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.

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1 Introduction

Syndicated loan markets have become an important financing source for firms worldwide. For example, according to *Bloomberg Business Reporter*, the syndicated lending market is currently running at 4.5 trillion US dollars per annum. As a consequence, a large body of literature has focused on topics such as syndicate composition, the role of lead arrangers, and the signaling function of loan syndication or has used the syndicated loan market as a laboratory to test a host of theories on the impact of credit supply on the real economy. However, a lot less is known about why syndicated loans exist in the first place.

While both banking theory and practice may provide us with important clues as to why loans may be granted by a syndicate of banks, and not bilaterally by a single bank,[1] a lack of direct empirical evidence documenting this choice made by banks may have prevented the development of a definite theoretical framework.[2] We provide such direct empirical evidence.

We show that banks mainly use loan syndication for risk-management purposes: banks' ability to manage risks and firm riskiness are critical drivers of the syndication choice. Banks are more likely to grant syndicated loans (as opposed to bilateral loans) if their risk-bearing capacity is low and adequately monitoring firms comes at a high cost. Furthermore, banks are more likely to syndicate loans to risky firms. Overall, these findings contradict conjectures according to which borrowers that have gained enough reputation and are easy to monitor graduate to the syndicated loan market (e.g., Dennis and Mullineaux (2000)).

To come to this conclusion, we combine the euro-area-wide credit register called Anacredit (administered by the European Central Bank) with syndicated loan data (obtained from DealScan). The final data set provides us with a comprehensive overview of bank and firm activity on both credit markets and the entire credit structure of borrowers at the

[1] In Diamond (1984) for example duplication of monitoring is avoided by the individual financiers depositing their funds with one of them, that is, "the bank". Diversification by banks is also often modeled and discussed in the context of market competition and/or business cycles (see, e.g., Winton (1997); Joao AC Santos and Winton (2008)).

[2] The only paper we are aware of that attempts to rationalize why syndicated loans exist 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. To prevent the borrower from following this profitable strategy, lenders form large and diffuse syndicates to increase the penalty for default. Yet it is unclear that this model applies to the syndication of loans to corporates, for which it might be more difficult to profitably selectively default.

loan level. Our combined data set allows us to compare bilateral loans, that is, loans provided by one bank, with similar syndicated loans. We, therefore, overcome a limitation of previous work that observed either bilateral bank-firm lending or syndicated bank lending, but usually not both concurrently.[3] We then study the determinants driving the decision to syndicate at the lender, borrower, and loan level.

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. Nevertheless, the loan amount is an essential 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 for banks to syndicate a loan.

Second, a bank's ability to manage risks plays a crucial role in its decision to grant loans bilaterally or in syndication. Risk management ability is defined by two key factors: a 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 doubling the likelihood of syndicating the loan. Banks with low capital ratios cannot bear the loan risk alone and prefer to syndicate the loan. Screening and monitoring ability is proxied through a bank's industry specialization. Specialized banks have superior knowledge about an industry and are thus better at screening and monitoring (see, e.g., Blickle, Parlatore, and Saunders (2023)). As a consequence, a one standard deviation decrease in bank specialization in the industry of the firm[4] is associated with a 15 percent higher likelihood of syndication.

Third, banks are more likely to grant syndicated loans (as opposed to bilateral loans) to more risky firms. Firm risk is proxied through a bank-assigned default probability. A one

[3] A notable exception is Dennis and Mullineaux (2000) who investigate the share that the lead arranger syndicates. Their sample includes bilateral loans.

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

standard deviation (or one percentage point) increase in a firm's probability of default is associated with a 17 percent higher probability of syndication. Similar results are obtained if we alternatively measure loan risk by whether a firm's loan payments were overdue during the six months before getting a loan.

Fourth, we show that what holds for a bank's decision to grant loans bilaterally or in syndicates also holds for the share they retain in the syndicated loan. The higher-capitalized lead banks are, the more specialized they are in the firm's industry, and the smaller a firm's probability of default, the larger the share of the syndicated loan that lead banks retain. A one standard deviation increase in the respective factors is associated with a 1.3 to 3.8 percentage points change in the lead share or 6 to 18 percent of its standard deviation. 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 64 basis points higher than for 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 probability of default (PD) of one standard deviation (1.1 percentage points), is associated with an increase in the loan spread of 21 basis points for bilateral loans but as much as 34 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 what 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. However, we aim to speak and contribute to an extensive literature on the firm funding structure, syndicated lending, and debt pricing.[5] Diamond

[5]The topic of bilateral versus syndicated lending also relates to work that models and assesses the differences between single and multiple bilateral bank borrowing by firms (e.g., Bhattacharya and Chiesa (1995); Yosha (1995); Detragiache, Garella, and Guiso (2000); Ongena and Smith (2000); Farinha and Joao AC Santos (2002)). In contrast to this literature, we focus on the transition choice from (possibly multiple) bilateral to syndicated lending made by banks, which may represent a formalization of informal arrangements existing in some countries to deal with corporate bankruptcy when multiple banks lend bilaterally (e.g., Brunner and Krahnen (2008)). We leave the relationship between syndication and the bilateral funding structure of firms for future research.

(1991) rationalizes why some firms borrow bilaterally from banks that monitor them and others from the market in the form of bonds. Borrowers with a credit rating toward the middle of the spectrum rely on bank loans, whereas higher-rated borrowers borrow on the bond market. The reason is that the moral hazard problem is smaller for higher-rated borrowers with greater incentives to maintain their high credit rating.

We show that despite involving multiple financiers, which at first sight is a step towards market financing, the syndicated loan market works reversely: For risk-management purposes, banks syndicate the loans of firms that have a high probability of default and grant safe loans bilaterally. To make the connection to the bond market more concrete, we extend our analysis to include bonds. For all loan or bond sizes, we find that first-time syndicated loan borrowers are riskier than first-time bond issuers. We also show that firms with a syndicated loan outstanding are not more likely to issue a bond for the first time than firms with a large bilateral loan outstanding. This contradicts conjectures according to which borrowers that have gained enough reputation graduate to the syndicated loan market.

We also speak to an extensive literature on the 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.

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 the pricing difference in different debt markets. For example, Schwert (2020) finds that firms pay a premium for borrowing bilaterally from banks compared to bondholders. Our results suggest that this might not be true for bilateral and syndicated loans. We also show that while syndicates accommodate risky firms, they are much more sensitive to firm risk in their pricing behavior than bilateral lenders.

We proceed as follows: Section 2 introduces the data and provides an overview of sample characteristics. Section 3 presents the results, and section 4 conducts robustness exercises. Section 5 compares bilateral loans and the syndicated loan market with the bond market. Section 6 concludes.

2 Data and sample characteristics

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, for the first time, we get a comprehensive overview of a bank's role in granting bilateral credit and participating in syndicated loans. AnaCredit also includes syndicated loan information, allowing us to complement important variables in Dealscan. Additionally, AnaCredit's monthly panel structure enables us to control for the secondary market for syndicated loans.

In this section, we first describe the selection of bilateral loans with which we compare syndicated loans. We then provide an overview of the syndicated loan market in the euro area based on Dealscan. 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 syndicated loans and their borrowers.

2.1 Bilateral bank loans: data selection

To understand why some firms borrow bilaterally from banks and others borrow from syndicates, we select an appropriate sample of bilateral loans. Bilateral loans come from Ana-

Credit, which provides loan-level information on loans granted by banks and their subsidiaries within the euro area. It covers the universe of bank loans with a minimum borrowing amount of 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 starts. We exclude borrowers who have a syndicated loan outstanding or had one in the past. This leaves us with 39,292 firms that borrowed 82,332 bilateral loans.

Additional firm balance sheet information is primarily sourced from AnaCredit, but in cases where there are missing observations, we complement the data using Orbis. Similarly, bank financial information is obtained from BankFocus. AnaCredit data are matched with Orbis and BankFocus using public identifiers as well as firm names and addresses. Of the bilateral loan borrowers and their lenders in our sample, over 99 percent can be matched to Orbis and BankFocus, respectively.

2.2 Syndicated loans in the euro area: summary statistics

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. The primary sources of data are reports by syndicated loan originators. Syndicated loan deals can consist of single or multiple tranches with potentially different pricing or maturity terms. In line with previous studies, such as 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 aggregated appropriately to reflect the deal level.

The top graph in Figure 1 shows that the average number of syndicated loans issued per month in the euro area increased from just over 30 in 1999 to over 70 before the onset of the 2007/2008 global financial crisis. While the number of loans was not depressed much during the sovereign debt crisis that followed the global financial crisis in Europe and even recovered to new highs of more than 90 loans per month between 2014 and the onset of the COVID-19 pandemic in 2020, the sum of monthly syndicated loan amounts has gone down considerably (bottom graph in Figure 1). Amounts plummeted with the onset of the great

financial crisis from previous highs of above 75 billion euros in syndicated loan amounts issued monthly to an average of above 30 billion euros until 2014, when they recovered to a new average of around 40 billion euros. The COVID-19 pandemic only had a small effect on the number of loans and their total 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, according to the number of issuances, 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, firms have issued between 100 and 200 loans during our sample period.

2.3 Matching AnaCredit with DealScan

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

Next, we match DealScan lenders to AnaCredit banks using their names and country of residence. As for borrowers, the level of consolidation is predominantly the same in both data sets. Out of the 1,551 syndicate participants identified in DealScan, we can 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 the 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 shared among all syndicate participants. Lead arrangers are responsible for reporting on behalf of other participants who are not reporting lenders 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.[6]

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.

As for bilateral loan borrowers and their lenders, financial information for syndicated loan borrowers and syndicate participants again comes from AnaCredit whenever available and 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. To ensure comparability between bilateral and syndicated loans, we only consider syndicated loans that are not issued to finance mergers and acquisitions or project finance, purposes that require lending set-ups that are outside the scope of this paper.[7] This selection leaves us with 2,951 firms that borrowed 3,712 syndicated loans during our sample period.

2.4 Matched syndicated loans: summary statistics

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

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

[7] Specifically, we consider syndicated loans with purposes such as general purpose, real estate loan, capital expenditure, working capital, general purpose/ refinance, restructuring, aircraft and ship finance, or ship finance.

10.4 bilateral credit relationships before they obtain a syndicated loan, where credit relationships are defined as having any outstanding loans. The median is 5, and the 10th and 90th percentile are 1 and 19, respectively. If we, alternatively, only consider relationships as those where banks have at least an accumulated amount of one million euros in loans committed, the mean, median, 10th, and 90th percentile become 8.6, 4, 1, and 16, respectively.

On average, 36 percent of banks with an existing credit relationship before the firm borrows from a syndicate also participate in the syndicate (the median, 10th, and 90th percentile are 33, 0, and 100 percent, respectively). If we only consider firms with fewer than 10 bank relationships, an average of 39 percent participate in the syndicate. Instead, if we only consider banks that hold at least 20 percent of a firm's outstanding bank debt, the average is 61 percent.

Reversely, how familiar are syndicated loan participants with the borrower, that is, which share of syndicate participants has a pre-existing bank relationship with the firm? The average syndicate comprises 6.4 lenders, while the median, 10th, and 90th percentile are 5, 2, and 12, respectively. Of these lenders, which include both banks and non-banks, 25 percent, on average, have a pre-existing bank relationship with the firm (the median, 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 suggest that in terms of amount and interest rate, the syndicated loan is a "non-event". Figure 3 shows that of the banks that have an existing credit relationship with a syndicated loan borrower, neither the banks that participate in the syndicate nor the ones that do not change their firm exposure in the months before or after the syndicated loan. Likewise, the interest rate charged on bilateral credit does not change much before or after the syndicated loan. This observation is again true for banks participating and banks not participating in the syndicate (Figure 4).

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

2.5 Comparing bilateral loans with syndicated loans: summary statistics

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 borrow bilateral loans of at least 5 million euros and those that borrow syndicated loans. Firms that get a syndicated loan are significantly larger than firms that get a bilateral loan. The average balance sheet size of the former is 706 million euros, while that of the latter is 311 million euros, which is also reflected in the number of employees and revenues. Syndicated loan borrowers have existed on average for 27 years while bilateral loan borrowers have existed for 24 years on average, 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 million euros.

Banks report a probability of default of their borrowers in AnaCredit. We use the simple average across all banks per firm to measure the firm's overall probability of default. Table 1 shows that unconditionally, the average and median probability of default is smaller for bilateral loan borrowers than for syndicated loan borrowers. We will show in the results section 3.3 that conditionally on a comprehensive array of control variables, these results continue to hold and that the firm's probability of default is a significant driver behind 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 2,488 for syndicated loans. In Tables 7 and 8 of the robustness section 6, we show that our results also hold and are even stronger for a sub-sample of loans between 100 and 700 million euros, for which we have a more balanced sample of syndicated loan borrowers and bilateral loan borrowers.

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, an occurrence 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 for loans between 5 and 100 million euros, which are routinely granted bilaterally. Beyond the 5-100 million euros bin, bilateral credit still dominates in the 100-200, 300-400, and even 600-700 million euros bins. Only after the 600-700 million euros bin does bilateral lending become rare and syndicated lending comparably more common.

Instead of the loan amount alone, are rules around large exposures to 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 them would have stayed well below the large exposure threshold of 10 percent had they granted them bilaterally. Additionally, 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 spread over the 3-month Euribor are 241 and 206 basis points on syndicated loans and 192 and 178 basis points on bilateral loans.

3 Results

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 with the choice to syndicate in an economically meaningful way. Conditional on the loan getting syndicated, they are also associated with the share retained by the lead arranger. In contrast to 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 it retains, that is, the intensive margin of the syndication process. Additionally, 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

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

i refers to the loan, f 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. When we estimate the extensive margin of the syndication process, that is, whether a loan is syndicated, y_{ifbjct} is a dummy variable that equals 1 if the loan is syndicated and 0 otherwise. When we estimate the intensive margin, y_i is the lead share retained. $Risk_{ifbjct}$ captures different measures of the bank's ability to take risks and loan risk as the main independent variables, and X_{ifbjct} captures controls specified below. All specifications include country and year fixed effects (ϕ_c and δ_t) while bank fixed effects (η_b) and economic sector fixed effects (θ_j) are used depending on the exact specification.

We start by testing the extensive margin by estimating a linear probability model. Linear probability models, in contrast to probit or logistic models, have the benefit that the coefficient on the interaction of two variables reflects the cross-partial derivative of the dependent variable with respect to these two variables as opposed to the partial derivative with respect

to the product of the two variables. In the former case, the interaction term has the same economic interpretation as in other linear models, while the latter 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 case the loan gets syndicated.[9] 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.[10] Lead arrangers are defined similarly to Ivashina (2009) as being assigned either of the following roles: book-runner, arranger, lead arranger, facility agent, syndication agent, co-arranger, lead manager, and co-lead manager.

3.1 Loan syndication and bank capital ratio

We start by using the bank capital ratio as a measure of a bank's ability to take risks and as the main explanatory variable in regression (1). In contrast to the graduation conjecture, but in line with a risk-sharing hypothesis, we expect higher-capitalized banks to be able to grant loans bilaterally while lower-capitalized banks might be hesitant to bear these large loans by themselves. Table 2 displays the results. In all specifications, we control for the natural logarithm of the loan amount and of bank and firm balance sheet size as well as country, industry, and year fixed effects. Standard errors are clustered at the country-industry level of the firm. Columns (1) and (2) feature the capital ratio without interaction, while columns (3) and (4) 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. In columns (2) and (4), we use the natural logarithm of the bank operating revenue and profits as additional bank controls since bank fixed effects would eliminate almost any variation in the bank

[9] Syndicated loan specialists in the industry that we have talked to confirmed that our assumption on the syndication process is reasonable.

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

capital ratio.

Columns (1) and (2) of Table 2 show that higher-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 both 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 4.8 percentage points increase in the probability that a loan gets syndicated. Given that the unconditional probability for a loan to be syndicated is only 4 percent, this corresponds to a doubling of the probability to syndicate. This confirms that the risk-bearing capacity of a bank, as measured by its capital ratio, is meaningfully associated with its syndication choice.

Columns (3) and (4) 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 0.019 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 be defaulted on due to superior post-origination monitoring and screening of loan applicants. Bank specialization can thus be viewed as the ability to estimate a firm's probability of default. Low uncertainty about a firm's probability of default (or a high industry specialization) allows the bank to be compensated adequately for the risk it takes. We therefore hypothesize that the more specialized a bank is in a firm's industry, the greater its propensity to grant the loan bilaterally.

Additionally, we interact the industry specialization measure with the natural logarithm

of the loan amount to test if bank industry specialization becomes more important the larger the loan. Finally, we hypothesize that a bank's ability to precisely assess a firm's probability of default as captured by its industry specialization becomes less important the larger its capital ratio. We test this by interacting the bank's industry specialization with its capital ratio.

Our measure for industry specialization is the sum of loan amounts going to the industry the firm operates in over the bank's total loan portfolio. The measure alone does not account for the relative size of an industry but should allow us to capture the bank's ability to assess the firm's probability of default. For example, 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 size. While Blickle, Parlatore, and Saunders (2023) do control for the relative size of an industry, it is a priori unclear if bank A is better able to assess the probability of default of a firm that operates in industry 1 compared to industry 2. We feature different fixed effects to account for both possibilities.

To allow for the possibility that the bank's relative dominance within an industry matters, that is, that bank A is better able to assess the probability of default 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 from the relative industry size.[11]

Columns (1) – (3) of Table 3 use the measure of bank industry specialization without interaction, columns (4) and (5) interact it with the natural logarithm of the loan amount, and columns (6) and (7) interact it with bank capital ratio. Columns (3) and (5) feature bank fixed effects, and column (7) uses no bank fixed effects but additional bank controls to allow for variation in bank capital ratio. 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.

[11] All results hold in alternative (unreported) specifications when we include industry fixed effects but no bank fixed effects (bank, industry, and year fixed effects would absorb most variation in industry specialization).

Columns (1) – (3) consistently show that banks more specialized in the firm's industry are more likely to grant the loan bilaterally than in a syndicate. All effects are statistically significant at the 1 percent level and economically meaningful. In column (3), our preferred specification that 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 0.6 percentage points or 15 percent decrease in the probability of the loan to get syndicated. This result is in accordance with 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.[12]

Columns (4) and (5) show that the negative association between bank industry specialization and the probability for a loan to be syndicated gets 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 great expertise in an industry, while for large loans to be granted 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.

The negative association between a bank's choice to syndicate and bank industry specialization is weakened by the bank's ability to absorb risk, as measured by its capital ratio and shown in columns (6) and (7). In both columns, the coefficient for the interaction term is significant at the 1 percent level. Column (7), which uses additional bank controls, shows that for a bank with a capital ratio of 23.7 percent (75th percentile of the distribution of capital ratios across all observations), the coefficient of the bank industry specialization is -0.026 while for a bank with a capital ratio of 17.1 (25th percentile), the coefficient of bank industry specialization is -0.112. For these banks, a one standard deviation increase in their industry specialization is associated with a 60 percent decrease in their likelihood to syndicate a loan. 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.

[12]This paper approximates but does not observe bilateral lending and borrowing.

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 loans bilaterally or in a syndicate. We interpret these measures as a bank's ability to take risks and find that the higher that ability the more likely they are to extend loans bilaterally. However, a bank's ability to take risks implies a crucial role for loan risk itself. In this section, we analyze the role of loan risk and its interaction with other loan and bank characteristics in the bank's decision to grant a loan bilaterally or in a syndicate.

Loan risk is directly linked to the firm's risk of default. Banks that are in a lending relationship with a firm report their estimates of firm probability of default in AnaCredit. Our measure of firm risk risk of default is the simple average of probability of default estimates across all banks with which the firm is in a lending relationship. In line with the previous results, we hypothesize that loans to firms with a higher probability of default are more likely to be syndicated. This should be especially true for larger loans and banks with a lower capital ratio to absorb the risk. Furthermore, we expect bank industry specialization to mute the role of a firm's probability of default.

Table 4 presents the results. 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) and (2) feature the firm probability of default without interaction terms; column (2) includes bank fixed effects while column (1) does not. Both columns show a strongly positive and significant association between the firm probability of default and the bank's choice to syndicate. Our more tightly controlled specification with bank fixed effects in column (2) suggests that a one standard deviation increase in firm probability of default, which equals around one percentage point, is associated with an increase in the probability of the bank syndicating the loan of 0.7 percentage points or 17 percent. These results reinforce the previous ones and suggest that the firms that borrow from syndicates are not the safest ones that have built a reputation by borrowing bilaterally. Instead, banks syndicate out the risky loans while granting the safe ones bilaterally.

Next, we qualify this effect by interacting it with loan and bank characteristics. The interaction coefficients in columns (3) and (4) of Table 4 show that the firm probability of default

matters more for banks' decisions to syndicate a loan the larger the loan amount. Column (3) features no bank fixed effects, while column (4) does. The latter shows that for loans with amounts of 5 million euros, the coefficient on the firm probability of default equals 0.5. In comparison, for loans with amounts of 300 million euro, the coefficient equals 3.1. Accordingly, for a firm with a funding request of 300 million euros, an increase in its probability of default of one standard deviation is associated with an increase in the probability that the bank syndicates the loan of 80 percent. This confirms the intuitive hypothesis that banks syndicate large loans to risky firms and grant loans to safe firms (small or large loans) bilaterally.

In columns (5) and (6), we interact the firm probability of default with bank capital ratio. The specification in column (6) controls for the natural logarithm of bank operating revenue and profits in addition to the controls in column (5). Both columns show that the firm probability of default matters more for lower-capitalized banks than higher-capitalized banks. According to these results and all else equal, the coefficient on the firm probability of default is 1.4 for banks with low capital ratios of 17.1 (25th percentile), implying that for these firms, a one standard deviation increase in their probability of default increases the likelihood of syndication by 36 percent (recall that the likelihood is 17 percent for the average bank). These results suggest that higher-capitalized banks can accommodate risky firms bilaterally while lower-capitalized banks limit their exposure to risky firms by syndicating loans.

Columns (7) and (8) present the interaction of firm probability of default and bank industry specialization. We again choose not to control for the relative size of an industry, which would require industry fixed effects, but measure industry specialization at the within-bank level. Both interaction coefficients are negative and highly statistically significant. This implies that banks specializing in an industry can accommodate riskier firms bilaterally. To exclude the possibility that all these results are driven by the probability of default estimates of the bank that grants the loan, which might be endogenous to whether the loan gets syndicated, specifications in Table A1 of the Appendix use the probability of default estimates of all banks except the bank that grants the loan under consideration. The results presented in Table A1 are qualitatively similar to those in Table 4.

The specifications in Table 4 and in the robustness Table A1 use as a measure for the firm risk the probability of default as assigned by the banks that the firm is in a (bilateral) credit relationship with. As a more exogenous measure of loan risk, specifications reported in Table A2 in the Appendix use a dummy variable that indicates if a firm was overdue on their loan payments during the six months before borrowing a loan.[13] On average, 47 percent of firms whose loans get syndicated were overdue on some of their loan payments, while 40 percent of firms whose loans do not get syndicated were overdue during the six months before borrowing. Using this measure for firm risk confirms the findings presented in Tables 4 and A1.

This section concludes the investigation of the determinants of the extensive margin, that is, whether banks grant loans bilaterally or in a syndicate. All three sections consistently show that banks are more likely to syndicate loans the lower their ability to take risk and the higher the loan risk.

3.4 Lead share

In this section, we investigate the intensive margin of the syndication process, that is, the share of the loan that the bank retains. We show that risk considerations determine whether the loan gets syndicated and how much of the loan is retained. 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, 10th, and 90th percentile are 5, 2, and 13, respectively. The average share that the lead arranger under consideration retains is 27 percent, and the median, 10th, and 90th percentile are 23 percent, 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 the determinants of the lead share, we run regression (1) with the share retained by the lead arranger as the dependent variable and a bank's capital ratio, its industry specialization, and the firm probability of default as the main independent variables. We always control for the natural logarithm of the loan amount, the firm size, and country and year

[13] Plosser and João AC Santos (2014) show that some low-capital banks improve their regulatory ratios by biasing their internal risk estimates.

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.

In columns (1) and (2) of Table 5, we feature the capital ratio without (column (1)) and with (column (2)) additional bank controls. Before, we showed that the lower the capital ratio, the more likely the loan would be syndicated. In line with that, results in columns (1) and (2) show that the lower the capital ratio, the lower the share of the loan that the bank retains. A one standard deviation decrease in a bank's capital ratio is associated with a 3.8 percentage point decrease in the share that the bank retains or 18 percent of its standard deviation.

Columns (3) and (4) of Table 5 show that the more specialized a bank is in the firm's industry, the higher the share it retains. Column (4) features bank fixed effects while column (3) does not; both do not use industry fixed effects to measure the bank specialization at the bank level and not the industry level. According to column (4), a one standard deviation increase in bank industry specialization (out of the banks that act as lead arrangers for syndicated loans), 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 0.15, is associated with an increase in the share retained by the lead arranger of 1.6 percentage points or 8 percent of the lead share's standard deviation.

Finally, columns (5) and (6) of Table 5 feature the firm probability of default as the main explanatory variable. Both columns show that a higher probability of default is associated with a smaller share retained by the lead arranger. A one standard deviation increase in a firm's probability of default is associated with a decrease in the bank's loan share of 1.3 percentage points or 6 percent of its standard deviation.

Blickle, Parlatore, and Saunders (2023) report that in the U.S., many lead arrangers sell their entire shares shortly after syndication. Loan sales might bias our results if they are correlated with the share retained at loan initiation and banks' risk considerations. AnaCredit includes syndicated loans and has a panel structure, allowing us to account for loan sales. 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 in the Appendix and largely confirm the

results presented here.

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. 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 64 basis points larger than that on comparable bilateral loans. It is also more sensitive to loan risk than the loan spread on bilateral loans.

The specification we test is

$$\begin{aligned} \textit{loan spread}_{ifbjct} =& \beta_0 + \beta_1 \textit{loan is syndicated}_{ifbjct} * \textit{loan risk}_{ifbjct} + \\ & \gamma X_{ifbjct} + \eta_b + \theta_j + \phi_c + \delta_t + \epsilon_{ifbjct}. \end{aligned} \tag{2}$$

Our outcome variable is the loan spread, which is measured in basis points over the Euribor reference rate. We control for Euribor maturities with reference rate fixed effects. Explanatory variables are an indicator variable that equals one if the loan is syndicated and zero otherwise, as well as the firm probability of default to proxy loan risk. We also control for the natural logarithm of the loan's maturity in days, whether it is secured, its amount, firm size, and country, industry, and year fixed effects. In columns (5), (6), and (7) of Table 6, we additionally control for the seniority and callability of the loan. Columns (2), (4), and (6) feature bank fixed effects. Standard errors are clustered at the country-industry level.

In columns (1) and (2) of Table 6, the dummy variable that indicates if a loan is syndicated is shown together with control variables but without a firm's probability of default. Our preferred specification with bank fixed effects (column (2)) shows that conditional on controls, the spread on the average syndicated loan is 78 basis points higher than the spread on the average bilateral loan. Controlling for the a firm's probability of default as done in columns (3) and (4) shrinks the average difference between both loan types to 66 basis points (column (4)). Unsurprisingly, a firm's probability of default itself is very strongly and posi-

tively 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. In column (5), we additionally control for loan seniority and callability. Sub-ordinate debt is equally uncommon for syndicated loans as it is 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. As such, the results remain essentially the same; the syndicated loan spread is 64 basis points higher than that on bilateral credit.

To understand the sensitivity of the loan spread to a firm's probability of default as charged by syndicates compared to bilateral lenders, we interact the syndicated loan indicator with the probability of default and show the results in columns (6) and (7) of Table 6. Column (7) uses bank fixed effects in addition to the controls used in column (6). The results show a greater sensitivity of the loan spread to the firm probability of default when the loan is syndicated than when it is granted bilaterally. In particular, an increase in the probability of default 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 as much as 34 when the loan is syndicated. This shows that syndicates are willing to accommodate risky firms but price their risk more sensitively than had the loan not been syndicated.

4 Robustness

In the data section, we show the distribution of loan amounts of bilateral loans compared to 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 to 100 million euros. Nevertheless, it might be that some of our results are driven by the tails of the distribution where our sample is unbalanced. Indeed, in the loan amount bucket of 5 to 100 million 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 that carry amounts between 100 and 700 million euros. In this category, we have 3,178 bilateral loans and 1,764 syndicated loans.

4.1 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 syndicated ($= 1$) as the dependent variable. First, we consider bank capital ratio, bank industry specialization, and the interaction of the two as the main independent variables, but not their interaction with loan size since our sub-sample was 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 bank capital ratio is not the main independent variable, it is also controlled for.

Table 7 shows the results. Columns (1) and (2) feature the bank capital ratio as the main independent variable while controlling for industry fixed effects. Column (2) uses additional bank controls. Both columns confirm the results of Table 2 of 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 results for the entire sample (-0.036 compared to -0.008). This is natural since we only consider large loans for which the bank's ability to take risks matters more.

Columns (3) and (4) show the association between syndication and bank industry specialization. Column (4) uses bank fixed effects, while neither column features industry fixed effects. Again, we confirm the 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 results of the entire sample presented in Table 3 (-0.108 compared to -0.028), while the result in column (4) loses slightly in significance.

Finally, in columns (5) and (6), we interact bank capital ratio with bank industry specialization to find that capital ratio matters less in bank decisions to syndicate the more specialized they are, confirming results on the entire sample. Neither column uses bank fixed effects, but column (6) uses additional bank controls. The results are again much larger in

size (0.060 compared to 0.013) and equally significant than what was presented in Table 3 for the entire sample.

4.2 Firm probability of default

What about loan risk? Our second robustness test again considers the syndication choice as the dependent variable and, as the main independent variable, the probability of firms' default in our more balanced sub-sample. We use the same control variables as in Table 7.

Columns (1) and (2) of Table 8 use the firm probability of default without interaction; column (2) features bank fixed effects. Again, the results align with the results of the entire sample presented in Table 4 with much larger coefficients (4.731 compared to 1.103) and significance at the 1 percent level.

Loan risk becomes more important for the syndication choice the lower the bank capital ratio. This finding from Table 4 on the entire sample is confirmed in columns (3) and (4) on the sub-sample, where column (4) uses additional bank controls. The coefficient on the interaction term is again much larger in the sub-sample compared to the entire sample (-1.288 compared to -0.298), following the intuition that these forces matter more for larger loans (between 100 and 700 million euros).

Finally, loan risk loses relevance for the bank's syndication choice the more highly specialized the bank is, as can be seen in columns (5) and (6). The effect loses slightly in significance but goes up in magnitude compared to the results presented in Table 4 of the entire sample (-14.763 compared to -2.547).

Our robustness check confirms that it is not loans in the tails of the loan amount distribution that drive the determinants of syndication choice. Instead, all results presented here have gained significantly in magnitude, confirming that what holds for all loans also holds for loans between 100 and 700 million euros, a range that sees a similar number of bilateral and syndicated loans.

5 Bank credit, syndicated lending, and the bond market

Syndicated loans have the features of bilateral loans and public debt. The previous sections have demonstrated that, despite these similarities, theories according to which the most reputable firms graduate from bank lending to the public debt market do not apply to syndicated loan borrowers. This section qualifies our argument by comparing bilateral and syndicated loan borrowers to bond issuers. We provide descriptive evidence that syndicated loans are indeed a sidetrack in a firm's graduation from bilateral loans to public debt.

In particular, we identify 81 firms that issue a bond above 5 million euros for the first time.[14] All 81 firms graduate from bilateral bank borrowing to the bond market; that is, all firms have bilateral bank loans outstanding at the time of 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. 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. In other words, borrowers with a syndicated loan outstanding are not more likely to graduate to the bond market than borrowers with a large bilateral loan outstanding.

Next, we compare the firm 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' probability of default and their median for the three groups of firms. The top graph does so for firms that take up debt amounts up to 100 million euros, the middle graph for debt amounts between 100 and 200 million euros, and the bottom graph for debt amounts above 200 million euros. For all debt amounts, the median firm probability of default 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). Bond issuers' median probability of default 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). Generally, the higher the loan amount, the safer the firms are, regardless of debt type.

The low number of firms that graduate from syndicated loans to public debt and the

[14] 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)).

observation that syndicated loan borrowers are much riskier than bilateral loan borrowers and bond issuers suggest that syndicated loans do not lay between bilateral loans and public debt in terms of firms' lending cycle. 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 at the bank, firm, and loan level. We achieve this by combining the ECB's credit registry AnaCredit and LSEG's DealScan data set. This gives us an overview of firm and bank activity on both credit markets and a complete picture of the firm bilateral funding structure.

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 gone to the syndicated loan market does not increase the likelihood of a firm issuing a bond for the first time.

Additionally, 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

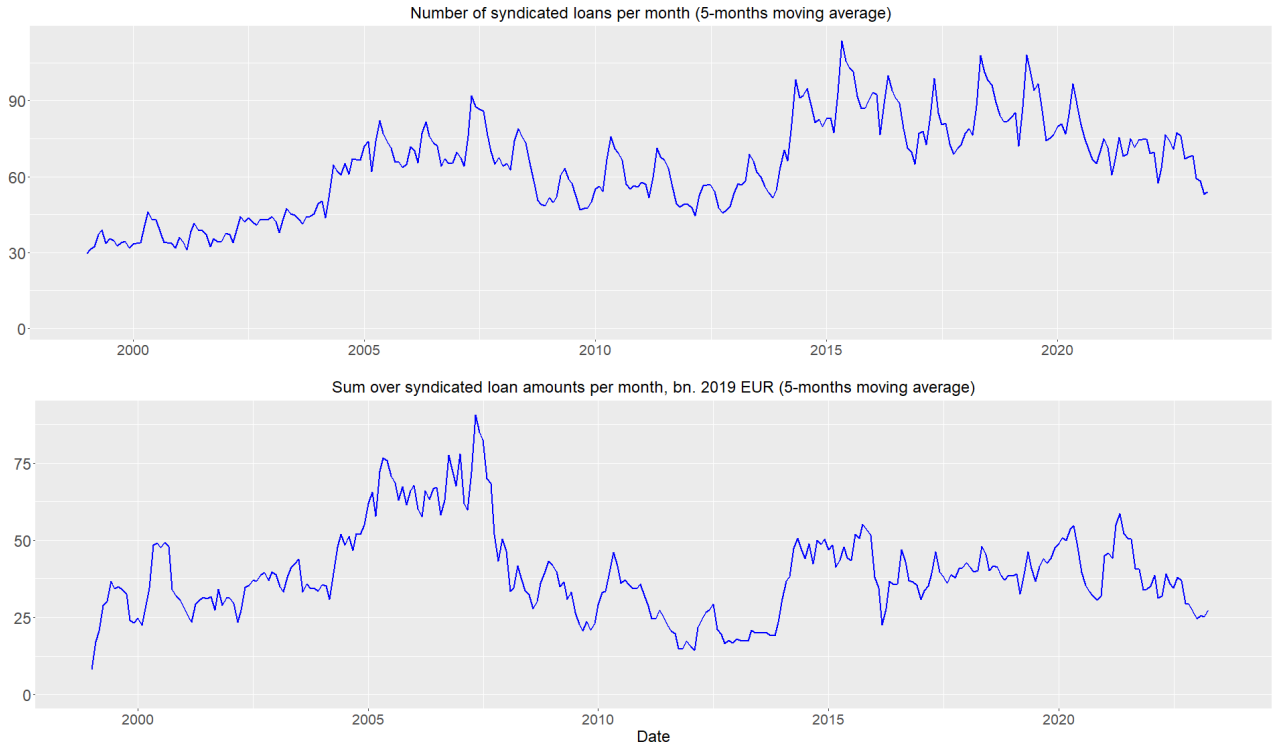

Figure 1: **Number and amount of syndicated loans per month, 1999-2023.** This figure shows the 5-month moving average of the number of syndicated loans (top) and the sum of syndicated loan amounts (bottom) per month from 1999 (introduction of the euro) until 2023 for euro area syndicated loan borrowers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

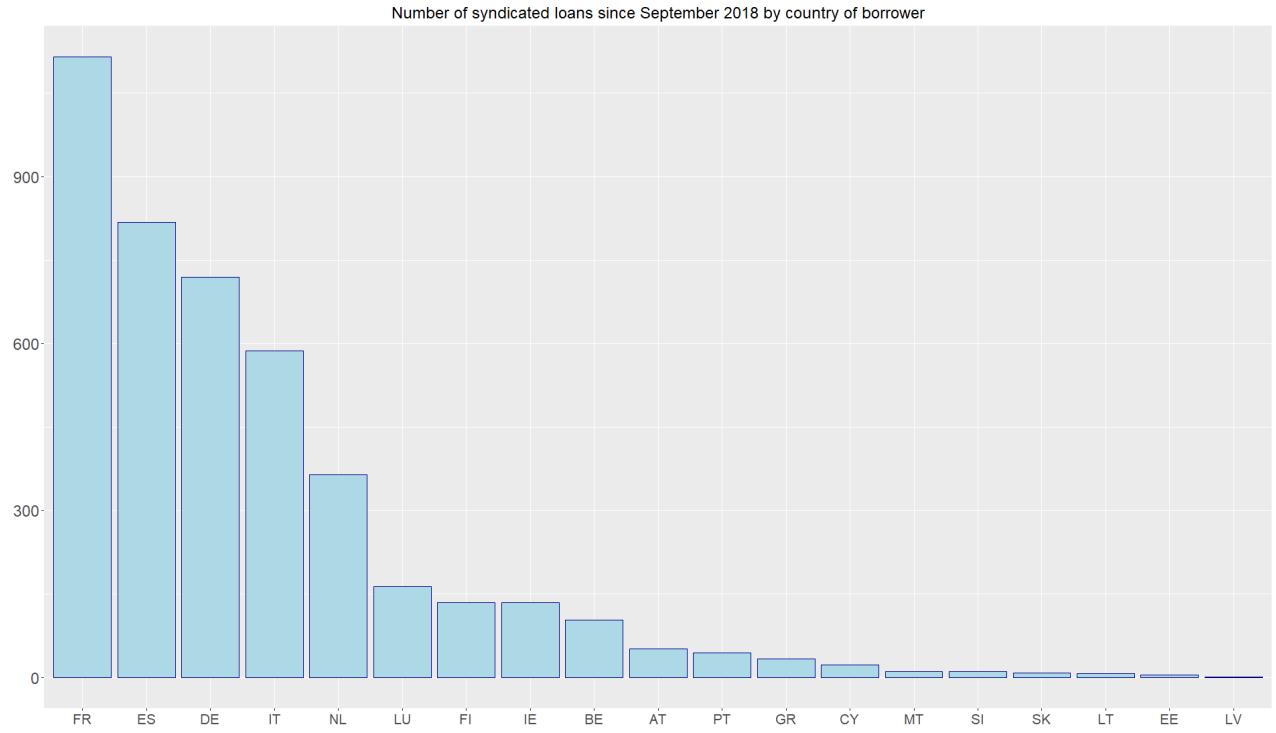

Figure 2: **Total number of syndicated loans per country, September 2018 – June 2023.** This figure shows the total number of syndicated loans between September 2018 and July 2023 by the country of the borrower.

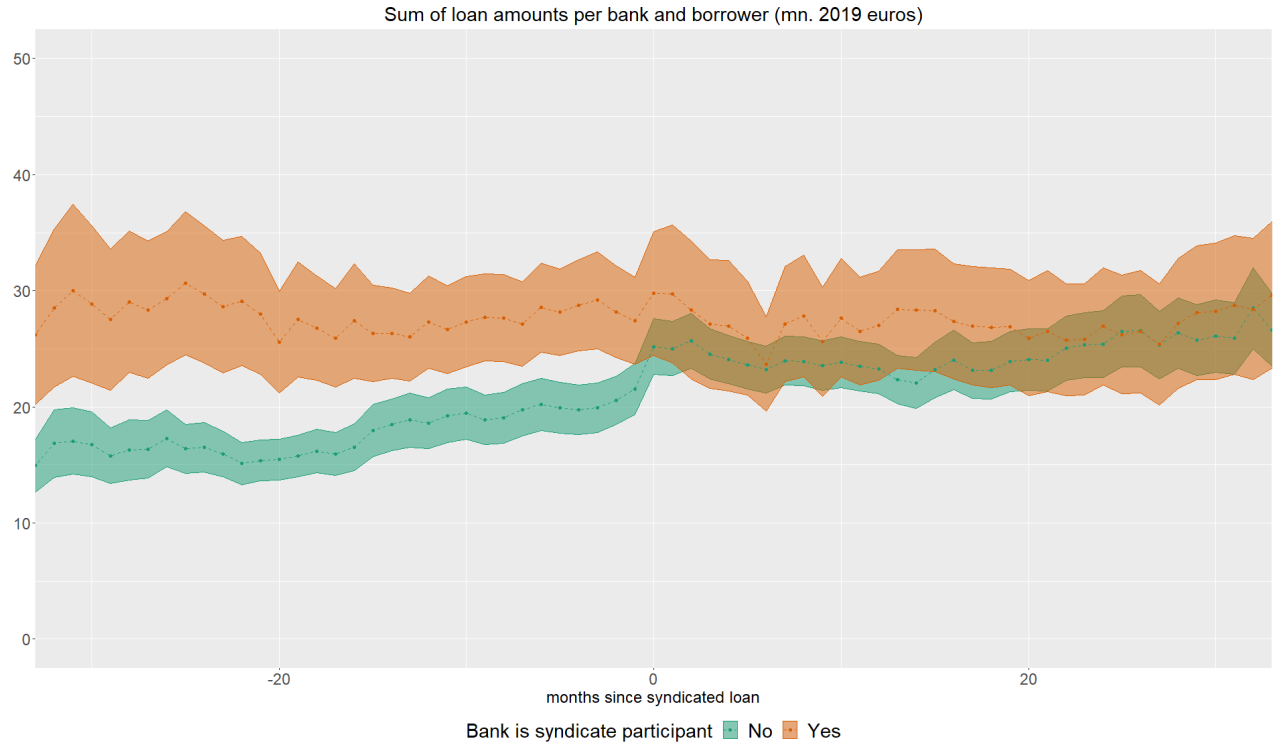

Figure 3: **Banks' average total exposure to syndicated loan borrowers.** This figure shows on the y-axis the mean and the 95 percent confidence interval of the sum of loan amounts that banks lend to syndicated loan borrowers via bilateral loans. The x-axis shows the months before (left) and after (right) 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 around the issuance date of the syndicated loan so as not to pick up the syndicated loan itself by mistake.

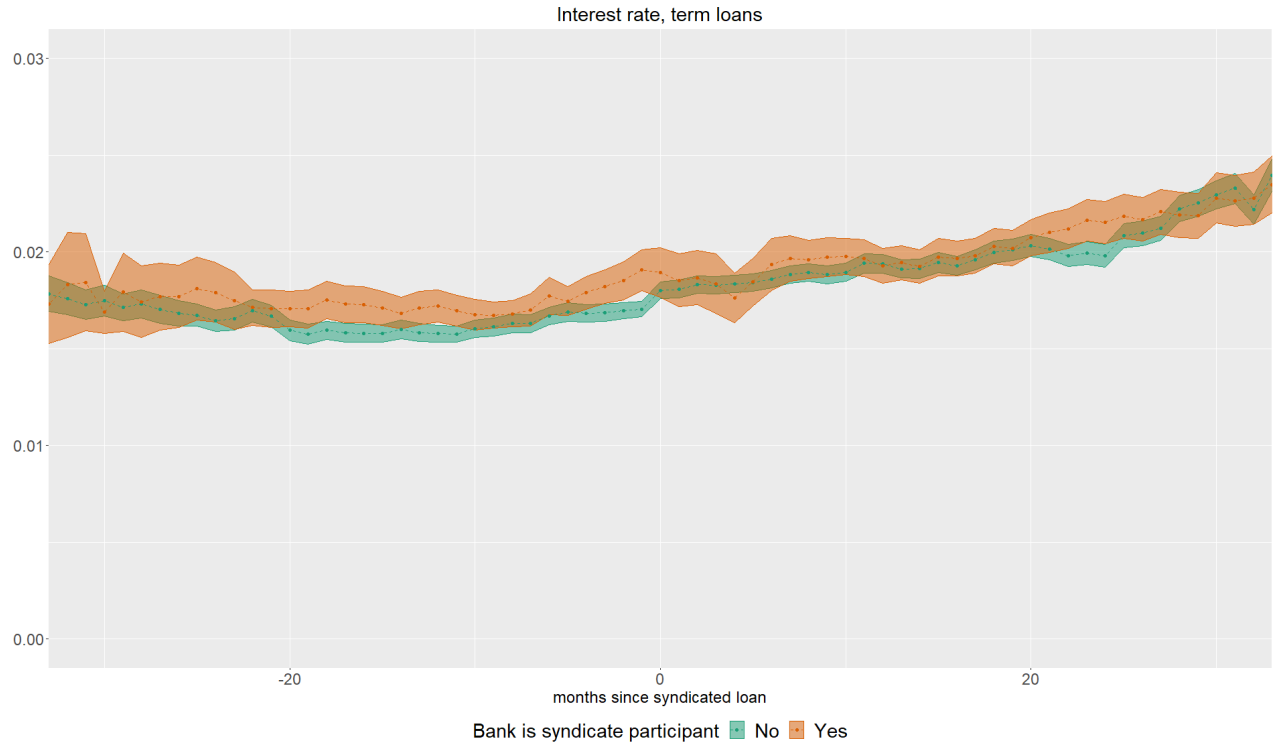

Figure 4: **Interest rates on bilateral loans to syndicated loan borrowers.** This figure shows on the y-axis the mean and the 95 percent confidence interval of the annualized interest rate banks charge to syndicated loan borrowers on bilateral loans. The x-axis shows the months before (left) and after (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 around the issuance date of the syndicated loan so as not to pick up the syndicated loan itself by mistake.

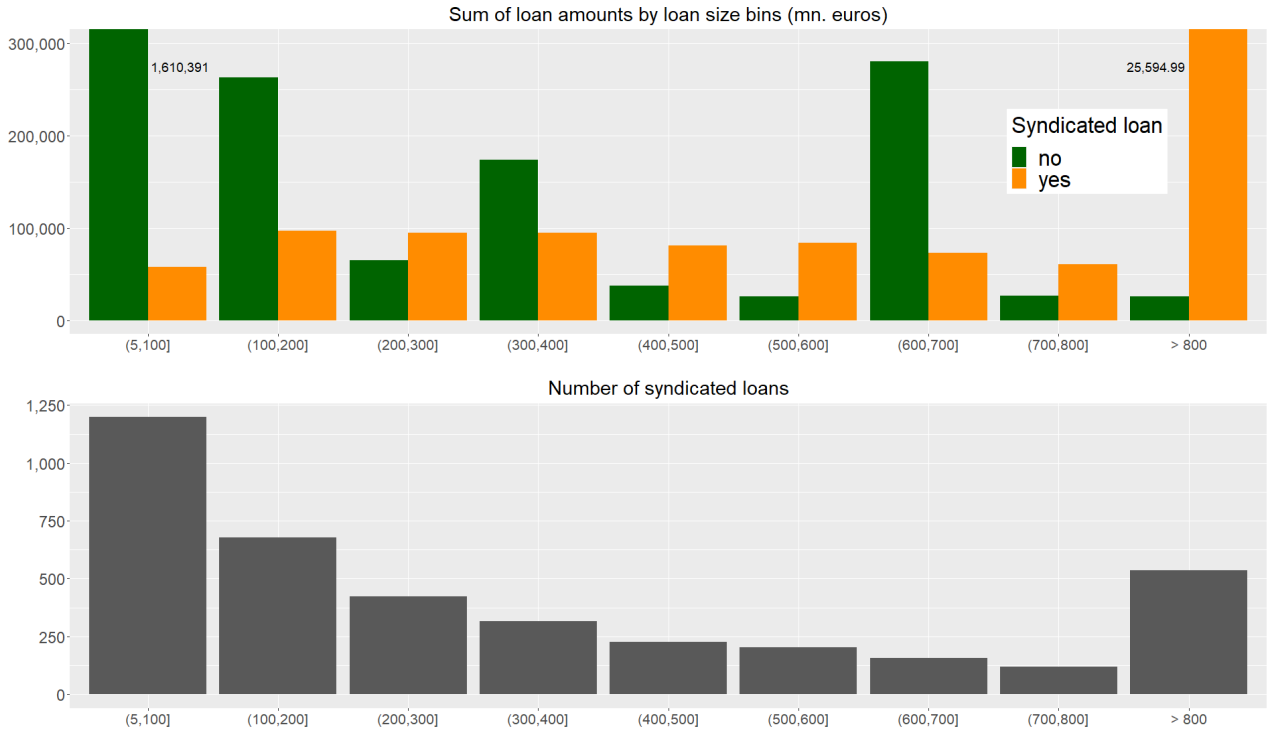

Figure 5: **Loan size of syndicated loans compared to bilateral loans.** This figure shows the sum of syndicated loan amounts and the sum of bilateral loan amounts in million euros by 100 million euros bins (top) and the number of syndicated loans in the respective bin (bottom). The first bin starts at 5 million euros. Our sample period goes from September 2018 until June 2023.

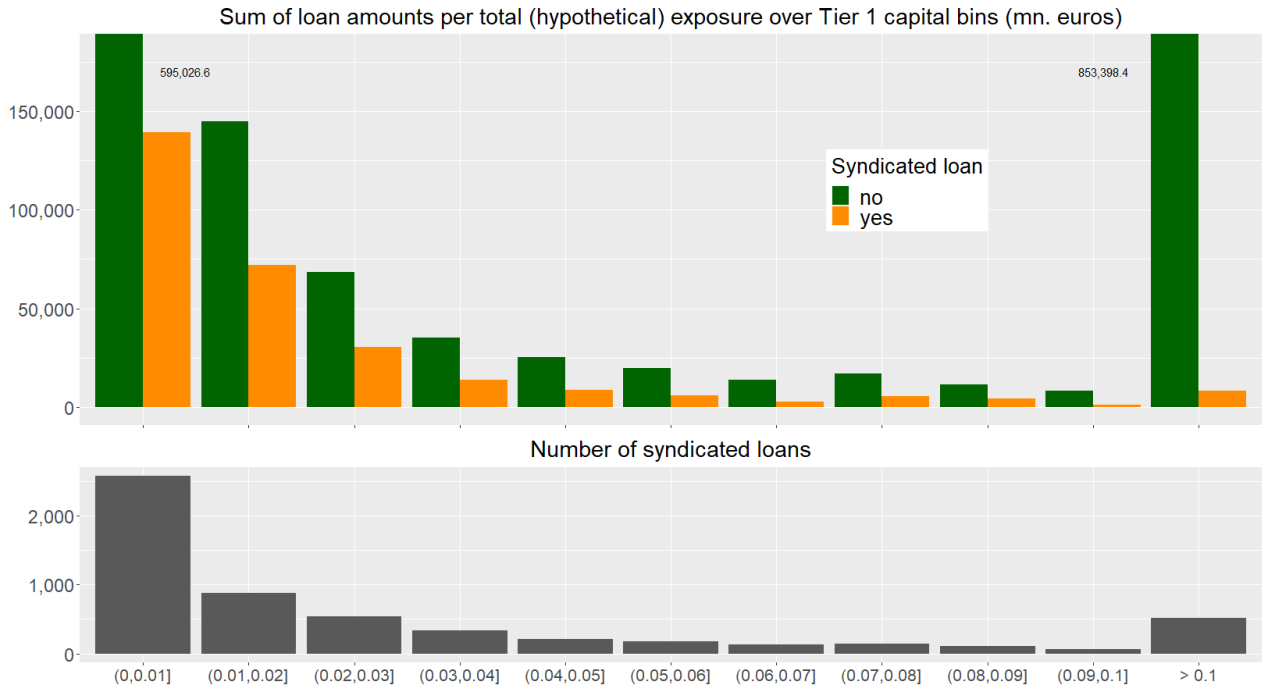

Figure 6: **Banks' total borrower exposure when they grant bilateral or syndicated loans.** This figure shows banks' total exposure to a borrower by loan type and bins of total exposure over their Tier 1 capital in the top graph and the number of syndicated loans by the same bins in the bottom graph. 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. Our sample period goes from September 2018 until June 2023.

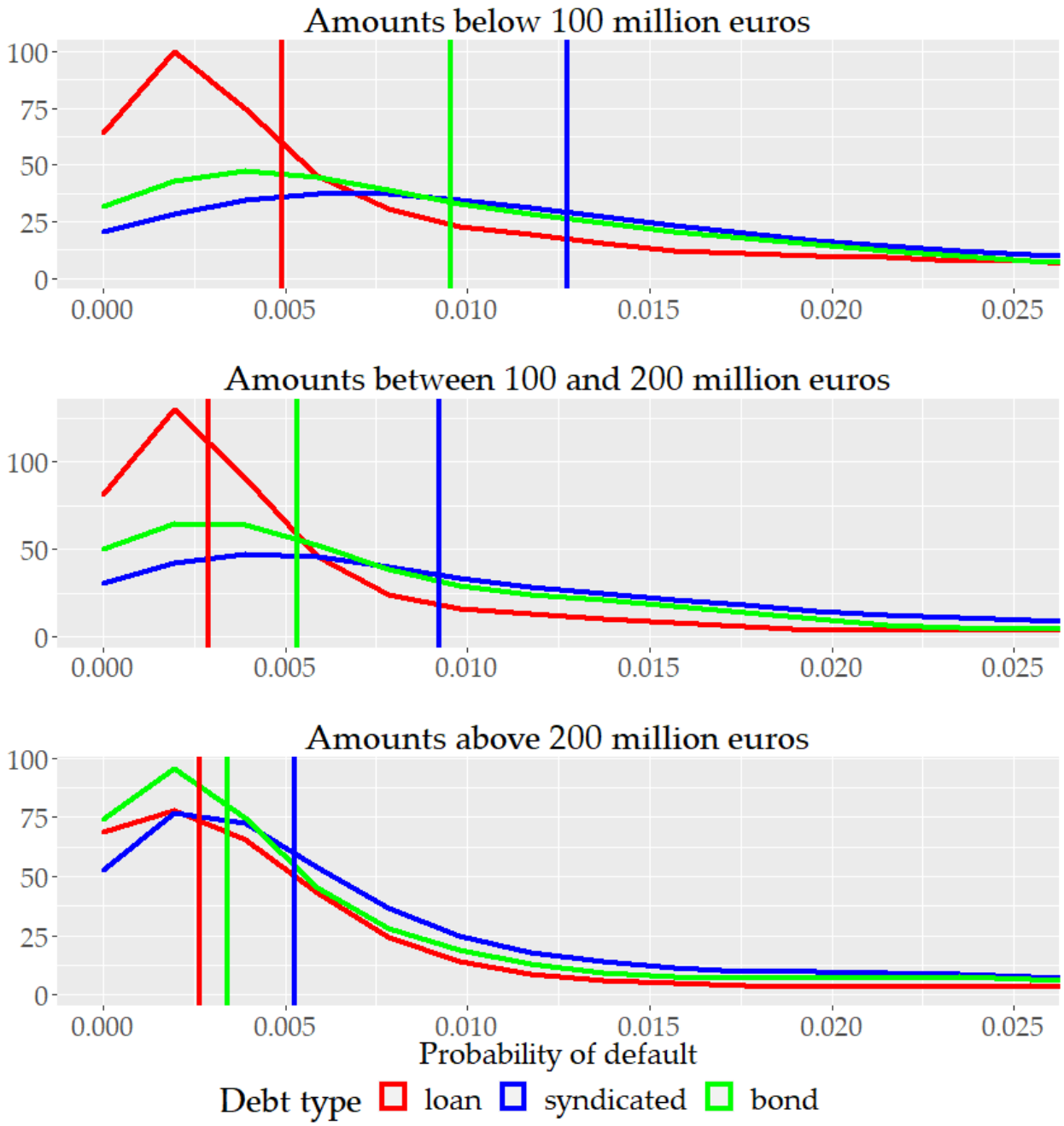

Figure 7: **Firm default probabilities - distribution**. This figure shows the densities of the probability of default estimates and its median of firms that borrow loans from banks (in red), syndicated loans (in blue), and bonds (in green). All debt types carry amounts of at least 5 million euros. As a measure for firms' probabilities of default, we take a simple average over all relationship banks' probability of default 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 of this table, winsorized above at the 98 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 independent 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:			
	Loan is syndicated			
	(1)	(2)	(3)	(4)
bank capital ratio	-0.009^{***}	-0.008^{***}	0.019^{***}	0.019^{***}
	(0.0002)	(0.0002)	(0.0004)	(0.0004)
bank capital ratio * log loan deal amount			-0.008^{***}	-0.008^{***}
			(0.0001)	(0.0001)
log loan deal amount	0.089^{***}	0.085^{***}	0.273^{***}	0.269^{***}
	(0.001)	(0.001)	(0.004)	(0.004)
Bank and firm size	Yes	Yes	Yes	Yes
Country, industry, year FE	Yes	Yes	Yes	Yes
Bank profit and revenue	No	Yes	No	Yes
Observations	66,956	62,079	66,956	62,079
Adjusted R^2	0.346	0.336	0.416	0.407
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 independent 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:						
	Loan is syndicated						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
bank' industry specialization	-0.062^{***}	-0.015^{***}	-0.028^{***}	0.210^{***}	0.196^{***}	-0.184^{***}	-0.334^{***}
	(0.005)	(0.003)	(0.005)	(0.017)	(0.015)	(0.009)	(0.012)
bank' industry specialization * log loan deal amount				-0.093^{***}	-0.082^{***}		
				(0.008)	(0.007)		
bank' industry specialization * bank capital ratio						0.009^{***}	0.013^{***}
						(0.0004)	(0.001)
log loan deal amount	0.085^{***}	0.082^{***}	0.097^{***}	0.093^{***}	0.108^{***}	0.082^{***}	0.083^{***}
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
capital ratio	-0.008^{***}	-0.010^{***}	0.0002	-0.010^{***}	-0.00004	-0.011^{***}	-0.009^{***}
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Bank and firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	No	No	No	No
Bank FE	No	No	Yes	No	Yes	No	No
Bank profit and revenue	No	No	No	No	No	No	Yes
Observations	63,998	63,998	63,998	63,998	63,998	63,998	59,287
Adjusted R^2	0.279	0.253	0.438	0.261	0.443	0.255	0.269
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 independent variable. Firm PD is measured as the simple average over 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:							
	Loan is syndicated							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
firm PD	0.678***	1.103***	0.426	−0.510*	6.458***	6.488***	1.268***	1.593***
	(0.111)	(0.104)	(0.335)	(0.292)	(0.424)	(0.433)	(0.135)	(0.128)
firm PD * log loan deal amount			0.097	0.629***				
			(0.155)	(0.138)				
firm PD * bank capital ratio					−0.289***	−0.298***		
					(0.019)	(0.019)		
firm PD * bank industry specialization							−2.076***	−2.547***
							(0.354)	(0.349)
log loan deal amount	0.119***	0.126***	0.118***	0.120***	0.120***	0.117***	0.113***	0.125***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
bank capital ratio	−0.006***	0.002***	−0.006***	0.002***	−0.004***	−0.003***	−0.007***	0.001***
	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0004)
bank industry specialization							−0.008	−0.007
							(0.006)	(0.008)
Bank and firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	No	Yes	No	No	No	Yes
Bank profit and revenue	No	No	No	No	No	Yes	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Observations	32,559	32,559	32,559	32,559	32,559	29,533	31,630	31,630
Adjusted R^2	0.434	0.565	0.434	0.566	0.438	0.427	0.345	0.481

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 and control variables. The bank under consideration is the main lead arranger in case of multiple. Bank industry specialization is the ratio of loan amounts to a certain industry over the bank's total loan portfolio. A firm's probability of default (PD) is measured as the simple average over 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 country and industry level of the borrowing firm.

	Dependent variable:					
	Lead share retained					
	(1)	(2)	(3)	(4)	(5)	(6)
bank capital ratio	0.006***	0.006***	0.005**	0.004	0.007***	0.003
	(0.002)	(0.002)	(0.002)	(0.006)	(0.002)	(0.006)
bank industry specialization			0.126**	0.107*		
			(0.053)	(0.058)		
firm PD					−1.251**	−1.132*
					(0.614)	(0.592)
log loan deal amount	−0.059***	−0.059***	−0.055***	−0.056***	−0.059***	−0.066***
	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)
Firm size	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank profit and revenue	No	Yes	No	No	No	No
Bank FE	No	No	No	Yes	No	Yes
Industry FE	Yes	Yes	No	No	Yes	Yes
Observations	1,782	1,555	1,476	1,476	1,201	1,201
Adjusted R^2	0.148	0.148	0.132	0.191	0.139	0.213
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 6: Interest rate, firm risk, and syndication

This table shows the results of linear regressions of the loan spread in basis points on the firm probability of default, a dummy variable that equals one if the loan is syndicated, and control variables. Firm PD is measured as the simple average of the probability of default (PD) estimates of all banks with which the firm is in a credit relationship. If the loan is syndicated, bank fixed effects concern the main lead arranger in case of multiple. 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 country and industry level of the borrowing firm.

	Dependent variable:						
	Loan spread (bps)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
probability of default			2,045.894***	2,055.621***	2,020.445***	1,809.103***	1,889.648***
			(112.048)	(100.196)	(100.742)	(118.226)	(104.255)
loan is syndicated	86.151***	78.180***	74.353***	66.321***	63.732***	50.390***	49.830***
	(3.978)	(4.466)	(5.032)	(5.354)	(5.213)	(6.356)	(6.474)
probability of default * loan is syndicated						1,746.816***	1,163.108***
						(353.931)	(348.492)
log maturity in days	0.008	0.870	1.300	5.272***	5.157***	1.006	5.142***
	(0.663)	(0.669)	(0.906)	(0.929)	(0.938)	(0.916)	(0.939)
secured	17.829***	16.629***	11.734***	13.816***	12.277***	10.337***	12.375***
	(1.582)	(1.463)	(2.196)	(1.996)	(1.995)	(2.201)	(1.994)
Country, industry, year, reference rate FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	No	Yes	Yes	No	Yes
Callability and priority	No	No	No	No	Yes	Yes	Yes
log loan amount and firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,298	20,226	10,006	9,964	9,746	9,780	9,746
Adjusted R^2	0.266	0.504	0.260	0.497	0.495	0.253	0.496
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 independent 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 case of multiple. 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:					
	Loan is syndicated					
	(1)	(2)	(3)	(4)	(5)	(6)
bank capital ratio	-0.035^{***}	-0.036^{***}	-0.044^{***}	-0.005	-0.051^{***}	-0.050^{***}
	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)
bank industry specialization			-0.214^{***}	-0.108^{*}	-1.495^{***}	-1.583^{***}
			(0.063)	(0.055)	(0.181)	(0.201)
bank capital ratio * bank industry specialization					0.059^{***}	0.060^{***}
					(0.006)	(0.007)
log loan amount	0.169^{***}	0.155^{***}	0.160^{***}	0.110^{***}	0.177^{***}	0.162^{***}
	(0.013)	(0.013)	(0.011)	(0.010)	(0.011)	(0.012)
Bank and firm size	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	No	No	No
Bank FE	No	Yes	No	Yes	No	No
Bank profit and revenue	No	No	No	No	No	Yes
Observations	3,840	3,580	3,578	3,578	3,578	3,354
Adjusted R^2	0.622	0.641	0.533	0.724	0.542	0.548
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 independent 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 case of multiple. Firm PD is measured as the simple average over 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:					
	Loan is syndicated					
	(1)	(2)	(3)	(4)	(5)	(6)
firm PD	4.254***	4.731***	27.712***	28.224***	8.802***	7.912***
	(1.178)	(1.048)	(5.672)	(5.939)	(1.575)	(1.367)
firm PD * bank capital ratio			−1.225***	−1.288***		
			(0.294)	(0.308)		
firm PD * bank industry specialization					−23.985***	−14.763*
					(8.880)	(7.542)
bank capital ratio	−0.015***	0.011*	−0.004	−0.006	−0.028***	0.011*
	(0.004)	(0.006)	(0.004)	(0.005)	(0.004)	(0.007)
bank industry specialization					−0.088	−0.035
					(0.113)	(0.122)
log deal amount	0.246***	0.219***	0.254***	0.245***	0.305***	0.265***
	(0.020)	(0.021)	(0.021)	(0.023)	(0.022)	(0.022)
Bank and firm size	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	No	No	No	Yes
Bank profit and revenue	No	No	No	Yes	No	No
Industry FE	Yes	Yes	Yes	Yes	No	No
Observations	1,233	1,233	1,233	1,056	1,062	1,062
Adjusted R^2	0.389	0.599	0.401	0.390	0.302	0.546
Note:						*p<0.1; **p<0.05; ***p<0.01

Appendix

Table A1: Robustness: 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 independent variable. Firm PD is measured as the simple average over 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:							
	Loan is syndicated							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
firm PD (other banks)	0.450***	0.886***	1.412***	0.646	5.142***	5.022***	0.914***	1.288***
	(0.133)	(0.123)	(0.465)	(0.408)	(0.475)	(0.487)	(0.157)	(0.152)
firm PD (other banks) * log loan deal amount			−0.350*	0.088				
			(0.197)	(0.176)				
firm PD (other banks) * bank capital ratio					−0.238***	−0.238***		
					(0.022)	(0.022)		
firm PD (other banks) * bank industry specialization							−1.934***	−2.105***
							(0.409)	(0.370)
log loan deal amount	0.143***	0.139***	0.146***	0.139***	0.144***	0.141***	0.138***	0.139***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
bank capital ratio	−0.006***	0.002***	−0.006***	0.002***	−0.004***	−0.003***	−0.007***	0.002***
	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0003)	(0.0003)	(0.0002)	(0.0004)
bank industry specialization							−0.004	−0.013
							(0.008)	(0.010)
Bank and firm size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	No	Yes	No	No	No	Yes
Bank profit and revenue	No	No	No	No	No	Yes	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Observations	24,462	24,462	24,462	24,462	24,462	22,204	23,564	23,564
Adjusted R^2	0.481	0.603	0.482	0.603	0.484	0.470	0.402	0.526
Note:								*p<0.1; **p<0.05; ***p<0.01

Table A2: Robustness: 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 independent 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 case 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 country and industry level of the borrowing firm.

	Dependent variable:			
	Loan is syndicated			
	(1)	(2)	(3)	(4)
overdue (past 6 months)	0.004***	−0.025***	0.079***	0.006***
	(0.001)	(0.004)	(0.005)	(0.002)
overdue (past 6 months) * log loan deal amount		0.010***		
		(0.002)		
overdue (past 6 months) * bank capital ratio			−0.004***	
			(0.0002)	
overdue (past 6 months) * bank industry specialization				−0.008*
				(0.004)
log loan deal amount	0.099***	0.094***	0.086***	0.097***
	(0.002)	(0.002)	(0.001)	(0.002)
bank capital ratio	0.0005**	0.0005**	−0.006***	0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
bank industry specialization				−0.023***
				(0.005)
Bank and firm size	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	No	Yes
Bank profit and revenue	No	No	Yes	No
Industry FE	Yes	Yes	Yes	Yes
Observations	66,522	66,522	61,666	63,580
Adjusted R^2	0.519	0.520	0.338	0.437
Note:				*p<0.1; **p<0.05; ***p<0.01

Table A3: Robustness: 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 bank 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 case of multiple. 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 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 country and industry level of the borrowing firm.

	Dependent variable:					
	Lead share retained (6 months after syndication)					
	(1)	(2)	(3)	(4)	(5)	(6)
bank capital ratio	0.004**	0.004*	0.004	0.007	0.004**	0.006
	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)	(0.005)
bank industry specialization			0.186***	0.157***		
			(0.052)	(0.053)		
firm PD					−0.682	−0.765
					(0.576)	(0.574)
log loan deal amount	−0.058***	−0.059***	−0.054***	−0.054***	−0.056***	−0.060***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Firm size	Yes	Yes	Yes	Yes	Yes	Yes
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank profit and revenue	No	Yes	No	No	No	No
Bank FE	No	No	No	Yes	No	Yes
Industry FE	Yes	Yes	No	No	Yes	Yes
Observations	1,616	1,414	1,357	1,357	1,109	1,109
Adjusted R^2	0.140	0.140	0.131	0.176	0.145	0.228
Note:						*p<0.1; **p<0.05; ***p<0.01