Credit Conditions when Lenders are Commonly Owned

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Abstract

We investigate how common ownership between lenders affects the terms of syndicated loans. We provide a novel view on the role of common ownership in mitigating information asymmetries on the quality of borrowers and the resulting contractual distortions in the terms of the loan. Our empirical evidence shows that high common ownership decreases loan rates, lowers the share of the loan retained by the lead bank, and mitigates rationing at issuance. Further investigations lend support to the hypothesis that common ownership serves as a device for information transmission: common ownership especially affects the terms of loans for new borrowers, when the lead arranger is likely to hold an informational advantage. As information flows from the lead arranger to syndicate members, we show that member-to-lead and member-to-member common ownership does not affect the terms of syndicated loans.

Keywords: common ownership; syndicated loans; information asymmetries

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1 Introduction

Over the last two decades, the banking sector has become increasingly interconnected thanks to the steady growth of shareholders owning equity in multiple banks: the literature refers to those shareholders as "common owners". In 2013, the four largest U.S. asset managers (Blackrock, Vanguard, State Street, and Fidelity) held a combined 20% of the shares of the four largest commercial banks (JP Morgan, Citigroup, Bank of America, and Wells Fargo).

Asymmetric information is another defining feature of banking markets, with consequences in terms of risk pricing and credit rationing. Borrowers employ a variety of strategies to signal attractive attributes to the uninformed lenders by introducing distortions in contracting (Spence, 1974; Leland and Pyle, 1977). In the syndicated lending industry, the lead bank, which conducts the due diligence and acts on behalf of the borrower, mitigates asymmetric information vis á vis syndicate members by retaining a larger share of the loan (Sufi, 2007; Focarelli et al., 2008; Ivashina, 2009). In banking, the direct sharing of information on borrowers is an effective tool to ease information asymmetries (Padilla and Pagano, 2000; Jappelli and Pagano, 2002). In this paper, we show that common ownership allows lenders to achieve the same result.

We investigate how common ownership between lenders affects credit conditions and credit availability. Our paper fits within the broader debate that looks at the relationship between common ownership and market outcomes. A recent body of empirical work examines the common ownership hypothesis: this suggests that as firms in the same industry are held by overlapping investors, these firms may internalize the interests of their competitors via the financial stakes held by the common shareholders. Our setting, the syndicated loan industry, differs in the agency problem between lenders. We conjecture that a lender with superior information on the borrower's risk profile, such as the lead bank in a syndicated loan, truthfully transmits such information to another lender when the two are interconnected via a common shareholder. The increase in common ownership and its possible effects on loan syndication is of concern to policymakers. Regulators explicitly acknowledge that common ownership between the lead bank and potential syndicate members can be conducive to the exchange of information between investors in syndicated loans (European Commission, 2019). This practice is not regarded as anti-competitive per se; however, lenders should not disclose sensitive information, collude, or otherwise harm the borrowers. The syndicated market has been subject to repeated investigations by the U.S., European, British, Dutch, and Spanish authorities to evaluate possibly harmful exchanges of information. High levels of common ownership would facilitate those exchanges: this direct effect of common ownership is supported by anecdotal evidence, with Shekita (2021) compiling 30 case studies of interventions by common owners on corporate governance. Information exchanges can have both positive and negative implications, which we investigate in this paper.

We use a stylized model to derive empirical predictions on the effects of common ownership in reducing information asymmetries, which, in turn, affect loan prices, the ownership structure within the loan, and the overall volume of lending. The lead bank represents a penniless borrower: the borrower and the lead bank privately observe the type of borrower, which can be either good or bad.[1] As the assets of the lead bank are not sufficient to fund the borrower's project, the lead bank needs to form a syndicate. We distinguish between two scenarios: high and low common ownership. Only when common ownership is high, is information on the borrower type truthfully transmitted by the lead bank to the syndicate members. When common ownership is low, asymmetric information implies that, in equilibrium, the lead bank will have to promise higher returns to the syndicate members and commit its own funds in the loan. By doing so, the lead bank signals the quality of the borrower to other potential lenders. As only some lead banks possess sufficiently large funds to signal the quality of the loan in the capital market, low common ownership will determine rationing at issuance. If, instead, common ownership is high, lending can take place at the conditions that would prevail with symmetric information. An ancillary consequence of lower returns with high common ownership is that lending conditions should exhibit lower variability.

The syndicated lending market provides an ideal setting in which to test the four predictions of our theoretical framework. Although multiple banks can participate in a loan, only the lead bank conducts due diligence of the client: this creates a problem of information asymmetry between the lead bank and syndicate participants. A syndicated loan typically consists of a number of tranches (facilities). After receiving the mandate, the lead bank announces to the market the non-price characteristics of the loan and its facilities, such as collateral and maturities. The price of each facility and the composition of the syndicate are set on the market, resulting in variations in price and composition of the syndicates across facilities of the same loan. In contrast, default risk and creditor rights are essentially constant across facilities of the same loan: lenders can force the borrower into bankruptcy if credit events occur, such as payment defaults or covenant violations. Hence, in our most demanding specifications, we can credibly identify differences in lending conditions between facilities *within* a loan with varying degrees of common ownership, while keeping the default risk constant.

We find support for all four predictions in the data. First, high levels of common

[1] The source of asymmetric information can be the probability of successful project completion, as we currently assume in the model, or the cost of monitoring the firm, as in Sufi (2007). The predictions of the model remain unchanged.

ownership between the lead bank and the syndicate participants are associated with lower prices. We identify the impact of common ownership on prices leveraging variation in common ownership across facilities and loans. We obtain these results in specifications that account for other factors potentially affecting the loan spread, including an extensive set of controls and fixed effects related to (i) the loan and the facility; (ii) the borrower; and (iii) the lender. In panel regressions, coefficient estimates indicate that an increase of one standard deviation in common ownership is associated with a lower spread of 6 basis points.

To rule out the possibility that variations in common ownership and spread may reflect omitted characteristics that systematically correlate with prices and common ownership levels, we estimate the effect of common ownership on the pricing of facilities of the same type *within* a given loan. The within-loan estimates confirm the negative effect on prices: an increase of one standard deviation in common ownership implies a reduction in spread of 9 basis points.

We then discretize our common ownership measure into five indicator variables corresponding to the quintiles of its support. All our estimates show that reductions in spread are relevant only for high levels of common ownership (quintiles 4 and 5), and that those reductions are monotonically increasing in common ownership. Within a quintile, a change in common ownership from the minimum to the maximum level reduces the price by roughly 10 to 12 basis points, where the average loan spread is around 195 points for the upper quintiles.

Second, we find that an increase of one standard deviation in common ownership is associated with a statistically significant 0.64 percentage point decrease in the amount of the loan retained by the lead bank. Again, the effect is non-linear: the lead banks of syndicates in the top quintiles of common ownership (quintiles 3 to 5) retain a significantly smaller share of the loan compared to those in the bottom quintiles. Within a quintile, an increase in common ownership from the minimum to the maximum level implies a reduction in the amount retained by the lead bank corresponding to approximately 1.7 percentage points in quintile 3 and 2.8 percentage points in quintiles 4 and 5. As the lead arrangers retain on average 21% of the loan amount, the impact of common ownership is sizeable.

Third, we find that common ownership impacts credit supply. We empirically compare the intensity of lending relationships between two types of lead arrangers: arrangers that experience a prevalence (more than half) of loans with high common ownership in their portfolio in a given quarter, and arrangers that do not. Lead arrangers with a prevalence of high common ownership have stronger lending relationships: they underwrite 31% more loans in a quarter than lead arrangers with low prevalence, or 66% more in terms of amount.

Fourth, high common ownership should imply lower price dispersion. We verify that an increase of one standard deviation in common ownership is associated with a decrease of 2.68 basis points in the dispersion of loan rates across facilities.

We are careful to rule out alternative explanations to our findings. First, we explicitly control for vertical relations, namely common ownership between lenders and borrowers. Second, we empirically address the fact that common ownership is the result of the syndicate structure. As the lenders' decision to enter the syndicate is not random and may depend, among other factors, on the level of common ownership with the lead arranger and other unobservables collected in the error term, we account for this form of self-selection. Our results do not qualitatively differ when accounting for selection. We also conjecture that the decision of potential lenders to enter the syndicate and fund the loan essentially depends on the credit risk of the borrower. In contrast, the choice of the specific facility should mainly depend on lender-specific preferences, and as a consequence, the composition of the syndicate across facilities within a loan should not depend on the degree of common ownership. We empirically confirm that common ownership is not a driver of participation in the single facilities of a loan.

We then focus on the potential mechanism, namely the knowledge transfer between the lead arranger and the potential members. We have already documented that the lead arranger decreases the amount of funds retained in the loan at high levels of common ownership; signaling using share retention would still be necessary if common ownership were to serve purely as a mechanism of interest alignment. We provide four additional pieces of evidence consistent with common ownership as a mechanism of information transmission. First, we empirically show that common ownership has an impact only in the case of new borrowers, as the lead arranger is likely to hold an informational advantage over the syndicate members. Second, we use data on credit default swaps (CDS) as they reflect forward-looking and aggregate information held by market participants. Prior to the loan origination, the credit spread of a borrower receiving a loan characterized by high common ownership tends to be similar to the spread of CDS issued by the same borrower receiving a loan characterized by low common ownership. After a deal with high common ownership, the CDS spread for that borrower is lower, reflecting the positive information on its credit worthiness provided by the syndicate composition. Third, we run two placebo tests of our hypothesis: as only the lead bank possesses superior information on the riskiness of the borrower, the level of common ownership from the syndicate member to the lead arranger or between members should not affect credit conditions. We find that member-lead and member-member common ownership has no impact on any of the outcome variables, which constitutes an indirect confirmation that information transmission is effectively initiated by the lead bank. Fourth, we investigate the intensity of a lending relationships in relation to a given borrower receiving at least two loans in a quarter; one characterized by a high level of common ownership and the other by a low level. Prior to the loan in high common ownership, lenders do not differ in the intensity of their lending relationships with the borrower. Afterwards, syndicate members in the high common ownership deal increase their participation by around 20 percentage points relative to members in the low common ownership deal, both in terms of the amount underwritten and the number of financial relations. We interpret this result as evidence of superior information that lenders in high common ownership possess on the borrower, which later fosters stronger relationships. Finally, we provide evidence on how information can be transmitted across lenders. We empirically document a positive relationship between common ownership and the degree of overlap between directors sitting on the board of lenders. This supports the idea that information transmission is plausible, for example through common directors, when common ownership between the lead bank and members of the syndicate is sufficiently high.

In conclusion, our results offer practical guidance to policy makers. We provide empirical evidence consistent with the presence of a flow of information between the lead bank and the commonly owned syndicate member banks. As a result, the effects of information asymmetries on contractual terms are mitigated through common ownership.

Related literature Our paper proposes a new mechanism through which common ownership between lenders affects lending conditions. Specifically, we show that common ownership reduces the distortions in credit conditions that arise with asymmetric information. We contribute to several strands of the literature.

The literature on syndicated lending has well documented how asymmetric information affects lending conditions, and in particular the lead bank's loan retention strategy to mitigate the costs of asymmetric information (Sufi, 2007; Focarelli et al., 2008; Ivashina, 2009).[2] Other aspects of syndicated lending examined in the literature include how the composition of the syndicate affects loan spreads (Lim et al., 2014), the propensity to syndicate a loan (Dennis et al., 2000), the relationship between final spreads and fees (Berg et al., 2016; Cai et al., 2018), and the role of covenants (Drucker and Puri, 2009). We exploit the institutional features of the syndicated lending market (and the heterogeneity of syndicate composition across facilities of the same loan in particular) to identify the impact of common ownership between banks on lending conditions.

Common ownership has recently attracted significant attention by financial and industrial economists. The literature mainly focuses on the common ownership hypothesis,

[2]Bruche et al. (2020) provide an alternative explanation for loan retention, which hinges on the presence of a pipeline risk taken by the lead when originating a loan in order to distribute it.

according to which an investor holding a controlling stake in several firms belonging to the same industry might, in turn, influence their pricing with the purpose of softening competition (Azar et al., 2016, 2018; He and Huang, 2017).[3] In related work, Saidi and Streitz (2021) look at the link between credit concentration and industry markups, where common lenders induce less aggressive behavior among their borrowers. Massa and Rehman (2008) study the relationship between mutual funds and banks in the same financial group, providing evidence of direct information flows within the financial conglomerates through informal channels, such as personal acquaintances. Jiang et al. (2010) investigate the simultaneous holding of both equity and debt claims of the same company by non-commercial banking institutions in syndicated loans; they show that syndicated loans with dual holders have lower spreads than those without. Jang et al. (2019) and Cho and Yang (2020) relate to our work as they consider common ownership to be a device that lowers the information processing costs for institutional investors, with consequences in terms of corporate decision making and the comparability of financial statements. Finally, Cici et al. (2015), Ojeda (2019), and Wang and Wang (2019) study the impact of common ownership between lenders and borrowers. Overall, they document lower loan spreads, larger loans, and more frequent lending activity in the presence of common ownership. In contrast to all these papers, we are the first to look at common ownership between lenders and its effect on credit terms. We find empirical evidence consistent with the results of a model in which, thanks to common ownership, the lead bank does not need to signal the quality of the borrower by means of "dissipative" signals (Tirole, 2006), such as the retention of a share of the loan. In all our specifications, we nevertheless account for relationships of common ownership between lenders and borrowers, which excludes the possibility that our results are driven by borrower-lender overlapping ownership.

2 Institutional Setting

2.1 The syndicated loan market: asymmetric information and loan structure

Syndicated lending is an important source of financing for U.S. corporations. Sufi (2007) and Ivashina (2009) report that more than 90% of the largest 500 non-financial Compustat

[3]Boller and Morton (2020) use inclusion in a stock market index to identify the impact of an increase in the overlap among investors. Newham et al. (2018), Ruiz-Pérez (2019) and Gerakos and Xie (2019) analyze the effect of common ownership on entry. Antón et al. (2021) investigate how managerial incentives can link common ownership and competition. Aslan (2019) looks at the relationship between common ownership and costs. Backus et al. (2021a) use a test of conduct to reject that common ownership has a large effect on markups. Comprehensive reviews of this growing literature by Schmalz (2021) and Backus et al. (2019) provide a summary of the empirical evidence.

firms in 2002 obtained a syndicated loan between 1994 and 2002. In 2006, syndicated loan issuance surpassed corporate bond issuance with a volume of \$1.7 trillion. More recently, the Federal Reserve's Terms of Business Lending survey documented that 44% of all commercial loans in 2013 were syndicated loans.

The syndicated loan market operates over the counter. Transactions are the result of informal interactions between borrowers and lenders. The borrowers are firms that seek funding from the syndicate to leverage large capital investments. The syndicate is headed by the lead bank, or arranger. Other syndicate members are banks or institutional investors.

The borrower solicits potential lead banks to submit a bid. These banks propose their syndication and pricing strategy to the borrower. The chosen lead bank then receives the mandate to issue a loan and performs the due diligence. Details of the mandate signed between the lead bank and the borrower remain confidential, including any potential re-arrangement of the fees to the lead bank depending on the outcome of the syndication. Syndicated loans are not considered to be a "security" under federal or state laws, as recently confirmed by the Southern District of New York in the case Kirschner v. JPMorgan Chase Bank, and a loan syndication is not a "security distribution". As a consequence, the due diligence standards are left to the criteria of the lead arranger, who also disclaims any responsibility for the accuracy of the information included in the memorandum provided to the potential investors (Ivashina, 2005). Following Sufi (2007), most of the literature considers the presence of private information in the hands of the lead bank as a defining feature of the industry.

The loan issued by the lead bank is divided into tranches, or facilities, of different types (credit line, term loan), amount, and maturities. All non-price terms of the loan, such as type, amount, maturity, purpose, collateral, and covenants, are set before the marketing phase starts. Only type, amount, and maturity vary across facilities within a loan. Finally, the interest rate paid to syndicate members, calculated as the spread over LIBOR, and the composition of the syndicate are determined during the marketing phase. Specifically, the lead bank proposes the price for each facility in the loan, and potential syndicate members decide whether they wish to buy at the specified spread. The deal is closed when the desired level of demand is met. The lead bank can subscribe part of the loan to close the deal, although it does not have an obligation to do so. Finally, if credit events occur, such as payment defaults or covenant violations, syndicate members can force the borrower into bankruptcy.

2.2 Common ownership in the syndicated loan market

Asset managers, such as Black Rock, Vanguard, State Street, and Fidelity are often shareholders in both the lead bank and the syndicate members, and their holdings have been growing substantially over the recent years, as documented in Table B.I. Appel et al. (2016) and Brav et al. (2019) present evidence that institutional investors use their voting blocs to influence the governance of firms. In practice, asset managers may exert their control through "voice" (Edmans et al., 2019), by direct interventions, such as monitoring the managers, or by suggesting strategic changes. Matvos and Ostrovsky (2008) show that in mergers with negative acquirer announcement returns, mutual funds holding shares in both the acquirer and the target are more likely to vote for the merger. He et al. (2019) provide evidence that institutional investors play a more active monitoring role when common ownership is high. Appel et al. (2016) show that the presence of mutual funds has a direct impact on the composition of the board of directors, and in particular an increase in ownership by passive funds is associated with an increase in non-executive directors entrusted by the shareholders.

In our empirical framework, we study situations in which the lead bank and the members in the syndicate are commonly owned by large institutions, exploiting variations in the level of common ownership across loans and across facilities within a loan. Our conjecture is that common ownership may facilitate the transmission of private information regarding the borrowing firms from the informed lead bank to the uninformed members of the syndicate. Regulators explicitly recognize the possibility of such influence: in a recent report on loan syndication and competition in credit markets, the European Commission acknowledges that information transmission may arise when the lead bank and syndicate members are commonly owned (European Commission, 2019). The syndicated market has been subject to repeated investigations by the U.S., European, British, Dutch, and Spanish authorities to evaluate possibly harmful exchanges of information: see the Jones Day Commentary. In 2006, the Antitrust Division of the U.S. Department of Justice (DOJ) investigated private equity syndicates ("club deals"), an industry that shares parallels with syndicated lending. The DOJ expressed concern that syndicate members may conspire to artificially reduce the acquisition price of the targets of those deals by allocating leveraged buyout opportunities among participants. While the DOJ did not pursue action against the private equity firms, the investigation underscores the DOJ's concerns about potential anticompetitive conduct within the industry. In Section 6.5, we provide further evidence on the plausibility of information transmission through shared directors between lenders via the common owner.

3 Hypothesis Development

Consider a penniless borrower who owns a project but lacks financial resources to carry it out.[4] The borrower delegates the lead bank (L) to form a syndicate for a loan of size 1; it then shares the returns of the investment with the lead bank. A continuum of potential members of the syndicate (M) operate in perfectly competitive financial markets and have the financial resources to fund the project. We denote by A, with $0 < A < 1$, the maximum amount of the loan that the lead bank can pledge. A then represents the lead bank's "inside liquidity".

The borrower's project can be one of two types: the good type (G) has a probability of success equal to p; the bad type (B) has a probability of success $q < p$. Independent of the borrower type, the project yields R in the case of success and 0 in the case of failure. Throughout the scenarios we consider, the lead bank knows the type of the borrower's project. We use α and $(1 - \alpha)$ to denote the potential syndicate members' (M) prior probabilities that the borrower's project is of type G and type B, respectively.[5]

We assume that only the good borrower's project has a positive net present value (NPV) ($pR > 1$), and that the bad borrower's project has a negative NPV ($qR < 1 - A$). Moreover, we assume that the project return to the lead bank representing a bad type ($qR - A$) is positive, which makes it costly for the lead bank to signal the good type and achieve separation from the bad type.[6] As a result of this assumption, a lead bank representing a good borrower would be strictly better off if it could truthfully disclose its information about the quality of borrowing.

The contracts we consider consist of a sharing rule that determines how the project returns are divided between the lead bank L representing a firm of a given type j ($R_{j,L}$) and the syndicate members M ($R_{j,M}$), with $j = G, B$ and $R_{j,L} + R_{j,M} = R$.[7] The sharing rule is complemented by two additional components. The first is a decision rule on whether the loan is extended by potential syndicate members to a firm of given type $j = G, B$ ($x_j \in [0, 1]$). The second is the amount of cash that the lead bank L invests in the loan ($\mathcal{A}_j \leq A$).

The lead bank L holds all the bargaining power. It designs contracts that can be accepted or rejected by M. When indifferent, L will prefer not to commit any cash in the

[4] In this section, we describe the model we use to derive our empirical predictions. See Appendix A for the derivation of the formal results.

[5] In this model, α can be interpreted as the fraction of good-type borrowers in the economy, or the probability that a given borrower is of type G. This setting extends the model in Tirole (2006), Chapter 6, which in turn uses the mechanism approach in Maskin and Tirole (1992) to solve the contract's design problem.

[6] We report the exact conditions in Appendix A.

[7] The share of the lead bank is then split between the lead bank and the firm according to a bargaining game outside the model.

loan. This reflects, for example, the presence of alternative investment opportunities that are more remunerative than the borrower's project. We will analyze the perfect Bayesian equilibrium of the contract design game. When solving the model, we parameterize the level of common ownership between the lead bank and the syndicate member by κ, capturing the weight that the lead bank L places on the utility of the commonly owned syndicate members M. Finally, all agents in the economy are risk neutral, the lead bank is protected by limited liability, and the risk-free interest rate is nil.

We solve the model under two scenarios: the first is the case without common ownership ($\kappa = 0$); while the second considers the case with common ownership ($\kappa > 0$). The lead bank uses common ownership to truthfully channel its private information regarding the borrower's probability of success to the commonly owned syndicate members. In other words, common ownership is equivalent to an information transmission technology. We will also discuss a situation in which common ownership affects the contracts simply because the lead bank internalizes the impact of its decisions on the profits of the commonly owned investors (as in Antón et al. 2021), absent any transmission of information. We will show that the two situations yield different testable predictions.

We use the model to derive empirical predictions on the two main features of syndicated lending contracts in the data, with and without common ownership: first, the interest rate paid by borrowers to the syndicate members (the all-in-drawn spread); and second, the amount of the loan retained by the lead bank.

Funding without common ownership We first consider the case without common ownership ($\kappa = 0$). We derive the *low-information-intensity* optimum of the contract design game (Rothschild and Stiglitz, 1976; Wilson, 1977). This corresponds to the separating allocation that maximizes the utility of the lead bank representing a good borrower subject to the constraint that the lead bank representing a bad borrower does not receive a rent. In practice, this separating contract is unappealing to a bad borrower and allows the potential members to break even.[8]

In equilibrium, if potential syndicate members subscribe the loan, the lead bank must choose between the contract targeting the bad borrower and the one targeting the good borrower. By construction, this choice is incentive compatible. The contract targeting a lead bank representing type B is such that this firm will not be funded. Instead, to achieve separation, the contract targeting a lead bank representing type G does two things. First,

[8]The low-information-intensity optimum contracts minimize the cross-subsidization of the bad borrower. Our assumptions guarantee that this optimum allocation exists across the cases we consider (with and without common ownership). Tirole (2006) defines the condition on α such that the low-information-intensity optimum is the unique perfect Bayesian equilibrium of our game. If this condition is not satisfied, there may also exist pooling equilibria that will still satisfy our prediction on the use of A in the contracts (see discussion below).

it requires the lead bank L to pledge all its funds as a signal that it is confident about the good borrower's future returns ($\mathcal{A}_G = A$). Second, the reward to the lead bank L is determined by the mimicking condition of the bad type: the lead bank picks the largest repayment that makes the lead bank representing a bad type indifferent between accepting the contract targeting the good type and remain inactive ($R_{G,M} = R - A/q$). Finally, the good-type contract can be implemented by a debt contract featuring M transferring $1 - A$ upfront and receiving $R - A/q$ if the project succeeds.

Funding with common ownership Consider now the case in which the lead bank places a weight $\kappa > 0$ on the utility of the commonly owned potential syndicate members. Specifically, there is a fraction of commonly owned potential syndicate members (M_{Co}) and a complementary fraction that are not commonly owned with the lead bank (M_{NCo}). In line with our empirical application, any contract offered by the lead bank features the same reward to M_{Co} and M_{NCo} (so that $R_{j,M} = R_{j,M_{Co}} = R_{j,M_{NCo}}$, with $j = G, B$).

We model common ownership as an information transmission device. We say that information transmission can happen only if $\kappa \geq \underline{\kappa}$, and then empirically identify the threshold $\underline{\kappa}$ in the application. The lead bank channels its private information regarding the borrower's probability of success to the commonly owned syndicate members M_{Co}. As a consequence, M_{Co} are perfectly informed about the type of the borrower. M_{NCo} know that the lead bank shares its private information with M_{Co}, but do not observe the type of the firm represented by the lead bank L.

With common ownership, we construct an equilibrium in which the lead bank representing a bad borrower does not get access to funding. Instead, the lead bank representing a good borrower will get the equilibrium contract with symmetric information. In particular, the loan to the good firm is fully underwritten by the members of the syndicate ($\mathcal{A}_G = 0$) in exchange for the transfer for $R_{G,M_{Co}} = R_{G,M_{NCo}} = 1/p$.

Since they know that the lead bank L channels its private information to the commonly owned syndicate members M_{Co}, the non-commonly owned syndicate members M_{NCo} are able to infer the type of borrower represented by L based on the contracts offered by L and M_{Co}'s decision to accept or reject the offer. As a consequence, they accept the symmetric-information contract if the commonly owned investors M_{Co} accept it. It is optimal for the lead bank to offer the symmetric-information contract because it yields the full NPV of the project. Finally, the lending contract can be interpreted as a debt contract in which the members of the syndicate lend 1 upfront and get $1/p$ in the case of the project's success, or else the borrower goes bankrupt.

Common ownership and interest alignment We now consider the situation in which common ownership serves purely as a mechanism to align interests across lenders

(Antón et al., 2021), and there is no information transmission between the lead bank L and the commonly owned investors M_{Co}. We expect common ownership to impact the design of the contract because, in contrast to the case without common ownership, the objective function of the lead bank features a weight $\kappa > 0$ attached to the utility of commonly owned syndicate members M_{Co}. As before, we focus on the separating allocation corresponding to the low-information-intensity optimum of the contract design game.

Again, the optimal contract excludes the lead bank representing a bad firm type from borrowing. Since there is no information transmission, in order to signal the good type, the contract targeting the good borrower commits all the liquidity of the lead bank in the loan ($\mathcal{A}_G = A$). Moreover, it promises a reward to investors that monotonically decreases with the weight κ attached to the commonly owned syndicate members. The intuition is that the lead bank L sets a lower reward to the syndicate members, since it obtains a share of M_{Co}'s utility.

Overall, the reward when common ownership serves as a mechanism of interest alignment differs from what we should observe if common ownership acts as an information transmission device. If common ownership acts as an information transmission device, our results point to a regime shift featuring a lower reward only if common ownership is large enough ($\kappa \geq \underline{\kappa}$). In addition, the lead bank representing a good borrower does not need to retain a share of the loan. In contrast, if common ownership serves as a mechanism to align interests, we should continue to see that the lead bank retains a share of the loan to perform signaling.

Empirical predictions We now list the empirical predictions of the model (see Appendix A for a derivation of all results in this section). Our null hypothesis is that sufficiently high levels of common ownership facilitate information transmission.

Proposition 1. *Comparing the lending conditions (interest rate and amount of the loan retained by the lead bank) with and without common ownership, we find that:*

1. *The interest rate charged by syndicate members is lower with high common ownership than without common ownership;*

2. *The lead bank commits more funds to the loan without common ownership than with high common ownership;*

3. *Without common ownership, we observe rationing at issuance. We do not observe rationing at issuance with high common ownership;*

4. *The standard deviation of loan returns to the syndicate members is lower with high common ownership than without common ownership.*

Absent common ownership, the separation of types requires that the lead bank representing a good borrower is less greedy (compared with high common ownership) and promises higher rewards to the syndicate members. Moreover, to achieve separation, the lead bank representing a borrower with a good project signals its type by committing A in the loan. The lead bank thus conveys the quality of the loan it is issuing by means of a "dissipative signal" (Tirole, 2006). With high common ownership, separation is achieved thanks to the channeling of the lead bank's private information to the commonly owned investors. For the third implication in the proposition, we assume heterogeneous lead banks with respect to the value of A that they can commit in the loan, so that only the lead banks with sufficiently large funds can offer the separating equilibrium contractual terms that avoid the breakdown of capital markets. Finally, thanks to lower interest rates, the returns' standard deviation will be lower with high common ownership.

Discussion Without common ownership, the presence of asymmetric information implies that the lead bank must signal the good borrower's type to the potential members by committing its funds in the loan. Since signaling is costly, the interest rate paid will be larger than with common ownership. These results require that there is truthful information sharing with high common ownership. In our analysis, this interpretation is supported by the case evidence reported in the institutional setting in Section 2.2 and by the evidence in Section 6.5, that when common ownership is large, banks are more likely to share a network of directors that facilitates the channeling of information.

The predictions of our model are derived under the assumption that the lead bank holds private information on the expected return of the borrower. We would find the same qualitative results if the lead bank had superior information on the cost of monitoring the borrower (Sufi, 2007). If the monitoring cost is unobservable by potential syndicate members, the lead bank needs to retain a share of the loan to signal that it has an incentive to exert effort. Moreover, costly signaling would cause a lower reward to the lead bank, and hence a larger reward to the members of the syndicate. Thus, the predictions of this alternative model would be the same as those we find without common ownership.

In principle, other dissipative signals could be used to achieve the separation of types without common ownership. For example, the borrower could accept shorter maturities or pledge collateral. However, the non-price dimensions of syndicated loans are set before the marketing stage; that is, before syndicates form at the facility level. Moreover, except for maturity, the non-price attributes do not vary across facilities. Any correlation with common ownership would therefore be spurious or non-consequential.

Finally, Tirole (2006) shows that, depending on the value of prior beliefs α, there may exist pooling equilibria in which both types are better off than in the separating allocation considered without common ownership. In such equilibria, the lead bank chooses between accepting a contract in which the borrower is rewarded only in the case of success, and a contract that has an upfront lump-sum payment A and no investment. In practice, the lead bank representing a bad borrower, which chooses the second option, is offered a bribe to go away. Our focus on the separating equilibrium in the analysis without common ownership is motivated by the fact that such pooling contracts are not offered in syndicated lending. Nonetheless, they still satisfy our prediction on the lead bank's commitment of A in the loan.

4 Data

Our sample is constructed in two steps: in the first step, we assemble a sample of borrower-bank-loan-facility observations between 1990 and 2013; and in the second, we combine our data with information from Thomson Reuter S34 to determine the common investors of the lead bank and the syndicate members within a loan.

4.1 Sample construction

Syndicated loans Our primary data source is the Loan Pricing Corporation's (LPC) DealScan database, which identifies bank-borrower relationships. DealScan contains detailed information on the loan, such as the interest rate paid to the lender group measured in basis points (the all-in drawn spread, which is the sum of the spread of the facility over LIBOR and any annual fees), loan size, loan type (credit line or term loan), purpose (mainly corporate, excluding leveraged buyout), and the presence of collaterals. We restrict the sample to loans issued by commercial banks incorporated in the U.S. to U.S. non-financial firms between 1990 and 2013.

We identify the participants in a syndicate at the loan-facility level. Following Ivashina (2009), we classify a bank as a lead bank if its Lender Role field in DealScan is one of the following: administrative agent, agent, arranger, book-runner, coordinating arranger, lead arranger, lead bank, lead manager, and mandated arranger.[9] We then use linking tables from Chava and Roberts (2008) and Schwert (2018) to merge the loan data with borrower and lender characteristics from Compustat, including borrower size, profitability and rating (investment-grade, high-yield, and unrated) and lender size and profitability.[10]

[9] In the residual case in which no lead bank or multiple ones are identified, we attribute the role of lead bank to the banks for which the field "Lead Arranger Credit" is marked with "Yes".

[10] Schwert (2018) hand-matches DealScan lender names with Compustat GVKEYs for all lenders with at least 50 loans or at least $10 billion in loan volume. The matching table takes into account bank subsidiaries and bank mergers during the sample period.

Common ownership To measure common ownership, we use several sources. The primary one is the Thomson Reuters S34 database, which consolidates information from the mandatory 13F SEC filings that all institutions with at least \$100 million of assets under management have to report at quarterly frequency. We complement the Thomson Reuters S34 data with hand-collected 13F holdings from Backus et al. (2021b). We are careful to aggregate Blackrock holdings filed separately under different entities (Ben-David et al., 2018). We also use information on the 13D/G filings assembled by Schwartz-Ziv and Volkova (2020) for large (above 5%) shareholders; we therefore take 13D/G filings into account when 13F disclosures are not applicable, for example when the assets are owned by individuals. In addition, we conduct sample checks on other filings reporting information on insider holdings of executives and board members (Forms 3, 4, 5, and 144). These holdings are substantially lower than 5% and have a minor effect on our common ownership measure; we therefore ignore these individual stakes. Finally, we collect data on shares outstanding from the Center for Research in Securities Prices (CRSP), which we merge to historical CUSIP bank codes. The resulting sample allows us to determine which banks within a loan relationship have common institutional investors and the extent of overlapping ownership at syndicate member-facility-loan level.

4.2 Measures of common ownership

The literature proposes several measures of common ownership, from the Modified Herfindahl-Hirschman Index (MHHI) developed by O'Brien and Salop (2000) to the measures proposed by Gilje et al. (2020), Newham et al. (2018), and Antón and Polk (2014). We adopt the profit weights approach based on the theory of partial ownership developed by Rotemberg (1984). This approach is closely linked to our model and, more generally, to the theoretical literature on common ownership. In Appendix B, we replicate our main analysis using an alternative, model-free measure of common ownership and obtain similar results.

As in Rotemberg (1984), we assume that the lead bank maximizes a weighted average of shareholder portfolio profits. To construct the profit weights, we rely on O'Brien and Salop (2000). Each lead bank a places a weight κ_{ab_i} on the profit of each syndicate member bank in facility i (b_i) that is overlapping in ownership:

$$\kappa_{ab_i} = \frac{\sum\limits_{s \in S} \gamma_{as} \beta_{b_i s}}{\sum\limits_{s \in S} \gamma_{as} \beta_{as}}, \tag{1}$$

where S is the set of shareholders of lead bank a, and γ and β are, respectively, the voting and cash-flow rights of each investor s. These weights capture the importance to each lead bank of a dollar of profit generated by the syndicate members. We follow the vast majority of the literature and assume that one share corresponds to one vote (the proportionality of voting rights): $\gamma_{as} = \beta_{as}$ and $\gamma_{b_i s} = \beta_{b_i s}$.[11]

Given Equation (1), the average weight that the lead bank a places on the profit of other syndicate members in each facility i is:

$$CO_{ia} = \frac{1}{B_i} \sum_{b=1}^{B_i} \kappa_{ab_i}, \tag{2}$$

where $B_i \in [1, \overline{B}]$ is the number of syndicate members in each facility i. We consider other choices to aggregate profit weights between the lead bank and members at facility level, such as the median and mode, and find that estimation results remain unchanged. Finally, we repeat the same exercise to determine the degree of common ownership between: (i) borrowing firms and banks; (ii) syndicate member to lead arranger; and (iii) syndicate members within each loan relationship. Measure (i) will be an additional control to account for the presence of common and cross ownership between vertically related firms. Measures (ii) and (iii) will be useful to run falsification tests of our hypotheses.

Following Backus et al. (2021b), we decompose the profit weights in Equation (1) to study the sources of common ownership variation at the facility level. Let $IHHI_a = \|\beta_a\|^2$ be the Herfindahl-Hirschman Index for the investors in company a. Define $\cos(\beta_a, \beta_{b_i})$ as the cosine similarity between vectors a and b_i, representing the cosine of the angle between the positions that investors hold in a and those that investors hold in b_i. Backus et al. (2021b) show that:

$$\kappa_{ab_i}(\beta) = \underbrace{\cos(\beta_a, \beta_{b_i})}_{\text{overlapping ownership}} \cdot \underbrace{\sqrt{\frac{IHHI_{b_i}}{IHHI_a}}}_{\text{relative IHHI}}. \tag{3}$$

The first term is the overlapping ownership, which captures the similarity in investor positions. For investors holding positions in both the lead bank a and a syndicate member bank b_i, a higher position will determine a smaller angle with cosine similarity approaching one. The second term captures the relative concentration of investors. Ceteris paribus, if the lead bank has fewer, larger investors, then the value of $IHHI_a$ is large, control rights are relatively expensive, and profit weights $\kappa_{ab_i}(\beta)$ are smaller. Conversely, if the lead bank has many small investors, the value of $IHHI_a$ is small, control rights are relatively cheaper, and profit weights $\kappa_{ab_i}(\beta)$ are larger. In the descriptive analysis presented below, we use the decomposition in Equation (3) to document the patterns of common ownership.

[11] See Backus et al. (2021b) for a discussion on the importance of the one-share one-vote assumption and other measures of common ownership.

Finally, we define as common owners all institutions filing the mandatory 13F SEC filings (or, less frequently, 13D/G). In a limited number of cases, those institutions are asset management divisions of the lead bank itself: more precisely, direct investment of a lead bank in other lenders configures a situation of cross ownership rather than common ownership. We identify those management divisions and create profit weights that exclude them as common shareholders, while controlling for the presence of cross ownership. As those divisions tend to hold very low equity in other lenders, the distribution of profit weights is practically unaffected by such exclusions. For simplicity, our main measure of common ownership therefore includes those institutions as shareholders, whereby separately controlling for cross ownership does not affect our results.

4.3 Summary statistics

Table I provides the summary statistics. Our final sample includes 21,060 loans granted to 4,512 firms between 1990 and 2013. We identify 66 lead banks. The average syndicate size is 10 members. Syndicates extend loans of $1,028 million on average. Every loan comprises a number of tranches called facilities, which are our unit of observation. On average, a syndicated loan consists of 1.8 facilities. The average facility spread is 168 basis points and the average amount $608 million. Approximately 45% of loans are secured by collateral. Most facilities in our sample are credit lines (72%).[12] On average, lead banks retain 21% of the facility amount, and this variable is reported in around half of the observations in our sample.

Common ownership patterns In the U.S. banking sector, the four largest asset managers (Blackrock, Vanguard, State Street, and Fidelity) hold together around 20% of the four largest commercial banks' shares. Figure 1 documents the striking increase in common ownership during our sample period, confirming the findings of previous studies (Azar et al., 2018; Backus et al., 2021b). We calculate profit weights at the facility level and find that on average, lead arrangers have a weight of 0.68 on the profits of the other syndicate members, with an increase from 0.37 in 1990 to 0.79 in 2013.

To interpret these patterns, we decompose the profit weights into overlapping ownership and relative investor concentration, see Equation (3). Figure 2 shows the results of such decomposition between 1990 and 2013. The blue bar represents the lowest quintile of our measure of common ownership, and the red bar represents the highest quintile.

[12]In the summary statistics, we present two aggregate types: credit lines and term loans. In the data, we observe more granularity, with different types of term loans (A, B, C, and higher designations). We account for these types in the empirical application. Following Lim et al. (2014) we consider all facilities with designation B or higher as term loan B and use the following three categories for facility types: credit line, term loan A, term loan B and higher.

The decomposition shows the two underlying forces driving the growth in profit weights over the sample period. First, cosine similarity is growing as common investor positions in lenders have become larger over time. Second, relative investor concentration is rather constant over time, but control rights in lead banks characterized by high common ownership have become somewhat cheaper. Such a shareholder structure allows common investors to influence the lead banks' strategies more effectively. In particular, panel (a) depicts the clear increase in profit weights, $\kappa_{ab_i}(\beta)$, over time. Panel (b) shows that cosine similarity, $\cos(\beta_a, \beta_{b_i})$, is, as expected, higher at high levels of common ownership and increasing over time. Panel (c) depicts the relative investor concentration, $\frac{IHHI_{b_i}}{IHHI_a}$, and Panel (d) represents the average concentration level of investors in lead banks only, $IHHI_a$. Taken together, panels (c) and (d) show that while relative concentration between the bottom and upper quintile of common ownership does not differ greatly, investor concentration for the lead banks is much lower at the top quintile of common ownership and is clearly decreasing over time relative to the bottom quintile (increasing the gap between the bottom and the top quintile). With the lead bank having several small investors, $IHHI_a$ will be small and control rights cheaper. This is partly driven by the growth of retail shares at higher levels of common ownership: as retail investors do not have incentives to engage in active governance, they leave more room for common owners to influence the lead banks' strategies.

A variance decomposition for all lead bank-member pairs of profit weights reveals that around 70% of the variation in profit weights comes from overlapping concentration, and relative investor concentration never falls below 30%. Investor concentration has an impact in shaping the variation in profit weights both in the cross section and over time; for example, at the lowest quintile of common ownership, institutional investors tend to be large and undiversified, thus the lead banks put more weight on their own profits.

Univariate differences Table II summarizes the univariate differences between facilities with high and low common ownership residualized on year fixed effects to account for the trends in the raw data. We label a facility as having high common ownership if the average syndicate profit weight between the lead arranger and other syndicate members is in the upper quintile of the distribution.

On average, facilities with high common ownership display lower spreads, with a statistically significant difference of roughly 34 basis points, and a lower standard deviation of the returns. These facilities are characterized by a smaller amount retained by the lead bank and are less likely to be secured by collaterals. Moreover, there are no statistically significant differences between borrowers across the low and high common ownership facility groups in terms of riskiness and profitability (as measured by default probability, stock volatility, and ROA), except for a better ability of future loan repayment for borrowers in facilities with high common ownership (as measured by the interest coverage ratio). Although these patterns are broadly consistent with the predictions of the model, they may be driven by confounding factors, such as differences in borrower characteristics (observable or not). To control for these factors, we turn to the multivariate analysis in the next section.

5 Estimation and Results

We now investigate whether the four predictions of Proposition 1 are verified in the data. For each prediction, we first present the empirical specification. We then discuss the identification strategy, highlighting the key sources of identifying variation in the data. Finally, we present the results.

5.1 Interest rates

5.1.1 Empirical design

According to Prediction 1 of Proposition 1, the interest rate paid to the syndicate members will be lower at higher levels of common ownership. We test the prediction by estimating the following equation:

$$Spread_{iat} = \beta_0 + \beta_1 CO_{iat} + \beta_2 X_{iat} + \varepsilon_{iat}, \tag{4}$$

where the dependent variable $Spread_{iat}$ is the all-in-drawn spread paid to syndicate members of facility i arranged by bank a in quarter t. We omit the subscript for the borrowing firm to simplify the notation. The variable of primary interest, CO_{iat}, is the average weight that the lead bank a puts on the profits of other syndicate members present in a specific facility i, as defined in Equation (2). Prediction 1 translates into the prediction that the coefficient β_1 is negative when common ownership is high enough, where the threshold $\kappa \geq \underline{\kappa}$ is empirically identified. Our estimated β's do not estimate either the parameters of the demand curve or those of the supply curve, but instead the effect of each covariate on the equilibrium outcomes.

The vector of variables X_{iat} includes an extensive set of controls related to: (i) the loan and the facility; (ii) the borrower; and (iii) the lender. We also account for relationships of common ownership between lenders and borrowers: under the lens of a vertical integration model, common ownership between lenders and borrowers may result in lower prices for the borrower. Other facility and loan-related controls include facility amount, the number of participants, arranger's past relations with syndicate participants and with the borrower, the presence of collateral, and the maturity of each facility. The rationale of using the facility amount and other non-pricing features of the loans as controls is that those characteristics are fixed before the syndication process. If we remove those controls, our estimates are essentially unchanged. We also control for the three-month LIBOR rate at origination, as the literature documents a relationship between the LIBOR rate and loan spreads (Roberts and Schwert, 2020). Borrower-related controls include the borrower's size measured in assets, profitability, and a measure of leverage defined as book debt over total assets. Finally, lenders' related variables include their size, capital and profitability. Following Antón et al. (2021), we run an alternative specification using quintile dummies of lender's size to address the concern that the common ownership variable may be picking up non-linear effects of the lender's size; our estimates are essentially identical. The full set of controls X_{iat} is listed in Table B.II.

In addition to our time-varying set of controls, we employ multiple fixed effects to difference out alternative interpretations, such as confounding effects of demand and supply variations. The inclusion of fixed effects for facility type and loan purpose ensure that our results are not driven by omitted characteristics at facility level. In our baseline specification, we also include industry-year-quarter fixed effects to control for aggregate variation in demand for syndicated loans in each sector, as well as the aggregate time-varying propensity towards risk in each sector. We therefore base our inferences on within industry and year-quarter variations so as to difference out the fact that important events, such as the financial crisis of 2008, may have had differing impacts across industries. Borrower fixed effects account for unobserved time-invariant heterogeneity across borrowers. Finally, to capture time-invariant supply factors (for example the fact that the lead arranger may specialize in loans with specific features or hold a certain reputation), we add lead bank fixed effects.

Our coefficient of primary interest (the one on common ownership) is mainly identified by the cross-sectional variation that arises from differences in the composition of the syndicate both across facilities and across loans. Specifically, as we use quarter-year fixed effects, interacted with the industry in which the borrower operates, the coefficient is identified by the within variation in common ownership among facilities and loans that differs from the average common ownership level faced by borrowers in a certain industry and period. Persistent differences in common ownership across borrowers and lead arrangers are absorbed by our fixed effects at borrower and lead arranger level.

Before presenting the coefficient estimates, we assess the importance of each source of variation. We regress our common ownership measure on all the covariates included in the main specification, and then partition the variance of the residual into three components: (i) variance in industry-year-quarter, borrower, lead arranger, facility type and loan purpose; (ii) variance across loans within an industry-year-quarter; and (iii) variance across facilities within a loan. We find that the first component explains around 69.0% of the total variance in common ownership: this is the portion of variance absorbed by our fixed effects and time-varying controls. Variability in common ownership across loans and facilities, after accounting for the fixed effects and the controls, accounts for 24.9% of the variance in common ownership. The remaining 6.1% arises from differences in common ownership attributable to variation across facilities within a loan, and this is the variation that we will exploit in the within-loan specifications (see below).

5.1.2 Panel-regression estimates

Panel (a) of Table III presents the estimation results for the coefficients of primary interest. In columns 1 and 2 of Table B.IV in Appendix B, we report the full set of coefficient estimates. Column 1 of Table III reports the effect of our common ownership measure on prices. The estimated coefficient indicates that an increase of one standard deviation in common ownership is associated with a lower spread of 5.95 basis points.

To understand how price reductions vary across the range of common ownership, we discretize our common ownership measure into five indicator variables corresponding to the quintiles of its support: CO^1_{iat} $(0.06 < CO_{iat} < 0.46)$; CO^2_{iat} $(0.46 < CO_{iat} < 0.62)$; CO^3_{iat} $(0.62 < CO_{iat} < 0.75)$; CO^4_{iat} $(0.75 < CO_{iat} < 0.84)$; CO^5_{iat} $(0.84 < CO_{iat} < 1.20)$. Column 2 of Table III shows that reductions in spread are relevant only for high levels of common ownership (quintiles 4 to 5, corresponding to 41% of the loans in our sample), and those reductions are monotonically increasing in common ownership. Assuming no changes in spread for the omitted category (CO^1_{iat}), the point estimates represent the average change in spread for loans in each quintile. Our results are not only statistically significant, but also economically significant: within a quintile, a change in common ownership in a facility from the minimum to the maximum level reduces the price by 10 to 12 basis points. The average loan spread in quintiles 4 and 5 of common ownership is around 195 points.

Robustness Appendix B contains the results of several robustness tests. Table B.III reports the same empirical specification using an alternative definition of common ownership as the average of the minimum commonly held shares between the lead arranger and the syndicate members (Newham et al., 2018). Here, the parameter estimates suggest an even stronger effect of common ownership on spread. Our results are also robust to the inclusion of different sets of fixed effects, as reported in Table B.IV. In particular, in column 3, we consider borrower-year fixed effects to control for unobserved time-varying borrower heterogeneity, where estimates indicate an even larger reduction in spread associated with high common ownership.[13] In column 4, we include the interaction of lead indicators and year-quarter fixed effects (rather than the additive specification with lead bank and year-quarter fixed effects). The interaction rules out possible sorting based on unobservable variations in the risk preferences in each lead arranger; the resulting coefficient has roughly the same magnitude. Finally, the syndicated loan market is concentrated. JP Morgan and the Bank of America are the most active lead arrangers, with around 45% of the loans in the sample (50% in terms of value). We repeat our analysis excluding the loans arranged by these two banks, with the results reported in column 5. The coefficient estimates are substantially unchanged, confirming the effectiveness of our controls at the lead arranger level, and that the negative effect of common ownership on prices is not driven only by the two main actors in this market, but in fact impacts the market as a whole.

5.1.3 Within-loan estimates

We now focus on pricing differentials between different facilities of the same type *within* a loan with varying degrees of common ownership. This identification strategy was first used by Ivashina and Sun (2011) and later adopted by Lim et al. (2014). It rules out the possibility that the variation in spread associated with common ownership reflects omitted characteristics related, for example, to borrower risk that systematically correlates both with price and common ownership. As a credit event on one or more facilities within a loan triggers the default of the entire loan, facilities of the same type and in the same loan essentially reflect the same underlying risk characteristics. We also control for any other remaining difference across facilities of the same type (size and maturity) that may influence their pricing.

We exploit the variation in pricing arising from the set of 314 loans with multiple facilities of the same type. We estimate Equation (4) on this subsample, with results reported in columns 1 and 2 of Table III, Panel (b). The estimates again confirm our hypothesis that price reduces as common ownership increases. Our estimates imply a spread reduction of an even greater magnitude with respect to the above estimation; that is, within a quintile, a change in common ownership in a facility from the minimum to the maximum level reduces the spread by roughly 19 basis points.

As robustness check, we also look at the within-borrower variation, where we focus on borrowers issuing one or more loans, in the same year, with more than one facility type, though not necessarily from the same loan. Our sample contains 2,062 loans with those characteristics. Table III reports the coefficient estimates of Equation (4) on this

[13]Following Degryse et al. (2019), we prefer the use of quarter-year-industry fixed effects as our main specification. The use of borrower-year fixed effects implies the loss of single-period borrowers which could bias our results.

subsample. The estimated decrease in price determined by common ownership is similar to the within-loan specification. [14]

In sum, both the estimates based on cross-sectional variation and within-loan variation are consistent with Prediction 1 of Proposition 1.

5.2 Funds committed by the lead bank

5.2.1 Empirical design

Prediction 2 of Proposition 1 says that at higher levels of common ownership, information sharing between the lead bank and the members of the syndicate implies that the lead bank retains a lower share of funds for each facility in the loan.[15] We test Prediction 2 by estimating the following equation:

$$Percent\ Lead\ Amount_{iat} = \beta_0 + \beta_1 CO_{iat} + \beta_2 X_{iat} + \varepsilon_{iat}, \quad (5)$$

where the dependent variable is the percent of facility i's amount retained by lead bank a in quarter t. The term X_{iat} includes the same extensive set of controls used in Equation (4) related to: (i) the loan and the facility; (ii) the borrower; and (iii) the lender. As before, we account for variation in facility type and loan purpose by including industry-year-quarter fixed effects to control for aggregate variation in demand for syndicated loans in each sector, and use lead bank fixed effects to capture time-invariant supply factors.[16] Reflecting the fractional nature of the dependent variables, we also follow Papke and

[14] An even more demanding test of the hypothesis comes from cases in which we have the contemporaneous presence of facilities of the same type displaying high and low common ownership within a particular loan; consistent with the findings above we define a low level of common ownership corresponding to quintiles 1, 2, 3 and high common ownership corresponding to quintiles 4 and 5. In other words, while, for example, before we could exploit pricing variations within a loan varying in common ownership from quintiles 4 and 5, we can now only exploit pricing variations in loans where there are stark differences in the level of common ownership. We only have 64 loans satisfying the requirement, so we run into issues of small sample size. Nevertheless our results hold: Table B.V shows that when common ownership is high, syndicate members receive a lower spread on the particular facility relative to a facility with low-common ownership, and the coefficient magnitude is consistent with the above specifications.

[15] Blickle et al. (2020) document that in some instances the lead arranger sells its entire loan share shortly after syndication. They show that the DealScan sample for which the lead share at origination is reported tends to under-represent loans for which the lead arranger sales occur (4% in this sample). While, in general, the lead share at origination may not be a good measure for the lead arranger's exposure to the borrower over the loan's duration, we focus on the effect of changes in common ownership on the share retained; thus, selection in reported share is unlikely to constitute an important issue in our setting. The authors also note that the lead arranger may invest in the primary market with agreements to resell to an institutional investor on the secondary market following origination. As this issue mainly concerns leveraged loans, we run a robustness check in which we exclude those loans from our sample: our results are unaffected by the exclusion of these loans.

[16] As is well known in the literature, information on the share retained by the lead arranger is available for only half of the facilities in our sample; we therefore do not include borrower-level fixed effects because of overfitting concerns given the limited sample size.

Wooldridge (1996) and use a fractional logit specification to avoid the misspecification of a linear model related to the non-linearity in the effect of the explanatory variables and the decrease in variance when the mean gets closer to one of the boundaries. As the estimates are very similar, we report those from the ordinary least squares in order to maintain consistency with the pricing section.

5.2.2 Panel-regression estimates

Prediction 2 implies that β_1 is negative. Table IV presents the coefficient estimates of Equation (5). In columns 1 and 2 of Table B.VI in Appendix B, we report the full set of coefficient estimates. Column 1 of Table IV reports the effect of our common ownership measure on the share of loan retained by the lead bank without regard for the possible non-linearities of such an impact. Coefficient estimates indicate that an increase of one standard deviation in common ownership as measured by CO_{iat} implies a 0.64 percentage point decrease in the amount retained by the lead bank, holding all other variables constant at their mean values. Lead arrangers retain on average 21% of the facility amount. As above, we discretize our common ownership measure into five indicator variables corresponding to the quintiles of its support to account for non-linearities. Column 2 of Table IV reports that reductions in the funds committed by the lead bank are relevant only for high levels of common ownership. Assuming no effect on the amount retained by the lead bank for the omitted category (CO^1_{iat}), the point estimates in Table IV represent the average percentage point change in the share of the facility retained in each quintile. We find statistically significant decreases in quintiles 3 to 5; that is, within a quintile, an increase in common ownership from the minimum to the maximum level implies a reduction in the amount of the facility retained by the lead corresponding to roughly 1.7 percentage points in quintile 3 and 2.8 percentage points in quintiles 4 and 5. The impact of common ownership on the share of loan retained by the lead arranger is therefore sizable when common ownership is sufficiently high.

Robustness Appendix B contains the results of our robustness tests. As mentioned above, Table B.III reports the same empirical specification using an alternative definition of common ownership as the average of the minimum commonly held shares between the lead arranger and the syndicate members (Newham et al., 2018). Again, the parameter estimates suggest an even stronger effect of common ownership on the share of loan retained by the lead arranger. In column 3 of Table B.VI, we check the robustness of our results excluding loans arranged by the top two banks. The coefficient estimate of common ownership is negative and even larger in size, confirming that the negative effect of common ownership on the share of loan retained by the lead arranger is not driven by the two major lenders in this market alone.

5.2.3 Within-loan estimates

We now test Prediction 2 by restricting our attention to the relative differences in common ownership between facilities within the same loan. Thanks to such an identification strategy, measuring the effect of common ownership on the portion of funds committed by the lead arranger is unlikely to be affected by unobserved borrower-level heterogeneity. As already well-documented in the literature (Ivashina, 2009), information on the share retained by the arranger is often missing. When restricting our sample to loans with multiple facilities of the same type, we face a problem of small sample size and, as a consequence, low statistical power. We recover the missing shares using multiple imputation methods. Because of the high fraction of missing information, we only apply the technique to loans for which: (i) we have a sufficient number of observations for the auxiliary variables; and (ii) only some facilities in the loan have missing information on the amount retained by the lead arranger.[17] Our final sample contains 103 loans with multiple facilities of the same type in a loan for which we are able to recover the percent of the loan retained by the lead. We estimate Equation (5) using this subsample. Results are reported in columns 1 and 2 of Table IV, Panel (b). Again, the negative sign of the coefficient estimate β_1 points to a decrease in the share of the loan retained by the lead arranger. When accounting for the non-linear effect of common ownership on the share of funds retained by the lead arranger, we find a statistically significant decrease in quintiles 3 to 5. Moreover, within a quintile, an increase in common ownership from the minimum to the maximum level implies a reduction in the amount of the facility retained by the lead bank corresponding to roughly 7.5 percentage points.

We turn to multiple loans issued by a given borrower, in a given year, with more than one facility type. Our sample presents 701 loans with these characteristics. Our coefficients are identified by variations in the degree of common ownership across facilities of the same type in one or more loans issued by a borrower in a given year. Table IV reports the coefficient estimates of Equation (5) on this subsample. The results confirm a decrease in the retained amount determined by common ownership; that is, the magnitude of the coefficient estimates is similar to that obtained in the within-loan specification.[18]

In conclusion, we find empirical support for our hypothesis of reduction in the amount retained by the lead bank for each facility when common ownership is sufficiently high.

[17] Chodorow-Reich (2014) and Darmouni (2020) use imputation techniques on datasets of the same type to recover the missing information on the share retained by the arranger.

[18] Given the limited sample size (16 loans), we cannot run our test by selecting cases for which we have the contemporaneous presence of facilities of the same type displaying high and low common ownership within a particular loan.

5.3 Rationing

5.3.1 Empirical design

According to Prediction 3 of Proposition 1, we expect to observe rationing at issuance with low levels of common ownership, as lead arrangers need to commit larger funds in the loans and their funding resources are limited. On the contrary, as lead banks with high common ownership do not need to signal their type of borrower by committing funds in the loans, should be able to fund multiple and larger projects. We test the prediction by empirically comparing the intensity of lending relationships between two types of lead arrangers: first, arrangers that in a given quarter experience a prevalence of loans with high common ownership in their portfolio (more than 50% of their loans present a level of common ownership corresponding to quintiles 4 and 5); and second, arrangers with less than half of their loans in high common ownership in their portfolio. Following Jiang et al. (2010), we measure the intensity of lending relationships in terms of number of deals and the dollar amount, both normalized by the size of the lead arranger. We conduct the comparison between these two groups and test Prediction 3 by estimating the following equation:

$$Intensity\ Lending\ Relations_{at} = \beta_0 + \beta_1 I^H_{CO} + \beta_2 X_{at} + \varepsilon_{at}, \tag{6}$$

where the dependent variable is the number of loans or the dollar amount underwritten by a lead bank a in quarter t normalized by the lead bank size. The terms I^H_{CO} takes a value of one for lead arrangers with prevalence of high common ownership in their portfolio (>50%) in quarter t and zero otherwise. In all specifications, we include lenders' related controls such as size, capital, profitability, and quarter-year fixed effects. We exclude lead arrangers with loans that always present a low level of common ownership (quintiles 1 to 3). Doing so ensures that the two groups that we are comparing present similar characteristics. We assess this empirically by verifying that the distribution of observable characteristics, such as bank leverage, profitability, size, and market equity, are not statistically different between the two groups. In other words, we select the two groups of lead arrangers whose difference in the level of common ownership in a quarter is driven by quasi-random circumstances tied to the differences in fund inflows of potential investors, which in turn determines a slightly different composition in the syndicate and as a consequence the level of common ownership in their portfolio.

5.3.2 Coefficient estimates

Prediction 3 implies that β_1 is positive. Table V presents the estimations of Equation (6). Based on the regression results, lead arrangers with a prevalence of high common ownership in their portfolio underwrite 0.25 more loans in a quarter than lead arrangers with a low prevalence, or \$285 in terms of amount (columns 1 and 2). The median number of loans is 0.8 and the median amount is \$428 (both figures are normalized by the size of the lead arranger). In other words, lead banks with a prevalence of high common ownership underwrite 31% more loans in a quarter on average than lead banks with low prevalence, or 66% more in terms of amount.

We experiment with different thresholds defining the prevalence of high common ownership in the portfolio to assess the robustness of our results according to the definition of the two groups. As we manipulate the cutoffs to make the groups more similar, our results remain robust, even as the sample size reduces. For example, if we define I_{CO}^{H} taking a value of one for lead arrangers with more than 60% of the loans in high common ownership and zero with 40 to 60% percent of the loans in high common ownership, we find that lead arrangers with a prevalence of high common ownership in their portfolio underwrite 0.31 more loans in a quarter than lead arrangers with a low prevalence, or \$410 in terms of amount (columns 3 and 4). Finally, we consider a specification with all lead arrangers present in the sample, and add lead bank fixed effects to account for persistent differences across lead arrangers. Columns 5 and 6 report the results of the specifications; results are robust to this alternative specification.

5.4 Standard deviation of loan returns

5.4.1 Empirical design

According to Prediction 4 of Proposition 1, the standard deviation of the loan returns to the syndicate members is lower at higher levels of common ownership. We test the hypothesis by estimating the following equation:

$$Stand.Dev.\ Spread_{jat} = \beta_0 + \beta_1 CO_{jat} + \beta_2 X_{jat} + \varepsilon_{jat}, \tag{7}$$

where $Stand.Dev.\ Spread_{jat}$ denotes the standard deviation of the all-in-drawn spread across facilities within loan j arranged by bank a in quarter t. The unit of observation is therefore loan-lead bank-borrower, rather than facility-loan-lead bank-borrower as before. Common ownership is measured as the average profit weights across facilities within the loan j. The coefficient β_1 measures the effect of an increase in common ownership between members of the loan on the dispersion of the all-in-drawn spread.

5.4.2 Coefficient estimates

Prediction 4 implies that β_1 is negative when common ownership is sufficiently high. Table VI presents the estimates of Equation (7) in columns 1 and 2. An increase of one standard deviation in common ownership is associated with a 2.68 basis points decrease in the standard deviation of the spread. Given that the standard deviation of the spread is equal to 20 basis points, such a decrease corresponds to 13% of the total spread. In columns 3 and 4, we redefine the dependent variable as the standard deviation in the price of loans issued by the same borrower in a year; that is, coefficient estimates present the same sign and similar magnitude.

6 Explaining the Effects of Common Ownership: Information Transmission

Our findings are consistent with common ownership acting as a device of information transmission. We have documented that the lead arranger decreases the amount of funds retained in the loan at high levels of common ownership, and theoretically shown that signaling through share retention would still be necessary if common ownership were to serve purely as a mechanism of interest alignment. In this section, we conduct additional tests that help answer the question: is common ownership a mechanism of information transmission and how can this happen concretely?

6.1 New versus repeated borrowers

In our analysis, we have so far considered the overall effect of common ownership on the financing terms of syndicated loans. We expect that the role of common ownership will be stronger when information asymmetries are particularly pronounced. Following Sufi (2007), we consider the reputation of borrowers, measured by their past access to the loan market, as a proxy of heterogeneity in information asymmetry between the informed lead arranger and the uninformed syndicate members.

Table VIII reports the results of regressing the all-in-drawn spread against the common ownership measure for the subsamples of new borrowers and repeated borrowers. We find that common ownership matters only for borrowers whose reputation is less established. Those borrowers have practically no history in the loan market; thus, the lead arranger carrying out the due diligence will be more likely to hold an informational advantage over the uninformed syndicate participants. For borrowers forming new relationships with the lead arrangers in the market, we find statistically significant decreases in quintiles 3 to 5. Within a quintile, an increase in common ownership from the minimum to the maximum level implies a reduction in spread corresponding to 8.0 basis points in quintile 3, 16.9 basis points in quintile 4, and 22.0 basis points in quintile 5. In contrast, common ownership does not appear to impact the spread of repeated borrowers.

6.2 Evidence from credit default swaps

We use proprietary data on credit default swaps (CDS) to further corroborate the evidence of information transmission between lenders. CDS prices reflect forward-looking information possessed by market participants, including the investors of syndicated loans. They are also a good measure of a borrower's creditworthiness thanks to their simplicity: while syndicated loans incorporate diverse structures and restrictions, CDS are homogeneous contracts. We use the price information for CDS contracts for 219 borrowers between 2007 and 2013 that are also present in our sample as receiving syndicated loans. We use the five-year U.S. dollar denominated contracts which are the most liquid ones. We record the spread on the last trading day of each quarter as the quarter-end default premium of the borrower. We then compare the CDS spreads before and after a borrower receives a syndicated loan and compare what happens when the same borrower receives a loan characterized by high common ownership versus low common ownership. The before/after period covers four quarters. We conduct the comparison between these two groups as follows:

$$\ln\ CDS\ Spread_{ft} = \beta_0 + \sum_{j=-4}^{4} \beta_1 I_t + \sum_{j=-4}^{4} \beta_2 I_t I_{CO}^{H} + \beta_3 X_{ft} + \varepsilon_{ft}, \tag{8}$$

where f indexes the borrower firm, and t indexes the quarter; I_t are indicators denoting the quarter; I_{CO}^{H} takes a value of one for borrowers in loans with high common ownership and zero otherwise. The coefficient of interest is β_2. We include borrower controls and borrower plus quarter fixed effects. The comparison is therefore very clean, with β_2 representing the difference in the CDS spread for the same borrower after receiving a loan with high common ownership versus one with low common ownership.

Table X reports the coefficient estimates, which should be interpreted as the market's best estimates for the borrowers' default premium in the subsequent five years. Before a loan with high common ownership, a borrower receiving a loan with high common ownership does not seem to enjoy different default premiums, except for $t = -3$. Interestingly, after receiving the loan, the same borrower sees a drop in the CDS spread ($t = 1, 2, 4$). We interpret these findings as suggestive of information transmission within the syndicate, that informed traders can translate into a lower spread (lower default risk). In the quarters prior to loan origination, some market participants (including prospective members of the syndicate) may be better informed on the borrower, however the information is not available to most of them. Afterwards, the market reacts positively to a borrower entering a syndicated loan with high common ownership and the information is factored into the CDS price.

6.3 Falsification tests

We now present the results of two falsification tests that both leverage the testable implications of our hypothesis of common ownership as a mechanism of information transmission *from* the lead *to* the member banks.

Common ownership member-lead The first falsification test exploits the asymmetry in our measure of common ownership between pairs of banks; that is, lead-member κ_{ab_i}, and member-lead κ_{b_ia}. As discussed in Backus et al. (2021b), any difference in the value of these two measures is entirely driven by differences in relative investor concentration.[19] Such asymmetry is a feature of our common ownership measure and results in the following testable implication: since only the lead arranger holds superior information on the borrower, the level of common ownership *from* the syndicate member *to* the lead arranger (κ_{b_ia}) should not impact the lending conditions once we control for the weight that the lead arranger puts on the profit of the syndicate member (κ_{ab_i}).

We estimate Equation (4) and Equation (5) by regressing both the all-in-drawn spread and the amount of loan retained by the lead on our measure of average common ownership between the lead arranger and syndicate members in a facility (CO_{ia}), as before, and a measure of the average common ownership between syndicate members and the lead arranger in a facility (CO_{ib}). The expectation is that adding CO_{ib} should not impact the lending conditions. Panel (a) of Table VII shows the results: in all specifications, the magnitude of the coefficient of common ownership lead-member (CO_{ia}) is practically unchanged. Most importantly, the coefficient of common ownership member-lead (CO_{ib}) is small in magnitude and not statistically different from zero.

Common ownership member-member The second falsification test turns to the level of common ownership between members. We select a sample in which common ownership between the lead and the members is low; we then compute a measure of common ownership between the member pairs, rather than between lead-members. We

[19]In Appendix B, we provide a decomposition of the profit weights member-lead into cosine similarity and relative lender concentration: see Equation (3). Figure B.1 shows the results. Panel (a) shows that the cosine similarity member-lead is identical to the lead-member, as reported in Figure 2. Panel (b) depicts the relative concentration of lenders in the measure of common ownership member-lead, which differs from Panel (c) of Figure 2.

estimate Equation (4) by regressing the all-in-drawn spread against the member-member common ownership measure. Columns 1 and 2 of Panel (b) of Table VII report the estimated coefficients; we find that common ownership between members does not appear to impact the pricing of facilities. We also re-estimate Equation (5) regressing the share retained by the members against our measure of common ownership between member pairs. Columns 3 and 4 of Panel (b) of Table VII report the estimated coefficients. Again, common ownership between members does not impact the share of facility amount retained by the lead bank.

Overall, the results of both tests confirm that information sharing is effectively initiated by the lead bank when common ownership between the lead arranger and the members is high enough.

6.4 The effect of common ownership on the intensity of lending relations

After a loan deal with high common ownership between the lead bank and the given member banks, we expect that those lenders will have a stronger lending relationship with that borrower with respect to lenders participating in a low common ownership deal. Specifically, because lenders in the high common ownership loan possess superior information on the creditworthiness of the borrower, they will be more likely to engage with that borrower afterwards. We empirically compare the intensity of the lending relationship to a given borrowing firm between two types of lenders: lenders that experienced high common ownership with the lead bank and members that experienced low common ownership with the lead bank. As before, we measure intensity in terms of number of deals and dollar amount. We first select a panel at syndicate member-borrower and year-quarter level according to three criteria: (i) a given borrower is granted at least two loans at the origination date, where one of the loans is characterized by a high level of common ownership and the other one by a low level of common ownership; (ii) borrowers are granted at least one loan before and after the loan origination date; and (iii) the loans are not refinancing loans. Second, for each borrower we calculate the total number of loan facilities and the total dollar amount of these facilities in which the same syndicate member participates before and after a given loan deal date, scaled by the borrower's total newly initiated number of loans or the amount of loans during the same period. The before/after period covers 16 quarters, reflecting the average loan duration in our sample. We conduct the comparison between these two groups as follows:

$$Intensity\ Lending\ Relations_{fbt} = \beta_0 + \beta_1 I^H_{CO} I^{Post}_t + \beta_2 I^{Post}_t + \varepsilon_{fbt}, \qquad (9)$$

where f indexes the borrower firm, b the syndicate member bank, and t indexes the quarter; I^H_{CO} takes a value of one for members in the loan with high common ownership and zero otherwise; ; I^{Post}_t takes a value of one after the date of the loan origination and zero otherwise. The coefficient of interest is β_1. Panel (a) of Table IX reports the coefficient estimates of Equation (9), where the intensity of financial relationships between the borrower and the syndicate member is measured in the number of loans normalized by the total number of newly initiated loans. In the most saturated specification, with member, borrower, and year-quarter fixed effects (column 5), syndicate members in the high common ownership deal increase their participation after the origination date by 23 percentage points relative to the control group. Results are similar when measuring the intensity of financial relationships in dollar amount (Panel (b)): members in the high common ownership deal increase their participation after the origination date by around 20 percentage points relative to the control group.

6.5 Connections between lenders and common ownership

Connected directors can serve as a simple mechanism of information transmission across lenders.[20] We investigate the association between common ownership and directorship interconnections (interlocks) in our setting. For each pair of lead bank-potential syndicate member, we define a director interlock as an indicator equal to one if: (i) at least one director sits on the boards of both banks; or (ii) at least one director from each bank in the pair serves on the board of a common third firm. Information on directors and their joint employment is retrieved from BoardEx, with yearly frequency, for the period 1999-2013.[21] We then describe the probability of director interlocks by regressing the indicator on a measure of common ownership and an extensive set of covariates capturing characteristics of the lender pair.

Table XI presents the results of a linear probability model. We empirically document a positive relationship between common ownership and shared directors; that is, pairs of lead bank-potential syndicate member with higher levels of common ownership are more likely to exhibit interlocking directorships. This positive association remains significant after controlling for: (i) characteristics of the lenders (their size, equity, book leverage, return on assets, and whether they belong to the S&P 500); (ii) characteristics of the lender pairs (their portfolio similarity and their past relationships); and (iii) year dum-

[20] The literature has amply documented the role of directors on the success of acquisitions (Hilscher and Şişli-Ciamarra, 2013), especially directors with investment banking experience sitting on a board of non-financial firms (Huang et al., 2014), and the implications of conflicts of interest when a bank's relationship with a borrower is affected by extra control rights (Kroszner and Strahan, 2001; Santos and Rumble, 2006; Jagannathan et al., 2020).

[21] Our common ownership measure is built at quarter-year level. Because the information on directors is at yearly frequency, we use the measure of common ownership from the last quarter of each year.

mies. These results support the hypothesis that, in our setting, common ownership can constitute a communication device between firms if it is sufficiently large, as common directors are more likely at higher levels of common ownership. Our findings complement the work of Azar (2012), who provides descriptive evidence that firms with common owners are more likely to share directors, and Nili (2020), who documents the rise of so-called horizontal directors, serving on the boards of multiple companies within the same industry.[22]

7 Common Ownership and Syndicate Participation

Our variable of interest (that is, common ownership) is a function of the syndicate structure, namely the set of lenders participating in the syndicate. As the lender's decision to enter the syndicate is not random and may depend, among other factors, on the level of common ownership with the lead arranger and other unobservables collected in the error term, we extend our model to account for this form of self-selection. We assume that the utility maximization problem of potential members can be characterized by a reservation interest rate (spread) or reservation return. The reservation interest rate will depend on the characteristics of the member, along with the assessment on the riskiness of the borrower, as follows:

$$Spread^r_{iabt} = \gamma_0 + \gamma_1 \kappa_{iabt} + \gamma_2 X_{iabt} + \upsilon_{iabt}, \tag{10}$$

where i indexes the facility, a the lead arranger, b the potential syndicate member. The term κ_{iabt} is the weight that the lead arranger a puts on the profit of each potential syndicate member b in facility i arranged in quarter t, as defined in Equation (1). Finally, X_{iabt} is a vector of controls including characteristics of: (i) the potential member; (ii) the lead arranger; (iii) the loan and the facility; and (iv) the borrower. As above, we omit the subscript for the borrowing firm to simplify the notation.

If the actual interest rate offered to the potential members is below the reservation interest rate, $Spread^r_{iabt}$, the potential member does not participate in the syndicate. The participation decision of a potential member bank (p_{iabt}) is therefore:

$$\begin{aligned} p_{iabt} &= 1 \text{ if } Spread_{iat} - Spread^r_{iabt} > 0 \\ &= 0 \text{ if } Spread_{iat} - Spread^r_{iabt} \leq 0. \end{aligned}$$

[22]In a similar vein, Ferreira and Matos (2012) find that in the presence of common directors between bank-borrower pairs, the bank is more likely to be chosen as a lead arranger because of the informational advantage that the connected bank retains over other banks.

Using a slightly different version of the definition of $Spread_{iat}$ in Equation (4), the inequality can be expressed as follows:

$$\begin{aligned} p^*_{iabt} &= (\beta_0 - \gamma_0) + (\beta_1 \kappa_{iabt} - \gamma_1 \kappa_{iabt}) + \\ &\quad (\beta_2 X_{iat} - \gamma_2 X_{iabt}) + (\varepsilon_{iabt} - \upsilon_{iabt}) \\ &= \delta_0 + \delta_1 \kappa_{iabt} + \delta_2 X_{iabt} + \eta_{iabt}. \end{aligned}$$

The participation equation is therefore:

$$p_{iabt} = 1[\delta_0 + \delta_1 \kappa_{iabt} + \delta_2 X_{iabt} + \eta_{iabt} > 0]. \tag{11}$$

The resulting outcome equation is:

$$\begin{aligned} Spread_{iat} &= \beta_0 + \beta_1 \kappa_{iabt} + \beta_2 X_{iat} + \varepsilon_{iabt} \text{ if } p^*_{iabt} > 0 \\ &= \text{not observed if } p^*_{iabt} \leq 0, \end{aligned} \tag{12}$$

where we modify Equation (4) to use a more granular unit of observation at member-facility level rather than facility level as in the main specification.[23] Clearly, the error term η_{iabt} involves the unobserved determinants influencing the interest rate offered to the members ε_{iabt}. To account for the correlation between unobservable drivers of participation and the resulting interest rate offered to the syndicate members, we assume a joint normal distribution for the two error terms:

$$\begin{pmatrix} \eta_{iabt} \\ \varepsilon_{iabt} \end{pmatrix} \sim N\left(0, \begin{pmatrix} 1 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix}\right).$$

We estimate the model using the standard Heckman two-step procedure. The joint normality of the errors implies that the error in the pricing equation, ε_{iabt}, is a multiple of the error in the participation decision equation (σ_{12}) plus some noise that is independent of the participation decision equation.

While the sample selection model is theoretically identified without any restriction on the regressors, we use exclusion restrictions to allow for the identification of the parameters attributable to variation in the data rather than parametric assumptions. We argue that the following variables should impact participation, but should not affect the resulting prices: (i) the characteristics of potential members (except for the profit weight κ_{iabt}); and (ii) a variable capturing the portfolio similarity between the potential member and the lead (Euclidian distance). Interest rates are a function of a variety of determinants linked to the

[23] The dependent variable, $Spread_{iat}$, is set at facility level and does not vary across members of the same facility.

lead bank, the borrower and the loan, but the characteristics of potential members should not directly influence the final price. Within the characteristics of potential members, we include trading liquidity of potential members as a determinant of equity ownership by mutual funds. While the validity of exclusion restrictions cannot be directly tested, we perform numerous sensitivity analyses and the results do not change. Finally, all the variables included in the outcome equation are also present in the participation equation.

Table XII presents the results without the correction for selection (column 1) and with the correction (columns 2 and 3). Results from the selection model indicate that participation is not random. Panel (a) of Table XII presents the results using the full sample of observations. In column 2, we present the results of the participation equation. As expected, potential members with higher common ownership with the lead bank are more likely to enter the syndicate, confirming that high levels of common ownership can mitigate information asymmetries. As those potential members are more aware of investment opportunities, or hold superior information to other uninformed participants, their reservation price is lower, and they are more likely to participate in the syndicate. Other statistically important drivers of participation include the level of common ownership between the potential member and the borrower (positive), and the portfolio distance between the lead and the member (negative).

We find evidence of selection, with a significant sample selection term, λ, and an implied correlation coefficient of 0.49. We have unobserved attributes that positively affect both the probability of participating in the syndicate and the prices offered to the syndicate members. Qualitatively, these results do not appear to be very different from those without correction, especially with regard to the impact of common ownership on prices. We conclude that common ownership increases the demand for loans, which would per se reduce the spread through the book building process. However, even after accounting for selection, common ownership reduces the loan spread, which is an effect that we attribute to the role of common ownership in mitigating information asymmetries between the lead arranger and members.

In panel (b) of Table XII, we repeat the same analysis selecting the subsample of 314 loans with facilities of the same type in the same loan. In our setting, it is reasonable to assume that the decision of potential lenders to enter the syndicate and fund the loan essentially depends on the credit risk of the borrower. In contrast, the choice of the specific facility should mainly depend on lender-specific preferences. As a consequence, the composition of the syndicate across facilities within a loan should *not* depend on the degree of common ownership. Our intuition is verified in the data: common ownership is not a driver of participation in specific facilities of loans. The differences between the estimates with and without selection are very small. The t-statistic on the coefficient of the selection term, λ, is statistically insignificant, and the implied correlation coefficient is practically zero. As a result, the two models lead to similar coefficient estimates.

8 Conclusion

We study the impact of common ownership in the syndicated loan market, focusing on the connection between the lead bank and the syndicate members. Our hypothesis is that high levels of common ownership facilitate the transmission of private information on the borrowing firms between the lead bank and other members of the syndicate. Common ownership is therefore a tool to ease information asymmetries.

We propose a signaling model in which a lead bank detains private information on the riskiness of a project while seeking funding to finance it. Signaling is costly in that it requires a larger commitment of funds by the lead bank. We solve the model under two scenarios: first, no common ownership, corresponding to asymmetric information; and second, high common ownership, corresponding to symmetric information. The model provides four empirical predictions. At higher levels of common ownership: (i) the interest rate paid to the syndicate members is lower; (ii) the lead bank retains lower funds; (iii) we observe less rationing at the issuance; and (iv) the standard deviation of the loan returns to the syndicate members is lower.

We use data on the syndicated loan market to empirically verify these predictions and find clear empirical support for all of them. Our identification strategy leverages the cross-sectional variation in the level of common ownership arising from differences in the composition of the syndicate both across facilities within a loan and across loans. An increase of one standard deviation in common ownership between the lead arranger and members of the syndicate is associated with a decrease equal to 6 basis points in interest rates, 0.64 percentage points in the amount retained by the lead, and 2.68 basis points in the standard deviation of the spread. Lead arrangers with a prevalence of high common ownership in their portfolio experience stronger lending relationship. They underwrite 31% more loans in a quarter with respect to lead arrangers with a low prevalence, and 66% more in terms of the amount. These results are robust to a variety of robustness and falsification tests.

We provide four tests whose results confirm that common ownership is a mechanism of information transmission. First, common ownership has a stronger impact when asymmetries are pronounced, as in the presence of new borrowers. Second, we use data on credit default swaps as they reflect forward-looking and aggregate information held by market participants. A given borrower receiving a loan in high common ownership tends to have a default spread similar to the one observed when it receives a loan in low common ownership prior to loan origination. Immediately afterwards, the spread is lower, reflecting the information on the borrower credit worthiness. Third, we run two placebo tests showing that information flows from the lead bank to the members and not vice versa. Fourth, for a given borrower, syndicate members in a high common ownership deal tend to increase their participation by around 20 percentage points relative to members in a low common ownership deal, both in terms of the amount underwritten and the number of financial relationships. We interpret this result as evidence of superior information that lenders in high common ownership possess on the borrower, which fosters stronger relationships afterwards. Finally, we document the existence of a concrete channel of information transmission; specifically, overlaps between directors sitting on the boards of lenders are more prevalent when the common ownership is high.

Regulators recognize that common ownership can be conducive to the transmission of information about the borrower. We provide empirical evidence consistent with the presence of this flow of information and quantify the impact of common ownership on the contractual terms of the loan. More broadly, we provide a novel view on common ownership as a mechanism to mitigate the effects of information asymmetry. Given the pervasiveness of overlapping ownership across industries, future research analyzing its impact within other contexts characterized by information asymmetry would be of relevance.

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Tables and Figures

Table I: **Summary statistics**

	Mean	Std.Dev	p25	p50	p75	Obs.
			Loan Variables			
All-in-Drawn Spread	168	113	75	150	225	21,060
CO Lead-Member	0.690	0.200	0.580	0.740	0.831	21,060
CO Member-Borrower	0.510	0.290	0.270	0.530	0.744	21,060
Facility Amount $M	607.6	1,230.5	125.0	300.0	700.0	21,060
Loan Amount $M	1,028.1	1,965.7	200.0	500.0	1,150.0	21,060
Lead Amount	20.5%	15.8%	9.5%	15.0%	26.7%	10,236
# Facilities within Loan	1.820	1.060	1.000	2.000	2.000	21,060
Log Maturity	3.780	0.630	3.580	4.090	4.094	21,060
Secured Loan	0.450	0.500	0.000	0.000	1.000	21,060
Refinancing	0.730	0.450	0.000	1.000	1.000	21,060
Log Number of Members	2.130	0.720	1.610	2.200	2.639	21,060
Guarantor	0.100	0.300	0.000	0.000	0.000	21,060
Relationship Score	0.040	0.020	0.030	0.040	0.044	21,060
New Lending Relation	0.500	0.500	0.000	1.000	1.000	21,060
LIBOR 3M	0.030	0.020	0.000	0.020	0.054	21,060
Non-Bank Synd. Member	0.200	0.400	0.000	0.000	0.000	21,060
Prob. Default	0.030	0.130	0.000	0.000	0.000	21,060
Stock Volatility	0.400	0.190	0.270	0.360	0.472	21,060
Credit Line	0.720	0.450	0.000	1.000	1.000	21,060
Term Loan	0.280	0.450	0.000	0.000	1.000	21,060
			Borrower Variables			
Size	7.730	1.600	6.650	7.660	8.814	21,060
ROA	0.100	0.070	0.060	0.090	0.131	21,060
Book Leverage	0.330	0.210	0.190	0.300	0.430	21,060
Tangibilities	0.320	0.230	0.130	0.260	0.462	21,060
Tobin's Q	1.730	0.920	1.200	1.480	1.944	21,060
Log Int. Cov.	2.190	0.970	1.540	2.050	2.690	21,060
Liquidity Ratio	0.060	0.070	0.010	0.040	0.084	21,060
Unrated Borrower	0.300	0.460	0.000	0.000	1.000	21,060
High Yield	0.350	0.480	0.000	0.000	1.000	21,060
Investment Grade	0.350	0.480	0.000	0.000	1.000	21,060
			Bank Variables			
Lead Size	13.330	1.170	12.480	13.560	14.355	21,060
Lead Market Equity	0.120	0.060	0.070	0.110	0.158	21,060
Bank Book Equity	0.080	0.020	0.070	0.080	0.092	21,060
Lead Book Leverage	0.260	0.100	0.220	0.250	0.293	21,060
Lead ROA	0.010	0.000	0.010	0.010	0.013	21,060

The table reports summary statistics of the main variables in our sample related to (i) facilities and loans; (ii) borrowers; (iii) lead banks. CO denotes common ownership. All variables are defined in Table B.II.

Table II: **Differences in attributes of high versus low common ownership facilities**

	CO Low (1)		CO High (2)		Difference (1)-(2)	
	Mean	Obs.	Mean	Obs.	Diff.	t-stat
			Loan and Facility Characteristics			
All-in-Drawn Spread	22.21	4807	-11.50	6709	33.70***	(15.97)
Lead Amount	2.74	2356	0.86	1747	1.88***	(3.74)
Log Maturity	0.03	4684	-0.04	6650	0.07***	(6.36)
Secured Loan	0.06	4822	-0.05	6743	0.11***	(12.03)
All-in-Drawn Spread SD	2.70	2700	-1.42	3400	4.12***	(3.97)
			Borrower Characteristics			
Prob. Default	0.01	3417	0.00	5344	0.01	(1.47)
ROA	-0.00	4669	-0.01	6639	0.01	(1.03)
Log Int. Cov.	-0.02	4295	0.04	6024	-0.07**	(-3.13)
Observations	4822		6743			

The table reports the differences between facilities characterized by high versus low common ownership for the main variables of the sample. All variables are time demeaned. Log Int. Cov. denotes Log of 1 plus interest coverage truncated at 0. A facility is defined as high common ownership if the average level of profit weight between the lead bank and the syndicate members falls in the upper quintile of the common ownership distribution. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table III: **Interest rates**

Panel A: Full Sample

	(1)	(2)
CO	-29.556***	
	(-4.152)	
CO Quintile 2		0.993
		(0.299)
CO Quintile 3		-5.228
		(-1.498)
CO Quintile 4		-11.756***
		(-2.680)
CO Quintile 5		-13.255***
		(-3.160)
Loan Purpose FE	Yes	Yes
Facility Type FE	Yes	Yes
Lead FE	Yes	Yes
Borrower FE	Yes	Yes
SIC2 X Year-Quarter FE	Yes	Yes
Observations	19,890	19,890
Adjusted R-squared	0.808	0.808

Panel B: Within-loan estimates

	Same Facility Type - Same Loan		*Same Facility Type - Same Borrower-Year*	
	(1)	(2)	(3)	(4)
CO	-52.248***		-51.164***	
	(-4.114)		(-4.197)	
CO Quintile 2		-3.708		0.974
		(-0.489)		(0.167)
CO Quintile 3		-9.319		-8.950
		(-1.346)		(-1.046)
CO Quintile 4		-25.018***		-20.088***
		(-2.859)		(-2.952)
CO Quintile 5		-20.902***		-29.380***
		(-3.035)		(-4.820)
Loan Purpose FE	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	822	822	2,868	2,868
Adjusted R-squared	0.798	0.797	0.688	0.690

The table reports the OLS regression parameter estimates and t-statistics of Equation (4). The dependent variable is the all-in-drawn loan spread, expressed in basis points. The coefficient of interest is the one of CO, a measure of common ownership between the lead and member banks in the same facility given in Equation (2). The specification also controls for facility-loan, lender, and borrower characteristics. Standard errors are clustered by lead bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table IV: **Facility amount retained by the lead bank**

Panel A: Full Sample

	(1)	(2)
CO	-2.405**	
	(-2.332)	
CO Quintile 2		-0.337
		(-0.474)
CO Quintile 3		-1.840**
		(-2.331)
CO Quintile 4		-2.916***
		(-3.813)
CO Quintile 5		-1.937**
		(-2.037)
Loan Purpose FE	Yes	Yes
Facility Type FE	Yes	Yes
Lead FE	Yes	Yes
Borrower FE	No	No
SIC2 X Year-Quarter FE	Yes	Yes
Observations	6,741	6,741
Adjusted R-squared	0.726	0.727

Panel B: Within-loan estimates

	Same Facility Type - Same Loan		*Same Facility Type - Same Borrower-Year*	
	(1)	(2)	(3)	(4)
CO	-10.281		-5.030**	
	(-1.209)		(-1.995)	
CO Quintile 2		-5.010		-0.673
		(-1.515)		(-0.566)
CO Quintile 3		-8.296**		-2.189*
		(-2.227)		(-1.830)
CO Quintile 4		-8.591*		-2.145
		(-1.873)		(-1.584)
CO Quintile 5		-7.840*		-3.172**
		(-1.748)		(-2.212)
Loan Purpose FE	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	332	332	933	933
Adjusted R-squared	0.605	0.656	0.678	0.678

The table reports the OLS regression parameter estimates and t-statistics of Equation (5). The dependent variable is the percentage facility amount retained by each lead bank in the syndicate. The coefficient of interest is the one of CO, a measure of common ownership between the lead and member banks in the same facility given in Equation (2). The specification also controls for facility-loan, lender, and borrower characteristics. Standard errors are clustered by lead bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table V: **Rationing**

	CO Threshold $(0, 0.5]; (0.5, \max(CO)]$		CO Threshold $[0.4, 0.6]; (0.6, \max(CO)]$		CO Threshold $[0, 0.5]; (0.5, \max(CO)]$	
	(1)	(2)	(3)	(4)	(5)	(6)
	# Loans	Amount Lent	# Loans	Amount Lent	# Loans	Amount Lent
CO High Lead	0.254***	285.823***	0.308***	410.359***	0.153***	129.794**
	(3.894)	(4.133)	(3.283)	(4.489)	(3.321)	(2.587)
Bank Size	0.943***	945.341***	1.040***	1.029***	0.671***	548.132***
	(15.036)	(12.155)	(14.290)	(11.798)	(8.528)	(6.882)
Bank Market Equity	-6.435***	-2.955***	-7.177***	-2.714**	-0.057	0.514
	(-5.882)	(-3.387)	(-5.133)	(-2.249)	(-0.155)	(1.609)
Bank Book Leverage	-3.730***	-2.020***	-4.695***	-2.612***	-0.133	0.274
	(-12.876)	(-7.192)	(-9.431)	(-5.744)	(-0.794)	(1.244)
Bank ROA	7.506	-23.359**	9.357	-27.697*	-8.907***	-15.376***
	(0.711)	(-2.009)	(0.753)	(-1.876)	(-3.025)	(-4.436)
Lead FE	No	No	No	No	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	607	607	400	400	1,675	1,675
Adjusted R-squared	0.626	0.605	0.659	0.634	0.738	0.645

The table reports the OLS regression parameter estimates and t-statistics of Equation (6). The dependent variable is the number of loans (odd columns) and the dollar amount (even columns) underwritten by a lead bank in a quarter, normalized by the lead bank size. The coefficient of interest is the one of *CO High Lead*, an indicator variable taking the value of one for lead arrangers with prevalence of high common ownership in their portfolio and zero otherwise. The specification also controls for lead bank characteristics and year-quarter fixed effects. Standard errors are clustered by year-quarter. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table VI: **Standard deviation of loan returns**

	(1) Price SD Loan	(2) Price SD Loan	(3) Price SD Borrower-Year	(4) Price SD Borrower-Year
CO	-13.297***		-21.180***	
	(-2.779)		(-2.995)	
CO Quintile 2		-3.668*		3.392
		(-1.685)		(1.106)
CO Quintile 3		-4.973**		-11.592***
		(-2.069)		(-3.758)
CO Quintile 4		-3.303		-5.154*
		(-1.207)		(-1.959)
CO Quintile 5		-9.863***		-11.416***
		(-4.069)		(-4.544)
Loan Purpose FE	Yes	Yes	No	No
SIC2 X Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	3,916	3,916	4,798	4,798
Adjusted R-squared	0.442	0.443	0.369	0.375

The table reports the OLS regression parameter estimates and t-statistics of Equation (7). The dependent variable is the standard deviation of prices among facilities within the same loan (1)-(2) and same borrower-year (3)-(4). The coefficient of interest is the one of CO, a measure of common ownership defined as the average profit weight between the lead arranger and other syndicate members within the same loan (1)-(2) and same borrower-year (3)-(4). The specification also controls for facility-loan, lender, and borrower characteristics. Standard errors are clustered by lead bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table VII: **Falsification test: common ownership member-lead and member-member**

Panel A: CO directionality

	(1) Spread	(2) Spread	(3) Lead Amount	(4) Lead Amount
CO Member-Lead	-4.714	-5.028	-1.483	-0.719
	(-0.540)	(-0.582)	(-0.744)	(-0.364)
CO Lead-Member	-28.852***		-2.386**	
	(-4.076)		(-2.286)	
CO Quintile 2		1.492		-0.395
		(0.448)		(-0.550)
CO Quintile 3		-4.545		-1.907**
		(-1.312)		(-2.497)
CO Quintile 4		-11.050**		-2.999***
		(-2.507)		(-4.226)
CO Quintile 5		-12.608***		-2.011**
		(-2.994)		(-2.144)
Loan Purpose FE	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes
SIC2 FE	No	No	No	No
Year-Quarter FE	No	No	No	No
Lead FE	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	No	No
SIC2 X Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	19,851	19,851	6,722	6,722
Adjusted R-squared	0.808	0.808	0.726	0.727

Panel B: CO among syndicate members only

	(1) Spread	(2) Spread	(3) Lead Amount	(4) Lead Amount
CO among Members Only	-3.533		-0.157	
	(-0.214)		(-0.040)	
CO Among Members Quintile 2		-3.306		-0.602
		(-0.732)		(-0.482)
CO Among Members Quintile 3		-1.642		0.110
		(-0.350)		(0.114)
CO Among Members Quintile 4		9.253**		0.082
		(2.275)		(0.059)
CO Among Members Quintile 5		-1.989		1.983
		(-0.243)		(0.854)
Loan Purpose FE	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes
SIC2 FE	No	No	Yes	Yes
Year-Quarter FE	No	No	Yes	Yes
Lead FE	Yes	Yes	Yes	Yes
Borrower FE	No	No	No	No
SIC2 X Year-Quarter FE	Yes	Yes	No	No
Observations	3,994	3,994	1,669	1,669
Adjusted R-squared	0.817	0.818	0.608	0.609

The table reports the OLS regression parameter estimates and t-statistics of Equation (4) in Column (1) and (2) and Equation (5) in Column (3) and (4). The dependent variable is facility loan spread (Column 1 and 2) and the percentage of loan retained by the lead bank (Column 3 and 4). In Panel (a), the coefficient of interest is the one on *CO Member-Lead*, a measure of common ownership between the member and the lead in the same facility. In Panel (b), the coefficient of interest is the one on *CO among Members Only*, a measure of common ownership between the members in the same facility. The specification also controls for facility-loan, lender, and borrower characteristics. Standard errors are clustered by lead bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table VIII: **Interest rates and common ownership - New versus repeated borrowers**

	(1)	(2)	(3)	(4)
	New Borrower		Repeated Borrower	
CO	-49.182***		-9.682	
	(-5.104)		(-1.109)	
CO Quintile 2		3.412		-5.720
		(0.821)		(-1.152)
CO Quintile 3		-12.077**		-9.427*
		(-2.255)		(-1.747)
CO Quintile 4		-22.182***		-9.718
		(-4.139)		(-1.483)
CO Quintile 5		-25.200***		-8.292
		(-4.350)		(-1.406)
Loan Purpose FE	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes
Lead FE	Yes	Yes	Yes	Yes
SIC2 X Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	9,916	9,916	9,825	9,825
Adjusted R-squared	0.751	0.751	0.757	0.757

The table reports the OLS regression parameter estimates and t-statistics of Equation (4). The dependent variable is the all-in-drawn loan spread, expressed in basis points. The coefficient of interest is the one of CO, a measure of common ownership between the lead and member banks in the same facility given in Equation (2). Column (1) and (2) contain loans issued to new borrowers. Column (3) and (4) report the effect of syndicate common ownership on facility spreads for repeated lending relations. Standard errors are clustered by lead bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table IX: **Lending intensity to a borrower with loan with high versus low common ownership**

Panel A: Number of Loans

	(1)	(2)	(3)	(4)	(5)
Member CO High	0.171***	0.111**	0.126**	0.085	0.080
	(3.585)	(2.175)	(2.352)	(1.490)	(1.446)
Post	0.015	-0.121	-0.114	-0.124	-0.123
	(0.328)	(-1.527)	(-1.459)	(-1.492)	(-1.477)
Member CO High X Post		0.226**	0.215**	0.235**	0.235**
		(2.394)	(2.296)	(2.390)	(2.384)
Member FE	No	No	No	Yes	Yes
Borrower FE	No	No	No	No	Yes
Year-Quarter of Loan FE	No	No	Yes	Yes	Yes
Observations	452	452	452	452	452
Adjusted R-squared	0.033	0.043	0.118	0.147	0.150

Panel B: Loan Amount

	(1)	(2)	(3)	(4)	(5)
Member CO High	0.176***	0.128**	0.141***	0.102*	0.096*
	(3.645)	(2.501)	(2.619)	(1.700)	(1.660)
Post	0.020	-0.088	-0.084	-0.093	-0.092
	(0.437)	(-1.064)	(-1.032)	(-1.074)	(-1.060)
Member CO High X Post		0.180*	0.173*	0.192*	0.192*
		(1.848)	(1.798)	(1.896)	(1.893)
Member FE	No	No	No	Yes	Yes
Borrower FE	No	No	No	No	Yes
Year-Quarter of Loan FE	No	No	Yes	Yes	Yes
Observations	452	452	452	452	452
Adjusted R-squared	0.035	0.041	0.108	0.127	0.130

The table reports the OLS regression parameter estimates and t-statistics of Equation (9). The dependent variable is number of loan underwritten by a syndicate member normalized by the total newly initiated number of loans (Panel A) and the amount of loan underwritten by a syndicate member normalized by the total newly initiated number of loans (Panel B). The coefficient of interest is the one of *Member CO High X Post*, an indicator variable taking the value of one for syndicate members in the loans with high common ownership and after the date of the loan origination. Standard errors are clustered by lender and year-quarter. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table X: **CDS spread and the effect of high common ownership deals**

	(1) Log(CDS Spread)	(2) Log(CDS Spread)	(3) Log(CDS Spread)
CO High	0.082	0.122	0.093
	(1.318)	(1.164)	(1.337)
CO High X t=-4	-0.082	-0.039	-0.095
	(-0.957)	(-0.335)	(-1.047)
CO High X t=-3	-0.182*	-0.140	-0.205**
	(-1.925)	(-1.217)	(-2.058)
CO High X t=-2	-0.077	-0.031	-0.085
	(-0.934)	(-0.310)	(-0.970)
CO High X t=-1	-0.015	-0.015	-0.025
	(-0.262)	(-0.195)	(-0.409)
CO High X t=1	-0.136**	-0.167*	-0.152**
	(-1.968)	(-1.885)	(-2.190)
CO High X t=2	-0.239**	-0.343***	-0.254**
	(-2.128)	(-2.851)	(-2.306)
CO High X t=3	-0.104	-0.179	-0.122
	(-0.882)	(-1.314)	(-1.069)
CO High X t=4	-0.150	-0.201*	-0.161*
	(-1.642)	(-1.777)	(-1.744)
Borrower Controls	Yes	Yes	Yes
Borrower FE	Yes	No	Yes
Year-Quarter of Loan FE	No	Yes	Yes
Observations	4,668	4,667	4,668
Adjusted R-squared	0.882	0.893	0.888

The table reports the OLS regression parameter estimates and t-statistics of Equation (8). The dependent variable is the logarithm of the CDS spread. The coefficient of interest is the one on *CO High X* $\sum_{t=-4}^{4} t$, an indicator variable taking the value of one one for borrowers in loans with high common ownership and zero otherwise multiplied by indicators denoting the quarter (4 quarters before and 4 quarters after loan origination). Standard errors are clustered by borrower and year-quarter of loan. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table XI: **Board connections and common ownership**

	(1)	(2)	(3)
CO	0.304***	0.065**	0.065**
	(9.437)	(2.238)	(2.198)
Distance Lead-Member		-0.112***	-0.096**
		(-2.877)	(-2.467)
Relationship Lead-Member		0.193***	0.191***
		(4.385)	(4.354)
Lead Size		0.073***	0.077***
		(9.399)	(9.735)
Lead Market Equity		0.137	-0.033
		(1.259)	(-0.277)
Lead Book Leverage		-0.022	-0.088*
		(-0.474)	(-1.744)
Lead ROA		0.260	0.160
		(0.278)	(0.138)
Member Size		0.078***	0.083***
		(10.950)	(11.506)
Member Market Equity		0.159*	0.019
		(1.752)	(0.198)
Member Book Leverage		-0.028	-0.088*
		(-0.585)	(-1.781)
Member ROA		-0.134	-0.359
		(-0.154)	(-0.371)
Year FE	No	No	Yes
Observations	8,106	7,838	7,838
Adjusted R-squared	0.038	0.155	0.161

The table reports the OLS regression parameter estimates and t-statistics. The dependent variable is as an indicator equal to one if a pair of banks have a board connection. *Distance Lead-Member* is the portfolio distance between the lead bank and the syndicate participant in the previous four quarters, *Relationship Lead-Member* is the number of loans arranged by the lead bank where the member bank participated in the previous four quarters divided by the number of loans arranged by the lead bank in the previous four quarters. Standard errors are clustered by member bank. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table XII: **Interest rates: selection into the syndicate**

Panel A: Full sample

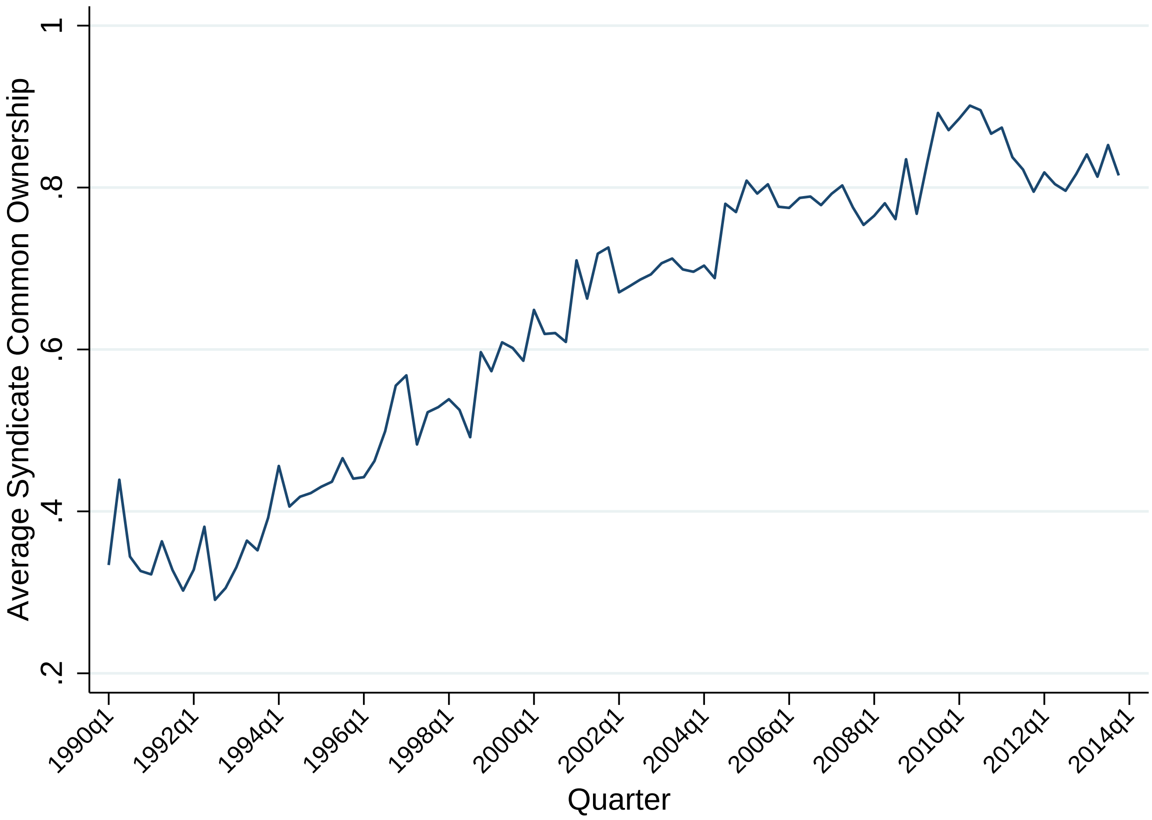
	No Selection	Heckman Selection	
	(1)	(2)	(3)
	Spread	Member	Spread
CO	-10.310***	0.160***	-8.287***
	(-3.296)	(2.909)	(-6.996)
λ			28.731***
			(7.354)
Loan Purpose FE	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
SIC2 FE	Yes	Yes	Yes
Observations	66,148	65,232	65,232

Panel B: Within loan

	No Selection	Heckman Selection	
	(1)	(2)	(3)
	Spread	Member	Spread
CO	-11.339**	0.016	-10.356**
	(-2.484)	(0.087)	(-1.986)
λ			-9.596
			(-1.277)
Loan Purpose FE	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
Observations	2,914	2,683	2,683

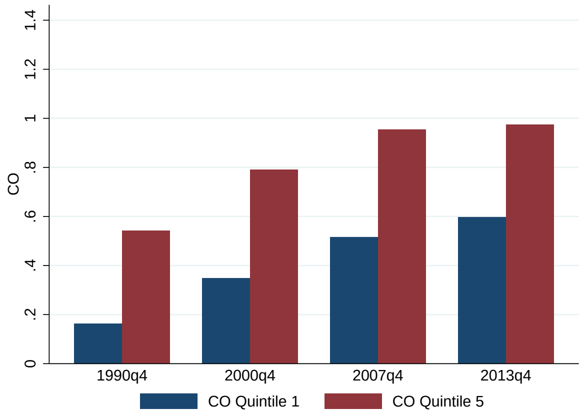
The table reports the the regression parameter estimates and t-statistics of a one-step OLS estimation of Equation (12) (Column 1) and a two-step estimation of Equation (11) and Equation (12) accounting for sample selection (Column 2 and 3). The dependent variable is the all-in-drawn loan spread, expressed in basis points. The coefficient of interest is the one of CO, a measure of common ownership between the lead and member banks given in Equation (1). The specification also controls for facility-loan, syndicate member bank, and borrower characteristics. Standard errors are clustered by member bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Figure 1: **Average common ownership in the syndicated loan industry over time**

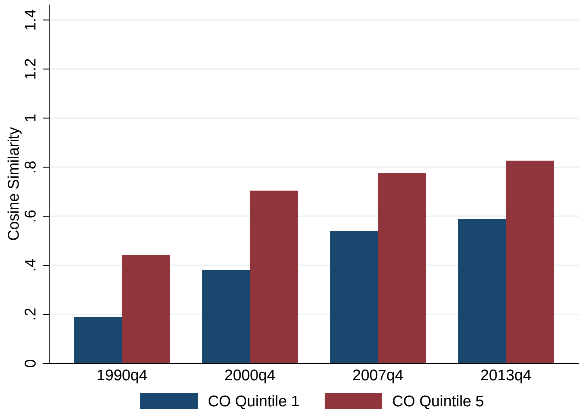


This figure reports the average common ownership among banks in the same syndicate between 1990 and 2013 at a quarterly frequency. Common Ownership is defined as the average profit weights between the syndicate lead-arranger(s) and the syndicate members.

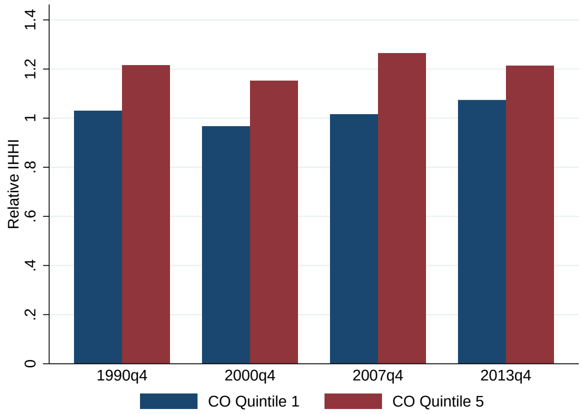
Figure 2: **Decomposition of lead-member common ownership measure**



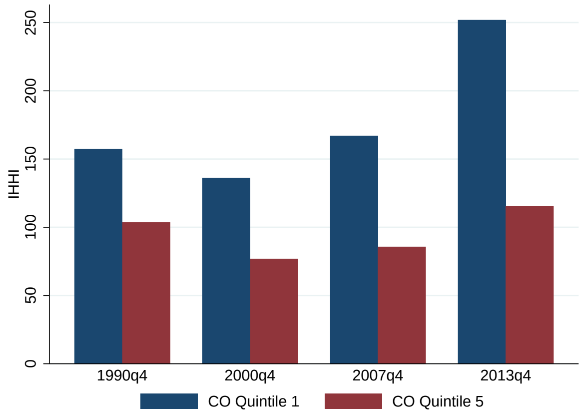
(a) CO



(b) Cosine Similarity



(c) Relative IHHI



(d) Lead IHHI

The figure reports the average values of syndicate common ownership (a) and its decomposition (b) and (c) for the highest and lowest quintile of the common ownership distribution over time. Syndicate common ownership (CO) is defined in Equation 2 and the decomposition in Equation 3. Panel (d) reports the average shareholders' concentration of lead banks (Lead IHHI) for the highest and lowest quintile of the common ownership distribution over time.

Appendix A

In this section, we present the formal details of the model and solve the results we present in Section 3.

Recall that the economy is populated by a penniless borrower that owns a project but lacks financial resources to carry it out. The borrower delegates the lead bank (L) to form a syndicate for a loan of size 1; it then shares with the lead bank the returns of the investment. A continuum of potential members of the syndicate (M) operate in perfectly competitive financial markets and have the financial resources to fund the project. A, with $0 < A < 1$, is the maximum amount of the loan that the lead bank can pledge.

The borrower's project can be one of two types. The good type (G) has a probability of success equal to p. The bad type (B) has a probability of success $q < p$. Independently of the type, the project yields R in the case of success and 0 in the case of failure. The lead bank knows the type of the borrower's project. We denote by α and $(1 - \alpha)$ the potential syndicate members' prior probabilities that the borrower's project is of type G and type B, respectively.

We make the following parametric assumptions.

Assumption 1.

$$pR > 1 > 1 - A > qR, \tag{A.1}$$

$$qR - A > \frac{q}{p}\left(\frac{1 - \kappa\theta qR}{1 - \kappa\theta}\right). \tag{A.2}$$

In Assumption 1.(A.1), $pR > 1$ implies that the good borrower's project has a positive net present value (NPV). $1-A > qR$ means that the bad borrower's project has a negative NPV despite the use of the lead bank's funds A. At the right-hand side of the condition in Assumption 1.(A.2), parameter $\kappa \in [0, 1]$ captures the weight that the lead bank attaches to the utility of the fraction $\theta \in (0, 1)$ of commonly owned syndicate members. At the left-hand side, $qR - A$ is the project return of a lead bank representing a bad type (qR), net of the "inside liquidity" A. The condition implies that the value of such net utility is large, which, as we will see, makes signaling the good type particularly costly for the lead bank. Taken together, Assumptions 1.(A.1) and 1.(A.2) imply that $0 < A < 1/2$ and an upper bound on θ. Both are satisfied in our data.

All agents are risk neutral, the lead bank is protected by limited liability, and the risk-free interest rate is nil. The contract we consider is $(x_j, R^s_{j,L}, R^f_{j,L}, R^s_{j,M}, R^f_{j,M}, \mathcal{A}_j)$, with $j \in \{G, B\}$. We denote by $x_j \in [0, 1]$ the decision on whether a lead bank representing a borrower of type j receives funding by the potential syndicate members. The share of the returns on a project of type $j = G, B$ received by $i = L, M$ in the case of success

(s) is $R^s_{j,i}$, it is $R^f_{j,i}$ in the case of failure (f). We assume for simplicity that $R^f_{j,L} = 0$; $R^f_{j,M} = 0$ follows from limited liability. Finally, $\mathcal{A}_j \leq A$ is the amount of cash invested by L in the loan. Suppressing the notation for success, the contract can be rewritten as $(x_j, R_{j,L}, R_{j,M}, \mathcal{A}_j)$, with $j \in \{G, B\}$.[24]

L holds all the bargaining power. It designs contracts that can be accepted or rejected by M. When indifferent, L will prefer not to commit any cash in the loan (i.e., $\mathcal{A}_j = 0$). We will analyze the perfect Bayesian equilibrium of the contract design game. We use $\kappa \in [0, 1]$ to denote the level of common ownership between the lead bank and the syndicate member, where κ is the weight that the lead bank L places on the utility of the commonly owned syndicate members. Similarly to Antón et al. (2021), we restrict κ within values in the unit interval. However, values of κ larger than one are empirically possible: they correspond to situations in which the lead bank places more weight on the utility of the commonly owned syndicate members than on its own utility. As a consequence, the lead bank would have the incentive to transfer its funds to the syndicate members.

To begin with, we solve a funding game without common ownership ($\kappa = 0$). We then introduce common ownership. In our model, the lead bank uses common ownership to truthfully channel its private information regarding the borrower's probability of success to the commonly owned syndicate members. We derive empirical predictions on the interest rate paid to the syndicate members ($1 + r = R - R_{j,L}$) and the amount of the loan retained by the lead bank ($\mathcal{A}_j$).

Before continuing, it is important to note that, with symmetric information, the lead bank rejects the loan to the bad type ($x_B = 0$) and grants the loan to a good type ($x_G = 1$). Moreover, it does not pledge its funds in the loan to the good type ($\mathcal{A}_G = 0$), and sets the reward to investors so to satisfy their break-even condition ($R_{G,M} = 1/p$). If these symmetric-information contracts were available under asymmetric information, a lead bank representing a bad borrower mimics the good borrower and its utility would be positive (because $pR - 1 > 0$). However, the syndicate members would not break even in expectation.[25]

A.1 Funding without common ownership

We now solve the contract design game without common ownership. As discussed in the main text, we focus on the *low-information-intensity* optimum of the contract design game (Rothschild and Stiglitz, 1976; Wilson, 1977).

[24] $R_{j,L}$ is then split between the lead bank and the borrower according to a bargaining game that is outside the model.

[25] Upon accepting, and given their priors, investors' expected utility is $\alpha p(1/p) + (1 - \alpha)q(1/p) < 1$ because of Assumption 1.(A.1).

Proposition 2. *Without common ownership, the separating contracts offered by the lead bank are* $(x_B, R_{B,L}, R_{B,M}, \mathcal{A}_B) = (0, 0, 0, 0)$ *and*

$$(x_G, R_{G,L}, R_{G,M}, \mathcal{A}_G) = (1, A/q, R - A/q, A).$$

Only the lead bank representing the good borrower chooses $(x_G, R_{G,L}, R_{G,M}, \mathcal{A}_G)$.

Proof. We solve for the separating allocation featuring a contract $c = (x_G, R_{G,L}, R_{G,M}, \mathcal{A}_G)$ for the good borrower and the symmetric information contract $\bar{c} = (x_B, R_{B,L}, R_{B,M}, \mathcal{A}_B) = (0, 0, 0, 0)$ for the bad borrower. Contract c will maximize the good borrower's utility subject to M breaking even for the good borrower and to the bad borrower not preferring c to $\bar{c}$. Under a condition equivalent to Assumption 1.(A.1), Tirole (2006) Lemma 6.2 proves that this separating allocation is the low-information-intensity optimum. In what follows, we construct the low-information-intensity optimum in our setting.

Contract c solves the following maximization problem:

$$\max_{\{x_G, R_{G,L}, R_{G,M}, \mathcal{A}_G\}} x_G p R_{G,L} - \mathcal{A}_G \tag{A.3}$$

subject to

$$x_G(pR_{G,M} - 1) + \mathcal{A}_G \geq 0, \tag{A.4}$$

$$x_G q R_{G,L} - \mathcal{A}_G \leq 0, \tag{A.5}$$

$$R = R_{G,L} + R_{G,M}, \tag{A.6}$$

$$x_G \in [0, 1],\ \mathcal{A}_G \leq A. \tag{A.7}$$

Condition (A.4) is the participation constraint of the potential syndicate members; Condition (A.5) is the mimicking constraint of the lead bank representing a bad borrower.

To begin with, $x_G > 0$ as otherwise the contract would yield a zero payoff for L, despite a type-G borrower holds a positive-NPV project. Moreover, were $x_G < 1$, then increasing x_G slightly, keeping $x_G R_{G,L}$ constant, does not affect neither the maximand nor the left-hand side of Condition (A.5), but increases the left-hand side of Condition (A.4) (because $pR > 1$ and $R_{G,M} = R - R_{G,L}$). Then, $x_G = 1$.

Since with symmetric information the utility of the bad borrower is equal to zero, Constraint (A.5) must be binding. That is, $qR_{G,L} = \mathcal{A}_G$. Plugging $R_{G,L} = \mathcal{A}_G/q$ into Expression (A.3), we obtain:

$$\mathcal{A}_G \left(\frac{p}{q} - 1 \right),$$

which increases in $\mathcal{A}_G$; thus, $\mathcal{A}_G = A$ (L commits its entire funds in the loan) and $R_{G,L} = A/q$.

Finally, the participation constraint of M can be rewritten as

$$pR - 1 > A\left(\frac{p}{q} - 1\right), \tag{A.8}$$

which hods true under Assumption 1.(A.2). □

To sum up, without common ownership, the lead bank (L) representing a good borrower will underwrite the loan by committing $\mathcal{A}^* = \mathcal{A}_G = A$. The syndicate members (M) receives an interest rate equal to $1 + r^* = R - A/q$.

A.2 Funding with common ownership

Consider now the case in which the lead bank places a weight κ on the utility of the commonly owned potential syndicate members. Specifically, there is a fraction $\theta \in (0, 1)$ of commonly owned potential syndicate members (M_{Co}) and a complementary fraction $(1-\theta)$ that are not commonly owned with the lead bank (M_{NCo}). Any contract offered by the lead bank features the same reward to M_{Co} and M_{NCo} (so that $R_{j,M} = R_{j,M_{Co}} = R_{j,M_{NCo}}$, with $j = G, B$).

We equate common ownership to an information transmission device. We let the lead bank channel its private information regarding the borrower's probability of success to the commonly owned syndicate members (M_{Co}). We say that information transmission can happen only if $\kappa \geq \underline{\kappa}$. As a consequence of information transmission, M_{Co} are perfectly informed about the type of the borrower. M_{NCo} know that the lead bank shares its private information with M_{Co}, but do not observe the type of the firm represented by the lead bank L.

The timing of the game with common ownership is as follows. Having shared with M_{Co} its information about the type of borrower it is representing, L designs the contracts to offer to investors. Subsequently, M_{Co} accept or reject. Finally, after observing M_{Co}'s decision, it is M_{NCo}'s turn to accept or reject the contracts offered by L.[26] In approaching the informed potential investors first, the lead bank implements a cheaper form of signalling, through the acceptance decision of the commonly owned syndicate members instead of contract design. This timing is consistent with the institutional setting of loan syndication. Post-mandate, the lead bank informally contacts a group of potential investors to target; the lead bank first presents the loan and shares information about the

[26]We obtain the same results if we consider a model in which L's decision to share information with M_{NCo} is an equilibrium outcome, M_{NCo} only observe L's decision to share information (not the type of the borrower), and the decision to accept the contract is taken simultaneously by M_{Co} and M_{NCo}. In this alternative model, M_{NCo} update their beliefs on the type of borrower represented by L only based on the latter's decision to share information (and the contract it designs).

loan terms and the borrower's creditworthiness to these potential investors. This process is described in Ivashina and Sun (2011) and Bruche et al. (2020).

We find the following:

Proposition 3. *With common ownership, the lead bank representing a good borrower will offer the equilibrium contract with symmetric information, namely:* $x_G = 1$*,* $R_{G,L} = R - 1/p$*,* $R_{G,M} = 1/p$ *and* $\mathcal{A}_G = 0$*. The lead bank representing a bad borrower, will never get access to funding (*$x_B = 0$*).*

Proof. We solve the contract design game with common ownership by assuming that L offers $c_j = (\mu_j, x_j, R_{j,L}, R_{j,M}, \mathcal{A}_j)$, with $j = G, B$, where μ_j denotes the probability that the commonly owned investors M_{Co} accept c_j, $x_j \in [0,1]$, $R = R_{j,L} + R_{j,M}$ and $0 \leq \mathcal{A}_j \leq A$. The timing of the game is:

1. The lead bank L formulates its offer to M_{Co} and M_{NCo}.
2. M_{Co}, being informed about the type of borrower represented by L, accept or reject the offer.
3. Conditional on observing the decision taken by M_{Co}, M_{NCo} update their priors α. We denote M_{NCo}'s posteriors by $\hat{\alpha}$; they depend on the contract offer (including the decision by M_{Co}, μ).
4. Given $\hat{\alpha}$, M_{NCo} decide whether to accept or reject L's offer.

We first show that any equilibrium contract must feature the acceptance decision of M_{Co}. In particular, we prove that the the utility of a lead bank L representing type j increases in μ_j. Take the objective function of L:

$$\mathcal{M}_{j,L}(c_j) \equiv x_j \omega_j R_{j,L} - \mathcal{A}_j + \mu_j \theta \kappa [x_j(\omega_j R_{j,M} - 1) + \mathcal{A}_j]$$

where $\omega_G = p$ and $\omega_B = q$. Consider two rewards $R_{j,M}$ and $\tilde{R}_{j,M}$ such that

$$\mu_j R_{j,M} = \tilde{\mu}_j \tilde{R}_{j,M}, \tag{A.9}$$

where μ_j and $\tilde{\mu}_j$ are the probabilities that M_{Co} accept when their reward is $R_{j,M}$ and $\tilde{R}_{j,M}$, respectively, with $\mu_j > \tilde{\mu}_j$ and $R_{j,M} < \tilde{R}_{j,M}$. Since $R = R_{j,L} + R_{j,M}$, setting $R_{j,M} < \tilde{R}_{j,M}$ implies that $R_{j,L} > \tilde{R}_{j,L}$. Hence,

$$\mathcal{M}_{j,L}(c_j) \geq \mathcal{M}_{j,L}(\tilde{c}_j),$$

where $\tilde{c}_j = (\tilde{\mu}_j, x_j, \tilde{R}_{j,L}, \tilde{R}_{j,M}, \mathcal{A}_j)$.

Moreover, Condition (A.9) implies that considering $R_{j,M}$ or $\tilde{R}_{j,M}$ does not affect the participation constraint of M_{Co}:

$$\mu_j \theta[x_j(\omega_j R_{j,M} - 1) + \mathcal{A}_j] \geq 0,$$

because $\mu_j \theta[x_j(\omega_j R_{j,M} - 1) + \mathcal{A}_j] = \tilde{\mu}_j \theta[x_j(\omega_j \tilde{R}_{j,M} - 1) + \mathcal{A}_j]$. All this means that a higher value of μ_j increases the utility of L and leaves the participation constraint of M_{Co} unaffected.

Consider then two candidate equilibrium contract offers such that $\mu_G = \mu_B = 1$. Specifically, we consider the symmetric-information contracts and the low-information-intensity contracts. By comparing the two, we will show that signaling via the acceptance decision of M_{Co} (as it happens under the acceptance of the symmetric-information contracts) is preferred by the lead bank L to the signaling via the contract design that takes place in the low-information-intensity contracts.

Symmetric information equilibrium contracts. Let the lead bank representing type $j \in \{B, G\}$ offer:

$$\begin{aligned} c_G^{SI} &= (\mu_G, x_G, R_{G,L}, R_{G,M}, \mathcal{A}_j) = (1, 1, R - 1/p, 1/p, 0), \\ c_B^{SI} &= (\mu_B, x_B, R_{B,L}, R_{B,M}, \mathcal{A}_j) = (1, 0, 0, 0, 0). \end{aligned}$$

Since they observe the type of the borrower, M_{Co} accept these contracts. After observing the contract offer and M_{Co}'s decision, M_{NCo} will also accept because, since $\hat{\alpha}|c_G^{SI} = 1$ and $\hat{\alpha}|c_B^{SI} = 0$, their participation constraint (PC) is always satisfied with equality:

$$\begin{aligned} PC(c_G^{SI}) &: \ (1 - \theta)[x_G(pR_{G,M} - 1) + \mathcal{A}_G] = 0, \\ PC(c_B^{SI}) &: \ (1 - \theta)[x_B(qR_{B,M} - 1) + \mathcal{A}_B] = 0. \end{aligned}$$

It follows that, at the symmetric information contracts, the utility of a lead bank representing a good type is $U_L^{SI} = pR - 1$; the utility of a lead bank representing a bad type is equal to zero.

Low-information-intensity optimum contracts. We now construct the separating allocation corresponding to the low-information-intensity optimum of the game with common ownership. Assumption 1.(A.2) guarantees that this optimum allocation exists in this setting.

For the same reason as in the proof of Proposition 2, the lead bank L sets

$$(\mu_B, x_B, R_{B,L}, R_{B,M}, \mathcal{A}_B) = (1, 0, 0, 0, 0),$$

and maximizes $\mathcal{M}_{G,L}(c_G)$ with respect to $c_G = (1, x_G, R_{G,L}, R_{G,M}, \mathcal{A}_G)$, subject to:

$$x_G(pR_{G,M} - 1) + \mathcal{A}_G \geq 0, \tag{A.10}$$

$$x_G q R_{G,L} - \mathcal{A}_G + \theta\kappa \tilde{U}_{B,M_{Co}} \leq 0. \tag{A.11}$$

Condition (A.10) is M_{NCo}'s participation constraint, Condition (A.11) is the mimicking constraint, and $\tilde{U}_{B,M_{Co}} \equiv x_G(qR_{G,M} - 1) + \mathcal{A}_G$. Proceeding as in the analysis without common ownership, we find that $x_G = 1$, $\mathcal{A}_G = A$, and

$$R_{G,L} = \frac{A}{q} - \frac{\theta\kappa}{(1-\theta\kappa)q}(qR - 1). \tag{A.12}$$

Plugging these values into $\mathcal{M}_{G,L}(c_G)$ we find that, with common ownership, the utility of the lead bank representing a good borrower at the low-information-intensity optimum separating allocation is

$$U_L^{SE} = (1-\theta\kappa)A\left(\frac{p}{q} - 1\right) - \frac{\theta\kappa p}{q}(qR - 1) + \theta\kappa(pR - 1).$$

Finally, the participation constraint of M_{NCo} in (A.10) can be rewritten as

$$U_L^{SI} \geq U_L^{SE}, \tag{A.13}$$

which holds true by Assumption 1.(A.2).

Equilibrium contracts. Given the results above, and, in particular, Condition (A.13), it follows that: (i) a lead bank L representing a good borrower strictly prefers offering c_G^{SI} to the low-information-intensity optimum contracts; (ii) a lead bank L representing a bad borrower will never get access to funding. $\square$

To sum up, if common ownership is an information transmission device, we find that, as with symmetric information, only the good projects will be funded ($x_G = 1$,$x_B = 0$), the loan is fully underwritten by the members of the syndicate ($\mathcal{A}^{**} = \mathcal{A}_G = 0$) in exchange of an interest rate equal to $1 + r^{**} = 1/p$. In analogy to the case without common ownership, the contract targeting a good type can be interpreted as a debt contract in which the members of the syndicate transfer 1 upfront and get $1/p$ in the case of project success or else the borrower goes bankrupt.

In the proof, we also show that signaling through the acceptance decision of the commonly owned syndicate members is preferred by the lead bank L to the signaling via the contract design that takes place in the low-information-intensity contracts.

A.3 Empirical predictions

The following proposition gives the four empirical predictions of the model (also listed in Proposition 1), and formally proves them. Our null hypothesis is that common ownership facilitates information transmission; thus, our predictions are based on the comparison of the results in Proposition 2 and Proposition 3.

Proposition 4. *Comparing the lending conditions* ($1+r$ *and* $\mathcal{A}$) *with and without common ownership, we find the results in Proposition 1.*

Proof. For the first prediction,

$$r^* - r^{**} \quad = \quad R - \frac{A}{q} - \frac{1}{p} > 0 \tag{A.14}$$

$$\iff \quad A < \frac{q(pR-1)}{p} \tag{A.15}$$

follows from Assumption 1.

The second prediction directly follows from $\mathcal{A}^{**} = 0 < A = \mathcal{A}^*$.

For the third prediction, we assume that there are many lead banks in the economy, each with funds A distributed according to some CDF $F(A)$. Then, only the lead banks with sufficiently large funds such that the bad firm will find mimicking unappealing will be able to obtain funding at the conditions of the separating equilibrium with asymmetric information.

For the fourth prediction: given $r \in \{r^*, r^{**}\}$, the formula for the variance of the project's returns is

$$Var(R) = E[r^2] - E[r]^2 = pr^2 - (pr)^2, \tag{A.16}$$

which is increasing in r for all $(1-p)r > 0$. So the standard deviation of returns is larger without common ownership. $\square$

Appendix B

Table B.I: **Largest Shareholders of Three Largest Banks**

JP Morgan

2002		2007		2014	
CAPITAL RESEARCH & MANAGEMENT	8%	HANSON INVESTMENT MANAGEMENT	6%	BLACKROCK INC	6%
BARCLAYS GLOBAL INVESTORS	4%	AXA	5%	VANGUARD GROUP INC	5%
STATE STREET CORP	3%	STATE STREET CORP	4%	STATE STREET CORP	5%
DEUTSCHE BANK	3%	FMR LLC	3%	FMR LLC	3%
AXA	3%	DAVIS SELECTED ADVISERS	2%	CAPITAL WORLD INVESTORS	3%

Citigroup

2002		2007		2014	
STATE STREET CORP	5%	STATE STREET CORP	3%	BLACKROCK INC	6%
BARCLAYS GLOBAL INVESTORS	4%	CAPITAL RESEARCH GLOBAL INVESTORS	3%	VANGUARD GROUP INC	5%
MANUFACTURERES LIFE INSURANCE	4%	CAPITAL WORLD INVESTORS	3%	STATE STREET CORP	5%
FMR CORP	4%	FMR LLC	2%	FMR LLC	3%
AXA	3%	AXA	2%	WELLINGTON MANAGEMENT GROUP	2%

Bank of America

2002		2007		2014	
MANUFACTURERES LIFE INSURANCE	8%	STATE STREET CORP	3%	BLACKROCK INC	6%
BARCLAYS GLOBAL INVESTORS	4%	FMR LLC	3%	VANGUARD GROUP INC	5%
FMR CORP	4%	AXA	2%	STATE STREET CORP	5%
DEUTSCHE BANK	3%	CAPITAL RESEARCH GLOBAL INVESTORS	2%	FMR LLC	4%
AXA	3%	WELLINGTON MANAGEMENT GROUP	2%	JPMORGAN	2%

This table reports the five largest shareholders of the three largest lead arrangers in the U.S. syndicated loan market. Ownership data comes from the Thomson Reuters s34 database.

Table B.II: **Variable Definition**

Variable	Description
	Loan Variables
All-in-Drawn Spread	Facility all-in-drawn spread over the LIBOR rate
Mean Syndicate Profit Weight	Average common ownership (profit weight) between syndicate lead arranger and syndicate members
CO Bank-Firm	Average common ownership (profit weight) between borrower and syndicate banks
Facility Amount $M	Facility amount in 100 billion dollars
Log Maturity	Natural logarithm of the maturity of the facility in months
Secured Loan	Dummy variable equal to 1 if the facility is secured
Refinancing	Dummy variable equal to 1 if the purpose of the facility is refinancing
Log Number of Members	Natural logarithm of the number of syndicate members
Guarantor	Dummy variable equal to 1 if the facility has a guarantor
Relationship Score	$\frac{\frac{1}{N}\times\sum_j^N \text{Number of facilities between lead}_i \text{ and participant}_j \text{ in the past 3 years}}{\text{Number of facilities arranged by lead}_i \text{ in the past 3 years}}$
New Lending Relation	Dummy equal to 1 if the borrower has not received a loan from the lead arranger(s) in the syndicate before
LIBOR 3M	LIBOR 3-months rate at the time of the loan origination
Non-Bank Syndicate Member	Dummy variable equal to 1 if the facility has a non-bank lender in the syndicate
Volatility	SD of the borrower's stock return over the 12 months period before loan issuance
Credit Line	Dummy variable equal to 1 if the facility is a credit line
Term Loan A	Dummy variable equal to 1 if the facility is a term loan A
Term Loan B	Dummy variable equal to 1 if the facility is a term loan B or higher (C,D,...,H)
	Borrower Variables
Size	natural logarithm of the borrower's total assets
ROA	EBIT over total assets
Book Leverage	Debt over total assets
Tangibilities	PP&T over total assets PP&T over total assets
High Yield	Dummy variable equal to 1 if the borrower has a high-yield rating
Unrated Borrower	Dummy variable equal to 1 if the borrower is unrated
Tobin's Q	Market to book value
Log Int. Cov.	Log of 1 plus interest coverage truncated at 0
Liquidity Ratio	Cash over total asset
	Bank Variables
Bank Size	Natural logarithm of the bank's total assets
Bank Market Equity	Market value of equity capital over total assets
Bank Book Equity	Book value of equity capital over total assets
Bank Leverage	Bank debt over total assets
Bank ROA	EBIT over total assets

Table B.III: **Facility Loan Spread and Common Ownership - Alternative definitions of common ownership**

	(1)	(2)	(3)	(4)
	Spread		Amount	
CO	-65.956**		-16.032***	
	(-2.547)		(-3.297)	
CO Quintile 2		2.227		-0.483
		(0.801)		(-0.564)
CO Quintile 3		-9.415**		-1.942**
		(-2.127)		(-2.177)
CO Quintile 4		-10.258**		-2.702**
		(-2.452)		(-2.183)
CO Quintile 5		-11.962**		-2.115
		(-2.438)		(-1.550)
Loan Purpose FE	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes
Lead FE	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	No	No
SIC2 X Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	19,834	19,834	6,727	6,727
Adjusted R-squared	0.808	0.808	0.726	0.726

The table reports the OLS regression parameter estimates and t-statistics of Equation (4). The dependent variable are: the all-in-drawn loan spread, expressed in basis points in column (1) and (2); and the percent of facility amount retained by the lead bank in column (3) and (4). The coefficient of interest is the one of CO, a measure of common ownership defined as the sum of the minimum commonly held shares by investors between the lead arranger and other syndicate members. Standard errors are clustered by lead bank. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table B.IV: **Interest rates - full results and robustness checks**

	(1) All	(2) All	(3) All	(4) All	(5) No Top2
CO	-29.556***		-67.374***	-26.622***	-21.380*
	(-4.152)		(-4.738)	(-3.641)	(-1.738)
CO Quintile 2		0.993			
		(0.299)			
CO Quintile 3		-5.228			
		(-1.498)			
CO Quintile 4		-11.756***			
		(-2.680)			
CO Quintile 5		-13.255***			
		(-3.160)			
Facility Amount	-0.003***	-0.003***	-0.003***	-0.003***	-0.004*
	(-4.468)	(-4.427)	(-3.371)	(-5.744)	(-1.869)
CO Member-Borrower	-16.546***	-16.618***	-0.894	-20.955***	-37.253**
	(-3.994)	(-4.005)	(-0.045)	(-6.880)	(-2.499)
Log Maturity	2.481**	2.574**	0.149	2.480*	3.960*
	(2.036)	(2.133)	(0.107)	(1.975)	(1.954)
Secured Loan	24.499***	24.391***	4.895	27.940***	48.130***
	(7.077)	(6.988)	(0.753)	(10.134)	(11.600)
Refinancing	-8.680***	-8.839***	-23.694***	-6.264***	-13.763*
	(-6.120)	(-6.374)	(-5.283)	(-4.396)	(-1.851)
Log Number of Members	-23.294***	-23.379***	-26.165***	-19.768***	-25.854***
	(-9.408)	(-9.394)	(-8.496)	(-9.606)	(-8.728)
Guarantor	-7.583***	-7.451***	-11.265*	-5.473***	-2.761
	(-3.358)	(-3.309)	(-1.959)	(-2.931)	(-0.404)
Relationship Score	-240.003***	-230.867***	-224.970*	-226.902***	-208.484***
	(-5.274)	(-5.211)	(-1.922)	(-5.111)	(-4.368)
New Lending Relation	-0.762	-0.540	-8.183***	0.885	-1.225
	(-0.513)	(-0.365)	(-2.834)	(1.000)	(-0.334)
LIBOR 3M	-457.657	-468.738	-1,522.179***	-887.311***	387.336
	(-0.960)	(-0.955)	(-5.880)	(-2.700)	(0.227)
Non-Bank Synd. Member	17.369***	17.553***	16.134***	16.248***	30.453***
	(6.446)	(6.477)	(2.893)	(8.174)	(5.535)
Prob. Default	46.687***	45.912***	15.467	55.743***	37.962***
	(4.681)	(4.558)	(0.685)	(5.496)	(2.772)
Stock Volatility	97.949***	97.921***	168.797***	94.997***	62.572***
	(9.208)	(9.264)	(4.087)	(10.664)	(6.589)
Size	-5.824***	-5.695***		-6.451***	-3.417
	(-3.419)	(-3.281)		(-3.537)	(-1.221)
ROA	-140.254***	-140.665***		-141.432***	-100.042***
	(-6.751)	(-6.733)		(-8.268)	(-2.715)
Book Leverage	38.078***	37.901***		36.709***	23.522
	(5.363)	(5.147)		(6.004)	(1.476)
Tangibilities	33.313***	34.202***		5.081	-4.444
	(2.699)	(2.745)		(0.395)	(-0.381)
Tobin's Q	-3.266*	-3.308**		-2.800**	-4.500**
	(-1.976)	(-2.009)		(-2.610)	(-2.019)
Log Int. Cov.	-4.868***	-4.884***		-5.673***	-9.940***
	(-3.780)	(-3.815)		(-3.088)	(-3.271)
Liquidity Ratio	33.822*	35.580*		19.940	45.488*
	(1.673)	(1.746)		(1.075)	(1.828)

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	(1) All	(2) All	(3) All	(4) All	(5) No Top2
Unrated Borrower	17.757***	17.814***		24.869***	14.715**
	(5.920)	(5.752)		(4.719)	(2.108)
High Yield	14.269***	14.373***		17.561***	24.579***
	(6.049)	(6.006)		(4.620)	(3.641)
Lead Size	-3.316	-2.487	-6.635***		-1.618
	(-1.155)	(-0.882)	(-2.941)		(-0.242)
Lead Market Equity	-20.169	-18.506	-1.172		51.273*
	(-0.635)	(-0.572)	(-0.065)		(1.962)
Lead Book Leverage	-21.979*	-22.286*	-2.692		11.704
	(-1.892)	(-1.922)	(-0.412)		(0.428)
Lead ROA	114.786	121.571	143.360		374.180
	(0.588)	(0.614)	(1.091)		(0.938)
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes	Yes	Yes
Lead FE	Yes	Yes	Yes	No	Yes
Borrower FE	Yes	Yes	No	No	No
SIC2 X Year-Quarter FE	Yes	Yes	No	No	Yes
Lead X Year-Quarter FE	No	No	No	Yes	No
Borrower X Year FE	No	No	Yes	No	No
Observations	19,890	19,890	18,160	20,528	5,440
Adjusted R-squared	0.808	0.808	0.884	0.774	0.715

The table reports the OLS regression parameter estimates and t-statistics of Equation (4). The dependent variable is the all-in-drawn loan spread, expressed in basis points. The coefficient of interest is the one of CO, a measure of common ownership between the lead and member banks in the same facility given in Equation (2). The specification also controls for facility-loan, lender, and borrower characteristics. Standard errors are clustered by lead bank. Columns (1)-(2) report the main results with the full set of controls. Column (3) and (4) report results on the full sample with a different set of fixed-effects. Column (5) excludes all the loans that had Bank of America or JP Morgan as lead arrangers. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table B.V: **Interest rates - Within-group estimates**

	(1)	(2)
	Same Facility Type - Same Loan	*Same Facility Type - Same Borrower-Year*
CO High	-13.087*	-25.085***
	(-1.889)	(-5.345)
Loan Purpose FE	Yes	Yes
Facility Type FE	Yes	Yes
Year-Quarter FE	Yes	Yes
Observations	135	1,516
Adjusted R-squared	0.960	0.593

The table reports the OLS regression parameter estimates and t-statistics of Equation (4) on a sample of loans containing facilities of the same type displaying high and low common ownership within a given loan. The dependent variable is the all-in-drawn loan spread, expressed in basis points. The coefficient of interest is the one of *CO High*, an indicator variable taking the value of one when common ownership between the lead and member banks in the same facility is high (quintile 4 and 5) and zero otherwise. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Table B.VI: **Facility amount retained by the lead bank - full results and robustness checks**

	(1) All	(2) All	(3) No Top2
CO	-2.405**		-3.582*
	(-2.332)		(-2.011)
CO Quintile 2		-0.337	
		(-0.474)	
CO Quintile 3		-1.840**	
		(-2.331)	
CO Quintile 4		-2.916***	
		(-3.813)	
CO Quintile 5		-1.937**	
		(-2.037)	
Facility Amount	0.000***	0.000***	0.000
	(3.424)	(3.086)	(0.906)
CO Member-Borrower	-1.687**	-1.484**	-2.690
	(-2.424)	(-2.043)	(-1.566)
Log Maturity	0.472*	0.490*	-0.108
	(1.809)	(1.897)	(-0.388)
Secured Loan	1.025***	1.000**	0.050
	(2.678)	(2.539)	(0.067)
Refinancing	-0.570	-0.595	-0.341
	(-1.351)	(-1.418)	(-0.393)
Log Number of Members	-16.123***	-16.055***	-20.616***
	(-13.854)	(-13.643)	(-21.772)
Guarantor	0.385	0.376	-0.304
	(0.777)	(0.759)	(-0.309)
Relationship Score	6.024	6.397	8.675
	(0.703)	(0.777)	(0.818)
New Lending Relation	0.427	0.518	-0.087
	(1.206)	(1.440)	(-0.123)
LIBOR 3M	-3.438	1.807	232.089
	(-0.032)	(0.017)	(0.983)
Non-Bank Synd. Member	3.027***	3.005***	1.595
	(6.593)	(6.383)	(1.397)
Prob. Default	-0.954	-0.925	-6.458**
	(-0.352)	(-0.339)	(-2.346)
Stock Volatility	3.893**	3.950**	4.401
	(2.514)	(2.577)	(1.649)
Size	0.411*	0.412*	0.668
	(1.788)	(1.767)	(1.218)
ROA	-1.429	-1.934	-2.979
	(-0.424)	(-0.561)	(-0.347)
Book Leverage	-1.374	-1.304	1.182
	(-0.836)	(-0.803)	(0.575)
Tangibilities	-3.535***	-3.749***	-6.131**
	(-2.831)	(-2.962)	(-2.671)
Tobin's Q	-0.300	-0.293	0.649
	(-1.015)	(-0.998)	(1.037)
Log Int. Cov.	0.177	0.173	-0.129
	(0.749)	(0.738)	(-0.191)
Liquidity Ratio	-1.516	-1.265	-5.750
	(-0.402)	(-0.326)	(-1.068)

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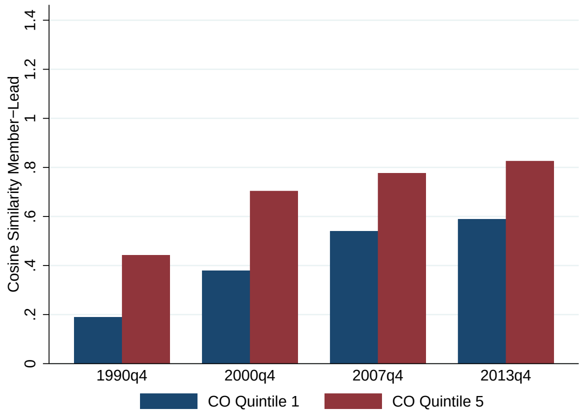
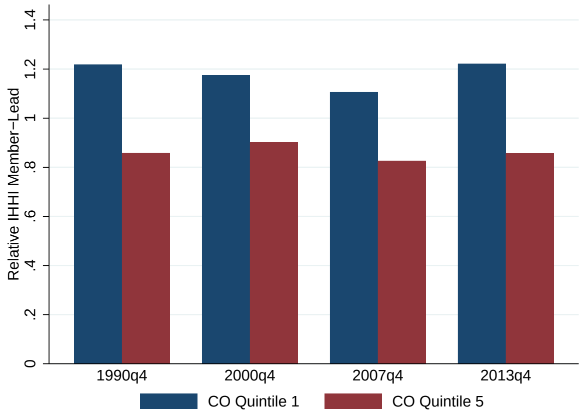
	(1) All	(2) All	(3) No Top2
Unrated Borrower	1.060***	1.162***	1.627
	(2.856)	(3.074)	(1.588)
High Yield	0.524	0.602*	-0.900
	(1.536)	(1.723)	(-0.734)
Lead Size	1.201	1.321	1.460
	(1.351)	(1.475)	(0.985)
Lead Market Equity	0.034	0.608	-4.118
	(0.006)	(0.106)	(-0.415)
Lead Book Leverage	3.851	2.435	-3.107
	(0.914)	(0.577)	(-0.408)
Lead ROA	-41.038	-37.605	-1.916
	(-0.926)	(-0.913)	(-0.024)
Loan Purpose FE	Yes	Yes	Yes
Facility Type FE	Yes	Yes	Yes
Lead FE	Yes	Yes	Yes
Borrower FE	No	No	No
SIC2 X Year-Quarter FE	Yes	Yes	Yes
Observations	6,741	6,741	1,890
Adjusted R-squared	0.726	0.727	0.819

The table reports the OLS regression parameter estimates and t-statistics of Equation (5). The dependent variable is the percentage facility amount retained by each lead bank in the syndicate. The coefficient of interest is the one of CO, a measure of common ownership between the lead and member banks in the same facility given in Equation (2). The specification also controls for facility-loan, lender, and borrower characteristics. Standard errors are clustered by lead bank. Columns (1)-(2) report the main results with the full set of controls. Column (3) excludes all the loans that had Bank of America or JP Morgan as lead arrangers. All variables are defined in Table B.II. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

Figure B.1: **Decomposition of member-lead common ownership measure**



(a) Cosine Similarity



(b) Relative IHHI

The figure reports the decomposition of the average values of syndicate common ownership (Member-Lead) for the highest and lowest quintile of the common ownership (Member-Lead) distribution over time. Syndicate common ownership (CO) is defined in Equation 2 and the decomposition in Equation 3.