top tier.

3.5 *Measuring the Distance Between Lead Arrangers and Borrowers*

To measure the physical distance between a loan's lead arranger and borrower, this paper hand collects information on their geographic location. The DealScan data provide addresses of some of the borrowers. For borrowers with missing addresses, information on cities and states in which the firms are located is collected from the Securities and Exchange Commission (SEC) 10-k fillings and Bloomberg. To manage the hand collection of the lead arrangers' addresses, those lead arrangers whose headquarters are located in the geographic regions outside North America are excluded from the analysis.[4] The addresses of the remaining lead arrangers are collected from the Call Reports and the National Information Center (NIC) of the Federal Reserve System. After the cities and states in which the lead arrangers and borrowers reside are collected, the next task was to manually collect the latitude and longitude of each city. The spherical distance in kilometers, which is denoted by $Distance_{i,j}$, between lead arranger i and borrower j is calculated using the formula provided by Dass and Massa (2011):

$$Distance_{i,j} = \arccos(deg[latlon]) \times r, \tag{4}$$

where

$$\begin{aligned} deg_{latlon} = {} & \cos(lat_i) \times \cos(lon_i) \times \cos(lat_j) \times \cos(lon_j) \\ & + \cos(lat_i) \times \sin(lon_i) \times \cos(lat_j) \times \sin(lon_j) + \sin(lat_i) \times \sin(lat_j) \end{aligned} \tag{5}$$

r is the Earth's radius in kilometers; *lat* and *lon* denote the latitude and longitude converted to radians from degrees by multiplying by $\pi/180$. When more than one lead arranger is involved in arranging a loan, this study selects the closest geographic distance between a lead arranger and the borrower. The distance used as an instrument is measured by the natural logarithm of one plus the spherical distance.

3.6 *Measuring Other Independent Variables*

The analysis uses an array of other independent variables to isolate the effects of factors that may influence the share retained by lead arrangers. One set of such independent variables corresponds to lead-arranger characteristics. The size of a lead arranger is measured by the natural logarithm of the book value

[4] Since the headquarters of most of the lead arrangers in the sample are located in the North America geographic region, the exclusion does not influence the result.

of total assets, and it is denoted by *Arranger Size*. When information on a lead arranger's total assets is not available in the Compustat database, this study uses the information on the total assets of the lead arranger's parent company. Again, if there is no information on the total assets at the parent company level, the total assets of the ultimate parent company is used. For loan facilities that have more than one lead arranger, the total assets of the lead arranger retaining the largest share is used. When more than one lead arranger retains the largest share, this paper uses the average of their total assets.

Another set of independent variables corresponds to loan characteristics. Loan size is measured by the natural logarithm of a loan facility amount, and is denoted by $\ln(\textit{Loan Amount})$. Loan maturity is measured by the natural logarithm of the number of months from the facility start date to the facility end date and is denoted by $\ln(\textit{Loan Maturity})$. The analysis uses a categorical indicator of loan types to distinguish whether a loan facility is a revolver, a term loan, a 364-day facility, or another loan type. Another categorical indicator of loan purpose is used to identify whether a loan is used for corporate purposes, working capital, debt repayment, takeover, or another purpose.

The final set of independent variables corresponds to borrower characteristics. The size of the firm is measured by the natural logarithm of sales at close, and is denoted by *Firm Size*.[5] Limited information about a firm is measured by a dummy variable, *Opacity*, which takes the value one for firms without S&P long-term issuer ratings. Firm reputation is measured by the natural logarithm of the number of times the firm has previously borrowed in the syndicated-loan market. Firm profitability is measured by EBITDA scaled by total assets. Firm leverage is measured by the ratio of total debt, which is the sum of debt in current liability and long-term debt, to total assets. Tangibility is measured by the ratio of property, plant and equipment to total assets. The possibility that a firm may go bankrupt is measured by a dummy variable, *Financial Distress*, which takes the value one for firms with an Altman (1968) Z-Score less than or equal to 1.81. All variables used in this study are formally defined in the Appendix.

3.7 *Summary Statistics*

Table 1 summarizes the sample's descriptive statistics calculated using all observations. Since some firms appear more than once in the sample, summary statistics of the borrowing firms are calculated at a firm-year level. For the remaining variables, their summary statistics are computed at a loan-facility level. Panel A summarizes descriptive statistics of lending relationships. The data reported in this panel show that relationship lenders often head syndicated loan arrangements. As suggested by the mean of *Relation Binary*, 53% of syndicated loans are organized by lead arrangers with whom the borrowers have prior lending relationships.

[5] As one can note, the measure of size for the borrowers is different from that for lead arrangers. To be consistent with other studies, the present study also uses sales at close to measure the borrower's size. The result is robust to using total assets

Table 1. Summary Statistics of Syndicated Loan Facilities

This table presents summary statistics for the sample of syndicated loan facilities. The sample has 43,651 syndicated loan facilities made to U.S. nonfinancial firms, spanning the time period from 1987 through 2013. Summary statistics are calculated at a loan facility level except summary statistics of the borrowers, which are calculated at the firm-year level. All variables are defined as in the Appendix.

				Distribution				
	N	Mean	SD	Min	25th	50th	75th	Max
Panel A: Lending Relationships								
Relation Binary	36,293	0.53	0.50	0.00	0.00	1.00	1.00	1.00
Relation Number	36,293	0.36	0.40	0.00	0.00	0.20	0.75	1.00
Relation Amount	36,293	0.32	0.38	0.00	0.00	0.12	0.59	1.00
Panel B: Syndicate Structure								
Retained Share	13,443	30.01	24.04	0.00	11.67	22.00	42.86	100.00
No. of lead arrangers	43,651	1.37	0.83	1.00	1.00	1.00	2.00	21.00
Panel C: Lead arranger characteristics								
Top 3 Arranger	43,594	0.34	0.47	0.00	0.00	0.00	1.00	1.00
Top 10 Arranger	43,594	0.55	0.50	0.00	0.00	1.00	1.00	1.00
Arranger Size, $B	17,973	818.80	737.65	0.01	222.03	621.76	1,291.80	3,771.20
Small Arranger	41,824	0.45	0.50	0.00	0.00	0.00	1.00	1.00
Panel D: Loan Characteristics								
Loan Amount (million)	43,650	327.69	744.73	0.00	45.00	125.00	320.00	30,000.00
Loan Maturity	40,675	48.55	24.99	0.00	33.00	57.00	60.00	396.00
Term Loan	43,651	0.27	0.44	0.00	0.00	0.00	1.00	1.00
Revolver	43,651	0.56	0.50	0.00	0.00	1.00	1.00	1.00
364-day facility	43,651	0.09	0.28	0.00	0.00	0.00	0.00	1.00
Corporate Purpose	43,651	0.34	0.47	0.00	0.00	0.00	1.00	1.00
Working Capital	43,651	0.15	0.36	0.00	0.00	0.00	0.00	1.00
Takeover	43,651	0.11	0.31	0.00	0.00	0.00	0.00	1.00
Debt Repayment	43,651	0.16	0.37	0.00	0.00	0.00	0.00	1.00
Covenant	43,651	0.50	0.50	0.00	0.00	1.00	1.00	1.00
P.Covenant	43,651	0.45	0.50	0.00	0.00	0.00	1.00	1.00
Panel E: Borrower Characteristics								
Opacity	25,656	0.60	0.49	0.00	0.00	1.00	1.00	1.00
Firm Size, $B	22,068	6.83	49.69	0.00	0.35	1.11	3.86	1,843.64
Small Firm	22,068	0.50	0.50	0.00	0.00	0.00	1.00	1.00
Profitability	23,040	0.13	0.09	−0.21	0.09	0.12	0.17	0.42
Tangibility	23,095	0.35	0.25	0.00	0.15	0.30	0.54	1.00
Leverage	23,109	0.32	0.21	0.00	0.17	0.31	0.45	0.82
Financial Distress	21,306	0.34	0.47	0.00	0.00	0.00	1.00	1.00

The data further suggest that lead arrangers contribute a larger share to a loan. As the structure of loan syndication summarized in Panel B shows, the mean of *Retained Share* indicates that lead arrangers retain on average 30.01% of the loan. Inspection of the distribution of this variable also reveals that the retained share varies widely, with the values raging from 0% to 100%. While the minimum of *Retained Share* suggests that some lead arrangers syndicate out the entire loan they organize, the maximum of this variable indicates that other lead arrangers retain the full amount. This panel further demonstrates that the syndicated loan market is dominated by facilities arranged by a single lead arranger, which account for nearly 75% of the syndicated loans in the sample.

The data provide additional information that a small number of lead arrangers control loan syndication activities. As reported in Panel C, which summarizes the lead arrangers' characteristics, the mean of *Top 3 Arranger* in-

dicates that 34% of syndicated loans are arranged by lead arrangers whose syndicated market share lies in the top 3 percentile. This finding is consistent with the result of previous studies that less than a dozen lead arrangers are responsible for more than half of loan syndication (Sufi, 2007; Do and Vu, 2010; McCahery and Schwienbacher, 2010). One plausible explanation for the greater involvement of a handful of arrangers in loan syndication activities would be that top arrangers have a well-established and extensive networks of lenders (Godlewski et al., 2012; Cai et al., 2014). This obviously enables them to easily syndicate out the loans they originate.

Syndicated loan facilities are characterized in Panel D. The average facility amount is 327.69 million dollars with a standard deviation of 744.73 million dollars. Loan facilities have an average maturity of 48.55 months, and a median maturity of 57 months. In terms of loan types, the line of credit (revolver) is the most common, accounting for 56% of the facilities in the sample. The next largest loan type, which accounts for nearly 27% of the syndicated facilities, is the term loan. Finally, syndicated loans are typically used to fund corporate purposes, which accounts for 34% of the loans in the sample. Other major purposes for which syndicated facilities are used are to working capital (15%), debt repayment (16%) and takeover (11%).

Panel E reports annual financial summary statistics of the borrowing firms. On average, borrowing firms have 6.83 billion dollars in sales at close. In terms of long-term issuer credit ratings, 40% of firms in the sample have S&P credit ratings, of which 11% have speculative-grade ratings. Firm profitability (EBITDA/Total assets) is Winsorized at the 1st and the 99th percentiles to eliminate the influence of extreme outliers. Firm leverage is Winsorized at the 95th percentile as Winsorization at the 99th percentile does not remove the extreme values. After Winsorization, firms have an average profitability of 13% and an average leverage is 38%. The average tangible-assets ratio is 35%. Nearly 34% of firms in the sample are financially distressed in the sense that they have Altman (1968) Z-Score less than or equal to 1.81.

3.8 *Preliminary Analysis*

This section deals with the preliminary analysis of the empirical association between the retained share and the lead arranger's lending relationships with the borrower. The preliminary analysis is conducted by way of univariate tests of the differences in the share retained by relationship and nonrelationship lead arrangers. To carry out a univariate test, syndicated loan facilities are partitioned into two groups on the basis of whether a facility is originated by a relationship lead arranger. Accordingly, using a binary measure of a lending relationship, a loan is designated as a relationship loan when $\textit{Relation Binary} = 1$, and as a nonrelationship loan when $\textit{Relation Binary} = 0$.

The univariate-based analysis of the means of syndicate structure, lead arrangers, loan facilities, and borrower characteristics is reported in Table 2. In the first column of this table, the means of the variables associated with loans syndicated by relationship lead arrangers are presented. The second column reports the means of the variables corresponding to facilities syndicated by

Table 2. Univariate Analysis of Variables by the Existence of Lending Relationships

This table presents a univariate analysis of the means of the variables used in this study. Columns (1) and (2) present the means and standard deviations (SD) of the variables for syndicated loans arranged by relationship lead arrangers. Columns (3) and (4) report the means and standard deviations of the variables for loans syndicated by nonrelationship lead arrangers. Column (5) displays the difference in means of the variables presented in Columns (1) and (3). Column (6) presents the standard deviation of the difference in means. All variables are defined as in the Appendix. The t test of the statistical significance of the differences in means is indicated by asterisk, where ***, **, and * indicate significance at the 1% level, the 5% level and the 10% level, respectively.

	Relationship Loans		Nonrelationship Loans		Difference	
	[Mean]	[SD]	[Mean]	[SD]	[Mean]	[SD]
	(1)	(2)	(3)	(4)	(5 = 1 − 3)	(6)
Retained Share	25.201	(21.530)	32.517	(24.965)	−7.316***	(0.448)
Top 3 Arranger	0.445	(0.497)	0.268	(0.443)	0.177***	(0.005)
Top 10 Arranger	0.659	(0.474)	0.458	(0.498)	0.202***	(0.005)
Arranger total assets	939.134	(780.842)	758.003	(683.241)	181.131***	(12.026)
Small Arranger	0.407	(0.491)	0.418	(0.493)	−0.011*	(0.005)
Opacity	0.488	(0.500)	0.607	(0.488)	−0.119***	(0.005)
Total no. prev. borrow	4.946	(3.610)	3.331	(3.027)	1.615***	(0.035)
Sales at close	9.199	(57.157)	6.353	(60.865)	2.846***	(0.663)
Small Firm	0.400	(0.490)	0.554	(0.497)	−0.154***	(0.006)
Profitability	0.132	(0.080)	0.128	(0.090)	0.003***	(0.001)
Tangibility	0.365	(0.249)	0.344	(0.241)	0.021***	(0.003)
Leverage	0.362	(0.210)	0.348	(0.228)	0.015***	(0.002)
Financial Distress	0.382	(0.486)	0.362	(0.481)	0.020***	(0.006)
Loan Amount (million)	425.957	(848.422)	268.202	(696.285)	157.756***	(8.220)
Loan Maturity	47.488	(24.676)	49.049	(24.713)	−1.562***	(0.269)
Term Loan	0.260	(0.439)	0.283	(0.450)	−0.023***	(0.005)
Revolver	0.549	(0.498)	0.560	(0.496)	−0.010	(0.005)
364-day facility	0.114	(0.318)	0.068	(0.251)	0.047***	(0.003)
Corporate Purpose	0.372	(0.483)	0.319	(0.466)	0.052***	(0.005)
Working Capital	0.140	(0.347)	0.157	(0.364)	−0.017***	(0.004)
Takeover	0.099	(0.298)	0.109	(0.312)	−0.010**	(0.003)
Debt Repayment	0.163	(0.369)	0.161	(0.367)	0.002	(0.004)
Covenant	0.504	(0.500)	0.536	(0.499)	−0.032***	(0.005)
P.Covenant	0.445	(0.497)	0.483	(0.500)	−0.038***	(0.005)

nonrelationship lend arrangers. The differences of these means are displayed in the last column. The t test of the statistical significance of the differences in means is indicated by asterisk, where three asterisks indicates significant at the 1% level, two at the 5% level and one at the 10% level.

The univariate analysis suggests that the share retained by lead arrangers with whom the borrowing firms have lending relationships significantly differs from the share held by nonrelationship lead arrangers. As the mean of *Retained Share* shows, relationship lead arrangers hold on average 25.20% of the loan. For the nonrelationship lead arrangers, the retained share is increased to 32.52%. The difference in the retained share is -7.32%, and is statistically significant at the 1% level. This mean difference indicates that the retained share is significantly smaller on a loan syndicated by lead arrangers that have lending relationships with the borrower vis-à-vis the retained share in a loan syndicated by nonrelationship lead arrangers. The apparently inverse empirical association between lending relationships and the retained share may provide preliminary evidence that establishing lending relation-

ships with firms enables lead arrangers to syndicate out more of the loans issued to the firms.

However, caution should be exercised at this stage with the above conclusion drawn from the univariate test for the simple reason that the mean comparison also shows a significant difference between relationship and nonrelationship loans in many other respects. As can be seen from the result reported in Table 2, potential explanatory variables of the retained share differ considerably between syndicates headed by relationship and nonrelationship lead arrangers. It is thus plausible that the result from the unconditional mean comparison may reflect the effects of other determinants of the retained share. As such, the observed reduction in the retained share may not be entirely attributable to lending relationships. That is, significant differences in important characteristics between syndicates headed by relationship and nonrelationship lead arrangers are likely to influence the difference in the retained share.

One important difference is related to lead-arranger characteristics. For example, the mean of *Top 3 Arranger* shows that 45% of relationship loans are arranged by lead arrangers whose reputation lies in the top 3 percentile and only 27% for the nonrelationship loans. The difference is statistically significant at the 1% level. Again, the univariate test shows that relationship loans tend to be arranged by large lead arrangers compared to nonrelationship loans. The prior literature has established that lead arrangers' reputation and size influence loan syndication activities. It therefore follows that both of these patterns could influence the differences in the retained share obtained from the unconditional mean analysis.

Another important difference is associated with borrower characteristics. As the univariate analysis shows, firms obtaining loans from relationship lead arrangers are not representative of firms getting loans from nonrelationship lead arrangers. Table 2, for example, shows that while 49% of relationship loans are borrowed by firms that do not have S&P credit ratings, the percentage is 61% for the nonrelationship loans. The difference is statistically different from zero at the 1% level. This appears to indicate that relationship lead arrangers syndicate loans to relatively more transparent firms. Furthermore, loans originated by relationship lead arrangers are made to relatively larger borrowers (measured in terms of *Sales at Close*) compared to loans syndicated by nonrelationship lead arrangers. Firms borrowing from relationship lead arrangers are more profitable (*Profitability*) than firms borrowing from nonrelationship lead arrangers. Research has shown that borrowers' informational opacity and size are important determinants of the retained share. The omission of these variables plausibly affect the observed difference in the retained share.

The other key difference is related to loan characteristics. One can observe that the average amount of relationship loans is 425.96 million dollars, which is almost twice the size of the average amount of a nonrelationship loan, 268.2 million dollars. Apparently, loans syndicated by relationship lead arrangers are considerably larger than those arranged by nonrelationship lead arrangers. Failing to control for such loan terms may also affect the differences in the

retained share. To adjust for the potential effects stemming from these factors, the next section controls for the above variables in the regression analysis.

4 Relationship Lending and Retained share: Empirical Results

4.1 *Baseline Specification*

This section lays the empirical groundwork for the regression analysis of the empirical association between lending relationships and the share retained by lead arrangers in syndicated loans. The analysis is conducted using a variant of a regression model that accounts for factors that could influence the retained share. The baseline regression model is specified as

$$\begin{aligned} \textit{Retained Share}_{i,j,l} = \alpha + \beta \textit{Relationship}_{i,j,l} + \gamma X_{i,t-1} \\ + \eta X_{j,t-1} + \psi X_l + \mu + \epsilon_{i,j,l} \end{aligned} \quad (6)$$

The dependent variable, $\textit{Retained Share}_{i,j,l}$, is the percentage held by a lead arranger i (the retained share) on a loan facility l made to a borrower j. The key independent variable of interest, denoted by $\textit{Relationship}_{i,j,l}$, measures previous lending relationships between the loan's lead arranger and borrower. Given the two competing views discussed in the paper, the coefficient of interest, β, measures the net effect of lending relationships on the retained share. A negative value suggests that the credible-commitment-to-monitoring view of a lead arranger's lending relationships with firms outweighs the information-exploitation view. This regression model also includes several other independent variables, which, for the sake of clarity, are presented as lead-arranger, borrower and loan controls.

Lead-arranger Controls: The variable $X_{i,t-1}$ in the retained-share equation stands for lead-arranger characteristics. It is argued in Section 2 that the lead arranger's reputation helps mitigate agency conflicts, and that this would promote retaining a smaller fraction of syndicate loans. Also, large lead arrangers are presumed to have the necessary skills and resources to conduct adequate screening and monitoring, so this would allow them to finance a smaller portion of the loan. This study controls for such possibilities using *Top 3 Arranger* and *Arranger Size*.

Borrowing-firm Controls: The variable $X_{j,t-1}$ captures borrower characteristics. As discussed in Section 2, a limited availability of the borrower's information exacerbates agency problems, considerably increasing the fraction of the loan financed by the lead arranger. Following previous studies, the current study controls for this notion with an indicator variable *Opacity*. The reputation and the size of the borrowing firms have also been identifies as major factors that facilitate syndication activities (Sufi, 2007; Cai, 2010). This study thus controls for these potential factors using *Firm Reputation* and *Firm Size*. The remaining firm-specific controls include firm profitability, tangibility, leverage, and financial distress.

Syndicated-loan Controls: The variable X_l represents a vector of loan characteristics. The regression equation includes loan-facility size, denoted by $\ln(\textit{Loan Amount})$, and loan maturity, $\ln(\textit{Loan Maturity})$. Additionally, this study uses an array of dummy variables to control for the type and the purpose of the loan. The loan-type dummies account for whether the syndicated loan is a revolver (lines of credit), a term loan or a 364-Day facility. The loan-purpose dummies account for whether the loan is for working capital, corporate purposes, debt repayment or takeover.

Fixed-effect Controls: In the above regression specification, μ controls for the borrower's industry fixed effects (Industry dummy) using a one-digit Standard Industrial Classification (SIC). It also controls for the loan-facility-start year fixed effects (Year dummy). There might also exist persistent firm-specific attributes that introduce correlations across observations within firms. A standard approach to control for this possibility is to use a firm fixed-effects dummy or clustering by firm. Petersen (2009) and Gow et al. (2010), however, argue that the conventional fixed-effect dummy, which requires the assumption of a constant effect, may not fully remove dependences between observations. That is, when there exist time-varying firm-specific effects, the fixed-effect approach continues to produce biased standard errors. They suggest clustering standard errors by firms. Accordingly, this analysis accounts for any potential correlations across observations by running a regression model clustering standard errors at the firm level.

4.2 *The Effect of Relationships and on the Retained Share*

This paper has raised two competing views about the effect of relationships on the retained share. The empirical analysis in this section indicates that the monitoring view outweighs the exploitation view in the syndicated loan market, and this result is depicted in Table 3. As can be seen from the result reported in Column (1), the binary measure of a lending relationship (*Relation Binary*) is negatively and significantly associated with the retained share. This result shows that lead arrangers who were previously involved in lending relationships with the borrower retain 2.43% less of the loan they arrange for the borrower in the subsequent years. The reported reduction is statistically significant at the 1% level. This result is in line with the view that relationships facilitate information production, which enhances monitoring and mitigates the agency problems to which participants are exposed. As a result, relationship lead arrangers are not required to structure syndicates such that they retain a larger share.

Beyond the statistical significance, the reported reduction in the retained share is also economically nonnegligible. To demonstrate this assertion, consider lead arrangers holding the sample average share of 30.01%. For these lead arrangers, the existence of previous lending relationships will lead to an 8.1% reduction of the retained share ($-2.43/30.01 \times 100$). This means that, in terms of the retained amount, lead arrangers organizing a syndicated loan with the sample average amount of 327.69 million dollars for borrowers with whom they have prior lending relationships will be able to contribute 7.97 mil-

lion dollars (327.69 × 30.01% × 8.1%) less than they would otherwise have to contribute if they had not established a lending relationship with the borrower.

The above analysis is repeated in column (2) by running a model in which the retained share is regressed on the proportion of the number of times that the lead arranger and the borrower previously interacted. The result shows

Table 3. The Effect of Relationships and on the Retained Share

This table presents coefficient estimates from regressing the percentage of a syndicated loan retained by a lead arranger (*Retained Share*) on the measures of a lending relationship between the lead arranger and the borrower. *Relation Binary* indicates whether a prior lending relationship exists between the lead arranger and the borrower of a syndicated loan. *Relation Number* captures the proportion of the previous lending relationships in terms of the number of interactions. *Relation Amount* accounts for the proportion of the previous lending relationships in terms of the amount of interactions. All other variables are defined as in the Appendix. Column (1) reports results when *Relation Binary* is used as the main variable of interest. Column (2) runs the analysis using *Relation Number* as a measure for relationship lending. Column [3] estimates the model in which relationship lending is measured by *Relation Amount*. Columns (4)–(6) repeat the same exercise replacing *Top 3 Arranger* with *Top 10 Arranger*. Standard errors are heteroskedasticity robust and clustered at the borrower level. The t-test of significance is represented as: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Retained Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Relation Binary	−2.429***			−2.141***		
	(0.52)			(0.52)		
Relation Number		−2.268***			−1.919***	
		(0.62)			(0.61)	
Relation Amount			−2.009***			−1.689***
			(0.65)			(0.65)
Top 3 Arranger	−3.626***	−3.705***	−3.742***			
	(0.54)	(0.54)	(0.54)			
Top 10 Arranger				−5.471***	−5.556***	−5.604***
				(0.65)	(0.65)	(0.65)
Arranger Size	−1.254***	−1.252***	−1.249***	−0.579	−0.567	−0.558
	(0.39)	(0.39)	(0.39)	(0.41)	(0.41)	(0.41)
Opacity	1.577*	1.594*	1.675**	1.460*	1.475*	1.542*
	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)
Firm Reputation	−0.524	−0.917**	−0.881**	−0.573	−0.917**	−0.886**
	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)
Firm Size	−1.745***	−1.771***	−1.778***	−1.714***	−1.737***	−1.742***
	(0.27)	(0.27)	(0.27)	(0.27)	(0.26)	(0.26)
Profitability	−1.386	−1.005	−1.134	−0.941	−0.608	−0.713
	(4.16)	(4.16)	(4.17)	(4.10)	(4.10)	(4.10)
Tangibility	−2.054	−2.167	−2.111	−2.169	−2.267	−2.221
	(1.41)	(1.41)	(1.41)	(1.41)	(1.41)	(1.41)
Leverage	−4.928***	−4.788**	−4.846**	−4.735**	−4.609**	−4.656**
	(1.89)	(1.89)	(1.89)	(1.88)	(1.87)	(1.87)
Financial Distress	1.339	1.375	1.334	1.488*	1.520*	1.487*
	(0.86)	(0.86)	(0.86)	(0.86)	(0.86)	(0.86)
ln(*Loan Amount*)	−6.807***	−6.811***	−6.819***	−6.658***	−6.662***	−6.667***
	(0.35)	(0.35)	(0.35)	(0.34)	(0.34)	(0.34)
ln(*Loan Maturity*)	−5.034***	−5.011***	−5.007***	−4.969***	−4.948***	−4.944***
	(0.56)	(0.57)	(0.57)	(0.56)	(0.56)	(0.56)
Loan-type dummies	YES	YES	YES	YES	YES	YES
Loan-purpose dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES
R^2	0.413	0.412	0.412	0.419	0.418	0.418
N	7,659	7,659	7,659	7,659	7,659	7,659

that the previously observed pattern continues to hold mainly in the sense that the continuous measure of lending relationships (*Relation Number*) is negatively and statistically significantly related to the retained share. It thus appears that the greater the intensity of lending relationship involvements with borrowers, the more likely that loans are syndicated out. One may explain this result along the lines that repeated interactions over time (i.e., long-lasting relationships) could encourage borrowers to divulge more proprietary information. One could also envision the quality of information generated to be a function of repeated interactions, which permits the accumulation and utilization of the proprietary information. This signals the lead arranger's monitoring-cost advantage to participants.

It could also be argued that repeated interactions provide lead arrangers with punishment mechanisms that instill an interest in firms to develop self-disciplining behavior. The theoretical result in the finance literature shows that credible penalties make defaults less of a problem (see, e.g., Allen, 1981). The idea is that a borrower's current misbehavior has consequences for its access to credit in the future from the same lenders; bad behavior might not go without being penalized. One form of penalty may be charging a higher interest rate. That is, currently poorly performing borrowers face higher interest rates in future loans they obtain from the same lenders (Stiglitz and Weiss, 1983). The other form of penalty may be a termination threat (Stiglitz and Weiss, 1983; Bolton and Scharfstein, 1990). Lenders may terminate a future loan contract to firms that perform poorly during the current period. Thus, repeated interactions make it possible for lead arrangers to impute premiums in the form of punishments so that borrowers that value more future relationships—i.e., firms that assess the benefit from a current cheating to be less than the cost of losing future relationships—would self-restrain. Thus, these punishment mechanisms solve one layer of agency conflicts in loan syndication, which facilitates lead arrangers' syndication activities.

The additional analysis is continued in the third column by regressing the retained share on the proportion of the amount of syndicated loans that the lead arranger has organized for the firm. The reported result shows that *Relation Amount* is also negatively and statistically significantly related to the percentage retained. This amount-based measure also provides further evidence of how lending relationships influence syndication activities. Specifically, the inversely estimated association between the amount-based measure of lending relationships and the retained share may suggest that lenders arranging loans for firms for whom they have previously provided large amounts of loans retain a smaller share in the current loan. This result follows perhaps because borrowers tend to disclose more proprietary information or place more value on their relationships with lead arrangers on whom they heavily depend in terms of loan size.

In the three remaining columns of Table 3, this paper reruns the analysis in the first three columns with a different measure of lead arrangers' reputation: substituting *Top 3 Arranger* with *Top 10 Arranger*. As one would expect, all the coefficients of the measures of lending relationships are negatively and

statistically significantly estimated. Thus, except for a small reduction in the estimated magnitudes, the conclusion drawn above remains unchanged.

The control variables have the expected signs, and most of their coefficients are also statistically significant. For example, more reputable and larger lead arrangers retain smaller shares. Lead arrangers organizing syndicated loans for informationally opaque firms (*Opacity*) retain more of the loans. But when the borrowing firm is reputable (*Firm Reputation*), lead arrangers retain less of the loan. In line with the argument based on agency theory that lenders use loan terms—specifically, smaller size and shorter maturities—to control firms that suffer from greater agency problems, the lead arrangers' retained share decreases with loan size and maturity.

4.3 *Endogeneity Problems*

A potential concern with the result presented above is endogenous relationship formation. It is plausible that the decision to borrow from a previous relationship lead arranger or to lend to a previous relationship borrower may not be made at random, but endogenously chosen. If uncontrolled observable and unobservable characteristics are associated with the lead arranger's choice and also determine the share retained by the lead arranger, the OLS regression may confound the effect of lending relationships with the effect of these uncontrolled covariates. Thus, a robustness check needs to be performed to determine whether the potential nonrandomness of the lead arranger–firm matching drives the result and invalidates the inference about the impact of lending relationships on the retained share drawn from the OLS analysis. This is the objective of the next sections.

4.3.1 *Mahalanobis and Propensity Score Matching*

One alternative econometric method often used in observational studies that can help this study analyze situations where financing decisions are made endogenously is the matching method (Heckman et al., 1997; Imbens and Wooldridge, 2009). The matching method addresses the endogeneity concern by identifying a set of control groups (i.e., loan facilities provided by nonrelationship lead arrangers in this study) that best match the treated group (i.e., loan facilities provided by relationship lead arrangers in this paper). After identifying the closest comparison group, the matching method computes the differences in the retained share (i.e., the outcome variable) between the matched relationship and nonrelationship loans. Since the treated and control groups are similar, any difference in the retained share is presumed to be the effect of the variable of interest, the lending relationship in this case.

The current study uses several different methods proposed by the literature to identify a control group. One such method is covariate-based matching. The basic idea of this method is to use all observable covariates jointly to select a set of nonrelationship loans (the control group) whose covariate values are similar to those of the relationship loans (the treated group). However, comparison on multiple dimensions (i.e., the use of several covariates)

may lead to poor distributional overlap and introduce bias. To avoid such potential bias, the literature suggests using Mahalanobis matching (Cochran and Rubin, 1973; Rubin, 1980). In this matching framework, control groups are chosen on the basis of their Mahalanobis distance from the treated group, given as

$$MD_{l_{r,i}l_{nr,i}} = (X_{l_{r,i}} - X_{l_{nr,j}})' \sum^{-1} (X_{l_{r,i}} - X_{l_{nr,j}}) \quad (7)$$

where $MD_{l_{r,i}l_{nr,i}}$ is the Mahalanobis distance between a relationship loan $l_{r,j}$ and a nonrelationship loan $l_{nr,j}$. $X_{l_{r,i}}$ and $X_{l_{nr,j}}$ are the vectors of observed covariates corresponding to relationship and nonrelationship loans, respectively. $\sum$ is the sample variance–covariance matrix. For each relationship loan, this study selects a control group of nonrelationship loans that minimizes the Mahalanobis distance matrix. The literature, however, has shown that the Mahalanobis-distance-based matching is susceptible to bias with a large number of covariates (Gu and Rosenbaum, 1993).

To test the sensitivity of the results, this study uses an alternative method to select a control group: propensity-score matching (PSM; Rosenbaum and Rubin, 1983; Abadie and Imbens, 2006, 2008). This approach mitigates the above bias problem by matching on a function of the covariates instead of on the covariates themselves. That is, it solves the problem by reducing comparability to a single dimension (the propensity score). A unidimensional comparison (i.e., a scalar function of the covariates) offers attractive properties in that the scalar facilitates matching and eliminates the potential curse of the dimensionality problem associated with covariate-based matching. PSM chooses a control group based on the probability of being included in the treated group. In this study, this means that each relationship loan is matched to a set of nonrelationship loans that have similar propensity for being syndicated by relationship lead arrangers. To apply the PSM, this study first runs a regression model:

$$\Pr(\textit{Relation Binary}_{i,j,l} = 1) = \alpha_0 + \alpha_1 X_{i,t-1} + \alpha_2 X_{j,t-1} + \alpha_3 X_l + \mu_i, \quad (8)$$

where $\Pr(\cdot)$ denotes a probit model used to estimate the probability that a facility is syndicated by a relationship lead arranger. The central issue in the PSM is the choice of the covariates used to estimate the propensity scores. Several studies suggest including variables that affect both the outcome and treatment variables in the estimation of the propensity scores (see, e.g., Rubin and Thomas, 1996; Heckman et al., 1998; Marco and Kopeinig, 2008). Accordingly, the above model uses lead arranger ($X_{i,t-1}$), borrower ($X_{j,t-1}$) and loan (X_l) characteristics that are presumed to have potential to affect the retained share and the probability of the loan being a relationship loan. The model also controls for the purpose of the loan, the type of the loan, the one-digit borrower industry and the year fixed effects.

There are several standard estimators for implementing this matching technique. This study focuses on the two commonly used in empirical studies. One widely used estimator is *nearest neighbor* matching (Cochran and Rubin, 1973; Rubin, 1973). For each treated unit, this estimator finds the nearest neighbor in the control group to generate a matched pair. In this study, this estimator calculates the difference in the retained share between a relationship loan

and n nonrelationship loans for which the Mahalanobis distance matrix is at its minimal, or that have the closest propensity score. To get correct standard errors for the nearest-neighbor estimator, this study uses the Abadie and Imbens (2006) variance estimator.

The other commonly used estimator is *Kernel* matching (Heckman et al., 1997, 1998). In this study, the kernel calculates the difference in the retained share between a relationship loan and the weighted average of the retained share in nonrelationship loans. The weights are assigned such that the nonrelationship loans that have the closest propensity scores to the given relationship loan receive a higher weight. The *Epanechnikov* kernel uses only nonrelationship loans whose propensity scores lie within a given bandwidth while the *Gaussian* kernel uses all nonrelationship loans to calculate the weighted average. Correct standard errors for the kernel estimators are obtained by using bootstrapping with 100 replications.[6] Furthermore, for the Epanechnikov estimator, this study uses a propensity-score bandwidth of $h = 0.01$.

The matching-analysis results show that relationship loans do have lower retained share than similar nonrelationship loans (Table 4). The analysis first undertakes *one-to-one* matching based on the Mahalanobis distance metric. As can be noted from Column (3) (the difference in the retained share), the one-to-one estimator shows that the average treatment effect on the treatment loans (*ATT*) is -1.176. One can note from Table 4 that with increasing Mahalanobis distance (i.e., using more nonrelationship loans in the control group), the retained share in relationship loans continued to be consistently lower than the retained share in nonrelationship loans.

The retained-share difference is also supported when matching is based on the propensity score. For example, the one-to-one estimator shows that the *ATT* is -1.784. Relaxing the restriction on the number of nonrelationship loans used as a control group does not affect the result. For example, the nearest neighbor estimator reports the *ATT* of -2.001 for $n = 10$ and -2.075 for $n = 50$. Using the Epanechnikov kernel estimator—excluding nonrelationship loans for which the difference in propensity score between the matched pair exceeds the given propensity score bandwidth—the matching analysis yields an *ATT* of -2.059. Extending the facilities included in the control group to all nonrelationship loans, the Gaussian kernel estimator generates an *ATT* of -2.096. Thus, it appears from this analysis that after controlling for selection on observables, lending relationships continue to have the retained-share-reducing effect.

4.3.2 *Binary Endogenous Treatment Models*

While the matching method employed in the previous section controls for a bias stemming from selection on observable factors, the endogeneity concern may still exist perhaps because the financing decision may be based on unobservable factors. An alternative econometric method that can help to control for bias stemming from selection on unobservable (and observable) factors

[6] This study uses the STATA code PSMATCH2 (Leuven and Sianesi, 2003, version 4.0.11, 22 October 2014) to implement the PSM technique.

Table 4. Mahalanobis and Propensity Score Matching

This table reports results from the Mahalanobis and PSM techniques. The nearest neighbor estimator calculates the difference in the retained share between each relationship loan and n nonrelationship loans that have the closest Mahalanobis distance or with the nearest propensity scores. The Epanechnikov estimator uses nonrelationship loans with the propensity scores within the bandwidth $h = 0.01$. The Gaussian estimator uses all nonrelationship loans to calculate the difference in the retained share. *ATT* denotes the average treatment on the treated loan. The t-test of significance is represented as: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Treated obs.	Untreated obs.	*ATT*
	(1)	(2)	(3)
Panel A: Mahalanobis distance matching			
One-to-one	4,521	3,139	-1.176^{***}
			(.45)
Nearest neighbor	4,521	3,139	-1.812^{***}
($n = 10$)			(.40)
Nearest neighbor	4,521	3,139	-2.713^{***}
($n = 50$)			(.42)
Panel B: Propensity score matching			
One-to-one	4,504	3,139	-1.784^{***}
			(.67)
Nearest neighbor	4,504	3,139	-2.001^{***}
($n = 10$)			(.53)
Nearest neighbor	4,504	3,139	-2.075^{***}
($n = 50$)			(.51)
Epanechnikov	4,469	3,139	-2.059^{***}
			(.52)
Gaussian	4,504	3,139	-2.096^{***}
			(.51)

is the binary treatment model (Heckman, 1979; Maddala, 1983; Wooldridge, 2002). The basic idea behind this method involves estimating a system of equations in which the outcome variable equation (the retained-share equation in this study) is augmented with an additional binary endogenous treatment-variable equation (a lending-relationship-formation equation in the current study). The specification of such an endogenous-regression framework is given by the following system of equations.

$$\textit{Retained Share}_{i,j,l} = \beta_0 + \beta_1 \textit{Relation Binary}_{i,j,l} + \mathrm{Z}_1^{'}\delta + \epsilon_i \tag{9a}$$

$$\textit{Relation Binary}*_{i,j,l} = \alpha_0 + \mathrm{Z}^{'}\gamma + u_i \tag{9b}$$

The estimation technique employed with this system of equations solves the endogeneity problem associated with the arranger–borrower relationship formation by allowing the residuals in the retained-share equation (9a) and the lending-relationships equation (9b) to be correlated. That is, $\mathrm{cov}(\varepsilon_i, u_i) = \rho \neq 0$. The relationship equation is implemented as a probit model, where the dependent variable ($\textit{Relation Binary}^{*}_{i,j,l}$) is a dummy that identifies whether the loan is syndicated by a relationship lead arranger. The vector $Z = (Z_1, Z_2)$ in equations (9a) and (9b) stands for observable factors that influence a lead arranger's choice. This vector includes a set of variables (Z_1) that may determine the lead arranger's share and may also affect lead-arranger–borrower matching. This vector also includes a variable (Z_2) that affects lending-relationship formation, but does not affect the lead arrangers' retained share. This variable serves as an exclusion restriction for better identification purposes.

This study uses the geographic distance measured in kilometers between the lead arranger and the borrower of a loan (Section 3) as the instrument (Z_2). The choice of this variable is motivated by the standard argument in the relationship literature that a relationship-based lending technology requires the collection of a borrower's proprietary information. As noted by Petersen and Rajan (2002) and Dass and Massa (2011), geographic proximity considerably reduces the costs associated with the collection and processing of the borrower's soft information. One can thus expect geographic proximity to increase the likelihood of forming a lending relationship—i.e., affecting the lead-arranger–borrower matching. Geographic distance is, however, unlikely to directly affect the share retained by lead arrangers. This argument rationalizes the use of geographic distance as a preferred instrumenting technique in the empirical literature (see, e.g., Bharath et al., 2011; Aslan, 2015).

The binary measure, $Relation\ Binary_{i,j,l}$, in the retained share equation (9a) is modeled as an outcome of an unobserved latent variable, $Relation\ Binary^{*}_{i,j,l}$. Since whether a loan is syndicated by a relationship or nonrelationship lead arranger is observable, the observed binary relationship outcome variable is modeled as

$$Relation\ Binary_{i,j,l} = \begin{cases} 1, & Relation\ Binary^{*}_{i,j,l} > 0 \\ 0, & \text{otherwise.} \end{cases}$$

The literature offers different methods by which the system of equations given above is estimated. One such method is called *Probit-2SLS*. This method requires applying a probit model to a relationship formation and then calculating the predicted probability of a lead arranger choice, which is later used as an instrument for a relationship formation to get a new fitted value. Finally, this method requires regressing the retained share on a new predicted probability of relationship formation. The other method is called *Probit-OLS*, where a probit model is applied to a relationship formation and then the predicted probability is calculated. In the second stage, the procedure requires running an OLS regression of the retained share on the predicted probability. The third method is called *Heckit*, a Heckman two-step selection model. All these models are estimated using a new STATA command for estimating binary endogenous treatment models called *ivtreatreg* (Cerulli, 2014).

Table 5 presents the results from the estimation of the binary endogenous treatment models. Estimates from the first stage, in which a probit model of a lending-relationship formation is estimated, are reported in Column (1). Interestingly, the estimated coefficient of the geographic distance is negative and also statistically significant at the 1% level. This result conforms with the prediction from the theoretical literature and the evidence presented in prior studies that firms in closer proximity to lenders have a greater likelihood of forming a lending relationship. The current result presents the flip side of this argument: A greater the distance reduces the chances of forming lending relationships. The analysis also shows that while reputable lead arrangers are more likely to form lending relationships, larger lead arrangers are less likely to engage in lending relationships. Additionally, while firms that are larger and more reputable are more likely to borrow from relationship lead

Table 5. Estimation of Binary Endogenous Treatment Models

This table presents the results of the effect of lending relationships on the retained share obtained from binary endogenous treatment models. Column (1) reports results from the probit first stage of relationship formation. Column (2) estimates the retained share with Probit-2SLS. Column (3) runs the retained share using the Probit-OLS estimation, and column (4) reports result from the second-stage Heckit. *Distance* is the spherical distance in kilometers between the lead arranger's and borrower's headquarters. *Relation Binary* identifies whether a loan is syndicated by a relationship lead arranger. All other variables are defined as in the Appendix. Number of observations in parenthesis is for the first-stage Heckit model. Standard errors are heteroskedasticity robust and clustered at the borrower level. The t-test of significance is: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Relationship formation	*Retained Share*		
	First stage	Probit-2SLS	Probit-OLS	Heckit
	(1)	(2)	(3)	(4)
$\log(1 + Distance)$	−0.036***			
	(0.01)			
Relation Binary		−12.934**	−14.737**	−14.348**
		(6.28)	(6.83)	(6.27)
Top 3 Arranger	0.351***	−2.141**	−1.914**	−1.967**
	(0.04)	(0.87)	(0.92)	(0.92)
Arranger Size	−0.058***	−1.612***	−1.647***	−1.646***
	(0.02)	(0.35)	(0.35)	(0.31)
Opacity	−0.053	1.160*	1.109*	1.131*
	(0.04)	(0.65)	(0.63)	(0.63)
Firm Reputation	0.375***	1.007	1.245	1.196
	(0.02)	(0.87)	(0.93)	(0.90)
Firm Size	0.038***	−1.479***	−1.453***	−1.462***
	(0.01)	(0.22)	(0.22)	(0.21)
Profitability	−0.182	−0.758	−0.782	−0.823
	(0.22)	(3.37)	(3.31)	(3.07)
Tangibility	0.122	−1.661	−1.612	−1.618
	(0.08)	(1.16)	(1.13)	(1.18)
Leverage	−0.169*	−5.575***	−5.650***	−5.662***
	(0.10)	(1.59)	(1.53)	(1.44)
Financial Distress	−0.012	1.576**	1.554**	1.575**
	(0.05)	(0.69)	(0.67)	(0.67)
$\ln(Loan\ Amount)$	0.023	−6.846***	−6.838***	−6.833***
	(0.02)	(0.32)	(0.31)	(0.25)
$\ln(Loan\ Maturity)$	−0.023	−5.045***	−5.047***	−5.057***
	(0.03)	(0.53)	(0.52)	(0.42)
Loan-type dummies	YES	YES	YES	YES
Loan-purpose dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Lambda				7.312*
				(3.82)
McFadden's pseudo R^2	0.084			
R^2			0.760	
N	6,982(6,983)	6,982	6,982	6,983

arrangers, firms with greater leverage are less likely to be involved in relationships.

The binary endogenous treatment model estimated by Probit-2SLS in Column (2) shows that the coefficient of lending relationship is -12.93, and that it is distinct from zero at the 5% level. The third column presents the effect of lending relationship on the retained share as estimated by Probit-OLS. The estimated coefficient is -14.74 and it is significant at the 5% level. The fourth column provides a two-stage Heckman estimate. The reported coefficient of lending relationship is -14.35, which is significantly different from zero at the

5% level. These results suggest that, even after controlling for endogeneity, establishing lending relationship is associated with a significant reduction in the retained share. However, the estimation of the binary endogenous treatment models produces relationship coefficients with larger magnitude in comparison to the OLS estimates. As can be seen, these coefficients are approximately a factor of six larger.[7] This large increase might be due to the predicted relationship formation not being a very good fit for *Relation Binary*, as is evident from low McFadden's pseudo R^2.[8] Since OLS yields conservative results, it is used through the remaining sections of this paper.

4.4 *Variation by Lead-Arranger Reputation and Size*

The theoretical discussion presented in Section 2 maintained that the share retained by more reputable lead arrangers is less affected by lending relationships than that retained by less reputable lead arrangers. To investigate this theoretical speculation, the measures of lending relationships are allowed to interact with the lead arrangers' reputation in the baseline regression model. The results of the analysis of the variation of the effect of lending relationships on the retained share by the lead arranger's reputation reported in Table 6 support the above claim.

As the present finding shows, the reduction in the retained share is largely confined to syndicated arrangements with less reputable lead arrangers. This finding is evident from the result (Column (1)) using the interaction term between the binary measure of lending relationships and the top-tier dummy, *Relation Binary* $\times$ *Top 3 Arranger*, as the main variable of interest. As before, the coefficient on *Relation Binary* remains negative and statistically significant, but the estimated interaction term is positive and statistically significant. This result is in conformity with the reputation hypothesis. Further analyses are conducted in Columns (2) and (3), which repeat the exercise in the first column replacing the binary measure with measures that capture the intensity of lending relationships. As depicted in these columns, while *Relation Number* and *Relation Amount* have negative and statistically significant coefficients, the terms for their interactions with reputation, *Relation Number* $\times$ *Top 3 Arranger* and *Relation Amount* $\times$ *Top 3 Arranger*, are positive and statistically significant. These regression analyses suggest that a reduction in the retained share, caused by a prior lending relationship, is concentrated in syndicates headed by less reputable lead arrangers.

This result suggests that the effect of lending relationships on the retained share depends on the degree of the lead arranger's reputation. That means, relationships have a varying effect in the sense that there is a level of a lead arranger's reputation beyond which relationships have a smaller retained-share

[7] Other studies have also found a larger increase in coefficient estimates. For example, Bharath et al. (2011) estimate the impact of relationships on loan spreads using IV regression. Instrumenting relationship with distance, they observe the coefficient for relationships increases approximately 5.1 times compared to OLS estimates.

[8] According to McFadden (1974, 1978), values for pseudo R^2 ranging from 0.2 to 0.4 represent very good model fit.

Table 6. Variation by Lead Arrangers' Reputation and Size

This table reports regression results when relationship measures are allowed to interact with the lead arranger's reputation and size. Columns (1)–(3) run the model using interactions between relationship measures and *Top 3 Arranger* where *Top 3 Arranger* identifies lead arrangers in the top 3% in terms of their market share in the syndicated-loan market. Columns (4)–(6) repeat the analysis using the interaction between relationship measures and *Small Arranger* where *Small Arranger* identifies lead arrangers whose total assets are below the sample median. All other variables are defined as in the Appendix. Standard errors are heteroskedasticity robust and clustered at the borrower level. The t-test of significance is: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Retained Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Relation Binary × *Top 3 Arranger*	3.973***					
	(0.99)					
Relation Number × *Top 3 Arranger*		4.153***				
		(1.14)				
Relation Amount × *Top 3 Arranger*			3.105**			
			(1.23)			
Relation Binary × *Small Arranger*				−2.482**		
				(1.02)		
Relation Number × *Small Arranger*					−2.788**	
					(1.18)	
Relation Amount × *Small Arranger*						−3.210**
						(1.31)
Relation Binary	−3.634***			−1.156		
	(0.67)			(0.72)		
Relation Number		−3.612***			−0.785	
		(0.81)			(0.83)	
Relation Amount			−2.954***			−0.103
			(0.84)			(1.01)
Top 3 Arranger	−6.179***	−5.501***	−4.980***	−3.657***	−3.751***	−3.784***
	(0.85)	(0.76)	(0.76)	(0.54)	(0.54)	(0.54)
Small Arranger				0.941	0.540	0.703
				(1.48)	(1.41)	(1.43)
Arranger Size	−1.239***	−1.256***	−1.247***	−1.379**	−1.406***	−1.372**
	(0.39)	(0.39)	(0.39)	(0.54)	(0.54)	(0.55)
Opacity	1.650**	1.670**	1.723**	1.597*	1.600*	1.648**
	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)
Firm Reputation	−0.555	−0.918**	−0.879**	−0.544	−0.936**	−0.888**
	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)
Firm Size	−1.759***	−1.774***	−1.780***	−1.748***	−1.774***	−1.772***
	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)
Profitability	−1.214	−1.058	−1.128	−1.260	−0.968	−1.106
	(4.14)	(4.15)	(4.16)	(4.16)	(4.16)	(4.16)
Tangibility	−1.992	−2.087	−2.068	−1.993	−2.084	−2.041
	(1.40)	(1.40)	(1.41)	(1.41)	(1.41)	(1.41)
Leverage	−4.897***	−4.846**	−4.890***	−4.960***	−4.762**	−4.812**
	(1.89)	(1.89)	(1.89)	(1.89)	(1.89)	(1.89)
Financial Distress	1.316	1.367	1.315	1.320	1.345	1.302
	(0.86)	(0.86)	(0.86)	(0.86)	(0.86)	(0.86)
ln(*Loan Amount*)	−6.804***	−6.816***	−6.817***	−6.815***	−6.819***	−6.821***
	(0.35)	(0.35)	(0.35)	(0.35)	(0.35)	(0.35)
ln(*Loan Maturity*)	−5.048***	−5.024***	−5.019***	−5.038***	−5.016***	−5.018***
	(0.56)	(0.57)	(0.57)	(0.56)	(0.56)	(0.56)
Loan-type dummies	YES	YES	YES	YES	YES	YES
Loan-purpose dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES
R^2	0.415	0.413	0.413	0.414	0.413	0.413
N	7,659	7,659	7,659	7,659	7,659	7,659

effect. The concentration of the reduction of the retained share at the bottom of the lead arrangers' reputational spectrum suggests that reputation makes the importance of establishing relationships less relevant. This finding seems to support the idea that the impact of a relationship is more important in contracts in which lead–participant agency conflicts are high, and that as agency-problem-mitigation instruments, lead arrangers' reputation and relationships are not complementary.

The available evidence shows that the syndicated-loan market is dominated by large banks (see, e.g., Ross, 2010). This evidence may be construed as reflecting the concern on the part of syndicate participants about the small lead arrangers' screening and monitoring ability. Small lead arrangers may not provide enough screening and monitoring to convince participants to take part in the loans they arrange. Since relationships can facilitate screening and monitoring, one may thus ask whether establishing a lending relationship enables small lead arrangers to persuade participants that they can offer the necessary screening and monitoring. This section is thus explores whether the effect of lending relationships varies enough that the reduction in the retained share is more pronounced for small lead arrangers. To examine this idea, lending relationships are allowed to interact with a dichotomized variable that captures lead arrangers' size in the regression of the retained-share equation. The binary variable *Small Arranger* takes the value one if a lead arranger has less than the median total assets. In syndicated arrangements in which multiple lead arrangers are involved, this paper adopts the size of the lead arranger with the largest retained share.

Consistent with a size-based interpretation, the analysis suggests that the effect is stronger for small lead arrangers, as can be seen from the results reported in the last three columns of Table 5. These columns show that the estimated coefficients on the measures of lending relationship continued to be significant and negative. Interestingly, the estimated coefficients of the interaction term *Relation Binary* $\times$ *Small Arranger* in Column (4), *Relation Number* $\times$ *Small Arranger* in Column(5) and *Relation Amount* $\times$ *Small Arranger* in Column (6) are also negative and significantly different from zero. This result thus clearly shows that lending relationships have more pronounced effects for small lead arrangers. On the basis of this result, one can conclude that small lead arrangers with relationships do not need to retain a larger share of the loans to these firms to induce participants to join in the loan.

4.5 *Relationship Effects: Opaque versus Transparent Firm*

The evidence to this point suggests that lead arrangers can build lending relationships to reduce the share they must retain. The theoretical discussion in Section 2, however, holds the argument that participants are potentially exposed to different degrees of agency conflicts based on the borrowing firm's information environment. More specifically, they may be subject to more severe agency conflicts in a sample of contractual arrangements with informationally opaque than transparent firms. This section thus tests whether the effect of lending relationships on the retained share differs between loan con-

tracts with opaque and transparent firms. To this end, the syndicate arrangements in the sample are split into two groups on the basis of whether, or not, the firm has an S&P credit rating. *Opacity* identifies loan contracts with firms that do not have S&P credit ratings and is used to construct two interaction terms, *Relation Binary* $\times$ *Opacity* and *Relation Binary* $\times$ $(1 - Opacity)$. The applied estimation technique then involves running a regression model in which the two interaction terms are added as additional regressors and then testing the equality of the interaction coefficients.[9] Table 7 presents the estimation results.

The analysis suggests that lending relationships have the retained-share-reducing effect whether contracts are made with informationally opaque or transparent firms. This result is presented in Column (1) where the estimated coefficients of the two interaction terms are negative and statistically significant at the 1% level. Thus, the analysis suggests that involvement in lending relationships is associated with a reduction in the share held by lead arrangers organizing syndicated loans for both informationally opaque and transparent firms. The test of the equality of the coefficients on the two interaction terms, Δ interaction coeff, further shows that the two interaction coefficients are not statistically significantly different from one another. On the basis of this insignificant equality test of the interaction coefficients, one cannot reject the null hypothesis that a negative retained-share effect is equal in loan contracts with opaque and transparent firms.

Additional evidence on the causal invariance (i.e., the impact of relationships remains invariant between opaque and transparent firms) is also found by examining whether the effect of lending relationships on the retained share varies between syndicate arrangements made with small and large firms. This analysis is conducted by splitting syndicated loans in the sample into two groups based on the borrower's sales at close and constructing a binary variable, *Small Firm*, that identifies syndicate arrangements whose borrowers have below the sample median values of sales at close. The estimation technique then involves running a retained share model by adding to a regression specification the interaction terms, *Relation Binary* $\times$ *Small Firm* and *Relation Binary* $\times$ $(1 - Small\ Firm)$, as additional independent variables. As shown in Column (2), both the interaction terms are significant and negatively related to the retained share. This result suggests that establishing lending relationships also lead to a smaller retained share for lead arrangers organizing syndicated loans for both small and large firms. Again, the test for interaction-coefficient equality, Δ interaction coeff, shows that the coefficients on the two interaction terms do not significantly differ from each other.

The analysis of whether the retained-share-reducing effect varies between syndicated loans whose borrowing firms have speculative- and nonspeculative-grade credit ratings provides additional evidence that the impact of lending relationships is causally invariant. This analysis is performed by estimating

[9] I also investigated whether the results are sensitive to different estimation methods. In unreported results, I estimated two separate regressions using samples of syndicated-loan arrangements with opaque and transparent firms. The test of the equality of the coefficients on the *Relation Binary* in the two models produces very similar results to those reported here.

Table 7. Relationship Effects: Opaque versus Transparent Firm

This table presents results from the estimation of whether the impact of lending relationships on the retained share varies between syndicate arrangements with opaque and transparent firms. *Relation Binary* measures whether a previous lending relationship exists between the lead arranger and the borrower. *Opacity* identifies syndicate arrangements made with firms that do not have S&P credit ratings. *Small Firm* identifies contracts made with firms that have below the sample median sales at close. *Speculative Grade* identifies syndicated loans made to firms with S&P credit ratings between BB^+ and C. The Δ interaction coeff presents results of tests of the differences between the interaction terms. All other variables are defined as in the Appendix. In all regressions, standard errors are heteroskedasticity robust and clustered at the firm level. The t-test of significance is: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Retained Share		
	(1)	(2)	(3)
Relation Binary $\times$ *Opacity*	-2.578^{***}		
	(0.72)		
Relation Binary $\times (1 -$ *Opacity*$)$	-2.231^{***}		
	(0.73)		
Relation Binary $\times$ *Small Firm*		-1.858^{**}	
		(0.80)	
Relation Binary $\times (1 -$ *Small Firm*$)$		-2.898^{***}	
		(0.58)	
Relation Binary $\times$ *Speculative Grade*			-3.471^{***}
			(1.09)
Relation Binary $\times (1 -$ *Speculative Grade*$)$			-2.233^{***}
			(0.53)
Top 3 Arranger	-3.637^{***}	-3.596^{***}	-3.618^{***}
	(0.54)	(0.54)	(0.54)
Arranger Size	-1.257^{***}	-1.245^{***}	-1.257^{***}
	(0.39)	(0.39)	(0.39)
Opacity	1.771^{*}	1.541^{*}	1.231
	(1.05)	(0.82)	(0.86)
Firm Reputation	-0.528	-0.529	-0.498
	(0.44)	(0.44)	(0.44)
Firm Size	-1.745^{***}	-1.615^{***}	-1.774^{***}
	(0.27)	(0.29)	(0.27)
Profitability	-1.381	-1.509	-1.519
	(4.16)	(4.15)	(4.16)
Tangibility	-2.058	-2.048	-2.075
	(1.41)	(1.41)	(1.41)
Leverage	-4.921^{***}	-4.911^{***}	-4.703^{**}
	(1.89)	(1.89)	(1.92)
Financial Distress	1.347	1.329	1.328
	(0.86)	(0.86)	(0.86)
ln(*Loan Amount*)	-6.807^{***}	-6.802^{***}	-6.819^{***}
	(0.35)	(0.35)	(0.35)
ln(*Loan Maturity*)	-5.034^{***}	-5.030^{***}	-5.017^{***}
	(0.56)	(0.56)	(0.56)
Δ interaction coeff	-0.347	1.040	-1.238
	(1.02)	(0.92)	(1.08)
Loan-type dummies	YES	YES	YES
Loan-purpose dummies	YES	YES	YES
Industry dummies	YES	YES	YES
Year dummies	YES	YES	YES
R^2	0.413	0.413	0.413
N	7,659	7,659	7,659

a retained-share model that includes the interaction terms *Relation Binary* $\times$ *Speculative* and *Relation Binary* $\times (1 -$ *Speculative*$)$ as additional regressors. The binary variable *Speculative* identifies contractual arrangements made with borrowing firms that have speculative-grade ratings, S&P credit ratings between

BB^+ and C. The reported result shows that both interaction terms have negative and statistically significant coefficients. This result shows that a lead arranger's lending relationship with a firm decreases the share it retains in a loan even when the loan is made to a firm with speculative-grade credit ratings. The interaction-coefficient comparability test, Δ interaction coeff, shows that the coefficients are not statistically significantly different from one another.

4.6 *Relationship Effects: Covenanted versus Uncovenanted Loans*

Two competing predictions were also raised in the theoretical discussion presented in Section 2 about the effect of lending relationships on the lead arrangers' retained share in loan contracts that include covenants. One prediction suggests that exposure to agency conflicts is less in the sample of syndicated loan contracts that impose covenants. This prediction follows from the perspective that covenants limit borrowers' action sets, so participants should be exposed to less serious agency conflicts. The other prediction posits that exposure to severe agency problems are high in the sample of loan contracts that include covenants. This is because in contracts that include covenants, the borrower's compliance with the imposed restrictions requires monitoring, and hence a high potential for shirking.

To test these competing predictions, this section examines whether the effect of lending relationships on the retained share varies between covenanted and uncovenanted loans. Towards this end, syndicated loans in the sample are divided into two facility groups: those facilities in which covenants are included and those facilities in which covenants are not included. Using the dummy variable *Covenant* to identify loan contracts that impose covenants, the study constructs two interaction terms, *Relation Binary* $\times$ *Covenant* and *Relation Binary* $\times$ $(1 - \textit{Covenant})$. The adopted estimation method involves running a retained-share model that includes the two interaction terms and then testing the comparability of the interaction coefficients.[10] Table 8 reports the estimation results.

The analysis indicates that lending relationships have stronger retained-share reducing effects in loan contracts that include covenants. As is evident from an inspection of the results reported in Column (1), while the estimated coefficient of the interaction term *Relation Binary* $\times$ *Covenant* is significantly negative, the estimated coefficient on the interaction term *Relation Binary* $\times$ $(1 - \textit{Covenant})$ is not statistically significantly different from zero. This result suggests that lending relationships serve as an important factor in terms of reducing the retained share in loan contracts that include covenants. The test of the comparison of the coefficients of the two interaction terms, Δ interaction coeff, rejects the null hypothesis of the equality of the coefficients. This test suggests that the retained-share-reducing effect of a lending relationship is

[10] In unreported results, I split the sample into two on the basis of whether loan contracts include covenants and ran two separate regressions using covenanted and uncovenanted loans. The coefficients on *Relation Binary* in the two regression models were significantly different.

Table 8. Relationship Effects: Covenanted versus Uncovenanted Loans

This table provides results from the estimation of whether the effect of relationships on the retained share varies between covenanted and uncovenanted loans. Columns (1) and (2) report the coefficient estimates for the full sample. Columns (3) repeats the analysis for loan contracts made with firms that have S&P credit ratings between AAA and BBB^{-}, whereas Columns (4) and (5) report the results when the firms have credit ratings between BB^{+} and C. *Covenant* and *P.Covenant* identify contracts that include any covenants and performance covenants, respectively. Δ interaction coeff presents results of tests of the differences between the interaction terms. All other variables are defined as in the Appendix. In all regressions, standard errors are heteroskedasticity robust and clustered at the firm level. The t-test of significance is: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Retained Share				
	Full sample		High S&P ratings	Low S&P ratings	
	(1)	(2)	(3)	(4)	[5]
Relation Binary × *Covenant*	−3.130***		−2.220***	−6.081***	
	(0.57)		(0.68)	(1.42)	
Relation Binary × (1 − *Covenant*)	−0.733		−0.390	−0.065	
	(0.78)		(0.89)	(3.71)	
Relation Binary × *P.Covenant*		−3.348***			−6.398***
		(0.60)			(1.43)
Relation Binary × (1 − *P.Covenant*)		−1.028			−0.209
		(0.65)			(3.02)
Top 3 Arranger	−3.661***	−3.653***	−1.147**	−4.156***	−4.198***
	(0.54)	(0.54)	(0.58)	(1.51)	(1.52)
Arranger Size	−1.235***	−1.250***	−2.190***	−1.780*	−1.706*
	(0.39)	(0.39)	(0.60)	(0.93)	(0.93)
Opacity	1.563*	1.705**	0.000	0.000	0.000
	(0.82)	(0.82)	(.)	(.)	(.)
Firm Reputation	−0.551	−0.545	−0.461	0.015	0.025
	(0.44)	(0.44)	(0.42)	(1.15)	(1.15)
Firm Size	−1.776***	−1.792***	−0.764**	−0.746	−0.691
	(0.27)	(0.27)	(0.35)	(0.61)	(0.62)
Profitability	−1.501	−1.362	7.305	−5.227	−4.654
	(4.16)	(4.15)	(6.26)	(9.71)	(9.69)
Tangibility	−2.079	−2.201	−3.766**	5.136*	4.870
	(1.41)	(1.42)	(1.82)	(3.07)	(3.08)
Leverage	−4.898***	−4.610**	0.793	8.649*	9.070**
	(1.89)	(1.89)	(2.67)	(4.67)	(4.62)
Financial Distress	1.334	1.279	−1.208	0.226	0.239
	(0.86)	(0.86)	(0.92)	(1.83)	(1.82)
ln(*Loan Amount*)	−6.787***	−6.794***	−3.814***	−5.570***	−5.569***
	(0.35)	(0.35)	(0.62)	(0.86)	(0.86)
ln(*Loan Maturity*)	−4.974***	−4.951***	−7.132***	−4.357***	−4.146***
	(0.56)	(0.56)	(1.34)	(1.42)	(1.43)
Δ interaction coeff	−2.397***	−2.320***	−1.830**	−6.016	−6.188**
	(0.83)	(0.70)	(0.78)	(3.69)	(3.01)
Loan-type dummies	YES	YES	YES	YES	YES
Loan-purpose dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
R^2	0.414	0.414	0.322	0.266	0.267
N	7,659	7,659	2,117	1,319	1,319

substantially stronger in loan contracts that include covenants. It thus appears that covenants that restrict borrowers' actions do not make the importance of relationships less relevant.

The above finding also holds when investigating whether the effect of relationships varies between loans that include performance covenants and all other facilities. This analysis is motivated by research suggesting that performance covenants are particularly included in loan contracts to increase

the lender's incentive to monitor borrowers (Christensen and Nikolaev, 2012). To conduct the analysis, the estimated model includes two interaction terms, *Relation Binary* $\times$ *P.Covenant* and *Relation Binary* $\times (1 - P.Covenant)$. The dummy variable *P.Covenant* identifies loan contracts that include performance covenants. As reported in Column (2), the coefficient on the interaction term *Relation Binary* $\times$ *P.Covenant* is negative and statistically significant. In contrast, the estimated coefficient of the interaction term *Relation Binary* $\times (1 - P.Covenant)$ is not statistically significant. Δ interaction coeff also rejects the null hypothesis of the equality of the coefficients. This finding suggests that the effect of lending relationships is more pronounced in syndicated loan contracts that impose performance covenants.

In Column (3), I repeat the regression analysis in the first column for the sample of firms with investment-grade credit ratings, S&P long-term issuer ratings BBB^{-} or above. As can be seen from the results reported in the third column, while the interaction term *Relation Binary* $\times$ *Covenant* is statistically significant, the estimates of the interaction term *Relation Binary* $\times (1 - Covenant)$ is not statistically significantly different from zero. The test of the coefficient equality of the interaction terms, Δ interaction coeff, rejects the null hypothesis that the coefficients are not distinct from each other. This result indicates that lending relationships are associated with a reduction in the retained share for loan contracts that include covenants even when the borrowers are high-quality firms.

The last two columns repeat the previous exercises on the sample of borrowers with speculative-grade credit ratings (i.e., S&P long-term issuer ratings between BB^{+} and C). As reported in the fourth column, the coefficient on *Relation Binary* $\times$ *Covenant* is significantly negative, while the estimated coefficient on *Relation Binary* $\times (1 - Covenant)$ is statistically insignificant. A test of the equality of the interaction coefficients, however, cannot reject the null hypothesis that the two interaction terms are not significantly distinct from each other. The result presented in Column (5) shows that while the coefficient on *Relation Binary* $\times$ *P.Covenant* is negatively and significantly estimated, the estimate of the coefficient on *Relation Binary* $\times (1 - P.Covenant)$ is not significantly different from zero. Δ interaction coeff, shows that the interaction terms are significantly different. Overall, this analysis suggests that lending relationships are associated with a significantly stronger reduction in the retained share among loan contracts that include covenants.

5 Additional Robustness Tests

For this analysis, I conducted robustness checks of the results to potential endogeneity problems associated with lending-relationship formation using alternative estimation techniques that correct for endogeneity bias. However, some potential concerns related to other factors may still remain. These additional concerns are more likely related to the method applied in this paper to construct lending-relationship measures. This section, thus, performs two additional robustness tests to dissipate these additional potential concerns.

5.1 *Multiple Lead Arrangers*

One potential concern is that the reduction in the retained share may be related to the number of lead arrangers in a loan facility. The argument here is that some syndicated lending arrangements are headed by multiple lead arrangers. It is likely that multiple lead arrangers increase the likelihood of a syndicated loan being arranged by a lead arranger with whom the borrower has lending relationships. This follows simply because more than one lead arranger have a higher likelihood than one lead arranger of having existing lending relationships with the firm. One may thus expect a positive corre-

Table 9. The Effect of Relationships on the Retained Share: Evidence from Facilities with A Single Lead Arranger

This table reports the regression results of the effects of lending relationships on the percentage of a syndicated loan retained by the lead arranger (*Retained Share*). The results reported in Columns (1)–(3) are obtained from the sample of syndicated loans headed by a single lead arranger. *Relation Binary* indicates whether lending relationships exist between the lead arranger and the borrower of a loan. *Relation Number* accounts for the proportion of previous lending relationships in terms of the number of interactions. *Relation Amount* capture the proportion of previous lending relationships in terms of the amount of interactions. All other variables are defined in the Appendix. In all regressions, standard errors are heteroskedasticity robust and clustered at the firm level. The t-test of significance is: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Retained Share		
	(1)	(2)	(3)
Relation Binary	-2.022^{***}		
	(0.62)		
Relation Number		-2.131^{***}	
		(0.75)	
Relation Amount			-2.253^{***}
			(0.74)
Top 3 Arranger	-4.179^{***}	-4.210^{***}	-4.179^{***}
	(0.70)	(0.70)	(0.70)
Arranger Size	-0.847^{*}	-0.852^{*}	-0.853^{*}
	(0.44)	(0.44)	(0.44)
Opacity	0.093	0.118	0.176
	(0.94)	(0.94)	(0.94)
Firm Reputation	-0.711	-1.030^{**}	-0.995^{*}
	(0.51)	(0.51)	(0.51)
Firm Size	-1.853^{***}	-1.876^{***}	-1.877^{***}
	(0.30)	(0.30)	(0.30)
Profitability	-1.152	-0.874	-0.991
	(4.80)	(4.80)	(4.80)
Tangibility	-1.089	-1.125	-1.114
	(1.67)	(1.67)	(1.67)
Leverage	-6.786^{***}	-6.651^{***}	-6.735^{***}
	(2.16)	(2.15)	(2.15)
Financial Distress	1.584	1.599	1.564
	(1.07)	(1.06)	(1.07)
ln(*Loan Amount*)	-7.942^{***}	-7.941^{***}	-7.930^{***}
	(0.39)	(0.39)	(0.39)
ln(*Loan Maturity*)	-4.722^{***}	-4.687^{***}	-4.684^{***}
	(0.66)	(0.66)	(0.66)
Loan-type dummies	YES	YES	YES
Loan-purpose dummies	YES	YES	YES
Industry dummies	YES	YES	YES
Year dummies	YES	YES	YES
R^2	0.412	0.411	0.412
N	5,583	5,583	5,583

lation between a measure of lending relationships (*Relation Binary*) and the likelihood that a loan has more than one lead arranger. This, in turn, means that the presence of multiple lead arrangers could ultimately drive the association between *Relation Binary* and *Retained Share*. In this situation, the observed reduction in the retained share may reflect the effect of the number of lead arrangers rather than the effect of lending relationships, or both.

The analysis shows that excluding those facilities that are provided by multiple lead arrangers from the sample does not seem to affect the previously established results. As Table 9 depicts, the estimated coefficients of lending-relationship measures are still negative and significantly different from zero. Thus, even though it is plausible that having multiple lead arrangers can affect the retained share, the present finding clearly suggests an effect of lending relationships. These negative coefficients suggest that even in loan facilities organized by a single lead arranger, building lending relationships with firms enables lead arrangers to retain a smaller share.

5.2 *Fixed Effects and Clustering*

The analysis discussed so far runs regressions clustering by firms to adjust standard errors for potential correlation between observations of the same borrowing firm. An alternative approach that can also handle the possibility of correlation among observations within firm is firm fixed effects. Including firm fixed effects has also an additional benefit in that it controls for potential endogeneity stemming from firm-level unobservables. To test the robustness of the baseline regression results to this alternative specification, this section reestimates the retained-share regression model with a firm fixed-effect dummy. Table 10 reports the results from the regression specification featuring a firm-level fixed-effect dummy. As can be seen from Column (1), the introduction of a firm-level fixed-effect dummy leads to a small reduction in the coefficient of the *Relation Binary* in comparison to the OLS estimates reported in Table 3. Nevertheless, this result also shows that lending relationships have a significant negative effect on the retained share. The analysis in Column (2) adds clustering by firms in a regression that includes a firm-level fixed-effect dummy. As one expects, clustering leaves the coefficient estimates of *Relation Binary* unchanged. While the standard errors increased to some extent with clustering by firms, the finding, however, shows that clustering did not make lending relationships' impact on the retained share less statistically significant.

The robustness analysis reported above determines if controlling for potential correlation across observations for a firm that arises from firm-level persistent attributes changes the statistical significance of lending relationships' impact on the retained share. One may also argue that a lead-arranger–level effect (i.e., persistent lead arranger attributes) could also drive correlation across observations between firms. To check the sensitivity of the statistical significance of the results to this possibility, clustering by a lead arranger is added to the retained-share regression model that includes a firm-level fixed-effect dummy. As can be noted from Column (3), clustering by lead arrangers in-

Table 10. The Effect of Relationships on the Retained Share: Fixed Effects and Clustering

This table presents the regression results of the impact of relationships on the percentage share of a syndicated loan retained by the lead arranger (*Retained Share*). While Columns (1)–(3) report results obtained from regressions with a firm fixed-effect dummy, Column [4] present results of a regression with a lead-arranger fixed-effect dummy. *Relation Binary* indicates whether a prior lending relationship exists between the lead arranger and the borrower of a loan. All other variables are defined in the Appendix. In Columns (2)–(4), standard errors are clustered at either the firm or lead-arranger level, whereas in the last column the standard errors are clustered at the firm and lead-arranger levels simultaneously. In all regressions, standard errors are heteroskedasticity robust. The t-test of significance is: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.

	Retained Share				
	Firm FE,	Firm FE, Clust. by firm	Firm FE, Clust. by lead	Lead FE Clust. by firm	Clust. by firm Clust. by lead
	(1)	(2)	(3)	(4)	(5)
Relation Binary	−1.933***	−1.933***	−1.933**	−2.112***	−2.429***
	(0.52)	(0.66)	(0.73)	(0.50)	(0.64)
Top 3 Arranger	−3.108***	−3.108***	−3.108***	−2.675***	−3.626***
	(0.59)	(0.85)	(0.56)	(0.56)	(0.45)
Arranger Size	−0.976*	−0.976	−0.976	0.532	−1.254*
	(0.51)	(0.69)	(0.83)	(0.57)	(0.76)
Opacity	−1.902	−1.902	−1.902**	1.154	1.577**
	(1.17)	(1.72)	(0.80)	(0.79)	(0.62)
Firm Reputation	−0.050	−0.050	−0.050	−0.663	−0.524
	(0.44)	(0.60)	(0.43)	(0.42)	(0.38)
Firm Size	−1.447	−1.447	−1.447	−1.704***	−1.745***
	(0.95)	(1.39)	(1.41)	(0.26)	(0.25)
Profitability	−10.519**	−10.519	−10.519***	−1.720	−1.386
	(5.15)	(6.90)	(3.88)	(4.02)	(5.03)
Tangibility	1.152	1.152	1.152	−1.201	−2.054
	(3.80)	(5.34)	(5.25)	(1.34)	(1.52)
Leverage	−3.386	−3.386	−3.386	−6.245***	−4.928***
	(2.75)	(3.73)	(3.56)	(1.75)	(1.88)
Financial Distress	0.335	0.335	0.335	1.303	1.339
	(0.90)	(1.24)	(0.62)	(0.81)	(1.23)
ln(*Loan Amount*)	−4.639***	−4.639***	−4.639***	−6.670***	−6.807***
	(0.39)	(0.51)	(0.35)	(0.34)	(0.65)
ln(*Loan Maturity*)	−3.869***	−3.869***	−3.869***	−5.050***	−5.034***
	(0.55)	(0.71)	(0.56)	(0.55)	(0.62)
Loan-type dummies	YES	YES	YES	Yes	YES
Loan-purpose dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
Firm fixed effect	YES	YES	YES	NO	NO
Lead fixed effect	YES	NO	NO	YES	NO
R^2	0.732	0.732	0.732	0.448	0.413
N	7,659	7,659	7,659	7,659	7,659

creases the standard errors. But lending relationship's impact is still significant at the 5% level. Moreover, introducing a lead-arranger–level fixed-effect dummy enables one to effectively address omitted-variable bias in addition to accounting for potential correlation across observations. Thus, to further check the robustness of a lending relationship estimate and its statistical significance, the analysis in Column (4) involves estimating a regression model that includes a lead-arranger fixed-effect dummy and clustering by firms. As the reported result shows, this specification yields the estimate of lending relationships that is very similar to those reported in the previous column.

The set of robustness results reported in Columns (2)–(4) of Table 10 is obtained from specifications that include clustering at either a firm level or a lead-arranger level. However, it could also be the case that there may be correlation between observations within a firm and within a lead arranger. In such situations, where there exists simultaneous correlations in two dimensions, Thompson (2011) shows that the usual one-dimensional clustering technique does not correctly adjust standard errors. As an additional robustness check to this possibility, this section uses a two-dimensional clustering approach that Thompson (2011) and Cameron et al. (2011) recently introduced and reruns the regression clustering by firms and lead arrangers. As shown in Column (5), this specification does not affect the statistical significance of the result reported in Table 3.

6 Conclusion

Syndicated lending has gained increasing popularity: A group of lenders jointly provide large loans to a firm on the basis of a single contract. Together with increasing popularity, however, has also come concerns about whether the potential information asymmetry stemming from the lead arrangers' lending relationships with borrowers introduces agency problems between a lead arranger and participants. Although the literature argues that lending relationships can influence the share retained by lead arrangers, which is used to certify the quality of a loan, the literature offers conflicting predictions. While a lending relationship can reduce the retained share by facilitating monitoring, it can also facilitate the exploitation of participants, thus increasing the lead arrangers' retained share.

I empirically examine the association between lead arrangers' lending relationships with firms and the share they retain in loans to them. Using prior interactions to measure lending relationships, my results strongly indicate that forging relationships decreases lead arrangers' retained share. Since lead arrangers claim less than entire loan they originate, it is possible that they may endogenously develop weak incentives for costly investments in choosing optimal monitoring efforts. If, however, lending relationships reduces the costs of monitoring, lead arrangers may still optimally invest in monitoring. Consequently, as the results in this analysis suggests, participants do not seem to provide relationship lead arrangers with the necessary monitoring incentives by way of insisting they retain a larger share.

The cross-sectional analysis presents results that further reduce concerns that lending relationships may introduce agency conflicts. The evidence shows that the negative effect of lending relationships on the retained share is stronger in syndicate arrangements headed by less reputable and small lead arrangers. Informationally opaque and high-risk borrowers would provide an ideal opportunity for relationship lead arrangers to exploit syndicate participants. The observed reduction in the share retained by relationship lead arrangers in contractual arrangements involving opaque firms, small firms, and firms with speculative-grade ratings suggests that postcontractual conflicts are more important than precontractual conflicts in loan syndication. As such, although

loans to these firms require intensive monitoring, relationship lead arrangers are not required to hold a larger share; their monitoring-cost advantages seem to be sufficient. In fact, the negative effect of lending relationships is concentrated in loan contracts that include covenants—contracts that presumably require closer monitoring and, hence, the benefit of relationships.

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Table 11. Variable Definitions

This table presents the definition of the variables used in this study.

Variable	Definition
Retained Share	The percentage of a syndicated loan retained by the lead arranger
Relation Binary	A dummy variable: one if the lead arranger and the borrower have a prior lending interaction in the last five years
Relation Number	The ratio of the number of times the lead arranger and the borrower have interacted in the last five years to the total number of loans the borrower has taken during the same period
Relation Amount	The ratio of the total amount of loans the lead arranger has made to the borrower in the last five years to the total amount of loans taken by the firm during the same period
Top 3 Arranger	A dummy variable: one if at least one of the lead arrangers of the syndicated loan is among the top 3 percentile in terms of market share in the syndicated-loan market
Top 10 Arranger	A dummy variable: one if at least one of the lead arrangers of the syndicated loan is among the top 10 percentile in terms of market share in the syndicated-loan market
Arranger Size	The natural logarithm of the lead arranger's total assets
Small Arranger	A dummy variable: one for lead arrangers with total assets below the sample median
ln(*Loan Amount*)	The natural logarithm of the loan facility amount in millions of dollars
ln(*Loan Maturity*)	The natural logarithm of the number of months from the facility start date to the facility end date
Term Loan	A dummy variable: one if the loan type is term loan
Revolver	A dummy variable: one if the loan type is revolver
364-day facility	A dummy variable: one if the loan type is 360-day facility
Corporate Purpose	A dummy variable: one if the loan purpose is for corporate
Working Capital	A dummy variable: one if the loan purpose is for working capital
Takeover	A dummy variable: one if the loan purpose is for takeover
Debt Repayment	A dummy variable: one if the loan purpose is for debt repayment
Covenant	A dummy variable: one if there exists at least one covenant in the loan contract
P.Covenant	A dummy variable: one if there exists at least one performance covenant in the loan contract
Opacity	A dummy variable: one for firms without Standard and Poor's long-term issuer rating
Firm Reputation	The natural logarithm of the number of times that the firm has borrowed in the syndicated-loan market during the last five years
Firm Size	The natural logarithm of the firm's total sales at close
Small Firm	A dummy variable: one for firms that have total sales below the sample median at close
Profitability	The ratio of earnings before interest, taxes, depreciation and amortization to the book value of total assets
Tangibility	The ratio of plant, property and equipment to total assets
Leverage	The ratio of total debt (i.e., the sum of debt in current liability and long-term debt) to book value of total assets
Financial Distress	A dummy variable: one for firms with Altman (1968) Z-Score below 1.81
Distance	The spherical distance measured in kilometers between the borrowing firm's headquarters and the headquarters of the lead arranger of a syndicated loan