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Joining forces: why banks syndicate credit

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Abstract

Banks can grant loans to firms bilaterally or in syndicates. We study this choice by combining bilateral loan data with syndicated loan data. We show that loan size alone does not adequately explain syndication. Instead, banks' ability to manage risks and firm riskiness drive the choice to syndicate. Banks are more likely to syndicate loans if their risk-bearing capacity is low and if screening and monitoring come at a high cost. Syndicated loans are more expensive and more sensitive to loan risk than bilateral loans. Our findings contradict the hypothesis that reputable borrowers graduate to the syndicated loan market.

Keywords: syndicated loans, bank risk, firm risk
JEL classification codes: E44, E52, E58, E63, F45, G20, G21

Non-Technical Summary

This paper investigates why some loans get granted bilaterally, while others are syndicated across multiple lenders. Our findings suggest that loan syndication is primarily a tool for banks to manage risk, which stands in contrast with the common view that reputable borrowers graduate to the syndicated loan market.

To come to this conclusion, we combine the proprietary credit register of the euro area called Anacredit (administered by the European Central Bank) with syndicated loan data from DealScan. The final data set allows us to compare bilateral loans with similar syndicated loans and study the determinants driving the decision to syndicate at the lender and loan level. We therefore overcome a limitation of previous work that observed bilateral lending or syndicated lending, but usually not both concurrently.

Our results show that banks syndicate loans when they are unable or unwilling to take full risk on their own. Banks with lower capital ratios, which have a limited ability to absorb losses, are significantly more likely to syndicate. Similarly, banks that lack expertise in the borrower's industry, which we proxy using a bank's lending concentration in that industry, are more likely to syndicate a loan. Firms with a higher probability of default also receive syndicated loans more frequently. In other words, syndication arises when either the bank's capacity to absorb risk is constrained, or the loan itself is too risky.

Although loan size plays a role-very large loans are more often syndicated-we find that size alone does not fully explain the syndication decision. For example, loans between €100 and €700 million are often granted bilaterally, while there are also plenty of syndicated loans in this size spectrum. This overlap reinforces our central point: banks syndicate not just because loans are large, but because of the underlying risk and their own constraints.

We also explore what happens after a bank decides to syndicate. Specifically, we look at how much of the loan the lead bank retains. We document that the same factors driving the syndication decision also influence the retained share. Banks with stronger capital and more industry expertise retain more of the loan. When a borrower is especially risky, banks are more likely to offload a larger portion to other syndicate participants. These two margins, the decision to syndicate and the retained share, appear to work hand in hand as tools for

managing exposure.

We further document that syndicated loans are significantly more expensive than comparable bilateral loans. On average, spreads are about 59 basis points higher even after accounting for loan terms and characteristics. In addition, syndicated loan spreads are also more sensitive to the risk of the borrower. Finally, we address the idea that syndicated loans serve as a stepping stone to the bond market. If that were true, we would expect firms with syndicated loans to be more likely to issue bonds later on. However, the data reveals that Firms that borrow through syndicates are not more likely to become first-time bond issuers than those that borrow through large bilateral loans. In fact, syndicated loan borrowers are often riskier than both bond issuers and bilateral loan borrowers, suggesting that syndication is not an intermediate stage on the path to bond markets.

1 Introduction

A large literature in corporate finance examines the coexistence of funding markets, particularly of bank loans and public bonds (e.g., Diamond (1991), Bolton and Freixas (2000), or Denis and Mihov (2003)). These studies emphasize trade-offs related to information asymmetry, monitoring, and renegotiation. Implicit in much of this work is the assumption that bank loans are a uniform financing instrument. In practice, syndicated loans account for a substantial share of bank lending,[1] and have been the subject of a growing literature examining syndicate formation, the role of lead arrangers, and the implications for credit supply (e.g., Sufi (2007), Ivashina (2009), or Lim, Minton, and Weisbach (2014)). However, much less is known about why syndicated loans exist in the first place. Why are some loans syndicated and others granted bilaterally, and what are the trade-offs driving this choice?

Syndicated loans combine features of bilateral loans and of bonds. Similar to bilateral loans, a bank, called the lead arranger, negotiates the loan and screens and monitors the firm.[2] Similar to bonds, there are multiple lenders, called syndicate participants, which assume a more passive role. Two opposing hypotheses emerge. On the one hand, syndicated loans might serve as an intermediary step for firms that want to graduate to the bond market. If this is the case, we expect banks to syndicate loans whose borrowers are reputable and safe (e.g., Diamond (1991), Chemmanur and Fulghieri (1994), or Bolton and Freixas (2000)). On the other hand, syndicating a loan could serve as a means of sharing risks between banks (Detragiache, Garella, and Guiso (2000)). If this is the case, we expect weaker banks to syndicate loans whose riskiness they cannot bear.

We provide evidence in line with the second hypothesis: banks' ability to manage risks and firm riskiness are critical drivers of the choice to syndicate. Banks are more likely to syndicate loans if their risk-bearing capacity is low, if screening and monitoring firms come at a high cost, and if the firm is risky. The same factors determine loan shares upon syndication. In addition, syndicated loans have higher spreads than comparable bilateral loans. Overall, our findings contradict conjectures according to which firms use the syndicated loan market

[1] For example, the consulting group Allied Analytics LLP has estimated that the global syndicated loan market stood at more than $1 trillion in 2021 and might grow to almost $4 trillion by 2031 (Allied Market Research (2022))

[2] In practice, there may be more than one lead arranger.

as a stepping stone to the bond market (e.g., Dennis and Mullineaux (2000)).

To come to this conclusion, we combine the proprietary credit register of the euro area—called AnaCredit and administered by the European Central Bank—with syndicated loan data from DealScan. The resulting dataset provides us with a comprehensive overview of banks' activity on the bilateral and the syndicated loan market, and the entire credit structure of borrowers at the loan level. It allows us to compare bilateral loans with similar syndicated loans and study the determinants driving the decision to syndicate at the lender level. We therefore overcome a limitation of previous work that observed either bilateral lending or syndicated lending but usually not both concurrently.[3]

We document five novel facts. First, while the loan amount plays an essential role in a bank's decision to syndicate, it is not the sole driver of syndication. Syndicated loans are more frequent than bilateral loans when loan amounts exceed 700 million euros. However, we typically observe a mix of bilateral and syndicated lending below that threshold. The loan amount is, nevertheless, a salient driver of syndication. A one standard deviation (or 1.17) increase in the natural logarithm of the loan amount—which corresponds to an increase in the loan amount from, for example, 5 million to 16.1 million euros or from 100 million to 322 million euros—is associated with a more than doubling of the probability that banks syndicate a loan.

Second, a bank's capability to manage risks plays a crucial role in its decision to syndicate loans. Risk management capability is defined by two key factors: the bank's loss-absorbing capacity and its screening and monitoring ability. We proxy a bank's loss-absorbing capacity by its capital ratio. A one standard deviation (or 6.3 percentage points) decrease in a bank's capital ratio is associated with a doubling in the likelihood of syndicating the loan. Banks with low capital ratios cannot bear the loan risk alone and prefer to syndicate. Screening and monitoring ability is proxied through a bank's industry specialization. Specialized banks have superior industry knowledge and, therefore, are better at screening and monitoring (Blickle, Parlatore, and Saunders (2023)). We find that a one standard deviation decrease in

[3]Some papers that analyze DealScan include in their investigations the small proportion of loans where the share retained by the lead arranger equals one hundred percent (e.g., Dennis and Mullineaux (2000) or Berg, Saunders, and Steffen (2016)). In contrast, and essential for our analysis of bilateral versus syndicated lending, by matching with AnaCredit we obtain a comprehensive overview of all conventional bilateral bank lending.

bank specialization in the firm's industry[4] is associated with a 22 percent higher likelihood of syndication.

Third, banks are more likely to syndicate loans that are granted to more risky firms. Firm riskiness is proxied through a bank-assigned probability of default (PD). A one standard deviation (or 1 percentage point) increase in a firm's PD is associated with a 22 percent higher probability of syndication. Accordingly, the likelihood of syndicating a loan increased by 20 percent during the COVID-19 pandemic for firms operating in affected industries. We confirm our results with two additional measures of firm riskiness.

We perform several robustness checks to confirm our second and third results. We show that the estimates are even stronger if we consider a more balanced sample of loans, of between 100 million and 700 million euros. We also show that our findings hold for firms that get a syndicated loan for the first time and for firms and banks with a pre-existing credit relationship. Finally, we show that potentially incomplete deal reporting in DealScan does not bias our results.[5]

Fourth, we show that what holds for banks' decisions to syndicate loans also holds for the share they retain in each syndicated loan. The higher capitalized the bank, the more specialized it is in the industry of the firm, and the safer the firm, the greater the loan share that the bank retains. A one standard deviation increase in the respective factors is associated with a change in the lead share of 2 to 8 percent. We confirm this result in an alternative specification that accounts for loan sales after syndication. These results reinforce the previous ones and suggest that banks minimize their *total* exposure to firms whose riskiness they cannot accommodate bilaterally.

Fifth, we find that the loan spread of syndicated loans is 57 basis points higher than that of comparable bilateral loans. This finding holds even if we account for loan seniority and callability. Furthermore, the sensitivity of the syndicated loan spread to firm riskiness is much higher than for comparable bilateral loans. An increase in the firm's bank-assigned PD of one standard deviation (1.1 percentage points) is associated with an increase in the

[4]This corresponds to a decrease in the ratio of the sum of loans to that industry over the total loan portfolio of 0.21.

[5]Ongena, Osberghaus, and Schepens (2025, forthcoming working paper) show that DealScan covers at most 54 percent of syndicated loans in Europe and that its coverage of loans is possibly non-random.

loan spread of 21 basis points for bilateral loans but of as much as 39 basis points when the loan is syndicated. This suggests that banks that cannot accommodate risky loans involve a syndicate willing and able to accommodate the risk but only at a higher interest rate than would be charged by a single bank able to accommodate the loan.

To the best of our knowledge, we are the first to empirically investigate the coexistence of bilateral and syndicated credit.[6] However, we aim to speak and contribute to an extensive literature on the firm funding structure, syndicated lending, and debt pricing.

The seminal paper of Diamond (1991) rationalizes why some firms borrow from banks that monitor them and others from the market in the form of bonds. Firms with a credit rating toward the middle of the spectrum rely on bank loans, whereas higher-rated firms borrow on the bond market. We show that despite involving multiple financiers, which at first sight is a step toward market financing, the syndicated loan market works reversely: for risk management purposes, banks syndicate the loans of firms that have a high PD and grant safe loans bilaterally. To explicitly reject the hypothesis that firms use syndicated loans to graduate to the bond market, we extend our dataset to include bonds. We find that firms with an outstanding syndicated loan are not more likely to issue a bond for the first time than firms with an outstanding large bilateral loan.

Our results also directly contribute to a large empirical literature that tests the work of Diamond (1991). In line with theory, most studies have confirmed that firms that issue bonds are safer and more reputable than firms that borrow from banks (e.g., Cantillo and Wright (2000), Denis and Mihov (2003), Gomes and Phillips (2012), Lin et al. (2013), Morellec, Valta, and Zhdanov (2015)). However, due to data limitations most studies do not differentiate between loan types (e.g., Cantillo and Wright (2000), Denis and Mihov (2003), and Lin et al. (2013)) or investigate the graduation from *syndicated loans* to bonds (e.g., Gomes and Phillips (2012) and Morellec, Valta, and Zhdanov (2015)). Our findings suggest that the results in the existing literature could be driven by the riskiness of syndicated loans. In an

[6]The only paper we are aware of that attempts to rationalize why syndicated loans exist in a theoretical model is by Chowdhry (1991), but it does so in the context of syndicated lending to sovereigns. In this model, sovereigns can selectively default on outstanding debt and re-apply for credit, which will be granted only if the lender itself has not been defaulted on. Lenders can prevent the borrower from following this profitable strategy by increasing the penalty for default through the formation of large and diffuse syndicates. However, it is unclear whether this model applies to the syndication of loans to firms, for which it might be more difficult to profitably selectively default.

explicit comparison of bilateral loan borrowers with first-time syndicated loan borrowers and first-time bond issuers, we find that for all loan and bond sizes first-time syndicated loan borrowers are more risky than borrowers of the other funding types. In contrast, first-time bond issuers are not safer than borrowers of large bilateral loans.

We also speak to an extensive literature on optimal syndicate composition (e.g., Esty and Megginson (2003) and Qian and Strahan (2007)) and the determinants behind the share of the syndicated loan that the lead arranger retains. If we consider the entire syndication process as the bank's decision to syndicate and, upon syndication, the question of who partakes in the syndicate and how large the bank's own share should be, we can view the first part as the extensive margin and the second as the intensive margin of the problem. Previous literature has only investigated the intensive margin of the syndication process within the set of loans in DealScan.

For example, some studies find that when the borrowing firm is opaque, the lead arranger retains a larger share of the loan to minimize moral hazard (Lee and Mullineaux (2004) and Sufi (2007)). Despite being extensively researched, this result is still hotly debated. For example, Blickle, Fleckenstein, et al. (2020) find that oftentimes the lead arranger sells its entire share on the secondary market after loan syndication and that loans sold are less likely to become non-performing. This finding conflicts with the lead arranger having to minimize moral hazard. We contribute to this literature by showing that the same considerations determining a bank's syndication choice are also associated with the share it retains—namely, risk considerations.

Finally, we contribute to the literature on debt pricing. Using syndicated loans, Schwert (2020) finds that loans are more expensive than comparable bonds (see also Cordell, Roberts, and Schwert (2023)). We again make a crucial differentiation between loan types and show that syndicated loans are more expensive and more sensitive to firm riskiness than comparable bilateral loans. The difference between the prices of bank loans more generally and those of bonds might be smaller than between syndicated loans and bonds. Our analysis is within the same bank, and accounts for the callability and priority in loan contracts.

We proceed as follows: Section 2 introduces the data and provides an overview of sample characteristics. Section 3 presents the empirical setup and the results, and Section 4 conducts

robustness exercises. Section 5 compares bilateral and syndicated loans with bonds. Section 6 concludes.

2 Data: Sample characteristics and stylized facts

We combine information on bilateral bank loans from the euro area credit registry AnaCredit with syndicated loan information from DealScan. This gives us a unique overview of each firm's entire bank credit structure. Additionally, and for the first time, we get a comprehensive overview of banks' role in granting bilateral credit and participating in syndicated loans. AnaCredit also includes syndicated loan information, allowing us to complement important variables in DealScan. Further, AnaCredit's monthly panel structure enables us to control for the secondary market for syndicated loans.

In this section, we first provide an overview of the syndicated loan market in the euro area, based on DealScan. We then describe the selection of the bilateral loans with which we compare syndicated loans. Next, we outline the firm, lender, and loan match between AnaCredit and DealScan. Based on this match, we provide summary statistics regarding firm credit structure and lender composition for firms that borrow from syndicates. Finally, we compare summary statistics of bilateral loans and their borrowers with those of syndicated loans and their borrowers.

2.1 Syndicated loans in the euro area

Syndicated loan information comes from DealScan by Thomson Reuters and LSEG. DealScan registers syndicated loans at the time of issuance, the counterparties involved, and many loan characteristics. Syndicated loan deals can consist of single or multiple tranches with potentially different pricing or maturity terms. In line with previous studies, such as that of Sufi (2007), we analyze syndicated loans at the deal level since the question of whether to syndicate a loan concerns the entire deal; that is, contracts are written for deals and not tranches. Variables only reported at the tranche level in DealScan are appropriately aggregated to reflect the deal level.

Figure 1 shows the number and amount of syndicated loan issuance per month in the

euro area since 1999. The top graph illustrates that the figure for monthly syndicated loan issuance increased from just over 30 in 1999 to more than 70 before the onset of the 2007/08 global financial crisis. The number of issuances did not decrease much during the Crisis or during the European sovereign debt crisis that followed. It even grew to new highs of more than 90 loans per month between 2014 and the onset of the COVID-19 pandemic in 2020. In contrast, the sum of monthly syndicated loan amounts decreased considerably after the global financial crisis (bottom graph in Figure 1). New amounts plummeted from previous highs of more than 75 billion euros to an average of around 30 billion euros until 2014, when they recovered to a new average of around 40 billion euros. The COVID-19 pandemic had only a small effect on the number of loans and their amounts.

Figure 2 plots the number of syndicated loans issued during our sample period of September 2018 to June 2023, by the borrower's country. It shows that, with issuance numbers as our ranking criterion, the euro area syndicated loan market is largest in France (1,115 loans), followed by Spain (818 loans), Germany (720 loans), Italy (587 loans), and the Netherlands (364 loans). In Luxembourg, Finland, Ireland, and Belgium there were between 100 and 200 loans during our sample period.

2.2 Bilateral bank loans

To understand why some loans are granted bilaterally while others are syndicated, we select an appropriate sample of bilateral loans. Bilateral loans come from AnaCredit, which provides loan-level information on loans granted by banks and their subsidiaries within the euro area. AnaCredit contains the universe of bank loans in which the bank has a firm exposure of at least 25,000 euros. It begins in September 2018 and tracks loans monthly from inception to maturity. Our sample ends in June 2023.

We consider all bilateral loans above 5 million euros—the amount at which syndicated lending reported in DealScan starts. We exclude borrowing firms that have received a syndicated loan at any time before or during our sample period. This leaves us with 39,292 firms, which collectively take out 82,332 bilateral loans.

The balance sheet information of bilateral loan borrowers is primarily sourced from AnaCredit, but missing observations are complemented with data from Orbis. Bank balance

sheet information is obtained from BankFocus. AnaCredit data are matched with Orbis and BankFocus data using public identifiers as well as firm names and addresses. Of the bilateral loan borrowers and their lenders in our sample, more than 99 percent can be matched to Orbis and BankFocus, respectively.

2.3 Matching DealScan with AnaCredit

We match borrowers, lenders, and loans in the syndicated loan dataset DealScan with their counterparts in the euro area credit registry AnaCredit. Borrowers are matched through their Legal Entity Identifiers (LEIs) if these exist and through firm names, countries, and addresses otherwise. In most cases, the level of consolidation in DealScan matches that of AnaCredit. However, in the rare instances where AnaCredit reports at a more granular level we aggregate AnaCredit data to align them with the more consolidated DealScan data. Out of the 3,518 euro area non-financial firms that receive a syndicated loan during our sample period, we can find the AnaCredit identity for 3,088, or 88 percent. This gives us the borrower identity for 3,864 of the 4,330 deals issued during that time, or 89 percent.

Lenders in AnaCredit and in DealScan are matched through their names and country of residence. Like for borrowers, the level of consolidation is largely the same in both datasets. Of the 1,551 syndicate participants identified in DealScan, we can only match 623 to banks in AnaCredit, representing 40 percent. However, matched syndicate participants tend to participate in a greater number of syndicates compared to unmatched participants. In particular, we know the bank's AnaCredit identifier for 88 percent of syndicated loan participations.

In addition to providing information on bilateral bank loans, AnaCredit also includes data on syndicated loans. Euro area banks must report their share of a syndicated loan (in euro amounts) and assign a syndicated loan identifier that is common among all syndicate participants. Lead arrangers are responsible for reporting on behalf of other syndicate participants that do not have to report to AnaCredit themselves. This allows us to match not only the identifiers of firms and banks but also the identifiers of syndicated loans. In practice, the syndicated loan identifier may vary across banks that report the same syndicated loan according to DealScan and loan characteristics in AnaCredit, which impairs the quality

of the loan match.[7]

We can match 36 percent of loan shares in DealScan to loans in AnaCredit. Conditional on having a firm and lender match, this number increases to 44 percent. If, additionally, the lender is classified in DealScan as a "Western European Bank" and operates in a euro area country, the match increases further, to 57 percent. The DealScan–AnaCredit loan match increases the coverage of DealScan's syndicate lender shares from 16 to 47 percent (deal-lender level). The coverage of credit spread data rises from 22 to 61 percent. The coverage of the share retained by the lead arranger increases from 18 to 56 percent. Finally, the coverage of the deal amount can be marginally increased, from 99.6 to 99.8 percent.

Financial information for syndicated loan borrowers and syndicate participants that we could match to AnaCredit also comes from AnaCredit whenever available, and from Orbis and BankFocus otherwise. Of the borrowers and lenders in DealScan that can be matched to AnaCredit, over 99 percent can also be matched to Orbis and BankFocus, respectively. Our matching exercise leaves us with 2,219 firms, which collectively receive 2,756 syndicated loans during our sample period.

2.4 Credit structure of syndicated loan borrowers

The match between AnaCredit and DealScan allows us to observe the credit structure of syndicated loan borrowers. Firms with a syndicated loan in our sample have an average of 10.4 bilateral credit relationships before they obtain a syndicated loan, where having a credit relationship is defined as having any outstanding loan. The median is 5, and the 10th and 90th percentiles are 1 and 19, respectively. If we, alternatively, only consider relationships as those where banks have at least an accumulated amount of 1 million euros in loans committed, the mean, median, and 10th and 90th percentiles become 8.6, 4, 1, and 16, respectively.

Do bilateral lenders participate in syndicated loans? On average, this is the case for 36 percent of banks, the median is 33 percent, and the 10th and 90th percentiles are 0 and 100 percent, respectively. If we only consider firms with fewer than 10 bank relationships, on average 39 percent of bilateral lenders also participate in a syndicate. If, instead, we only consider banks that hold at least 20 percent of a firm's outstanding bank debt, the average is

[7] Loan sales or complex balance sheet structures might further impair the loan match.

61 percent.

Reversely, how familiar are syndicated loan participants with the borrower—that is, what share of syndicate participants has a pre-existing bank relationship with the firm? The average syndicate comprises 6.4 lenders, while the median and the 10th and 90th percentiles are 5, 2, and 12, respectively. Of these lenders, which include both banks and non-banks, on average 25 have a pre-existing bank relationship with the firm (the median and the 10th and 90th percentile are 0, 11, and 75 percent, respectively). The average is slightly higher, at 26 percent, if we only consider syndicate participants that are banks. The main lead arranger has a pre-existing bank relationship with the firm in 25 percent of cases.[8]

Finally, what happens with firms' bilateral credit structures when they enter the syndicated loan market for the first time? Figures 3 and 4 plot bilateral loan amounts and their interest rates before and after a firm receives a syndicated loan. In both figures, we divide bilateral lenders into those that participate in the syndicate and those that do not. The figures suggest that banks do not change their loan amounts or interest rates substantially in anticipation or as a consequence of the syndicated loan. This is true for banks that participate in the syndicate and banks that do not.

2.5 Comparing bilateral loans with syndicated loans

We now use the final sample and compare bilateral loans and their borrowers with syndicated loans and their borrowers. Table 1 shows summary statistics of characteristics of firms that receive syndicated loans and those that receive bilateral loans of at least 5 million euros. Firms that receive a syndicated loan are significantly larger than firms that receive a bilateral loan. The average balance sheet size of the former is 706 million euros, while that of the latter is 311 million euros. This is also reflected in the number of employees (on average 469 versus 377) and annual revenues (on average 701 million versus 455 million euros). Syndicated loan borrowers are on average 27 years old while bilateral loan borrowers are on average 24 years old; the median is 10 and 8 years, respectively. Average cash flows are slightly higher for syndicated loan borrowers, at 68 million euros, than for bilateral loan borrowers, at 45

[8] Lead arrangers are defined similarly to their definition in the work of Ivashina (2009), as being assigned one of the following roles: book-runner, arranger, lead arranger, facility agent, syndication agent, co-arranger, lead manager, or co-lead manager.

million euros.

Banks report PDs of their borrowers in AnaCredit. We calculate the simple average across all banks per firm and use it as a measure of the firm's overall PD. Table 1 shows that, unconditionally, the average and median PDs are smaller for bilateral loan borrowers than for syndicated loan borrowers. Section 3.3 of the results will show that conditional on a comprehensive array of control variables and fixed effects, these results continue to hold and that the firm's PD is a significant driver of banks' decisions to syndicate.

How do loan characteristics differ across both loan types? While the average syndicated loan amount is much higher (595 million euros) than the average bilateral amount (28 million euros), the difference is primarily driven by a relatively high number of bilateral loans around the 5 million euro threshold. The absolute number of bilateral loans, for example, above 100 million euros is 3,241 and larger than the figure of 2,488 for syndicated loans. Robustness tests in Section 4 show that our main results also hold and are even stronger for a sub-sample of loans of between 100 million and 700 million euros, for which we have a more balanced sample of syndicated and bilateral loans.

Figure 5 shows the sum of bilateral loan amounts and the sum of syndicated loan amounts by 100 million euros bins (the first bin starts at 5 million euros) in the top graph and the number of syndicated loans by the same bins in the bottom graph. We do not observe a clear cut-off above which banks syndicate all loans, something we would expect if size was the only determinant of whether loans get syndicated. Instead, the figure shows that the bin with the most syndicated loans is the one containing loans of between 5 million and 100 million euros, which are routinely granted bilaterally. Beyond the 5 million–100 million euros bin, bilateral credit still dominates in the 100–200, 300–400, and even the 600–700 million euros bins. Only after the 600 million–700 million euros bin does bilateral lending become rare and syndicated lending comparably more common.

Instead of the loan amount alone, is bank regulation on large exposures to singular borrowers the main reason banks syndicate loans? Banks whose total exposure to a borrower is at least 10 percent of Tier 1 capital must inform their supervisors, which was found by Corell and Papoutsi (2024) to be associated with significant costs. Figure 6 suggests that large exposure regulation is unlikely to drive syndication. It plots the sum of bilateral loan

amounts and the sum of syndicated loan amounts by bins in the top graph and the number of syndicated loans by the same bins in the bottom graph. Instead of using loan size bins as we did in Figure 5, the bins are now created according to the ratio of the bank's total exposure to the borrower and its Tier 1 capital. The bins have a size of 0.01 (or 1 percent), while the last bin includes all exposures above 0.1 (or 10 percent). The bank's total exposure is the sum of the euro amount of all loans it has already committed to the borrower and the new loan amount. If the loan turns out to be syndicated, we calculate the bank's hypothetical exposure as if it had not been syndicated. The figure shows that, for most loans, banks that syndicate loans would have stayed well below the large exposure threshold of 10 percent had they granted them bilaterally. In addition, we do not find bunching around 10 percent: loans whose amounts add up to at least 10 percent of the bank's Tier 1 capital are far more often granted bilaterally than in a syndicate.

Regarding other loan characteristics, 41 percent of syndicated and 43 percent of bilateral loans in our sample are collateralized. The average and median maturity of syndicated loans are 5.6 and 5 years, while those of bilateral loans in our sample are 6.5 and 2.7. The average and median spreads over the 3-month Euribor are 241 and 206 basis points, respectively, on syndicated loans and 192 and 178 basis points, respectively, on bilateral loans.

3 Empirical setup and results

The previous section demonstrates that loan amounts alone cannot explain why banks grant some loans bilaterally and syndicate others. This section explores additional drivers behind that choice. The main drivers we investigate are a bank's ability to take risks and the loan risk, as captured by a multitude of variables. We show that both are significantly associated in an economically meaningful way with the choice to syndicate. Upon loan syndication, these drivers are also associated with the share that the lead arranger retains. In contrast to the previous literature, we investigate the entire syndication process, which includes banks' decisions to syndicate the loan (that is, the extensive margin of the syndication process) and the share they retain (that is, the intensive margin of the syndication process). In addition, we show how loan risk is priced differently for bilateral loans compared to syndicated loans.

The general specification we test to investigate the decision to syndicate and the share retained is

$$y_{ifbjct} = \beta_0 + \beta_1 Risk_{ifbjct} + \gamma X_{ifbjct} + \eta_b + \theta_j + \phi_c + \delta_t + \epsilon_{ifbjct}. \quad (1)$$

The loan is referred to by i, and f refers to the firm, b to the bank, j to the industry, c to the country, and t to the year. Bank-specific variables refer to the main lead arranger if the loan is syndicated. When we estimate the extensive margin of the syndication process, y_{ifbjct} is a dummy variable equal to 1 if the loan is syndicated and 0 otherwise. When we estimate the intensive margin, y_i is the lead share retained. Different measures of the bank's ability to take risks and loan risk as the main explanatory variables are captured by $Risk_{ifbjct}$, and X_{ifbjct} captures controls specified below. The specifications include year fixed effects (δ_t), while bank (η_b), country (ϕ_c), and economic sector fixed effects (θ_j) are used depending on the exact specification.

We start by testing the extensive margin of the syndication process. We use linear probability models, which have the benefit that the coefficient of the interaction of two variables reflects the cross-partial derivative of the dependent variable with respect to these two variables. The economic interpretation of the coefficient is therefore the same as in other linear models. In contrast, in probit or logistic models the coefficient of the interaction term reflects the partial derivative with respect to the product of two variables, which is more difficult to interpret (Ai and Norton (2003)).

To understand the lending function within banks, we need to make assumptions about the lending and borrowing process. In particular, we assume that the borrowing firm needs funds and approaches a bank that might or might not syndicate the loan. Put differently, we assume that the bank that is approached for funds acts as the lead arranger in the case that the loan gets syndicated. If there are multiple lead arrangers, we focus on the one that retains the largest share in the syndicated loan and if the lead share is missing, we consider a random lead arranger that operates in the same country as the firm.[9] Lead arrangers are defined similarly to their definition in the work of Ivashina (2009), as being assigned one of

[9] In contrast to what has been shown in previous studies about the US syndicated loan market (e.g., Sufi (2007)), in our sample 73 percent of loans have more than one lead arranger.

the following roles: book-runner, arranger, lead arranger, facility agent, syndication agent, co-arranger, lead manager, or co-lead manager.

We think that our assumption that the choice to syndicate is made by lead arrangers, rather than by borrowers, is plausible for three reasons. First, factors associated with loan demand explain much less of the choice than do factors associated with loan supply. Specifically, a regression of whether a loan is syndicated on country $\times$ economic sector $\times$ year $\times$ borrower-size fixed effects has an adjusted R^2 of only 15 percent. In contrast, the same regression on bank $\times$ year fixed effects has an adjusted R^2 of 38 percent.[10] Second, we show that syndicated loans are more expensive than bilateral loans. This makes it more likely that banks make the choice to syndicate rather than firms, which would not willingly choose a more expensive loan. Third, we structurally interviewed syndicated loan specialists in the industry, who confirmed our assumption that the syndication process is driven by bankers—that is, by the supply side.

3.1 Loan syndication and bank capital ratio

We start by using the bank capital ratio as a measure of the ability of a bank to take risks and as the main explanatory variable in regression (1). If banks use syndication as a means to share risks with other lenders, we expect less-capitalized banks to have a higher likelihood of syndicating a loan. In contrast, better-capitalized banks might be able to grant loans bilaterally by themselves. The reason for this is that better-capitalized banks have a greater distance to default (Berger and Udell (1994)), a greater ability to absorb risks (Berger and Bouwman (2009)), and greater monitoring incentives (Holmstrom and Tirole (1997)).[11] The negative relationship between syndication and the capital ratio of a bank should be stronger the higher the loan amount.

Table 2 shows the results. In all specifications, we control for the natural logarithm of the loan amount and for bank and firm balance sheet size, as well as for country, industry, and year fixed effects. Standard errors are clustered at the country-industry level of the

[10] These fixed effects were identified by Degryse et al. (2019) as being good proxies for loan demand and supply, respectively.

[11] Recent evidence shows that banks' total capital costs are uncorrelated with their capital ratios (Dick-Nielsen, Gyntelberg, and Thimsen (2022)). Therefore, supposedly higher funding costs cannot explain syndication.

firm. Columns (1), (2), and (3) feature the capital ratio without interaction, while columns (4) and (5) interact the capital ratio with the natural logarithm of the loan amount to test whether the capital ratio becomes more relevant as the loan size increases. While most regressions feature bank fixed effects in addition to control variables, in this regression they would eliminate almost any variation in the bank capital ratio. Instead, columns (2), (3), and (5) use the natural logarithm of banks' operating revenues and profits as additional bank controls. In column (3), we include loans whose purpose is to finance M&As or projects ("project finance"), while in all other columns we exclude loans made for those purposes.

Columns (1)–(3) of Table 2 show that better-capitalized banks have a lower probability of syndicating the loan and a higher probability of granting it bilaterally as the sole lender. The effect is consistent in size across all specifications and statistically significant at the 1 percent level. It is also economically meaningful. A one standard deviation (or 6.3 percentage points) decrease in the bank capital ratio is associated with a 3.8 percentage point increase in the probability that a loan gets syndicated. Given an unconditional probability of a loan being syndicated of 3 percent, this corresponds to a doubling of the probability of syndication. The result confirms that the risk-bearing capacity of a bank, as measured by its capital ratio, is meaningfully associated with its syndication choice.

Columns (4) and (5) of Table 2 show that the negative effect of the bank capital ratio is larger in absolute terms the greater the natural logarithm of the loan amount. This interaction effect is highly significant and economically meaningful. A one standard deviation (or 1.17) increase in the natural logarithm of the loan amount, which corresponds to an increase in the loan amount from, for example, 5 million to 16.1 million euros or from 100 million to 322 million euros, decreases the coefficient of the bank capital ratio by 0.01 (from 0.016 for the hypothetical case of loans with amounts of 0). These results are intuitive: small loans can be handled bilaterally by most banks, regardless of their capital ratio, while larger loans can only be granted bilaterally if the bank has enough capacity in the form of capital.

3.2 Loan syndication and bank industry specialization

Next we consider a bank's industry specialization as a proxy for its screening and monitoring abilities in that sector. Blickle, Parlatore, and Saunders (2023) find that loans to firms in

an industry in which a bank is specialized are less likely to fail due to superior screening of loan applicants and better post-origination monitoring. Bank specialization can thus be viewed as the ability to estimate a firm's PD. Low uncertainty about a firm's PD (or a high industry specialization) allows the bank to be compensated adequately for the risk it takes. If banks use syndication as a means to share risks, we expect that the more specialized a bank is in a firm's industry, the greater its propensity to grant the loan bilaterally.

To test this, we estimate regression (1) with industry specialization as the main explanatory variable. We also interact the industry specialization measure with the natural logarithm of the loan amount to test whether a bank's industry specialization becomes more important the larger the loan. In addition, it might be that highly specialized banks can grant loans bilaterally even if they have a low capital ratio. To test their substitutability for the decision to syndicate, we interact the bank's industry specialization measure with its capital ratio.

In line with the existing literature, we measure industry specialization as the skewness of the bank's loan portfolio. Specifically, it is the ratio of the sum of loan amounts that go to the industry in which the firm operates and the bank's total loan portfolio. Whether we should account for the relative size of an industry is a priori not clear. Take, as an example, bank A, which operate in industries 1 and 2. Bank A might grant a large share of its total loan portfolio to industry 1 and a smaller share of its loan portfolio to industry 2. However, if industry 1 is very large and industry 2 very small, bank A might be a small lender to industry 1 and the dominant lender to industry 2, relative to the industry's size. Is bank A better at assessing firms' PDs in industry 1 because it employs a lot of resources in that industry, or in industry 2, because it is a *relatively* large lender in that industry?[12] We feature different fixed effects to account for both possibilities.

To allow for the possibility that a bank's relative dominance within an industry matters—that is, that bank A is better able to assess the PD of a firm in industry 2—column (1) of Table 3 features industry fixed effects but no bank fixed effects. In all other columns, we do not use industry fixed effects but account for the within-bank industry specialization, independently of the relative industry size.[13]

[12] Blickle, Parlatore, and Saunders (2023) do control for the relative size of an industry.

[13] Most results hold in alternative specifications when we include industry fixed effects but no bank fixed

Columns (1)–(4) of Table 3 use the measure of bank industry specialization without interaction, columns (5) and (6) interact it with the natural logarithm of the loan amount, and columns (7) and (8) interact it with the bank capital ratio. Columns (3), (4), and (6) feature bank fixed effects, and column (8) uses no bank fixed effects but additional bank controls to allow for variation in the bank capital ratio. In column (4), we include M&A loans and project finance loans, which we exclude from all other columns. All specifications use country and year fixed effects, the natural logarithm of the loan amount, bank and firm balance sheet size, and bank capital ratio. Standard errors are clustered at the country-industry level.

Columns (1)–(4) consistently show that banks that are more specialized in a firm's industry are more likely to grant a loan bilaterally than via a syndicate. All effects are statistically significant at the 1 percent level and economically meaningful. In column (3), our preferred specification, which excludes M&A and project finance loans and measures industry specialization within banks by featuring bank but not industry fixed effects, a one standard deviation increase in industry specialization (that is, an increase in the ratio of the sum of loans to a given industry over the total loan portfolio, of 0.21) is associated with a 0.65 percentage point or 22 percent decrease in the probability of the loan being syndicated. This result is in line with the work of Keil and Müller (2020), who find that as banks' distance to borrowers decreases (as a proxy for their screening and monitoring ability), their syndicated loan issuance decreases and their bilateral loan granting increases.[14]

Industry specialization matters more for large loans. Columns (5) and (6) show that the negative relationship between a bank's industry specialization and the probability of a loan being syndicated is stronger the larger the loan. The coefficients on the interaction terms are significant at the 1 percent level. The result is again intuitive: Smaller loans can be granted with or without profound industry expertise. In contrast, to grant a large loan bilaterally a bank needs to have low uncertainty about the associated risk (or a high industry specialization). If a bank cannot assess the risk of a loan, it might be better off sharing it with other banks in the form of a syndicate, especially when the loan is large.

Unspecialized but well-capitalized banks can still grant loans bilaterally. As shown in

effects (bank, industry, and year fixed effects would absorb most variation in industry specialization).

[14]The authors' paper approximates but does not observe bilateral lending and borrowing.

columns (7) and (8), the negative relationship between a bank's decision to syndicate and bank industry specialization is weakened by the bank's ability to absorb risk, as measured by its capital ratio. In both columns, the coefficient of the interaction term is significant at the 1 percent level. Column (8), which uses additional bank controls, shows that for a bank with a capital ratio of 23.7 percent (the 75th percentile of the distribution of capital ratios across all observations), the coefficient of bank industry specialization is -0.031, while for a bank with a capital ratio of 17.1 (25th percentile), it is -0.112. For these less-capitalized banks, a one standard deviation increase in their industry specialization is associated with an 82 percent decrease in their likelihood of syndicating a loan (compared to the baseline estimate of 22 percent). These results show that poorly capitalized banks need low uncertainty of their risk assessment of a loan—that is, a high degree of industry specialization—to grant it bilaterally.

3.3 Loan syndication and firm probability of default

The results so far have shown that a bank's capital ratio and industry specialization are significantly associated with its choice to grant a loan bilaterally or to syndicate it. We interpret these measures as a bank's ability to take risks and find that the higher that ability, the more likely a bank is to extend a loan bilaterally. However, a bank's ability to take risks implies a crucial role for a loan's credit risk itself. In this section, we analyze the role of credit risk, and its interaction with other loan and bank characteristics, in a bank's decision to grant a loan bilaterally or to syndicate it.

We measure credit risk with the firm's default risk. Banks that use the Internal Ratings Based Approach (IRBA) and that lend to a firm report their estimates of that firm's PD in AnaCredit. We take the simple average of these PD estimates across all banks from which the firm receives a loan as our measure of the firm's default risk. In line with the previous results, we hypothesize that banks are more likely to syndicate loans that are granted to firms with a higher default risk. This should be especially true for larger loans and banks with a lower capital ratio with which to absorb the risk. In addition, we expect bank industry specialization to mute the role of a firm's default risk.

Table 4 presents the results of regression (1) with default risk as the main explanatory variable. All specifications contain as controls the natural logarithm of the loan amount and of bank and firm balance sheet size, the bank's capital ratio, and country and year fixed effects. Columns (1)–(3) feature the firm's default risk without interaction terms. In column (1), we do not include bank fixed effects, while in columns (2) and (3) we do. In column (3) we exclude M&A loans and project finance loans. The three columns show a strongly positive and significant relationship between default risk and the bank's decision to syndicate. Our specification with bank fixed effects but without M&A or project finance loans, in column (2), shows that a one standard deviation increase in default risk, which equals around 1 percentage point, is associated with an increase in the probability of the bank syndicating the loan of 1.3 percentage points, or 22 percent. These results reinforce the descriptive statistics and suggest a crucial role for credit risk in banks' decision to syndicate loans.

We qualify this role by interacting the default risk with the loan amount, and banks' capital ratios and industry specialization. In line with our previous results, we expect that the relationship between default risk and the decision to syndicate is stronger for larger loan amounts and weaker for better-capitalized and more specialized banks.

We start by interacting default risk with the loan amount. Column (4) features no bank fixed effects, while column (5) does. In line with our expectations, the interaction coefficients in both columns show that default risk matters more for banks' decisions to syndicate a loan the larger the loan amount. Column (5) shows that for loans of 5 million euros, the coefficient of firm default risk is equal to 0.48, while for loans of 300 million euros, it is equal to 3.5. For a firm that requests a 300 million euro loan, an increase in its PD of one standard deviation is associated with an increase in the probability that the bank syndicates the loan of 70 percent (compared to 22 percent in the baseline). This confirms our expectation that banks syndicate large loans to risky firms and grant (small or large) loans to safe firms bilaterally.

Next we interact the firm default risk with the bank capital ratio (columns (6) and (7)). Since bank fixed effects would suppress any variation in the bank capital ratio, the specification in column (7) again controls for the natural logarithm of bank operating revenue and profits in addition to the controls in column (6). Both columns show that firm default

risk matters more for less-capitalized banks than for better-capitalized banks. The coefficient of the firm default risk is 1.5 for banks with low capital ratios of 17.1 (25th percentile). This implies that for these firms a one standard deviation increase in their PD increases the likelihood of syndication by 37 percent (recall that the likelihood is 22 percent for the average bank). These results suggest that better-capitalized banks can accommodate risky firms bilaterally, while less-capitalized banks limit their exposure to risky firms by syndicating loans.

Columns (8) and (9) present the results of the interaction between firm default risk and bank industry specialization. We again choose not to control for the relative size of an industry with industry fixed effects but to measure industry specialization at the within-bank level. Both interaction coefficients are negative and highly statistically significant. This implies that banks that specialize in an industry can accommodate riskier firms bilaterally.

It could be that our results are biased by the PD estimates of the loan-granting bank. These estimates might be endogenous to the bank's likelihood of syndicating a loan. For example, banks that choose to syndicate a loan might communicate their PD estimates to potential syndicated loan participants. In such a case, they might set their estimates to appeal to these participants rather than setting them to reflect the economic riskiness of firms.[15]

To exclude this possibility, we perform three robustness tests. First, we use the COVID-19 pandemic as a plausibly exogenous shock to firms' PDs. We classify companies as belonging either to industries affected by COVID (accommodation, food service activities, real estate activities, and travel related activities)[16] or to industries unaffected by COVID. We then estimate regression (1) with the interaction between a dummy variable that indicates an affected firm and a dummy variable that indicates the COVID period (2020–22) as the explanatory variable. In line with our previous results, columns (10) and (11) of Table 4 show that being affected by COVID increases a banks' likelihood of syndicating the loan by 20 percent (column (10)).

Our second and third robustness tests re-estimate the specifications of columns (1)–(9)

[15] An example of banks setting PD estimates strategically is provided by Begley, Purnanandam, and Zheng (2017), Plosser and Santos (2018), and Behn, Haselmann, and Vig (2022). They show that some low-capitalized banks improve their regulatory capital ratios by biasing their internal risk estimates.

[16] The 2-digit NACE codes 55, 56, 68, and 79.

of Table 4, but using alternative measures for firms' default risks. In our second test, we omit the PD estimate of the loan-granting bank. Specifically, we measure firm default risk as the average of the PD estimates made by all banks except the loan-granting bank. The results are presented in Table A1 of the Appendix and are qualitatively similar to the results presented in our main Table 4.

Our third robustness test measures a firm's default risk with a dummy variable that indicates whether a firm was overdue on its loan payments during the six months prior to receiving a loan. This measure alleviates concerns that the PD estimates of all other banks are also biased. On average, 47 percent of syndicated loan borrowers were overdue on some of their loan payments in the six months before borrowing, while the figure is only 40 percent for the case of bilateral loan borrowers. Our results, when using this alternative measure for firms' default risks, are shown in Table A2 of the Appendix and confirm the findings presented in Tables 4 and A1.

This concludes the investigation of the determinants of the extensive margin of the syndication process—that is, banks' decisions to grant loans bilaterally or syndicate them. This and the two previous sections consistently show that banks are more likely to syndicate loans the lower their ability to take risks and the higher the loan risk. These determinants, together with the loan amount, interact with and reinforce one another in driving the decision to syndicate.

3.4 Lead share

After a bank decides to syndicate a loan, it chooses the share of the loan it wants to retain. We call the choice of the share retained the intensive margin of the syndication process and investigate it in this section. We show that the same risk considerations that determine a bank's choice to syndicate a loan also determine how much of the loan it chooses to retain. Through the extensive and intensive margin of the syndication process, banks match their *total* borrower exposure to their ability to take risks and the loan risk.

The syndicated loans in our sample have an average of 6.6 participants; the median and the 10th and 90th percentiles are 5, 2, and 13, respectively. The average share that the lead arranger retains is 27 percent, and the median and the 10th and 90th percentiles are 23 per-

cent, 3 percent, and 51 percent, respectively. Shares are from DealScan but complemented with data from AnaCredit to achieve a total coverage of 56 percent.

To test what determines the lead share of a specific loan, we estimate regression (1) with the share retained by the lead arranger as the dependent variable and the lead arranger's capital ratio and industry specialization and the firm's default risk as the main explanatory variables. We always control for the natural logarithm of the loan amount, the firm size, and country and year fixed effects. We do not control for the size of the syndicate, to allow the lead arranger to reduce its share by forming a larger syndicate. Standard errors are clustered at the country-industry level.

Table 5 shows the results. In columns (1)–(3), we use the capital ratio as the main explanatory variable without (column (1)) and with (columns (2) and (3)) additional bank controls. In column (3) we include M&A loans and project finance loans. In the previous section, we showed that banks with low capital ratios reduce their exposure to firms by syndicating loans. In line with that extensive margin, the results in columns (1)–(3) show that the lower the capital ratio of a bank, the lower the share of the loan it retains. A one standard deviation decrease in a bank's capital ratio (or 3.3 percent) is associated with a 0.7 percentage point decrease in the share that the bank retains (or 3 percent).[17]

In columns (4)–(6), we use the bank's industry specialization as the explanatory variable. The previous section showed that specialized banks are more likely to grant loans bilaterally. Here, we show that if they do syndicate loans, they tend to retain a higher share. Columns (5) and (6) feature bank fixed effects while column (4) does not. In column (6) we include M&A loans and project finance loans. The results show that a one standard deviation increase in bank industry specialization, which amounts to an increase in the ratio of the sum of loan amounts to a particular industry over the bank's total loan portfolio of 0.12, is associated with an increase in the share retained by the lead arranger of 1.8 percentage points or 8 percent.

Finally, columns (7)–(10) feature the default risk of the firm as the main explanatory variable. Column (8) again uses bank fixed effects, while column (7) does not. In column (9) we include M&A loans and project finance loans. Previously, we showed that a higher de-

[17] These results are in line with the results of Chu, Zhang, and Zhao (2019).

fault risk is associated with a higher likelihood that the bank will syndicate the loan. In line with that, here, we find evidence consistent with higher default risk being also associated with a smaller share retained. A one standard deviation increase in a firm's default risk is associated with a decrease in the bank's loan share of 0.5 percentage points or 2 percent.

Loan sales could bias our results. Blickle, Fleckenstein, et al. (2020) report that in the US, many lead arrangers sell their entire shares shortly after syndication. If the decision to sell and the amount sold are correlated with the share retained at loan initiation and risk considerations of banks, coefficients in Table 5 would be biased. DealScan alone cannot account for loan sales because it does not have a panel structure. To account for them, we make use of our AnaCredit–DealScan loan match and the fact that AnaCredit *has* a panel structure. With that, we run the same specifications as in Table 5 but for the lead share retained six months after syndication. The results are reported in Table A3 of the Appendix and largely confirm the results presented here.

Through the extensive and intensive margin of the syndication process, banks manage their total exposure to borrowers. This section showed that the drivers behind the extensive margin are the same as those behind the intensive margin.

3.5 Interest rate

In this section, we investigate the pricing function of syndicated loans and compare it to the pricing function of bilateral loans (granted by the same banks). Unconditionally, the average spread on syndicated loans is 241 basis points above the 3-month Euribor, and that on bilateral loans is 192 basis points above. Conditional on an array of loan characteristics, including loan seniority and callability, and within-bank, we find that the loan spread of syndicated loans is 57 basis points larger than that of comparable bilateral loans. It is also more sensitive to loan risk than the loan spread on bilateral loans.

The specification we test is

$$Loan\ spread_{ifbjct} = \beta_0 + \beta_1 Loan\ is\ syndicated_{ifbjct} + \gamma X_{ifbjct} + \eta_b + \theta_j + \phi_c + \delta_t + \epsilon_{ifbjct}. \quad (2)$$

Our dependent variable is the loan spread, which is measured in basis points over the

Euribor reference rate. Our main explanatory variable is an indicator variable that equals 1 if the loan is syndicated and 0 otherwise. In all specifications, we control for the natural logarithm of the loan's maturity in days, whether it is secured, its type (credit line or term loan), its amount, firm size, and country, industry, and year fixed effects. Reference rate fixed effects account for different maturities of the Euribor. Standard errors are clustered at the country-industry level.

Table 6 presents the different specifications and their results. We gradually saturate the table with more control variables and fixed effects and use different samples. Bank fixed effects are used in columns (2), (4)–(8), and (10). In columns (3)–(10) we control for loan risk, approximated by the firm's average PD, and in columns (5)–(10) we additionally control for the seniority and callability of the loan. In column (6) we include M&A loans and project finance loans. A concern may be that our results are driven by differences in the reporting of the loan spread in DealScan compared to AnaCredit. To alleviate this concern, in column (7) we use AnaCredit data for both bilateral and syndicated loans. Another concern may be that our results are driven by non-bank participation in syndicated loans. In column (8), we therefore limit our sample to loans whose lenders are all banks. Finally, in columns (9) and (10) we estimate the pricing sensitivity by interacting our explanatory variable, whether a loan is syndicated, with the riskiness of the loan.

Column (2) shows that, conditional on controls, the spread on the average syndicated loan is 80 basis points higher than the spread on the average bilateral loan. Controlling for loan risk, as done in columns (3) and (4), decreases the average difference between both loan types to 60 basis points (column (4)).[18] When we additionally control for loan seniority and callability (column (5)), the difference in spreads remains essentially the same, at 57 basis points. Subordinate debt is equally uncommon for syndicated loans and for bilateral loans, at 6 percent each. Similarly, less than 10 percent of syndicated loans are callable, and the same is true for the bilateral loans in our sample. Column (6) shows that including M&A loans and project finance loans does not significantly change our results.

Column (7) shows that our results are not driven by differences in the reporting of loan

[18]Unsurprisingly, loan risk itself is very strongly and positively associated with the loan spread. In our specification with bank fixed effects (column (4)), an increase of one standard deviation, or 1.1 percentage points, is associated with an increase of the spread by 23 basis points.

spreads between AnaCredit and DealScan. We rule out any influence of reporting biases by using the loan spread from AnaCredit for syndicated and bilateral loans instead of using the loan spread from DealScan for syndicated loans and that from AnaCredit for bilateral loans. Doing so keeps the difference in spreads almost unchanged, at 54 basis points.

Another driver of the difference in loan spreads between syndicated and bilateral loans may come from non-bank lenders among syndicate participants. The reason for this is that syndicated loans with participating non-banks are more expensive than bank-only syndicated loans (Lim, Minton, and Weisbach (2014)). Bilateral loans are naturally bank-only loans. Thus, the difference in loan spreads might simply come from the lender types rather than the loan types. Column (8) shows that this is not the case. Bank-only syndicated loans are still 51 basis points more expensive than bilateral loans.

To understand the sensitivity of the loan spread to a loan's default risk for both loan types, we interact the syndicated loan indicator with the average PD estimate and show the results in columns (9) and (10) of Table 6. Column (10) includes bank fixed effects in addition to the controls used in column (9). The results show a greater sensitivity of the loan spread to loan risk when the loan is syndicated than when it is granted bilaterally. In particular, an increase in the PD of one standard deviation, or 1.1 percentage points, is associated with an increase in the loan spread of 21 basis points for bilateral loans, but of as much as 39 basis points when the loan is syndicated. In combination with the results in the previous sections, this shows that syndicates are willing to accommodate risky firms but price their risk more sensitively than bilateral lenders would.

4 Robustness

We conduct four robustness tests for the extensive margin of the syndication process—that is, the bank's choice to syndicate a loan. First, we show that our results hold for a more balanced sample of syndicated and bilateral loans with amounts between 100 million and 700 million euros. Second, they also hold for firms that receive a syndicated loan for the first time. Third, they also hold for banks that have existing credit relationships with firms to which they grant the loans. And fourth, while DealScan seemingly only covers a subset of

all syndicated loans, we show that this possible selection does not bias our results.

4.1 Sub-sample of loans of between 100 million and 700 million euros

In Section 2.5, we show the distribution of the loan amounts of bilateral loans compared to those of syndicated loans. The overlap is considerable. For example, there exist more bilateral loans than syndicated loans with loan amounts above 100 million euros. Likewise, the most common syndicated loan amount bucket is 5 million to 100 million euros. Nevertheless, there may be concern that some of our results might be driven by the tails of the loan size distribution where our sample is unbalanced. Indeed, in the loan amount bucket of 5 million to 100 million euro loans we have 60 times more bilateral loans than syndicated loans. Likewise, above 700 million euros syndicated lending is 11 times more common than bilateral lending.

To exclude the possibility that the results concerning the bank's choice to syndicate a loan or grant it bilaterally are driven by loans in the tails of the loan size distribution, we verify them for loans of amounts between 100 million and 700 million euros. In this category, we have 3,178 bilateral loans and 1,764 syndicated loans.

4.1.1 Capital ratios and industry specialization

We re-run regression (1) for the more balanced sample with the dummy variable that indicates whether the loan is granted bilaterally (= 0) or is syndicated (= 1) as the dependent variable. First, we consider the bank capital ratio, bank industry specialization, and the interaction of the two as the main explanatory variables. We do not consider their interaction with loan size since our sub-sample is selected based on loan size. In all specifications, we control for bank and firm size, the natural logarithm of the loan amount, and country and year fixed effects. When the bank capital ratio is not the main explanatory variable, we also control for it.

Table 7 shows the results. Columns (1)–(3) feature the bank capital ratio as the main explanatory variable and control for industry fixed effects. Columns (2) and (3) use additional bank controls. In column (3) we include M&A loans and project finance loans. All columns confirm our baseline results of Table 2, which uses the entire sample; namely, a

higher capital ratio is associated with a significant decrease in the likelihood of syndication. The coefficient is significant at the 1 percent level and much larger in absolute value than the coefficient in our baseline results (-0.030 in column (2) compared to -0.006 in column (2) of Table 2). This makes sense, since here we only consider large loans, for which the bank's ability to take risks matters more.

Columns (4)–(6) show the relationship between syndication and bank industry specialization. Columns (5) and (6) use bank fixed effects, while no column features industry fixed effects. Column (6) includes M&A loans and project finance loans. We, again, confirm our baseline results of the entire sample; more specialized banks are more likely to grant loans bilaterally instead of syndicating them. The coefficients are again much larger in absolute value compared to our baseline results (-0.244 in column (5) compared to -0.031 in column (3) of Table 3).

Finally, in columns (7) and (8) we interact banks' capital ratios with their industry specialization. In line with our baseline results, we find that capital ratios matter less in banks' decisions to syndicate a loan the more specialized they are. Neither column uses bank fixed effects, but column (8) uses additional bank controls. The results are again much larger in size (0.077 in column (8) compared to 0.013 in column (8) of Table 3) than and of equal significance as what was presented in Table 3 for the entire sample.

4.1.2 Firm probability of default

In Section 3.3, we show that the higher the firm's PD, the greater the probability that the bank will syndicate the loan. We confirm this result here, again using the sub-sample of loans of between 100 million and 700 million euros. Thus, we estimate regression (1) with the bank's decision to syndicate a loan as the dependent variable and the firm's default risk and its interaction with banks' capital ratios and their industry specialization as the main explanatory variables. We use the same control variables as in the previous section.

Table 8 shows the results. We start by using the firm's default risk by itself; that is, without an interaction (columns (1)–(3)). Column (2) features bank fixed effects, while column (1) does not. In column (3) we include M&A loans and project finance loans. In line with our baseline results, the columns show that loans to riskier firms are much more likely to

be syndicated. Because firm risk is a greater concern for larger loans, and our sub-sample only includes larger loans, also the coefficients are much bigger than in the baseline regression (4.998 in column (2) compared to 1.291 in column (2) of Table 4) and significant at the 1 percent level.

Loan risk becomes more important for the choice to syndicate the lower the bank's capital ratio. This baseline result from Table 4, which uses the entire sample, is confirmed in columns (4) and (5) on the sub-sample, where column (5) uses additional bank controls. The coefficient of the interaction term is again much larger in absolute value in the sub-sample than in the entire sample (-1.451 in column (5) compared to -0.245 in column (7) of Table 4), following the intuition (and previous results) that these forces matter more for larger loans of between 100 million and 700 million euros.

Finally, we show that the firm's riskiness loses relevance for the bank's decision to syndicate a loan the more specialized the bank is. This can be seen in columns (6) and (7). The effect increases again in magnitude compared to the baseline results, which use the entire sample (-20.098 in column (7) compared to -2.495 in column (9) of Table 4).

This robustness test confirms that our baseline results regarding the determinants of a bank's decision to syndicate a loan are not driven by loans in the tails of the loan amount distribution. Instead, all results presented here have gained significantly in magnitude, confirming that what holds for all loans also holds for loans of between 100 and 700 million euros, a range that contains a relatively balanced sample of bilateral and syndicated loans.

4.2 First-time syndicated loan borrowers

It could be that firms that have previously received syndicated loans are different from first-time syndicated loan borrowers and that our results are driven by the former group. That is, banks may initially syndicate loans for reasons that are not discussed in this study. After the initial loan, firms may become riskier and banks syndicate loans based on risk considerations. In this section, we show that this is not the case. Instead, the same determinants that we identified in our main results as driving the syndication choice also drive it for first-time syndicated loan borrowers.

To show this, we limit our sample to firms that borrow syndicated loans for the first time

and compare them with the same group of bilateral loan borrowers that we use in our main results. We estimate regression (1) with banks' capital ratios, their industry specialization, and the firms' riskiness as explanatory variables. Table 9 shows the results. Columns (1)–(3) show that a lower capital ratio is an important driver of banks' choice to syndicate loans to firms that have never had a syndicated loan. Similarly, columns (4)–(6) show that the less specialized the bank, the greater its likelihood of syndicating a loan. Finally, the riskier the firm, the more likely is loan syndication by the bank (columns (7)–(9)). Thus, what drives syndication in our full sample also drives it for first-time syndicated loan borrowers.

4.3 Banks and firms with existing credit relationships

Having a pre-existing credit relationship with the firm could alleviate some of the frictions that we show are associated with a bank's choice to syndicate a loan. We test this in this section. To do so, we again re-estimate regression (1), but this time limiting our sample to banks and firms with a pre-existing credit relationship.

Table 10 shows the results. Although the coefficients lose magnitude slightly, the determinants of the choice to syndicate remain largely unchanged. The capital ratios of banks and the riskiness of firms continue to be key drivers. Interestingly, the coefficient of banks' industry specialization loses significance, which could indicate that having a credit relationship is a substitute for specialization, since both alleviate information asymmetries. Nevertheless, the same mechanism that in our main results we find drives syndication—namely, risk considerations—also exists in the case where banks and firms maintain a pre-existing credit relationship.

4.4 Reporting biases in DealScan

Our final robustness test concerns possible reporting biases in DealScan. In this paper, we use syndicated loans reported in DealScan, in line with most of the literature. However, Ongena, Osberghaus, and Schepens (2025, forthcoming working paper) use the loan match between AnaCredit and DealScan to show that DealScan covers at most 54 percent of all syndicated loans in Europe and that the selection of loans is non-random. To exclude the

possibility that the selection in DealScan drives our results, we conduct an additional robustness test. Specifically, we investigate whether the reporting of a loan in DealScan depends on the bank's capital ratio, its industry specialization, or the firm's riskiness. If it does, we would be concerned that the relationship between these variables and the bank's choice to syndicate is different for the DealScan sample than for the population of syndicated loans.

To exclude this possibility, we estimate a regression of a dummy variable that indicates whether a loan is reported in DealScan on our three explanatory variables: the bank's capital ratio (column (1)), its industry specialization (column (2)), and the firm's riskiness (column (3) of Table 11), as well as control variables. The table shows that there is no significant relationship between whether a loan is reported in DealScan and these explanatory variables. Thus, we do not expect the loan selection in DealScan to bias our results on the determinants of the bank's choice to syndicate a loan.

5 Bank credit, syndicated lending, and the bond market

Previous literature has shown that reputable firms borrow bonds, while riskier firms borrow from banks (e.g., Diamond (1991) and Denis and Mihov (2003)). Syndicated loans have features of (bilateral) bank loans and bonds. Despite this, theories on and evidence of the coexistence of bank loans and bonds do not seem to apply to syndicated loans. We have shown extensively that syndication is driven by risk management considerations. This suggests that the syndicated loan market is not an intermediary step for firms that want to graduate to the bond market. To qualify this argument, we directly measure firms' graduation from bilateral loans to the bond market and compare it with the graduation from syndicated loans to the bond market. In addition, we compare the riskiness of bilateral and syndicated loan borrowers with that of bond issuers.

We identify 81 firms that issue a bond above 5 million euros for the first time.[19] All 81 graduate from bilateral bank borrowing to the bond market; that is, all these firms have bilateral bank loans outstanding at the time of the bond issuance. In contrast, only 14 of the 81 first-time bond issuers have had a syndicated loan at any time before the bond issuance.

[19]We are grateful to Melina Papoutsi and Olivier Darmouni for providing us with a list of first-time bond issuers from their paper (Darmouni and Papoutsi (2022)).

Between September 2018 and January 2021, the sample period for which we have the first-time bond issuers, roughly 7,700 syndicated loans were outstanding compared to around 40,000 large bilateral loans. We calculate that the likelihood of a firm graduating from syndicated loans to bonds during our sample period is exactly equal to the likelihood of a firm graduating from bilateral loans to bonds—namely, 0.2 percent.

Next we compare the riskiness of bilateral loan borrowers with that of syndicated loan borrowers and bond issuers (all issuers during our sample, not just first-time issuers). Figure 7 plots the distribution of firms' probabilities of default and their median for the three groups of firms. The first group receives credit of up to 100 million euros (top graph), the second receives credit of between 100 million and 200 million euros (middle graph), and the third group receives credit of more than 200 million euros (bottom graph). For all groups, the median default risk of the firm is lowest for bilateral loan borrowers (0.5, 0.3, and 0.3 percent) and highest for syndicated loan issuers (1.3, 0.9, and 0.5 percent). The median default risk of bond issuers is between that of bilateral and syndicated loan borrowers but closer to bilateral loans for large debt amounts (1, 0.5, and 0.3 percent).

To sum up, firms are not more likely to graduate from syndicated loans to bonds than from bilateral loans to bonds. In addition, syndicated loan borrowers are much riskier than bilateral loan borrowers and bond issuers. This suggests that syndicated loans are not situated between bilateral loans and public debt in terms of firms' lending cycles. Instead, these findings indicate that syndicated lending represents a sidetrack for the riskiest firms with large financing needs.

6 Conclusion

We study a bank's choice between granting loans bilaterally or in a syndicate, and do so at the bank and the loan level. We achieve this by combining the ECB's credit registry AnaCredit and LSEG's DealScan dataset. This gives us an overview of banks' activities on both credit markets and a complete picture of firms' funding structure with regard to their funding by banks.

We find that banks are more likely to syndicate loans if their risk-taking ability is lower

and the loan risk higher. These results contrast conjectures according to which the best firms graduate from bilateral borrowing to more diffuse debt markets. Instead, risk management considerations govern much of the transition from bilateral to syndicated credit. This conclusion is substantiated by the observation that having borrowed a syndicated loan does not increase the likelihood of a firm issuing a bond for the first time.

In addition, we find that the same determinants that drive syndication—that is, bank risk-taking abilities and loan risk—also affect the syndicated loan share retained by banks. Through the process of syndication, banks manage their *total exposure* to firms. Finally, upon syndication, loan pricing is much more sensitive to loan risk than for bilateral loans.

Future research will determine to what extent firms' existing credit structure informs the transition from bilateral to syndicated credit. Syndicated lending enforces the coordination of creditors on a single contract, which might be especially favorable for firms with a diffuse bilateral credit structure.

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Figures

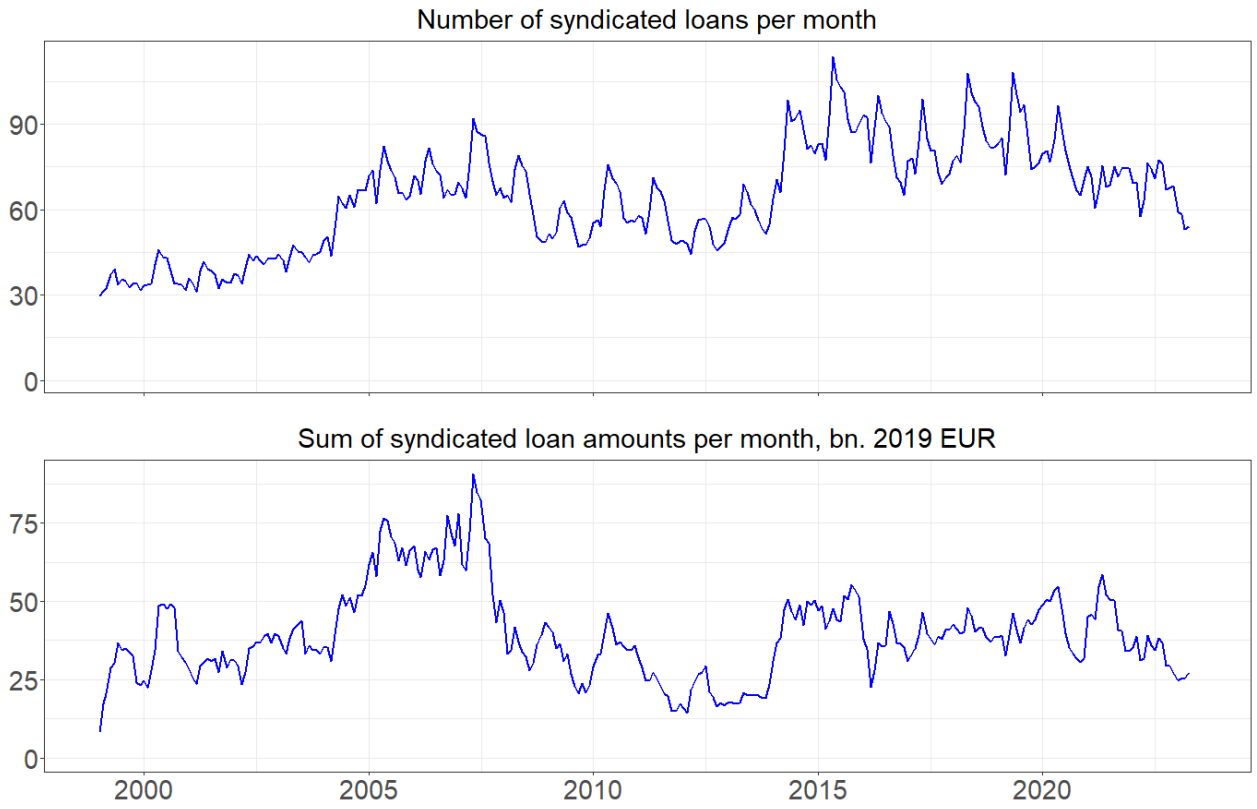

Figure 1: Number and amount of syndicated loans per month, 1999–2023. This figure shows the 5-month moving average of the number of syndicated loans (top) and the sum of syndicated loan amounts (bottom) per month from 1999 (introduction of the euro) until 2023 for euro area syndicated loan borrowers (changing composition). Amounts are in billion 2019 euros.

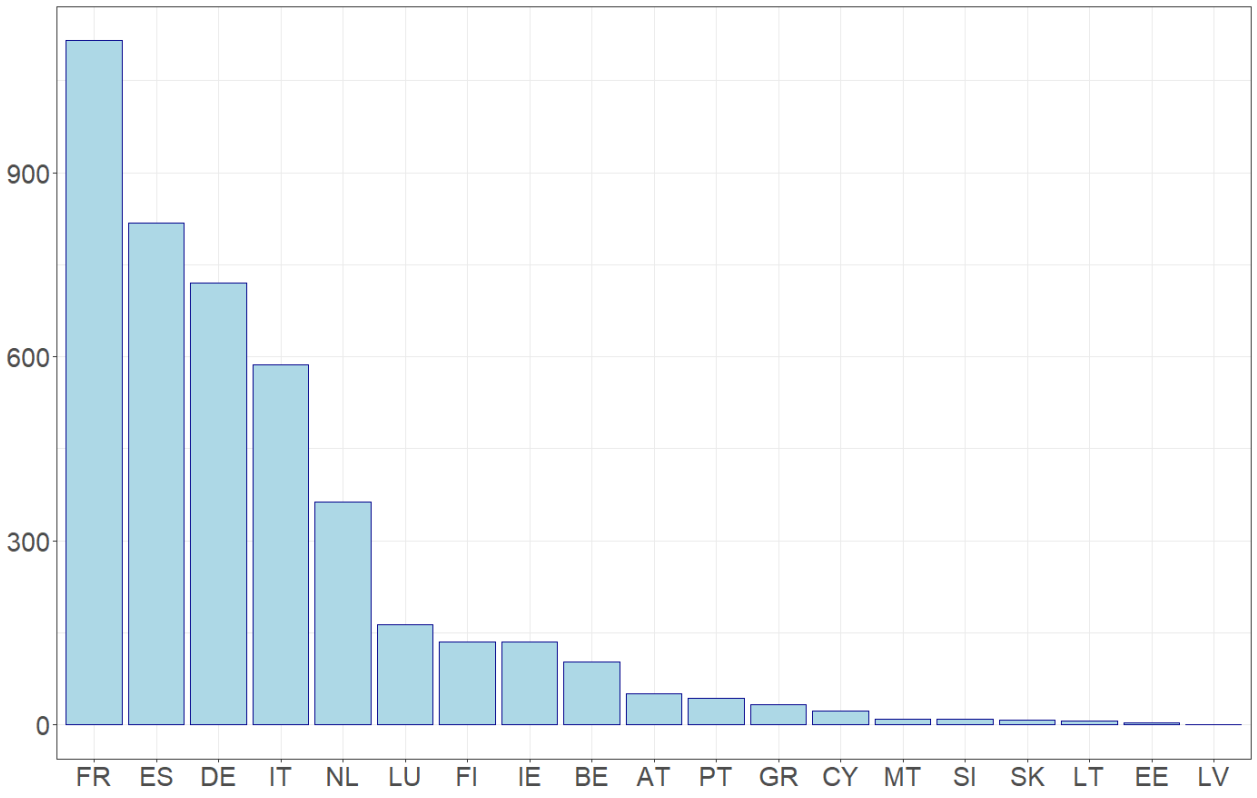

Figure 2: Total number of syndicated loans per country, September 2018–June 2023. This figure shows the total number of syndicated loans between September 2018 and July 2023 by borrower country.

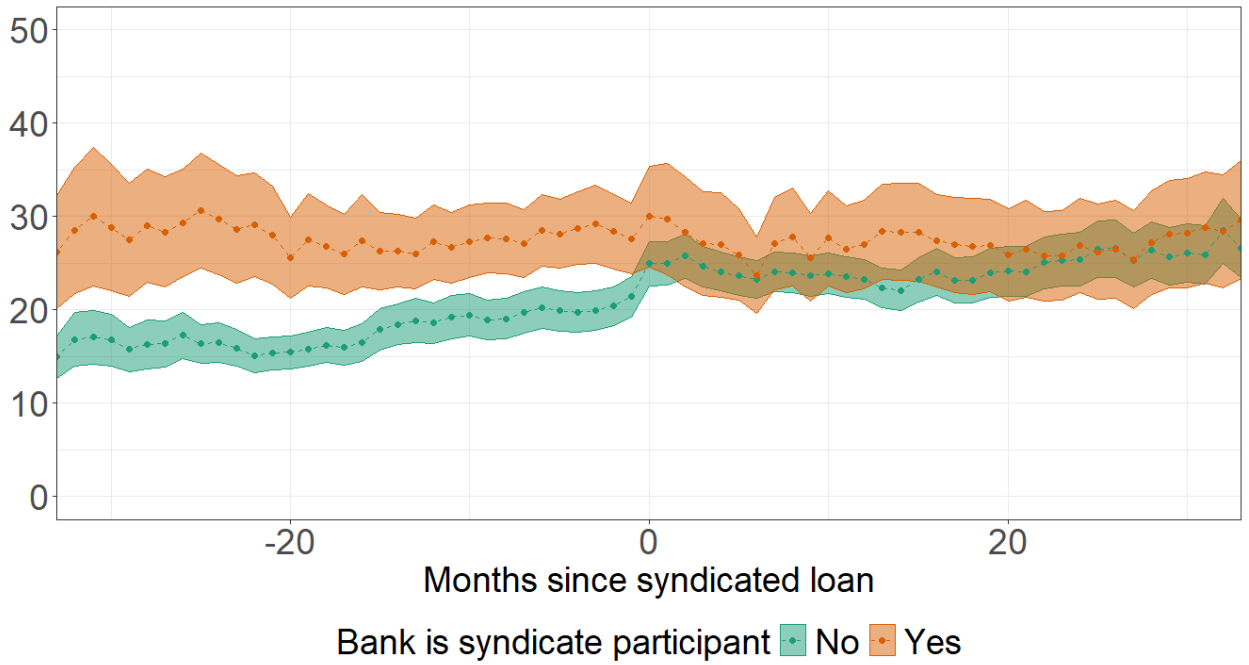

Figure 3: Banks' average total exposure to syndicated loan borrowers. This figure shows on the y-axis the mean and the 95 percent confidence interval of the sum of loan amounts that banks lend to syndicated loan borrowers via bilateral loans. The x-axis shows the months before (left) and after (right) syndication (0). Banks are split according to whether they participate in the syndicate (orange) or not (green). We drop bilateral loans taken up in the three months either side of the issuance date of the syndicated loan so as not to pick up the syndicated loan itself by mistake.

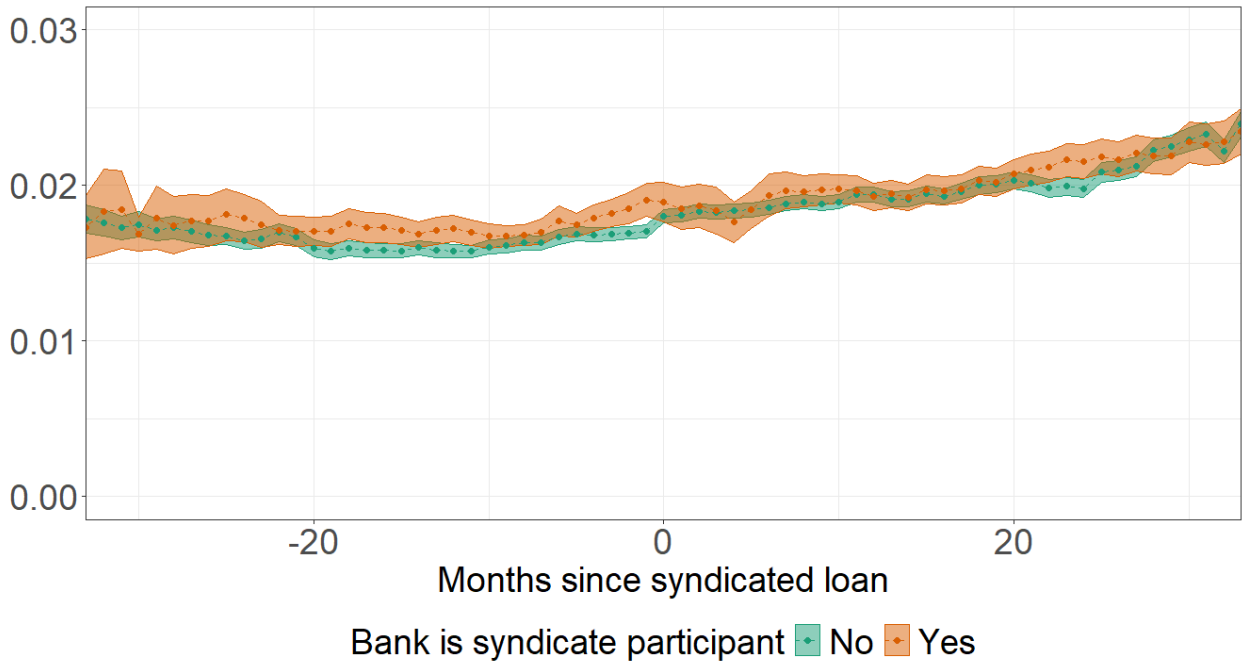

Figure 4: Interest rates on bilateral loans to syndicated loan borrowers. This figure shows on the y-axis the mean and the 95 percent confidence interval of the annualized interest rate banks charge to syndicated loan borrowers on bilateral loans. The x-axis shows the months before (left) and after (right) syndication (0). Banks are split according to whether they participate in the syndicate (orange) or not (green). We drop bilateral loans taken up in the three months either side of the issuance date of the syndicated loan so as not to pick up the syndicated loan itself by mistake.

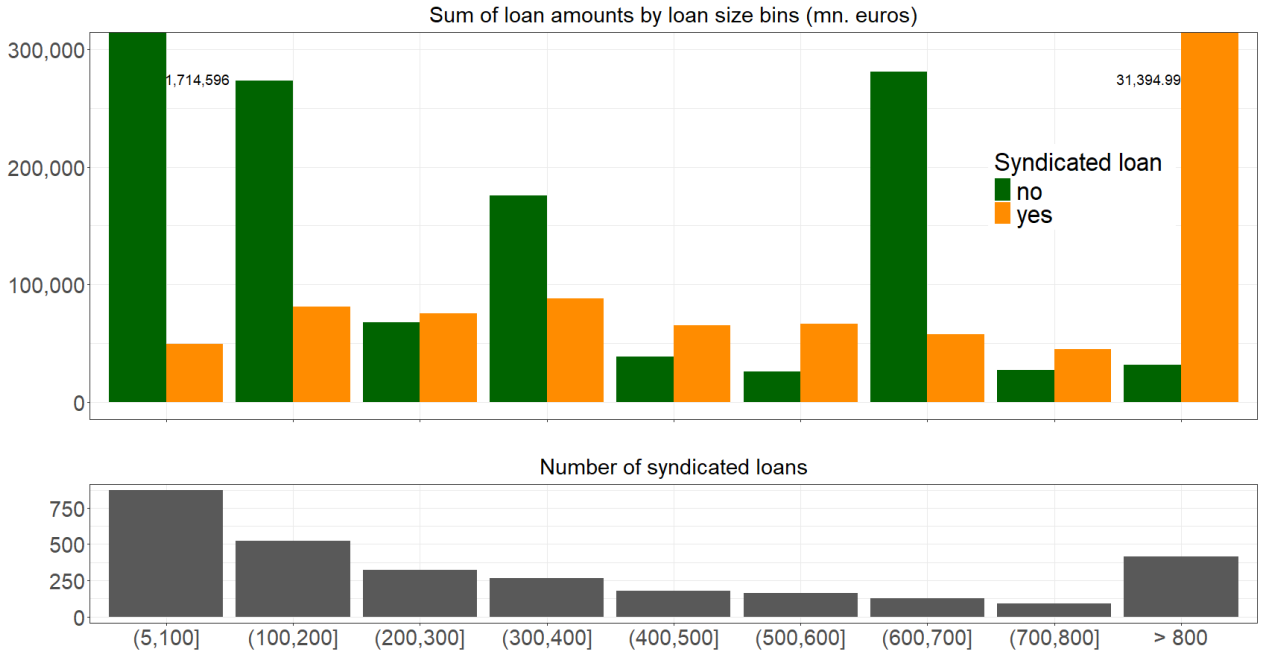

Figure 5: Loan size of syndicated loans compared to bilateral loans. This figure shows the sum of syndicated loan amounts and the sum of bilateral loan amounts in million euros by 100 million euro bins (top) and the number of syndicated loans in the respective bin (bottom). The first bin starts at 5 million euros. For readability's sake, we truncate the green bar on the far left and the orange bar on the far right. The true height of each is indicated by the figure next to it. Our sample period goes from September 2018 until June 2023.

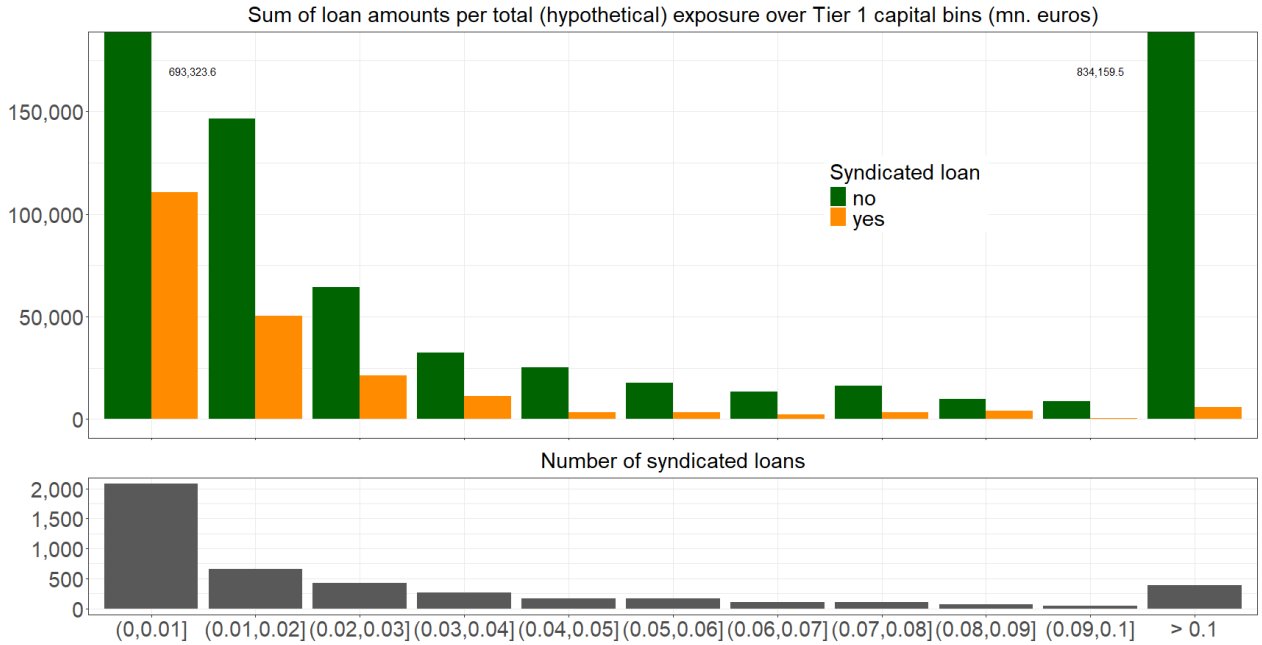

Figure 6: Banks' total borrower exposure when they grant bilateral or syndicated loans. This figure shows banks' total exposure to a borrower by loan type and bins of total exposure over banks' Tier 1 capital in the top graph and the number of syndicated loans by the same bins in the bottom graph. Total exposure is calculated as the sum of all existing loans by the bank to the borrower and the new loan in question. If the new loan turns out to be syndicated, the figure shows the hypothetical exposure as if it had not been syndicated. For readability's sake, we truncate the green bars on the far left and the far right. The true height of each is indicated by the figure next to it. Our sample period goes from September 2018 until June 2023.

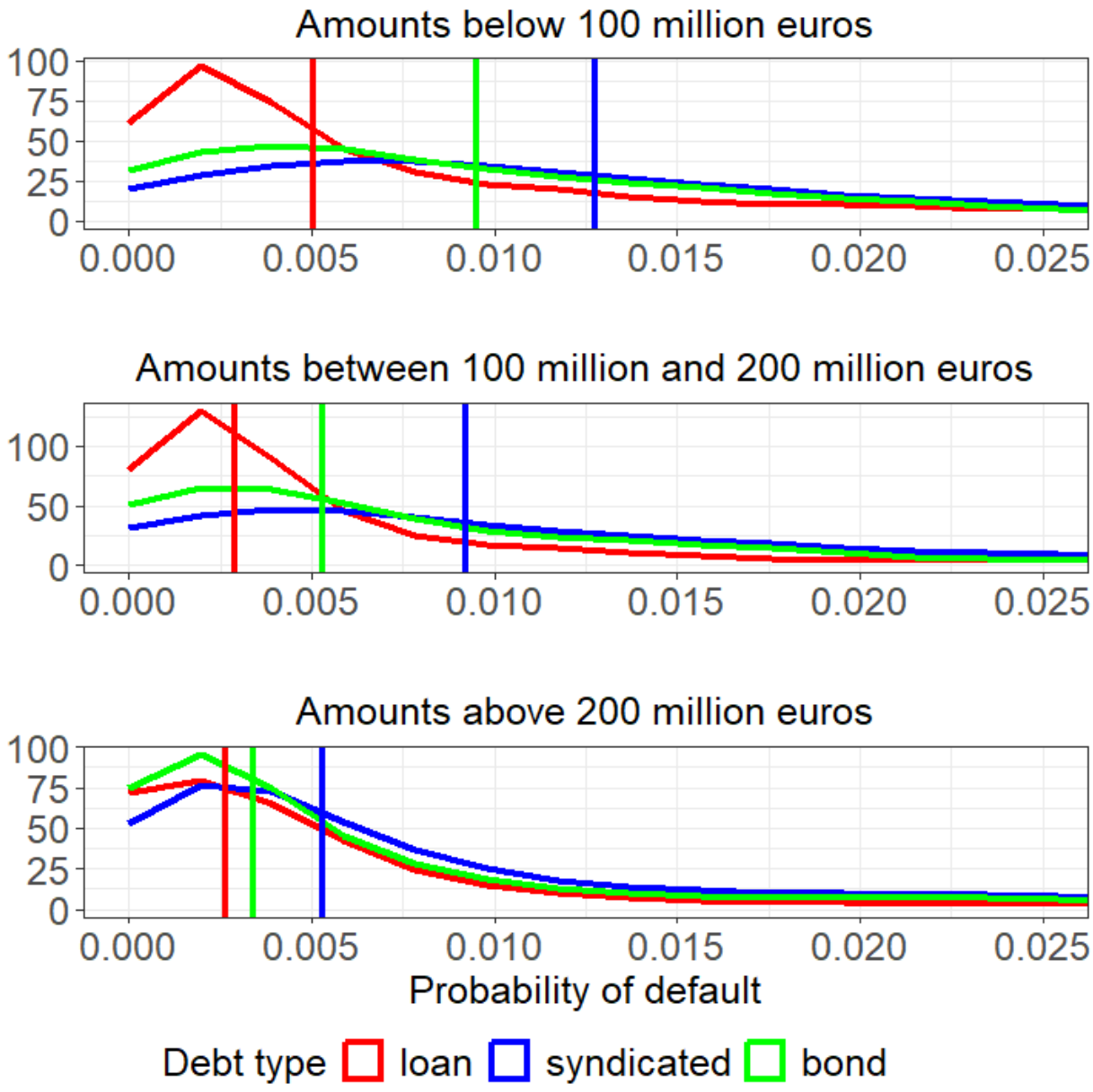

Figure 7: Distribution of firm default probabilities. This figure shows the densities of the probability of default (PD) estimates and their median of firms that borrow loans from banks (in red), syndicated loans (in blue), and bonds (in green). All debt types carry amounts of at least 5 million euros. As a measure for firms' probabilities of default, we take a simple average over all relationship banks' PD estimates of the firm before taking up the respective debt form. Observations are at the firm-issuance level; that is, firms are counted multiple times if they take up debt multiple times.

Tables

Table 1: Sample characteristics

This table presents summary statistics of firms that receive syndicated loans and firms that receive large bilateral loans. Amounts are in million 2019 euros, and for readability's sake are winsorized above the 98th percentile.

	Syndicated loan					Bilateral bank loan				
	mean	SD	10^{th}	median	90^{th}	mean	SD	10^{th}	median	90^{th}
Borrower size (million euros)	706	1,140	3.2	200	2,288	311	671	0.7	53	975
Number of employees	469	877	2	102	1,479	377	777	1	78	962
Firm age (years)	27	39	0	10	118	24	35	1	8	84
Revenue (million)	701	1,307	1.7	137	2,241	455	1,000	1.4	117	1,245
Cash flow (million)	68	202	-4.9	12	263	45	127	-0.1	8	110
Profits before tax (million)	43	89	-7.7	5.5	152	26	63	-1.7	4	85
Probability of default (PD)	0.011	0.011	0.001	0.007	0.028	0.008	0.010	0.0006	0.005	0.024

Table 2: Loan syndication and bank capital ratio

This table shows the results of a linear probability model with whether a loan gets syndicated (= 1) or granted bilaterally (= 0) as the dependent variable and the bank's capital ratio as the explanatory variable. Bank-specific variables concern the main lead arranger if the loan is syndicated and the sole bilateral loan provider otherwise. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In columns (2) and (4), we additionally control for the natural logarithm of bank profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:				
	Loan is syndicated				
	(1)	(2)	(3)	(4)	(5)
Bank capital ratio	−0.007***	−0.006***	−0.007***	0.015***	0.016***
	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)
Bank capital ratio * log deal amount				−0.007***	−0.007***
				(0.0002)	(0.0002)
Log deal amount	0.094***	0.089***	0.106***	0.240***	0.242***
	(0.002)	(0.002)	(0.001)	(0.004)	(0.004)
Credit line	−0.039***	−0.032***	−0.049***	−0.030***	−0.025***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Mean	0.03	0.03	0.04	0.03	0.03
Additional bank controls	No	Yes	Yes	No	Yes
Incl. M&A and project finance	No	No	Yes	No	No
Country, industry, year FEs	Yes	Yes	Yes	Yes	Yes
Bank and firm size	Yes	Yes	Yes	Yes	Yes
Observations	68,653	63,902	64,575	68,653	63,902
R^2	0.340	0.329	0.387	0.387	0.384
Adjusted R^2	0.339	0.327	0.386	0.386	0.383
Note:					*p<0.1; **p<0.05; ***p<0.01.

Table 3: Loan syndication and bank industry specialization

This table shows the results of a linear probability model with whether a loan gets syndicated (= 1) or granted bilaterally (= 0) as the dependent variable and the bank industry specialization as the explanatory variable. We measure bank industry specialization as the ratio of the sum of loan amounts to a certain industry over the bank's total loan portfolio. Bank-specific variables concern the main lead arranger if the loan is syndicated and the sole loan provider otherwise. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In column (7), we additionally control for the natural logarithm of bank profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:							
	Loan is syndicated							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank industry specialization	−0.073***	−0.028***	−0.031***	−0.037***	0.282***	0.286***	−0.211***	−0.339***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.018)	(0.016)	(0.010)	(0.013)
Bank industry specialization * log deal amount					−0.129***	−0.117***		
					(0.008)	(0.007)		
Bank industry specialization * bank capital ratio							0.009***	0.013***
							(0.0005)	(0.001)
Log deal amount	0.089***	0.087***	0.097***	0.112***	0.121***	0.127***	0.105***	0.103***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Bank capital ratio	−0.006***	−0.007***	0.0004	0.0004	−0.009***	−0.00004	−0.010***	−0.009***
	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
Credit line	−0.034***	−0.039***	−0.027***	−0.045***	−0.054***	−0.045***	−0.056***	−0.041***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Mean	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.03
Industry FEs	Yes	No	No	No	No	No	No	No
Bank FEs	No	No	Yes	Yes	No	Yes	No	No
Additional bank controls	No	No	No	No	No	No	No	Yes
Incl. M&A and project finance	No	No	No	Yes	No	No	No	Yes
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65,596	65,596	65,596	66,204	66,204	66,204	66,204	61,531
R^2	0.273	0.251	0.418	0.474	0.323	0.483	0.311	0.323
Adjusted R^2	0.272	0.251	0.410	0.467	0.323	0.476	0.311	0.322

Note: *p<0.1; **p<0.05; ***p<0.01.

Table 4: Loan syndication and firm probability of default

This table shows the results of a linear probability model with whether a loan gets granted bilaterally (= 0) or syndicated (= 1) as the dependent variable and the firm probability of default (PD) as the main explanatory variable. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Bank-specific variables concern the main lead arranger if the loan is syndicated and the sole bilateral loan provider otherwise. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In column (6), we additionally control for the natural logarithm of bank profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:										
	Loan is syndicated										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Firm PD	1.034***	1.291***	1.377***	−0.317	−0.709*	5.451***	5.669***	1.569***	1.714***		
	(0.104)	(0.099)	(0.104)	(0.424)	(0.382)	(0.374)	(0.380)	(0.129)	(0.125)		
Firm PD * log deal amount				0.495***	0.738***						
				(0.181)	(0.164)						
Firm PD * bank capital ratio						−0.224***	−0.245***				
						(0.018)	(0.018)				
Firm PD * bank industry specialization								−2.257***	−2.495***		
								(0.334)	(0.339)		
COVID industry * COVID period										0.019***	0.006***
										(0.002)	(0.002)
Log deal amount	0.132***	0.128***	0.141***	0.128***	0.122***	0.133***	0.128***	0.126***	0.127***	0.080***	0.094***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Bank capital ratio	−0.003***	0.001***	0.001***	−0.003***	0.001***	−0.001***	−0.001***	−0.004***	0.002***		
	(0.0002)	(0.0004)	(0.0004)	(0.0002)	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0004)		
Credit line	−0.039***	−0.028***	−0.047***	−0.039***	−0.027***	−0.037***	−0.031***	−0.039***	−0.026***	−0.044***	−0.029***
	(0.002)	(0.003)	(0.004)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.001)	(0.002)
Bank industry specialization								−0.015***	−0.017**		
								(0.006)	(0.007)		
Mean	0.05	0.05	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Bank FEs	No	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes
Additional bank controls	No	No	No	No	No	No	Yes	No	No	No	No
Incl. M&A and project finance	No	No	Yes	No	No	No	No	No	No	No	No
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,858	32,858	33,341	32,858	32,858	32,858	29,818	31,975	31,975	75,129	75,129
R^2	0.445	0.562	0.607	0.446	0.563	0.448	0.439	0.363	0.480	0.300	0.511
Adjusted R^2	0.443	0.551	0.598	0.444	0.552	0.446	0.436	0.362	0.469	0.299	0.504

Note: *p<0.1; **p<0.05; ***p<0.01.

Table 5: Lead share

This table shows the result of linear regressions of the share retained by the lead arranger of a syndicated loan as the dependent variable on bank capital ratio, its industry specialization, and the firm probability of default (PD) and control variables. The bank under consideration is the main lead arranger in the case of multiple lead arrangers. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. A firm's PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. In column (2) we control for the natural logarithm of bank profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:								
	Lead share retained								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bank capital ratio	0.004***	0.002*	0.001	✓	✓	✓	✓	✓	✓
	(0.001)	(0.001)	(0.001)						
Bank industry specialization				0.154**	0.150**	0.122**			
				(0.062)	(0.061)	(0.049)			
Probability of default							−0.779	−0.440	−1.026**
							(0.538)	(0.568)	(0.450)
Log deal amount	−0.056***	−0.057***	−0.054***	−0.054***	−0.059***	−0.051***	−0.057***	−0.063***	−0.056***
	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.004)	(0.006)	(0.006)	(0.005)
Credit line	−0.030**	−0.025*	−0.030**	−0.022	−0.020	−0.026*	−0.036**	−0.030*	−0.033**
	(0.014)	(0.015)	(0.013)	(0.015)	(0.016)	(0.014)	(0.016)	(0.017)	(0.015)
Mean	0.23	0.23	0.24	0.23	0.23	0.25	0.22	0.22	0.22
Bank FEs	No	No	No	No	Yes	Yes	No	Yes	Yes
Incl. M&A and project finance	No	No	Yes	No	No	Yes	No	No	Yes
Industry FEs	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Additional bank controls	No	Yes	Yes	No	No	No	No	No	No
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,578	1,349	1,825	1,308	1,308	1,745	1,125	1,125	1,477
R^2	0.232	0.249	0.238	0.176	0.284	0.291	0.236	0.362	0.351
Adjusted R^2	0.182	0.192	0.195	0.160	0.209	0.233	0.170	0.232	0.248
Note:									*p<0.1; **p<0.05; ***p<0.01.

Table 6: Interest rate, syndication, and firm risk

This table shows the results of linear regressions of the loan spread in basis points on the firm probability of default (PD), a dummy variable that equals 1 if the loan is syndicated, and control variables. Firm PD is measured as the simple average of the PD estimates of all banks with which the firm is in a credit relationship. If the loan is syndicated, credit line might be between 0 and 1 and captures the share of loan tranches that are a credit line. If the loan is syndicated, bank fixed effects concern the main lead arranger in the case of multiple lead arrangers. The regression only uses loans with Euribor as the reference rate and controls for different maturities through fixed effects. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:									
	Loan spread (bps)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Loan is syndicated	83.618***	79.893***	65.842***	60.132***	56.622***	58.686***	54.047***	50.199***	38.017***	37.264***
	(4.456)	(5.087)	(5.352)	(5.762)	(5.591)	(5.256)	(5.627)	(6.217)	(6.905)	(7.173)
Loan is syndicated * probability of default									2,027.437***	1,663.725***
									(409.024)	(398.932)
Probability of default			2,018.240***	2,069.086***	2,045.587***	2,031.595***	2,042.675***	1,984.070***	1,826.406***	1,906.358***
			(113.104)	(100.954)	(101.784)	(100.448)	(101.740)	(103.690)	(117.779)	(104.387)
Log maturity in days	−0.763	0.046	0.385	4.652***	4.633***	4.298***	4.445***	4.554***	0.224	4.701***
	(0.672)	(0.688)	(0.917)	(0.937)	(0.948)	(0.951)	(0.967)	(0.952)	(0.928)	(0.948)
Credit line	−19.232***	−18.883***	−30.239***	−22.239***	−21.052***	−19.608***	−20.279***	−19.590***	−29.638***	−20.204***
	(1.791)	(2.078)	(2.667)	(3.173)	(3.186)	(3.112)	(3.330)	(3.250)	(2.699)	(3.189)
Secured	16.717***	15.195***	9.721***	11.501***	10.875***	11.847***	9.589***	10.393***	9.042***	10.971***
	(1.599)	(1.470)	(2.212)	(1.979)	(1.985)	(1.985)	(1.967)	(1.984)	(2.214)	(1.983)
Mean	174.67	174.58	147.78	147.67	146.8	148.36	146.38	145.24	146.87	146.8
Bank FEs	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Callability and priority	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Incl. M&A and project finance	No	No	No	No	No	Yes	No	No	No	No
Spread data	DS, AC	DS, AC	DS, AC	DS, AC	DS, AC	DS, AC	AC	DS, AC	DS, AC	DS, AC
All lenders are banks	No	No	No	No	No	No	No	Yes	No	No
Country, industry, year, reference rate FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log loan amount and firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,819	19,766	9,699	9,668	9,487	9,739	9,463	9,208	9,513	9,487
R^2	0.278	0.537	0.276	0.541	0.538	0.530	0.536	0.543	0.272	0.539
Adjusted R^2	0.273	0.514	0.268	0.508	0.504	0.496	0.502	0.510	0.263	0.506

Note: *p<0.1; **p<0.05; ***p<0.01.

Table 7: Robustness on sub-sample—Loan syndication, bank capital ratio, and industry specialization

This table shows the results of a linear probability model with whether a loan gets granted bilaterally (= 0) or syndicated (= 1) as the dependent variable and the bank capital ratio and industry specialization as the explanatory variables. It aims at alleviating the concern that our main results are driven by very small loans of which there exist disproportionately many bilateral loans or very large loans of which there exist disproportionately many syndicated loans. The regressions in this table are therefore based on a sub-sample of loans larger than 100 million euros and smaller than 700 million euros. In this range, there are 1,764 syndicated loans and 3,178 bilateral loans (both loan types being subject to fewer observations due to missing data). As the sample selection is based on the loan amount, we merely control for the natural logarithm of the loan amount but do not interact it with bank capital ratio or industry specialization. The bank under consideration is the main lead arranger in the case of multiple lead arrangers. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In column (6), we additionally control for the natural logarithm of bank profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:							
	Loan is syndicated							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank capital ratio	−0.026***	−0.030***	−0.028***	✓	✓	✓	−0.043***	−0.044***
	(0.002)	(0.002)	(0.002)				(0.002)	(0.002)
Bank industry specialization				−0.404***	−0.244***	−0.251***	−2.147***	−2.120***
				(0.065)	(0.064)	(0.059)	(0.173)	(0.183)
Bank capital ratio * bank industry specialization							0.079***	0.077***
							(0.006)	(0.006)
Log deal amount	0.178***	0.170***	0.168***	0.158***	0.102***	0.103***	0.177***	0.170***
	(0.013)	(0.013)	(0.012)	(0.011)	(0.011)	(0.010)	(0.011)	(0.012)
Credit line	−0.179***	−0.158***	−0.222***	−0.195***	−0.187***	−0.231***	−0.199***	−0.182***
	(0.023)	(0.025)	(0.023)	(0.026)	(0.030)	(0.027)	(0.025)	(0.027)
Mean	0.29	0.26	0.32	0.25	0.25	0.3	0.25	0.23
Bank FEs	No	No	No	No	Yes	Yes	No	No
Additional bank controls	No	Yes	Yes	No	No	No	No	Yes
Industry FEs	Yes	Yes	Yes	No	No	No	No	No
Incl. M&A and project finance	No	No	Yes	No	No	Yes	No	No
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,797	3,573	3,879	3,551	3,551	3,815	3,551	3,363
R^2	0.611	0.630	0.666	0.509	0.715	0.745	0.528	0.532
Adjusted R^2	0.601	0.619	0.657	0.505	0.701	0.733	0.524	0.528
Note:								*p<0.1; **p<0.05; ***p<0.01.

Table 8: Robustness on sub-sample—Loan syndication and firm probability of default

This table shows the results of a linear probability model with whether a loan gets granted bilaterally (= 0) or syndicated (= 1) as the dependent variable and the firm probability of default (PD) as the main explanatory variable. The sub-sample is again composed of loans larger than 100 million euros and smaller than 700 million euros. In this range, there are 1,764 syndicated loans and 3,178 bilateral loans (both loan types being subject to fewer observations due to missing data). As the sample selection is based on the loan amount, we merely control for the natural logarithm of the loan amount but do not interact it with firm PD. The bank under consideration is the main lead arranger in the case of multiple lead arrangers. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In column (4), we additionally control for the natural logarithm of bank profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:						
	Loan is syndicated						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Firm PD	4.954***	4.998***	4.748***	28.978***	32.712***	9.506***	8.202***
	(1.288)	(1.179)	(0.986)	(5.790)	(6.307)	(1.728)	(1.668)
Firm PD * bank capital ratio				−1.211***	−1.451***		
				(0.284)	(0.307)		
Firm PD * bank industry specialization						−23.521**	−20.098**
						(10.489)	(9.884)
Bank capital ratio	−0.010***	0.016**	0.017***	0.001	−0.003	−0.024***	0.019**
	(0.003)	(0.007)	(0.006)	(0.004)	(0.004)	(0.004)	(0.008)
Log deal amount	0.270***	0.227***	0.210***	0.273***	0.279***	0.325***	0.278***
	(0.022)	(0.023)	(0.020)	(0.022)	(0.024)	(0.022)	(0.024)
Credit line	−0.042	−0.084**	−0.119***	−0.028	−0.026	−0.072**	−0.094**
	(0.031)	(0.035)	(0.031)	(0.031)	(0.034)	(0.033)	(0.037)
Bank industry specialization						−0.441***	−0.298**
						(0.116)	(0.151)
Mean	0.63	0.63	0.68	0.63	0.62	0.58	0.58
Bank FEs	No	Yes	Yes	No	No	No	Yes
Additional bank controls	No	No	No	No	Yes	No	No
Industry FEs	Yes	Yes	Yes	Yes	Yes	No	No
Incl. M&A and project finance	No	No	Yes	No	No	No	No
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,235	1,235	1,447	1,235	1,072	1,080	1,080
R^2	0.437	0.667	0.653	0.448	0.463	0.316	0.599
Adjusted R^2	0.389	0.592	0.585	0.401	0.409	0.298	0.538

Note: *p<0.1; **p<0.05; ***p<0.01.

Table 9: Robustness—Loan syndication for first-time syndicated loan borrowers

This table shows the result of linear regressions of whether a loan is syndicated (= 1) or granted bilaterally (= 0) as the dependent variable on bank capital ratio, its industry specialization, and the firm probability of default (PD) and control variables. We restrict our sample to bilateral loan borrowers and first-time syndicated loan borrowers. The bank under consideration is the main lead arranger in the case that the loan gets syndicated. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. In column (2) we control for the natural logarithm of banks' profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:								
	Loan is syndicated								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bank capital ratio	−0.004***	−0.004***	−0.004***	✓	✓	✓	✓	✓	✓
	(0.0001)	(0.0001)	(0.0001)						
Bank industry specialization				−0.025***	−0.021***	−0.021***			
				(0.002)	(0.004)	(0.004)			
Firm PD							0.411***	0.594***	1.377***
							(0.079)	(0.081)	(0.104)
Log deal amount	0.060***	0.056***	0.056***	0.055***	0.063***	0.063***	0.063***	0.065***	0.141***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Credit line	−0.042***	−0.037***	−0.037***	−0.040***	−0.041***	−0.041***	−0.027***	−0.029***	−0.047***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)
Mean	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.06
Bank FEs	No	No	No	No	Yes	Yes	No	Yes	Yes
Additional bank controls	No	Yes	Yes	No	No	No	No	No	No
Incl. M&A and project finance	No	No	Yes	No	No	Yes	No	No	Yes
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67,790	63,184	63,184	64,892	64,892	64,892	31,869	31,869	33,341
R^2	0.256	0.249	0.249	0.149	0.319	0.319	0.244	0.374	0.607
Adjusted R^2	0.254	0.248	0.248	0.148	0.310	0.310	0.242	0.359	0.598
Note:									*p<0.1; **p<0.05; ***p<0.01.

Table 10: Robustness—Loan syndication when the bank has an existing credit relationship

This table shows the result of linear regressions of whether a loan is syndicated (= 1) or granted bilaterally (= 0) as the dependent variable on the bank's capital ratio, its industry specialization, and the firm probability of default (PD) and control variables. We restrict our sample to banks that have a pre-existing credit relationship with the firm. The bank under consideration is the main lead arranger in the case that the loan gets syndicated. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. In column (2) we control for the natural logarithm of banks' profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:								
	Loan is syndicated								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bank capital ratio	−0.001***	−0.001***	−0.001***	✓	✓	✓	✓	✓	✓
	(0.0002)	(0.0002)	(0.0003)						
Bank industry specialization				−0.006**	−0.004	−0.004			
				(0.003)	(0.004)	(0.005)			
Firm PD							0.453***	0.421***	1.377***
							(0.162)	(0.157)	(0.104)
Log deal amount	−0.015***	−0.014***	−0.038***	−0.011***	−0.026***	−0.046***	−0.013***	−0.025***	−0.047***
	(0.002)	(0.003)	(0.004)	(0.002)	(0.006)	(0.007)	(0.003)	(0.008)	(0.004)
Credit line	0.008***	0.007***	0.016***	0.005***	0.006***	0.013***	0.014***	0.013***	0.141***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.002)
Mean	0.003	0.003	0.007	0.002	0.002	0.005	0.006	0.006	0.062
Bank FEs	No	No	No	No	Yes	Yes	No	Yes	Yes
Additional bank controls	No	Yes	Yes	No	No	No	No	No	No
Incl. M&A and project finance	No	No	Yes	No	No	Yes	No	No	Yes
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,876	18,356	18,426	17,875	17,875	17,931	7,030	7,030	33,341
R^2	0.234	0.230	0.279	0.027	0.240	0.355	0.316	0.496	0.607
Adjusted R^2	0.230	0.226	0.275	0.026	0.225	0.342	0.306	0.469	0.598
Note:									*p<0.1; **p<0.05; ***p<0.01.

Table 11: Robustness—Loan selection in DealScan

This table shows the result of linear regressions of whether a loan is reported in DealScan (= 1) or not (= 0) as the dependent variable on the capital ratios of banks, their industry specialization, and the firm probability of default (PD) and control variables. Our data are from AnaCredit. The bank under consideration is the one with the largest share. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. In column (1) we control for the natural logarithm of banks' profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:		
	Loan reported in DealScan		
	(1)	(2)	(3)
Bank capital ratio	−0.001	✓	✓
	(0.002)		
Bank industry specialization		−0.094	
		(0.084)	
Firm PD			−1.355
			(1.317)
Log deal amount	0.034***	0.039***	0.046***
	(0.007)	(0.009)	(0.010)
Bank FEs	No	Yes	Yes
Additional bank controls	Yes	No	No
Industry FEs	Yes	No	Yes
Country & year FEs, bank & firm size	Yes	Yes	Yes
Observations	1,915	1,992	1,467
R^2	0.227	0.276	0.310
Adjusted R^2	0.189	0.170	0.208
Note:	*p<0.1; **p<0.05; ***p<0.01.		

Appendix

Table A1: Loan syndication and firm probability of default

This table shows the results of a linear probability model with whether a loan gets granted bilaterally (= 0) or syndicated (= 1) as the dependent variable and the firm probability of default (PD) as the main explanatory variable. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship except for the bank that grants the loan. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Bank-specific variables concern the main lead arranger if the loan is syndicated and the sole bilateral loan provider otherwise. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In column (6), we additionally control for the natural logarithm of banks' profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:								
	Loan is syndicated								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Firm PD (other banks)	0.797***	1.021***	1.078***	1.171**	0.720*	4.315***	4.355***	1.184***	1.313***
	(0.115)	(0.110)	(0.116)	(0.473)	(0.420)	(0.419)	(0.422)	(0.135)	(0.133)
Firm PD (other banks) * Log deal amount				−0.137	0.111				
				(0.201)	(0.181)				
Firm PD (other banks) * bank capital ratio						−0.179***	−0.189***		
						(0.020)	(0.020)		
Firm PD (other banks) * bank industry specialization								−1.494***	−1.653***
								(0.360)	(0.339)
Log deal amount	0.139***	0.134***	0.145***	0.140***	0.133***	0.139***	0.135***	0.132***	0.133***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Bank capital ratio	−0.004***	0.001**	0.001***	−0.004***	0.001**	−0.002***	−0.002***	−0.004***	0.001***
	(0.0002)	(0.0004)	(0.0004)	(0.0002)	(0.0004)	(0.0003)	(0.0003)	(0.0002)	(0.0004)
Credit line	−0.043***	−0.033***	−0.050***	−0.043***	−0.033***	−0.041***	−0.035***	−0.041***	−0.031***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.004)
Mean	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.04	0.04
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Bank FEs	No	Yes	Yes	No	Yes	No	No	No	Yes
Additional bank controls	No	No	No	No	No	No	Yes	No	No
Incl. M&A and project finance	No	No	Yes	No	No	No	No	No	No
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,724	26,724	27,107	26,724	26,724	26,724	24,254	25,881	25,881
R^2	0.460	0.580	0.621	0.460	0.581	0.461	0.452	0.382	0.500
Adjusted R^2	0.457	0.568	0.610	0.457	0.568	0.459	0.449	0.381	0.487
Note:									*p<0.1; **p<0.05; ***p<0.01.

Table A2: Loan syndication and loan risk through overdue payments

This table shows the results of a linear probability model with whether a loan gets granted bilaterally (= 0) or syndicated (= 1) as the dependent variable and the loan risk as the explanatory variable. Loan risk is measured by a dummy variable that indicates whether a firm had overdue loan payments during the six months before getting a loan (= 1) or not (= 0). Banks' industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Bank-specific variables concern the main lead arranger if the loan is syndicated and the sole bilateral loan provider otherwise. The loan amount is the entire syndicated deal amount in the case that the loan gets syndicated and the bilateral loan amount otherwise. All columns contain the natural logarithm of bank and firm balance sheet size. In column (3), we additionally control for the natural logarithm of banks' profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:								
	Loan is syndicated								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Overdue (past 6 months)	−0.005***	0.006***	0.005***	−0.020***	−0.034***	0.080***	0.072***	−0.005***	0.011***
	(0.001)	(0.001)	(0.001)	(0.006)	(0.005)	(0.004)	(0.004)	(0.002)	(0.002)
Overdue (past 6 months) * log deal amount				0.005**	0.014***				
				(0.002)	(0.002)				
Overdue (past 6 months) * bank capital ratio						−0.004***	−0.004***		
						(0.0002)	(0.0002)		
Overdue (past 6 months) * bank industry specialization								−0.024***	−0.020***
								(0.005)	(0.004)
Log deal amount	0.094***	0.099***	0.112***	0.091***	0.091***	0.095***	0.090***	0.087***	0.097***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Bank capital ratio	−0.007***	0.0001	0.0002	−0.007***	0.0002	−0.005***	−0.005***	−0.007***	0.0004
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Credit line	−0.039***	−0.030***	−0.048***	−0.039***	−0.031***	−0.037***	−0.031***	−0.039***	−0.027***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Mean	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Bank FEs	No	Yes	Yes	No	Yes	No	No	No	Yes
Additional bank controls	No	No	No	No	No	No	Yes	No	No
Incl. M&A and project finance	No	No	Yes	No	No	No	No	No	No
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	68,204	68,204	68,958	68,204	68,204	68,204	63,462	65,165	65,165
R^2	0.338	0.506	0.555	0.338	0.508	0.342	0.330	0.251	0.418
Adjusted R^2	0.337	0.499	0.549	0.337	0.500	0.341	0.329	0.251	0.410
Note:									*p<0.1; **p<0.05; ***p<0.01.

Table A3: Lead share post sales

This table shows the result of linear regressions of the share retained by the lead arranger of a syndicated loan as the dependent variable on the bank's capital ratio, its industry specialization, and the firm probability of default (PD) and control variables. The lead share is measured six months after syndication; secondary loan data come from AnaCredit. The bank under consideration is the main lead arranger in the case of multiple lead arrangers. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. Firm PD is measured as the simple average over the PD estimates of all banks with which the firm is in a credit relationship. In column (2) we control for the natural logarithm of banks' profits and operating revenue. HC1 standard errors are clustered at the industry level within the country of the borrowing firm.

	Dependent variable:								
	Lead share retained (6 months after syndication)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bank capital ratio	0.005***	0.003*	0.001	✓	✓	✓	✓	✓	✓
	(0.001)	(0.001)	(0.001)						
Bank industry specialization				0.160**	0.132**	0.111**			
				(0.064)	(0.059)	(0.048)			
Probability of default							−0.504	−0.307	−0.943**
							(0.514)	(0.525)	(0.430)
Log deal amount	−0.057***	−0.057***	−0.055***	−0.055***	−0.060***	−0.054***	−0.060***	−0.066***	−0.059***
	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.004)	(0.006)	(0.006)	(0.005)
Credit line	−0.031**	−0.033**	−0.041***	−0.028*	−0.031*	−0.039***	−0.030*	−0.018	−0.024*
	(0.014)	(0.015)	(0.013)	(0.015)	(0.016)	(0.014)	(0.016)	(0.016)	(0.014)
Mean	0.22	0.22	0.22	0.22	0.22	0.23	0.21	0.21	0.21
Bank FEs	No	No	No	No	Yes	Yes	No	Yes	Yes
Industry FEs	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Additional bank controls	No	Yes	Yes	No	No	No	No	No	No
Incl. M&A and project finance	No	No	Yes	No	No	Yes	No	No	Yes
Country & year FEs, bank & firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,440	1,241	1,674	1,206	1,206	1,609	1,040	1,100	1,453
R^2	0.235	0.261	0.238	0.174	0.288	0.282	0.254	0.383	0.350
Adjusted R^2	0.183	0.202	0.193	0.157	0.212	0.221	0.185	0.250	0.242

Note: *p<0.1; **p<0.05; ***p<0.01.

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