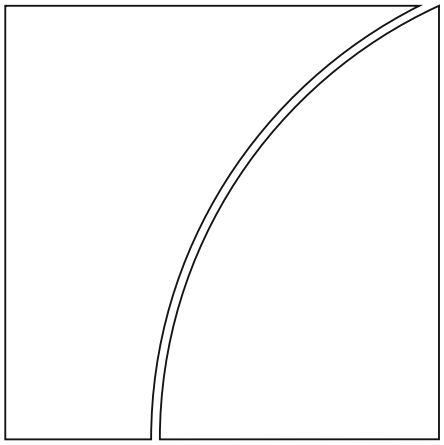

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by Iñaki Aldasoro, Sebastian Doerr and Haonan Zhou

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February 2023

JEL classification: F34, G01, G21, G23.

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Non-bank lending during crises

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Abstract

This paper shows that non-banks curtail their syndicated credit by significantly more than banks during crises, even after accounting for time-varying lender and borrower characteristics. We provide novel evidence that differences in the value of lending relationships explain most of the gap: unlike for banks, relationships with non-banks – whether measured by duration or intensity – do not improve borrowers' access to credit during crises. The rise of non-banks could therefore lead to a shift from relationship towards transaction lending and exacerbate the repercussions of financial crises.

JEL Codes: F34, G01, G21, G23.
Keywords: Non-banks, syndicated loans, financial crises, financial stability, relationship lending.

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1 Introduction

Since the Great Financial Crisis of 2007/08 non-bank financial institutions (non-banks) have steadily increased their global footprint. By now, they account for about half of the assets of the global financial system (Financial Stability Board, 2020).[1] The shift in financial intermediation from banks to non-banks has raised concerns about detrimental implications for credit supply, financial stability, and the real economy, especially during episodes of market turmoil (IMF, 2022). Recent studies provide insights into the role of non-banks in mitigating the effectiveness of monetary policy, emphasizing the importance of their funding models.[2] Much less is known about the behavior of global non-bank lending during crises. Moreover, while the literature has highlighted the crucial role of lending relationships with banks in alleviating borrowers' credit constraints during crises, whether relationships with non-banks benefit borrowers remains an open question.

Using global syndicated loan data, this paper provides novel evidence on non-bank lending and the role of lending relationships during financial crises. We establish that non-banks contract their syndicated lending by significantly more than banks during shocks in borrower countries. This lending gap persists when we condition on lender parent*time fixed effects that control for unobservable time-varying lender characteristics, including funding models. It also remains economically and statistically significant when we control for time-varying borrower characteristics. We then establish that accounting for the differences in the value of relationships – whether measured by duration or intensity – reduces the lending gap by over two-thirds. Further tests show that lending relationships with non-banks do not improve borrowers' access to credit during crises.

We use Thomson Reuters' Dealscan database on global syndicated loans to classify lenders into banks and non-banks. Around one-third of global syndicated lenders are non-banks. Their global presence has steadily increased since the early 1990s, and they originate about 20% of all new syndicated credit to non-financial firms today. We compute lenders' exposure to financial crises at the lender–borrower country–year level as the stock of outstanding loans extended by a lender to firms in a given crisis country over

[1] On the rise of non-bank credit and its drivers, see Buchak et al. (2018); Nelson et al. (2018); Fuster et al. (2019); Irani et al. (2020); Chernenko et al. (2019) and Gopal and Schnabl (2022).

[2] On non-banks and monetary policy, see Chen et al. (2018), Elliott et al. (2019), Xiao (2020), Cucic and Gorea (2021), Banerjee and Serena (2021), and Elliott et al. (2021), among others. For the U.S., Fleckenstein et al. (2021) document that non-bank lending is more sensitive than bank lending to movements in the excess bond premium.

the lender's total stock of outstanding syndicated loans. The measure reflects that some lenders are more exposed than others to the same financial crisis. Data on financial crises are obtained from Laeven and Valencia (2020).

We first establish that non-banks reduce their credit to non-financial firms by substantially more than banks when faced with a financial shock in the borrower country. We observe this 'lending gap' after controlling for unobservable time-varying lender heterogeneity through lender parent*year fixed effects. These fixed effects absorb differences in lenders' funding models, i.e., non-banks' stronger reliance on wholesale funding (Jiang et al., 2020; Xiao, 2020), which could contribute to greater cyclicality of global non-bank lending (Fleckenstein et al., 2021).[3] Specifically, we find that non-banks cut lending by about 50% more than banks.

Our analysis faces the common identification challenge that banks and non-banks lend to different borrowers. Indeed, we extend the findings in Chernenko et al. (2019) for mid-sized U.S. borrowers to a considerably larger sample of countries: borrowers connected to non-banks are significantly riskier, even when they are located in the same country and operate in the same industry. We account for these differences in borrower characteristics through borrower*time fixed effects that control for observable and unobservable time-varying borrower fundamentals. These fixed effects capture, for example, firm profitability, management, or leverage, and help separate loan supply from loan demand effects (Khwaja and Mian, 2008; Jiménez et al., 2014). When controlling for borrower-time fixed effects, the lending gap narrows but remains statistically significant and economically large.

In a second step we investigate to what extent the value of lending relationships drives the divergent evolution of bank and non-bank credit during crises. For banks, lending relationships have been shown to reduce information asymmetries and lead to better loan terms (Bharath et al., 2011; Ivashina and Kovner, 2011). They thus improve borrowers' access to credit especially during crises (Sette and Gobbi, 2015; Bolton et al., 2016; Beck et al., 2018). Motivated by these findings, we construct measures of lender-borrower relationships with banks and non-banks based on the duration of the relationship, as well as the intensity of previous interactions. To account for the differential effects of

[3]There are a number of additional advantages to lender parent*year fixed effects. They allow us to keep the full set of lenders in our sample, even if there is no balance sheet data available; they account for lender reputation; and they control for the role of internal capital markets among lenders belonging to the same parent.

relationships in downturns and normal times, we interact the measures with dummies for years of financial crises.

Controlling for relationships and their impact during crises in our regressions significantly narrows the gap between bank and non-bank lending. Regardless of the relationship measure, the lending gap narrows by over two-thirds to about 10%. The fact that relationships explain a large share of the gap suggests that non-banks behave more like transaction lenders, even if they share a history with a borrower.

To shed further light on the value of relationships across lender types, we examine their impact on loan spreads during crises. In our sample of global syndicated loans, we confirm previous findings that lending relationships with banks benefit borrowers by reducing loan spreads during crises. However, we find that these benefits are not present for non-banks. Additionally, we find that during crises, non-banks significantly reduce lending to riskier borrowers, despite their specialization and potential informational advantage in the market segment. These findings support the argument that relationships with non-banks provide limited value.

In further specifications, we show that lenders' industry specialization or the geographic diversification of their loan portfolios do not drive the lending gap. These factors have been linked to higher bank credit supply during crises (De Jonghe et al., 2020; Doerr and Schaz, 2021). We also find that the contraction in non-bank lending has real effects: firms connected to non-banks see a significantly stronger decline in overall syndicated lending during financial crises. Consequently, their investment rates decline by relatively more.

Our findings are robust along various dimensions. In terms of relationships, an alternative measure based on total amounts instead of length or intensity delivers similar results. Within credit lines, which are more likely to remain on balance sheet and are hence potentially more affected by relationships, we also find that the gap narrows after accounting for relationships. Moreover, controlling for lead arranger status (i.e., accounting for the fact that lead arrangers engage in screening and monitoring of borrowers) in addition to relationships has only a modest effect on the lending gap, suggesting that discrepancies in the value of relationships are a salient difference between banks and non-banks. Consistent with the argument that lending relationships are especially important when informational frictions are more pronounced, we find that the importance of relationships in explaining the lending gap is less pronounced in the U.S., one of the

best-developed and most transparent lending market. Our key findings also remain after we aggregate data at the lender–borrower country–year level, split the sample of borrowers into public or private firms, exclude investment banks from the non-bank sample, exclude non-bank lenders from major countries, or restrict the sample to large lenders in terms of loan volumes.

Taken together, our results indicate that the growth of non-bank lenders could intensify financial instability and have repercussions for the real economy during adverse events. The rising footprint of non-banks could lead to a shift away from relationship towards transaction lending, with potentially negative consequences for borrowers' access to credit during crises. As corporate indebtedness has reached historical highs (IMF, 2021), the rising footprint of non-bank lenders and the strong contraction in their lending to highly-leveraged borrowers during crises is a particularly worrying finding. Moreover, our results for the global syndicated loan market suggest that non-bank lenders do not act as shock absorbers or asset insulators during financial crises (Elliott et al., 2021; Chodorow-Reich et al., 2021).

Our findings have two important implications for policy. Existing policy proposals focus mostly on non-bank financial institutions' contribution to liquidity stress in money markets (Quarles, 2020; Hauser, 2021; Hubbard et al., 2021). Our results suggest that non-bank lending to non-financial firms also warrants close attention. Moreover, while regulation enacted after the Great Financial Crisis has arguably made banks more resilient, non-banks' greater presence and sharper contraction in lending might offset some of these gains during crises.

Literature and contribution. Our paper contributes to two strands of literature. First, we speak to the literature investigating non-bank lending. This work has largely focused on the impact of monetary policy shocks in single-country settings. Building on the insight that deposits flow out of banks during episodes of monetary tightening (Drechsler et al., 2017), Chen et al. (2018) argue that contractionary monetary policy leads to deposit flows from banks into non-banks in China. Accordingly, non-bank lending expands while bank lending contracts. Xiao (2020) supports this finding with a structural model, showing that shadow banks offset around one-third of the reduction in commercial bank deposits during monetary policy tightening cycles in the U.S. by serving a more price-sensitive clientele. Cucic and Gorea (2021) and Elliott et al. (2019) – for

Denmark and the U.S. – and Elliott et al. (2021) – in a cross-country setting – provide complementary evidence that non-banks moderate the impact of monetary policy.

We provide novel evidence in a cross-country setting that during financial crises, non-banks reduce lending by more than banks, and that lending relationships explain most of this difference. Non-banks' stronger contraction in lending is consistent with Fleckenstein et al. (2021), who show that non-bank syndicated lending is more sensitive than bank lending to the U.S. financial cycle. While they link this pro-cyclicality to U.S. non-banks' greater funding volatility, our results suggest that, in the global syndicated loan market, the value of lending relationships explains a significant part of the stronger fall in non-bank lending. Two factors could explain these differences. For one, we exploit cross-sectional variation in borrower-country financial crises, rather than variation in the U.S. financial cycle over time. Moreover, our global sample covers the universe of lenders and borrowers in the syndicated loan market, which could differ from their U.S. counterparts.[4]

Second, we speak to work on the effects of financial crises on banks' credit supply and the importance of lending relationships. For banks a large literature finds that nationality (foreign vs. domestic) is an important determinant of loan supply and that global banks transmit shocks across markets (Cetorelli and Goldberg, 2012; Schnabl, 2012; Giannetti and Laeven, 2012; De Haas and Van Horen, 2013; Popov and Van Horen, 2015; Hale et al., 2020; Doerr and Schaz, 2021). Claessens (2017) provides an excellent survey. Related work investigates the benefits of lending relationships for borrowers (Bharath et al., 2011; Ivashina and Kovner, 2011) and finds that relationships with banks alleviate borrowers' credit constraints during crises (Sette and Gobbi, 2015; Bolton et al., 2016; Beck et al., 2018). Our paper provides novel evidence that non-banks reduce lending by more than banks during crises and that – unlike for banks – lending relationships with non-banks do not provide substantive benefits to borrowers.

[4]Our setting exploits cross-sectional variation in crises across borrower countries, while controlling for the phase of the global financial cycle through granular fixed effects. In addition, our sample covers the universe of lenders in the global syndicated loan market. The funding of non-U.S. banks, which make up a sizable share of our sample, could be more cyclical than that of their U.S. counterparts because of their dependence on the wholesale U.S. dollar funding market (Ivashina et al., 2015). Related, non-bank lenders in our sample are mostly finance companies, investment banks, and insurance companies. They might differ in their funding volatility from CLOs, the dominant non-bank lender in Fleckenstein et al. (2021). Finally, the U.S. has one of the best-developed and most transparent lending markets (Beck et al., 2010), so lending relationships might be less important than in other countries. Indeed, when we restrict the sample to U.S. borrowers and lenders only, we find that the importance of relationships in explaining the lending gap is less pronounced, consistent with results in Fleckenstein et al. (2021).

2 Data and descriptive statistics

This section explains the data sources and construction of the main variables and provides summary statistics. It then highlights differences in borrower characteristics between bank and non-bank borrowers.

2.1 Data and variable definitions

Thomson Reuters' Dealscan database provides detailed information on syndicated loans. Syndicated loans are issued jointly by a group of financial institutions to a single borrower. The lending syndicate includes at least one lead institution (also called lead arranger) and usually further participants. Lead arrangers negotiate terms and conditions of deals, perform due diligence, and organize participants.[5] Compared to other types of loans, syndicated loans are on average larger in volume and issued to larger borrowers.

Syndicated lending is an important source of financing for firms, in particular larger ones (Chodorow-Reich, 2014; Cerutti et al., 2015). It represents around three-quarters of total cross-border bank lending to non-financial corporations in both high- and middle-income economies (Doerr and Schaz, 2021). Non-banks have a significant presence in the syndicated loan market in all regions and sectors, both in terms of total and cross-border lending (Elliott et al., 2021; Aldasoro et al., 2022).

Dealscan provides detailed information on syndicated loans at origination, including loan amount, maturity, and interest, as well as the identity and type of lenders and borrowers. We follow prior literature and restrict our sample in the following ways. We focus on syndicated lending to non-financial, non-utility firms, drop incomplete deals (with status "cancelled", "suspended", or "rumour"), and deals with no information on loan amounts. We manually identify and exclude lenders and borrowers linked to governments and government institutions, such as development banks. As Dealscan may report both the origination and amendments of the same deal (Roberts, 2015), we further drop deals containing the phrase "amends" or "amendment of" in their associated comments. We then convert all deal values to 2012 U.S. dollars.

[5]Lending in the syndicated loan market is organized in packages and facilities: a package is a loan agreement between a borrower and a group of lenders, and each package can contain one or more facilities. Our basic unit of observation is the facility.

Information on the share that each syndicate participant contributes to a given facility is available only for a subset of the deals. To assign facility amounts to individual lenders in case of missing lending shares, or for loan facilities with aggregate lending shares totalling more than 110%, we follow prior literature and split facility volumes on a pro-rata basis among all lenders in the syndicate.[6] Finally, we drop loans smaller than $10,000 (less than 1% of observations).

We classify lenders into banks and non-banks based on Dealscan's institution classification scheme. Accordingly, our focus is on the actual participation by types of bank and non-bank syndicate members, as in Lim et al. (2014) and Elliott et al. (2021).[7] For example, investment banks, finance companies, and mutual funds are considered as non-bank institutions. We amend the Dealscan classification by matching a majority of unclassified or "other" lenders to banks and non-banks based on keyword search, and manually reclassifying a number of lenders.[8] Non-banks differ from banks along several dimensions, including the absence of deposit insurance and a generally lighter regulatory burden. One important difference is that non-banks, whose funding structure is dominated by wholesale borrowing (Jiang et al., 2020), serve a more price-sensitive clientele (Xiao, 2020).

To identify banking crises we rely on Laeven and Valencia's (2020) (LV henceforth) Systemic Banking Crises Database. These data provide country-year-level information on episodes of financial distress for a large number of countries up until 2018. Over our sample period (from 1995 to 2018) it reports 83 distinct banking crises.[9] There is a concentration of financial turmoil around the late 1990s (Asian financial crisis) and from

[6]See Giannetti and Laeven (2012); De Haas and Van Horen (2013); Chodorow-Reich (2014); Bräuning and Ivashina (2020). A general finding in the literature is that alternative methods of splitting deal volumes do not materially affect results (Cerutti et al., 2015; Doerr and Schaz, 2021). However, our main results are robust to alternative methods of splitting volumes (unreported).

[7]A lender is a bank in our sample if it belongs to one of the following types: African bank, Asia-Pacific bank, Eastern European / Russian bank, foreign bank, Middle Eastern bank, mortgage bank, thrift / S&L, U.S. banks and Western European banks. Elliott et al. (2021) adopt a similar classification.

[8]Consistent with our definition of non-banks, some major investment banks grouped into banks by Dealscan are reclassified as non-banks. Examples include Macquarie Bank, RBC Capital Markets, and Nomura Holdings. Lenders with SIC code 6211 classified by Dealscan as banks are reassigned to non-banks, following Lim et al. (2014). In a few cases (notably Morgan Stanley), Dealscan classifies lenders into a generic category named "corporations". We unpack this category using our manual procedure. We identify 3,026 out of 4,118 unclassified immediate lenders as banks or non-banks. For more details, see also Aldasoro et al. (2022).

[9]The two conditions defining a banking crisis by LV are significant signs of financial distress in the banking system (such as bank runs, large losses, and/or bank liquidations), and significant banking policy intervention measures in response to losses in the banking system.

2008 onward (Great Financial Crisis).

Based on these data, we define lenders' exposure to crisis countries as follows:

$$crisis\ exposure_{l,c,t} = \frac{loan\ volume_{l,c,t-1} \times banking\ crisis_{c,t}}{loan\ volume_{l,t-1}}, \tag{1}$$

where $loan\ volume_{l,c,t-1}$ denotes the total amount of outstanding loans granted by lender l to borrowers in country c as of $t-1$, $loan\ volume_{l,t-1}$ denotes total outstanding loans by lender l to *all* countries, and $banking\ crisis_{c,t}$ is a dummy variable which equals one if borrower country c had a banking crisis in year t as defined by LV, and zero otherwise. *Crisis exposure* thus reflects that not all lenders are equally exposed to financial crises in a given country. Rather, it captures that lenders with greater loan exposure to borrowers in crisis countries are likely more affected than lenders with lower exposure.[10]

To measure lending, we focus on the total amount of new syndicated credit extended by lender l to borrower b in a given year. To account for the formation and termination of lending relationships, we construct lending based on a panel with loan amounts of zero in the years immediately before and after lender-borrower observations with positive credit amounts (extensive margin). Previous literature has highlighted the importance of lending along the extensive margin for syndicated credit (Giannetti and Laeven, 2012; Giannetti and Saidi, 2019).[11] Loan-level observations are aggregated to the lender-borrower-year level. As we saturate our empirical model with a rich set of fixed effects, the sample is further restricted to lenders and borrowers with at least two observations in a given year. As syndicated loans usually entail a group of lenders, the loss in sample size is negligible.

We measure the strength of lending relationships in terms of their duration and intensity. First, we capture the *duration* of a lending relationship by the number of years passed since the first syndicated loan recorded between a lender and a borrower since the late 1980s. This common measure proxies for lenders' accumulation of private in-

[10]Note that exposure is based on the stock of outstanding loans in a country. Syndicated loans are often sold on the secondary market, especially in the U.S., which could lead to measurement error in exposure. However, as long as the likelihood of a loan sale in a country across banks and non-banks is uncorrelated with their exposure to the market, this measurement error would lead to an attenuation bias. In the Online Appendix, we provide evidence in Table A2 that there is no systematic correlation between the likelihood of being a lead arranger (which are known to retain more of their loans on balance sheet) and exposure to countries. Importantly, there is no systematic difference in this correlation between banks and non-banks.

[11]As we show in robustness checks, our findings extend to the intensive margin.

formation on borrowers (Petersen and Rajan, 1994; Degryse and Ongena, 2005; Sette and Gobbi, 2015). Second, the *intensity* measure counts the total number of syndicates involving a specific lender-borrower pair over the past five years prior to the origination of a new loan (Bharath et al., 2007; Ivashina et al., 2008; Bharath et al., 2011; Ivashina and Kovner, 2011, among others).[12] Finally, for robustness tests we compute the total amount of new loans between lender l and borrower b over the past five years, normalized by the total amount of new loans taken by the borrower over the same time frame. For all three measures, we set the value to zero if there was no previous relationship.

We combine Dealscan data with data on listed firms from Compustat, following Chava and Roberts (2008). Overall, more than 13,000 firms in 90 countries in our regression sample are matched to Compustat. We collect information on a variety of firm characteristics and compute leverage as long term debt plus current liabilities over equity. Table A1 in the Online Appendix reports summary statistics.

We also construct a number of variables to measure borrower risk. First, we classify borrowers as risky if their average all-in drawn spread across all syndicated loans in a given year exceeds the 75^{th} percentile across the distribution of spreads across all borrowers in a given two-digit industry.[13] As borrowers on the syndicated loan market tend to be large firms, a higher interest rate compared to industry peers could indicate that they are seen as relatively more risky (see also Blickle et al. (2020)). Second, and closely related, we classify borrowers as risky if their spread in a given year exceeds the 75^{th} percentile across the distribution in their country (Elliott et al., 2021). And third, we use information on firm leverage from Compustat. We define firms as risky if they lie in the top tercile of the leverage distribution in a given year, as highly-leveraged firms are especially sensitive to negative shocks (Giroud and Mueller, 2017; Kalemli-Özcan et al., 2018).

Our final sample covers the years from 1995 to 2018 and includes information on 9,600 lenders (of which 32% are non-banks) and 41,188 borrowers. The sample comprises a total of 1,222,273 lender-borrower-year observations. Non-banks extend on average 11% of all new credit on the global syndicated loan market and they extend a significant share

[12] The intensity of a lending relationship between lender l and borrower b in year t is measured by the total number of loans extended by lender l to borrower b from year $t-5$ to $t-1$, with the possibility of lender l participating in multiple facilities over the past five years. Bharath et al. (2007) argue that a five-year window is appropriate, as it corresponds to the typical time until the next refinancing for the firms borrowing through syndicated loans.

[13] The all-in drawn spread is the interest rate spread over LIBOR paid by the borrower for each dollar drawn from the loan, together with annual or facility fees.

of all syndicated loans to borrowers located in all regions.[14]

Table 1 provides descriptive statistics for our main variables. On average, 11.5% of all observations are during years when a banking crisis takes place. The average crisis exposure equals 6.1%, with a standard deviation of 20.8%, implying that in a given year, about 6% of all loans are extended to borrowers in a crisis country. In general, loans by non-banks are larger in volume and carry considerably higher interest rates. Credit lines comprise about 40% of all non-bank loans, compared to 50% for banks (Aldasoro et al., 2022). Non-banks have a similar geographic concentration of their total loan portfolio, but on average a higher exposure to local banking crises.

2.2 Differences between bank and non-bank borrowers

Among mid-sized U.S. borrowers, Chernenko et al. (2019) show that non-banks lend to firms with higher leverage and lower profitability. To the extent that non-banks also serve riskier borrowers globally, this could affect their lending behavior compared to banks. To investigate non-banks' borrower pool, we estimate regressions at the lender–borrower–year level of the following form:

$$\textit{non-bank lender}_{l,b,t} = \beta\ \textit{high-risk indicator}_{b,t} + \tau_{c,i,t} + \varepsilon_{l,b,t}, \tag{2}$$

where the dependent variable is a dummy that takes on a value of one if a loan by lender l to borrowing firm b in year t is made by a non-bank. The explanatory variable *high-risk indicator* is a dummy that takes on a value of one if the borrowing firm is classified as risky, based on one of the measures defined above. To examine to what extent differences across borrowers are driven by non-banks serving borrowers located in different countries and industries, we compare coefficient estimates of Equation (2) without and with country*industry*time fixed effects ($\tau_{c,i,t}$). Standard errors are clustered at the borrower level.

Table 2 shows that riskier borrowers are significantly more likely to obtain a loan from a non-bank. In panel (a), column (1) categorizes risky firms based on the spread relative to industry peers; column (2) based on the spread relative to country peers;

[14]The bulk of non-bank syndicated lending is accounted for by investment banks and finance companies. For an overview of the role of non-bank lenders in the global syndicated loan market, see Aldasoro et al. (2022). See also Figure A1 in the Online Appendix.

and column (3) based on leverage. In all three columns, the coefficient β in Equation (2) is positive and statistically significant at the 1% level. For example, column (1) suggests that high-risk firms are about 11.7% more likely to obtain a loan from a non-bank. Panel (b) replicates the analysis but includes borrower country*industry*time fixed effects. Comparing borrowers located in the same country and operating in the same industry does not materially affect the results.

The significant differences across borrowers suggest that non-banks specialize in lending to riskier firms, in line with the observation that non-banks grant loans with higher spreads. These findings highlight the importance of accounting for observable and unobservable borrower characteristics, as we will discuss in what follows.

3 Empirical strategy and results

This section analyzes bank and non-bank lending during crises, as well as its drivers. It first explains the empirical strategy and then presents the results.

3.1 Empirical strategy

The baseline specification tests whether bank and non-bank lending evolve differently during financial turmoil in the country of the borrowing firm. We estimate the following specification:

$$\begin{aligned} log(credit)_{l,b,t} = \beta_1\ crisis\ exposure_{l,c,t} + \beta_2\ non\ bank_l \\ + \beta_3\ crisis\ exposure_{l,c,t} \times non\ bank_l + \phi_{l,b} + \psi_{l,t} + \tau_{b,t} + \varepsilon_{l,b,t}. \end{aligned} \tag{3}$$

The dependent variable $log(credit)_{l,b,t}$ denotes the log of new credit extended by lender l to borrower b in year t. The variable $crisis\ exposure_{l,c,t}$ measures the exposure of lenders to a given borrower country c that experiences a crisis in year t, as defined in Equation (1). Note that Equation (3) focuses on crises in borrower countries, which mitigates the concern that a shock to the lender is the cause of the financial crises – a concern that would be more relevant if we were to analyze shocks to lenders' home markets. The dummy $non\ bank_l$ takes on a value of one for non-banks and a value of zero for banks.

All regressions include lender*borrower fixed effects ($\phi_{l,b}$), which control for unobserv-

able and time-invariant lender and borrower heterogeneity (such as industry, location, or distance). We thereby exploit only the variation within the same lender-borrower combination over time.[15] These fixed effects, combined with a dependent variable in levels, imply an interpretation in changes. We cluster standard errors at the lender's parent level, as well as borrower country level, to account for serial correlation within the same borrower country across firms and time, as well as among borrowers of the same lender.[16]

The main coefficient of interest in Equation (3) is β_3, which indicates whether non-bank lending declines by more or less than bank lending during crises in borrowing countries. However, any observed differential lending behavior between banks and non-banks could in principle be driven by confounding factors at both the lender and borrower level, affecting the estimate of β_3. We address this concern through the inclusion of granular time-varying fixed effects.

One potentially confounding factor is the difference in funding structure between banks and non-banks. Recent literature, mostly in the U.S. context, shows that non-banks rely more on wholesale funding, unlike banks which are predominately funded with retail deposits (Jiang et al., 2020).[17] Suppliers of wholesale funding are generally more price sensitive, which could make non-bank funding flows and their lending more sensitive to the financial cycle (Fleckenstein et al., 2021). One important aspect to keep in mind, however, is that on the global syndicated loan market a significant share of lending by non-U.S. banks is dollar denominated (Ivashina et al., 2015). With limited access to U.S. dollar retail deposits, these banks must rely on more-volatile wholesale dollar funding markets (Aldasoro et al., 2022).

To control for differences in funding models, we include lender parent*year fixed effects ($\psi_{l,t}$). not only do these fixed effects control for aggregate factors affecting all lenders (e.g. the global financial cycle), they also absorb any observable and unobservable time-varying lender heterogeneity, for example size, profitability, or the reliance on wholesale funding. There are a number of additional advantages to this approach. First, since there exists only scant balance sheet data for non-banks (especially in a cross-country setting), lender parent*year fixed effects allow us to keep the full set of lenders in our sample,

[15] In our data, the probability of obtaining a loan in year t conditional on obtaining a loan in year $t-1$ from the same lender equals one-third for loans from both banks and non-banks.

[16] Clustering at the lender (as opposed to lender parent) level generally increases the precision of our estimates, but has the drawback of not accounting for potential correlation among observations across lenders belonging to the same parent.

[17] See also Chen et al. (2018); Xiao (2020), and Elliott et al. (2019).

while controlling for differences in funding conditions and other lender characteristics. Second, the fixed effects account for lender reputation, which has been shown to matter for syndicated loan origination (Sufi, 2007). And third, as we include fixed effects at the lender's parent level, we are also able to control for the role of internal capital markets among lenders belonging to the same parent (Cetorelli and Goldberg, 2012).

Beyond lender characteristics, a common challenge to identification is that banks and non-banks could serve different clients. For example, the results in Section 2.2 highlight that non-bank borrowers are riskier, which could affect any observed differences in lending. We address this challenge through the inclusion of granular time-varying fixed effects ($\tau_{b,t}$ in Equation (3)) either at the country-industry-size level (De Jonghe et al., 2020), or at the borrower level. With borrower*time fixed effects, we compare lending by banks and non-banks to the same borrower in the same year (Khwaja and Mian, 2008).

3.2 Results

Figure 1 presents our main finding: non-banks contract new lending by more than banks during financial crises in borrower countries. It plots the evolution of the log of new credit by banks (blue solid line) and non-banks (dashed black line) in a four-year window around banking crises. Each series is standardized to a value of one in the year before the crisis. Loan volumes follow a similar trend for both types of lenders in the years preceding a crisis, increasing by about 5%–10%. However, they diverge sharply once the crisis hits, indicated by a value of one on the horizontal axis. While both lender types see a contraction in credit, the decline is almost twice as large for non-banks.

Section 3.2.1 analyzes this pattern in greater detail, while Section 3.2.2 investigates the role of lending relationships in explaining the lending gap between banks and non-banks.

3.2.1 Non-bank lending during crises

Table 3 shows that non-banks reduce their lending by relatively more than banks during financial crises. Column (1) uses crisis exposure as explanatory variable. It exploits variation within each lender-borrower connection by using fixed effects at the lender*borrower level and controls for unobservable time-varying shocks common to all lenders and borrowers though year fixed effects. The negative and significant coefficient on crisis exposure

suggests that for the average lender, lending declines significantly during crises. In terms of magnitude, a one standard deviation increase in local crisis exposure leads to an additional decline in lending by 9.7% (0.21×-0.460).

Column (2) adds the interaction term with the dummy *non-bank*.[18] The coefficient of interest (β_3) on the interaction term is highly significant and negative. Lending by non-banks declines by more relative to banks during banking crises in borrower countries. A one standard deviation higher exposure is associated with a 8.3% decline in loan volume by banks, but a 22.5% decline by non-banks.

To control for unobservable time-varying differences across lenders, including their funding models, column (3) includes lender parent*time fixed effects. Non-banks still cut their global lending by significantly more than banks during crises. The modest change in the estimated coefficient suggests that, in the global context, differences in funding models do not explain the gap in lending between banks and non-banks around crises. This result, which differs from findings in the U.S. context (Fleckenstein et al., 2021), could arise for a number of reasons. First, our sample covers the universe of lenders in the global syndicated loan market, including many non-U.S. banks. These banks' funding could be more cyclical than that of their U.S. counterparts, in part reflecting their reliance on wholesale dollar funding markets (Ivashina et al., 2015), which might make them more sensitive to changes in the financial cycle. Second, our set of non-bank lenders is dominated by finance companies, investment banks, and insurance companies, while CLOs are the dominant non-bank lender in the United States. These lenders potentially differ in their funding volatility.

Our analysis faces the common identification challenge of separating loan demand from loan supply. The estimated coefficients in column (3) could reflect differences in (observable and unobservable) borrower characteristics, for example credit demand. Indeed, as we show in Section 2.2, firms borrowing from non-banks appear to be riskier than those that borrow from banks. We address this challenge by including time-varying granular fixed effects.

In column (4), we first enrich our specification with time-varying fixed effects at the borrower country–sector–size level.[19] As shown in Degryse et al. (2019), these 'ILST'

[18] The coefficient on the non-bank dummy is absorbed by lender*borrower fixed effects.

[19] Size refers to the quartiles of the distribution of total syndicated borrowing across firms in each year.

fixed effects are a good proxy for unobservable time-varying factors that could affect the loan demand of borrowers of distinct lenders differentially. When we compare lending by banks and non-banks to firms of similar size in the same country and industry, borrowing from a non-bank remains statistically different from borrowing from a bank during crises. However, compared to column (3), the coefficient is roughly halved in size, consistent with the argument that non-banks serve riskier clients with weaker credit demand during a crisis.

To further tighten identification, column (5) includes borrower*time fixed effects. These fixed effects allow shocks to affect each borrower heterogeneously at each point in time. We thereby control for unobservable time-varying borrower fundamentals, such as profitability, size, leverage, or funding demand. Essentially, we are comparing the same firm borrowing from banks and non-banks in a given year, while using only the within variation of each lender-borrower combination for estimation (Khwaja and Mian, 2008; Jiménez et al., 2014). After absorbing any unobservable borrower characteristics (including but not limited to loan demand), our estimates therefore likely reflect loan supply effects. Lending by non-banks declines by significantly more than lending by banks also in this saturated specification. In terms of magnitude, the estimated coefficient on the interaction term is similar to that in column (4). Increasing crisis exposure by one standard deviation decreases loan supply by an additional 6.6% for non-banks relative to banks.

Taken together, Table 3 shows that lending by non-banks declines by significantly more during crises relative to banks. Unobservable borrower characteristics explain about half of the estimated difference in lending behavior – in line with the evidence in Section 2 that non-banks lend to riskier borrowers that are expected to fare worse during crises. Yet the difference between bank and non-bank lending during crises remains statistically significant and economically sizeable. In what follows, we investigate to what extant lending relationships can explain this pattern.

3.2.2 The value of lending relationships

Lending relationships with banks reduce inefficiencies from information asymmetries (Ivashina and Kovner, 2011) and can benefit borrowers through better loan terms. Relationships are especially valuable when borrower transparency is low (Bharath et al.,

2011), for example during periods of heightened uncertainty or crises. Sette and Gobbi (2015) and Beck et al. (2018) show that lending relationships alleviate borrowers' credit constraints during episodes of economic shocks. Bolton et al. (2016) argue that relationship banks offer credit at more favorable terms to firms than transaction banks in a crisis.

To what extent lending relationships with non-banks affect loan terms, and whether differences in the value of lending relationships can explain the gap in lending between banks and non-banks during crises, remains an open question. We enrich Equation (3) with different measures of relationship strength to investigate this issue. Motivated by prior literature that emphasizes the importance of relationships during crises, we include an interaction term of the respective relationship measure with the financial crisis exposure variable.

Table 4 shows that accounting for lending relationships significantly narrows the difference in credit provision between banks and non-banks. All regressions are saturated with borrower*time fixed effects to control for unobservable time-varying differences across borrowers. Column (1) measures relationships via the lender-borrower relationship duration. In line with previous literature, the coefficient on the interaction term with crisis exposure is positive and highly significant: having a previous relationship with a lender is on average associated with better access to credit during crises. Importantly, relative to the baseline specification ($\beta = -0.314$ in Table 3, column (5)), the coefficient on the interaction term of *non-bank* and *crisis exposure* declines by almost 50% in magnitude, to -0.167. It remains significant at the 1% level.

We obtain a similar picture when we measure relationships via interaction intensity, i.e., the number of loans previously extended by a lender to a borrower. In column (2) the coefficient on the interaction term between relationship and crisis is positive and highly significant. The coefficient on the interaction term of *non-bank* and *crisis exposure* now equals -0.124, a fall of over 60% compared to the baseline specification. When we include both relationship measures and their interactions with crisis exposure in column (3), these conclusions remain unaltered.

In sum, results in columns (1)–(3) in Table 4 suggest that lending relationships benefit borrowers less during a crisis when borrowing from a non-bank, compared to borrowing from a bank. We will investigate this aspect in more detail below, where we analyze the effects of relationships on loan rates during financial shocks. In line with the argument

that relationships are especially valuable when borrower transparency is low (Bharath et al., 2011), we will further show that relationships explain less of the lending gap in a sample of U.S. borrowers and lenders only. This finding reflects that U.S. has one of the best-developed and most transparent lending markets (Beck et al., 2010) and is consistent with results in Fleckenstein et al. (2021).

In columns (4) and (5), we examine two other potential determinants of the lending gap – lenders' industry specialization and their portfolio diversification. As shown in Paravisini et al. (2022) and Blickle et al. (2021), banks often specialize in narrow markets, and De Jonghe et al. (2020) find that banks' industry specialization can protect borrowers from shocks. Doerr and Schaz (2021) further establish that lenders with a geographically diversified loan portfolio supply more credit during borrower-country crises. To measure lenders' industry specialization, we compute the share of loans originated to borrowers in industry i out of lender l's total loan origination in year t. To measure geographic diversification, we construct a lender-year level Herfindahl-Hirschman index (HHI) of lenders' loan portfolio shares across countries and define diversification as one minus the HHI.[20]

Column (4) in Table 4 includes lenders' industry specialization as well as diversification, interacted with crisis exposure. The magnitude of the coefficient on the interaction term of *non-bank* and *crisis exposure* declines only modestly to −0.282 (relative to column (5) in Table 3). The small drop in the coefficient size suggests that these factors do not explain the differences in lending behavior between banks and non-bank during crises.[21] This picture is reinforced when we include the interaction terms in the specification saturated with our relationship measures in column (5).

Relationships and loan spreads. To further investigate the value of lending relationships we analyze how they affect the spread on syndicated loans during crises. We expect that lending relationships mitigate the detrimental effects of crises on the spreads of bank loans (see Bharath et al. (2011), Sette and Gobbi (2015), or Bolton et al. (2016)). We add to this literature by exploring whether these effects differ for non-banks.

[20]The industry share and diversification are defined as follows: $share_{l,i,t} = loans_{l,i,t}/loans_{l,t}$ and $diversification_{l,t} == 1 - \sum_{j=1}^{J^l} s_{l,c,t}^2$, where l is lender, i is industry, c is country and t time, and $s_{l,c,t}$ measures the share of a lender l's loans to borrowers in country c relative to its total loans in year t.

[21]Note that including industry specialization or diversification without additional control variables in the regression yields positive coefficients on the interaction term with banking crisis, in line with previous findings (unreported).

Motivated by previous studies, we estimate variants of the following regression:

$$\begin{aligned} spread_{l,b,t} = \rho_1 crisis_{c,t} + \rho_2\ relationship_{l,b,t} \\ + \rho_3\ crisis_{c,t} \times relationship_{l,b,t} + \phi_{l,b} + \psi_{l,t} + \tau_{b,t} + \varepsilon_{l,b,t}. \end{aligned} \tag{4}$$

The dependent variable is the average spread on loans originated by lender l to borrower b in year t. The variable $crisis_{c,t}$ takes on a value of one during a financial crisis in borrower country c. The variable $relationship_{l,b,t}$ is a measure of the lending relationship, based on either duration or intensity. We cluster standard errors at the lender parent level, as well as firm-country level, to account for serial correlation within the same borrower country across firms and time, as well as among borrowers of the same lender. We include the full set of fixed effects at the lender-borrower, lender-time, and borrower-time level. We expect $\rho_1 > 0$, i.e., a higher spread during crises. We further expect relationships to mitigate the effect of a crisis on spreads, so $\rho_3 < 0$.

Table 5 shows that relationships lead to relatively lower spreads on bank loans during crises, but not among non-bank loans. Column (1), with lender*borrower and lender parent*year fixed effects, shows that the spread increases by about 25 basis points during crises (0.2 standard deviations) on average. Column (2) reports results for Equation (4) with relationships measured through the duration. The coefficient ρ_3 is negative and significant at the 1% level, suggesting that a longer lending relationship is associated with a lower spread – consistent with the literature.

In column (3) we further add interaction terms with the non-bank dummy. While longer relationships benefit bank borrowers during crises, the positive coefficient on the triple interaction term indicates that the spread rises for non-bank borrowers. Note also that the interaction of *non-bank* and *relationship* yields a negative coefficient. Non-banks appear to not charge higher spreads in non-crisis times to borrowers with which they have a longer relationship. This pattern contrasts with relationship banks (Bolton et al., 2016). Columns (4) and (5), where we replicate columns (2)–(3) but measure relationships with the number of loans (intensity), provide a similar picture.

In sum, results in Table 4 and Table 5 indicate that a significant part of the gap in lending is explained by the fact that a lending relationship offers greater benefits to borrowers when the lender is a bank. It appears as if non-bank lenders behave more like transaction or arm's length lenders, both during crisis and non-crisis times, even if they have a pre-existing relationship with a borrower.

What could explain the difference in the value of lending relationships between banks and non-banks? Theory suggests that banks can benefit from forming stronger relationships with borrowers in various ways, ranging from the ability to share sensible information or monitor collateral, to securing future lending and non-lending business with the borrower (see Bharath et al. (2007) for an overview). At the core of such effects lies the notion that relationships can lower the cost of information production, and that banks have an enhanced ability to collect borrower information (Rajan, 1992). Beyond informational advantages, banks' access to core deposits allows them to provide liquidity services and insure clients against credit shocks, benefiting relationship borrowers (Berlin and Mester, 1999; Strahan, 2008). Against this background, non-banks' relative disadvantage in providing non-lending services, as well as their reliance on wholesale funding, might lower the value they obtain from investing in lending relationships. A detailed investigation of why banks and non-banks value syndicated relationships differently is an interesting area for future research.

4 Risky borrowers, real effects, and robustness

In this section, we first investigate whether borrower risk influences non-bank lending. We then analyze the real effects of the contraction in non-bank lending during crises. Finally, we perform a series of robustness tests.

Lending to high-risk borrowers. Section 2.2 shows that non-banks specialize in lending to riskier, more leveraged borrowers. Previous literature has established that banks' specialization can benefit borrowers during crises, as banks have superior knowledge about borrowers' quality or internalize spillovers (Giannetti and Saidi, 2019; De Jonghe et al., 2020; Blickle et al., 2021). Guided by this work, we investigate whether non-banks shield risky borrowers during crises, compared to banks.

Table 6 shows that during crises non-banks cut lending to riskier borrowers by more. All specifications estimate variants of Equation (3) along the extensive margin, once without and once with borrower*time fixed effects. Columns (1)–(2) classify firms as risky if their average spread exceeds the yearly 75^{th} percentile in the borrowers' country. Columns (3)–(4) look at firms with spreads above the yearly 75^{th} percentile in the borrowers' two-digit industry. Columns (5)–(6) focus on those firms with balance sheet leverage in the

upper tercile of the distribution. Across specifications, non-banks reduce loan supply by more than banks during crises (negative coefficient on *crisis exposure* × *non-bank*), but the effect is even more pronounced among riskier borrowers – as indicated by the negative and significant coefficient on the triple interaction term. Note that the coefficient on *non-bank* × *high-risk borrower* is positive throughout, in line with the finding that non-banks serve riskier clients.

These findings point to an important contrast between banks and non-banks. Banks' specialization can benefit borrowers, and especially so during crises. In contrast, non-banks' specialization in lending to riskier borrowers does not mean that risky borrowers connected to non-banks profit from better access to credit during crises than those connected to banks. These results reinforce the argument that relationships with non-banks provide limited benefits. While relationships with banks improve loan terms especially when borrower transparency is low (Bharath et al., 2011), as might be the case for risky borrowers during crises, the same does not hold for non-banks.

Real effects. To analyze whether exposure to non-banks has real effects in terms of firm investment, we aggregate the data to the firm-year level. If firms can easily substitute syndicated loans from non-banks with other forms of credit (e.g. bonds or trade credit), the substitution could offset the credit contraction of individual non-banks. Changes in non-banks' loan supply will only have real effects if firms can at most partially substitute the fall in non-bank credit. We run variants of the following regression:

$$\begin{aligned}\Delta y_{b,t} = \gamma_1 \; BC_{c,t} + \gamma_2 \; & \textit{connected to non-bank}_{b,t-1} \\ + \gamma_3 \; BC_{c,t} \times \; & \textit{connected to non-bank}_{b,t-1} + \phi_b + \tau_t + \mathbf{X}_{b,t-1} + u_{b,t}.\end{aligned} \tag{5}$$

The dependent variable $\Delta y_{b,t}$ is either the log difference of total syndicated loan volume of borrowing firm b across all its lenders in year t, or the change in its investment rate. The banking crisis dummy ($BC_{c,t}$) varies at the country level and equals one during banking crisis years in firm country c. The variable *connected to non-bank*$_{b,t-1}$ is a dummy with a value of one if a firm received a loan from at least one non-bank in the year prior to the crisis and zero if it received loans from banks only. ϕ_b denotes firm fixed effects and τ_t denotes year or country*industry*year fixed effects. We additionally control for firms' log of total assets, return on assets, and long-term debt over total assets (captured in vector $\mathbf{X}$). We cluster standard errors at the firm-country level, i.e., the level of the shock. A

coefficient of $\gamma_3 < 0$ would indicate that non-bank connected firms see a stronger fall in overall syndicated loan volume and investment.

Table 7 shows that non-bank connected firms see a significantly stronger decline in loan volumes and investment rates. Column (1) shows that total syndicate loan volume for the average firm falls during financial crises. Column (2) adds interaction effects and shows that the contraction in lending is stronger among non-bank connected firms. We account for potentially confounding trends at the country level with borrower-country*industry*year fixed effects. In essence, we compare firms located in the same country and industry in a given year. For the investment rate, column (3) also shows a significant negative effect of non-bank exposure during crises. Coefficients increase in magnitude and significance when we focus on firms with a low number of lender connections in columns (4)–(5).

Taken together, these results suggests that firms are unable to perfectly substitute the fall in syndicated lending from non-banks with other sources. Moreover, firms with a limited ability to substitute across lenders are more affected by the contraction in non-bank credit.

Relationships. Results in Table 4 and Table 5 suggest that differences in the value of relationships explain a sizeable share of the lending gap between non-banks and banks. In Table 8 we shed further light on this finding. First, we consider an alternative measure of relationship strength based on total lending by a given lender to a given borrower in the past five years, normalized by the borrower's total new borrowing over the same period (Bharath et al., 2011; Ivashina and Kovner, 2011). Column (1) shows that the coefficient of the interaction between crisis exposure and the non-bank indicator decreases by close to 50%, similar to our findings for measures based on duration and intensity. Combining the three measures of relationships confirms this finding, as shown in column (2). Our result that relationships provide less value to non-bank borrowers does hence not depend on the specific measure.

The value of relationships may also play out differently depending on the type of loans. Insofar as a loan type is more likely to remain on balance sheet, as is the case for credit lines (Drucker and Puri, 2009), it should be more sensitive to relationships. Should accounting for lending relationships not narrow the lending gap between banks and non-banks among credit lines, it would thus speak against our argument. Columns

(3) and (4) report results for Equation (3) with the log amount of credit lines as dependent variable.[22] Among credit lines, controlling for relationships reduces the residual lending gap by almost 60%.[23]

We also control for whether a lender is a lead arranger of at least one loan to a borrower in a given year. Lead arrangers are in charge of screening and monitoring, and often build up a reputation in the syndicated loan market.[24] Our relationship measures might partly reflect these aspects rather than the value of relationships alone. In columns (5) and (6) we focus on the sample with information on lead arranger status (i.e. the intensive margin). We find that controlling for the lead arranger status in addition to relationships has only a modest effect on the lending gap, suggesting that the value of relationships is a salient difference between banks and non-banks.

Finally, we restrict the sample to U.S. borrowers and lenders only. Fleckenstein et al. (2021) show that lending relationships do not explain U.S. non-banks' greater sensitivity to the excess bond premium. Relationships may play smaller role in the U.S. as it has one of the best-developed and most transparent lending markets (Beck et al., 2010). Columns (7) and (8) provide support for this idea: the effect of lending relationships in narrowing the lending gap between banks and non-banks during financial crises is less pronounced in the U.S. sample. Accounting for relationships narrows the gap by less than 20%. These results highlight the additional insights obtained from examining non-bank lending in a global, multi-country setting.

Robustness. Table 9 reports a number of additional robustness checks. We first aggregate lending to the lender-borrower country-year level and then estimate regressions similar to Equation (3). Consistent with our lender-borrower-level results, column (1) shows that the interaction coefficients between lenders' crisis exposure and the non-bank dummy are negative and statistically significant. Controlling for time-varying borrower-country characteristics, a one standard deviation increase in crisis exposure results in a 7.6% relative contraction of aggregate lending by non-banks relative to banks. That is, not only do non-banks contract lending to individual borrowers, but also do so at the

[22] As noted above, credit lines comprise about 40% of all non-bank loans, compared to 50% for banks.

[23] Consistent with these arguments, we find that relationships narrow the lending gap by significantly less (close to 30%) among loans of type "term loan B", which are typically sold on the secondary market.

[24] Lead arrangers in our sample are defined as those classified as lead arranger in Dealscan and lenders whose role include the word "arranger", as well as those with the following role: lead bank, bookrunner, admin agent, syndications agent, documentation agent, agent, facility agent and security agent.

country level. Columns (2) and (3) show that, relative to banks, non-bank lending to public and private borrowers is reduced by a similar amount. In principle, investment banks could have close ties with banks. In column (4) we nevertheless find that results are robust to the exclusion of investment banks from our non-bank group. Column (5) keeps only lenders from the major markets (U.S., Japan and the UK) and finds that non-banks still contract their lending by more than banks during crises. Similar findings are obtained when we restrict the sample to major lenders, defined as those who contribute more than 10 billion USD in 2012 prices over our sample period (column (6)). We confirm in columns (7) and (8) that our main results remain robust when we use the growth rate of new credit as the independent variable.[25] Finally, column (9) shows that non-banks contract their lending by more than banks also along the intensive margin, i.e. when we do not account for the formation and termination of lending relationships.

5 Conclusion

The importance of non-bank financial institutions has steadily increased in recent decades. It has become a key objective of policy makers and academics to better understand their effects on credit supply, financial stability, and the real economy (Schnabel, 2021; Aramonte et al., 2022).

The rising footprint of non-banks could lead to a shift away from relationship towards transaction lending. With corporate indebtedness at historic highs (IMF, 2021), the strong contraction in non-bank lending to highly-leveraged borrowers is particularly worrying. Non-banks' rise could exacerbate the consequences for the real economy during episodes of negative shocks.

Existing policy proposals have mostly focused on the need to monitor non-bank financial institutions due to their contribution to liquidity stress in money markets (Quarles, 2020; Hauser, 2021; Hubbard et al., 2021). Our findings suggest that non-bank lending also warrants close attention. Moreover, while post Great Financial Crisis regulation has arguably made banks more resilient, non-banks' greater presence might offset some of these gains during crises.

[25] To account for variations in the extensive margin, the growth rate is defined as $\frac{Credit_{l,m,t}-Credit_{l,m,t-1}}{0.5(Credit_{l,m,t}+Credit_{l,m,t-1})}$ with $m = b$ (borrower) in column (7) and $m = c$ (country) in column (8).

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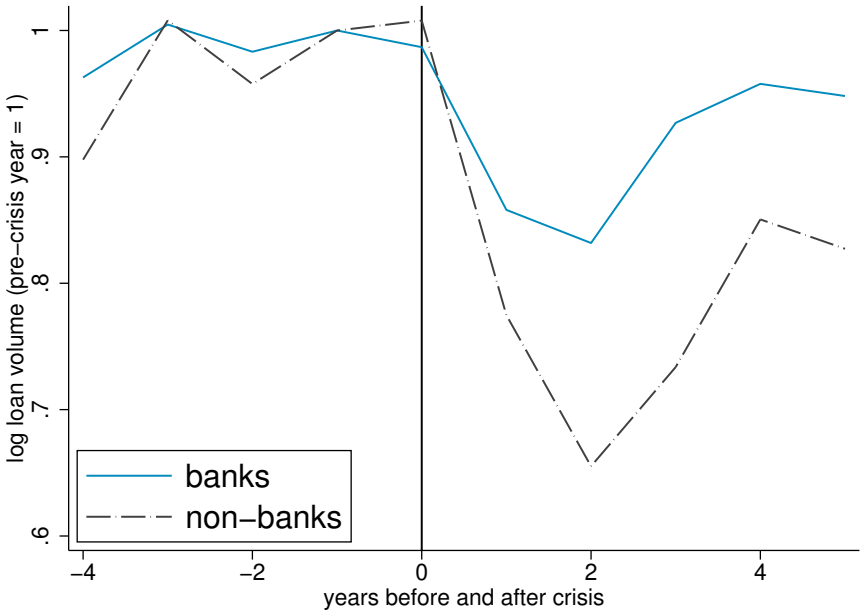
A Figures and tables

Figure 1: **Bank and non-bank lending during a crisis**



This figure plots the evolution of average new credit in logs in the years prior to, during, and after a financial crisis. Series are normalized to a value of one in the year of the crisis. A value of 0 on the x-axis denotes the year of the banking crisis in the borrower country. We split the sample into lending by banks (blue solid line) and non-banks (black dashed line). Both lender types see a decline in loan origination during the crisis and the following years, but non-banks see a stronger fall. There are no differential pre-trends.

Table 1: **Summary statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max	P50
total loan amount (mil 2012 USD)	360909	90.31	197.79	.013	13171.69	44.262
term loan amount (mil 2012 USD)	360909	26.398	105.352	0	9256.092	0
credit line amount (mil 2012 USD)	360909	54.264	120.585	0	7984.632	24.711
number of loans (intensive margin)	360909	1.614	1.058	1	27	1
all-in drawn spread (bps)	237820	166.104	123.848	15	625	138.863
log maturity (month)	355160	3.683	.668	2.118	5.375	3.963
country exposure	360909	.52	.363	0	1	.537
banking crisis	360909	.115	.319	0	1	0
crisis exposure (intensive margin)	360909	.061	.208	0	.992	0
crisis exposure (extensive margin)	1222273	.057	.2	0	.992	0
lending relation: duration (years)	1222273	2.081	3.193	0	29	1
lending relation: number of loans	1222273	1.591	1.993	0	46	1
industry lending share	1192719	.062	.154	0	1	.01
lender diversification	1222273	.526	.409	0	1	.561

This table reports summary statistics for the main variables in our analysis. For crisis exposure (see Equation (1)), it reports statistics for both the intensive and extensive margin sample.

Table 2: **Non-bank lenders and risky borrowers**

Panel (a): No fixed effects

VARIABLES	(1) country spread Pr(non-bank lender)	(2) industry spread Pr(non-bank lender)	(3) leverage Pr(non-bank lender)
high-risk indicator	0.117***	0.119***	0.023***
	(0.004)	(0.004)	(0.004)
Observations	465,002	465,002	404,845
R-squared	0.016	0.016	0.001
Borrower Country*Industry*Year FE	-	-	-

Panel (b): Within country-industry-year variation

VARIABLES	(1) country spread Pr(non-bank lender)	(2) industry spread Pr(non-bank lender)	(3) leverage Pr(non-bank lender)
high-risk indicator	0.180***	0.161***	0.040***
	(0.004)	(0.004)	(0.004)
Observations	464,757	464,757	404,845
R-squared	0.144	0.142	0.126
Borrower Country*Industry*Year FE	✓	✓	✓

This table reports results from a series of linear probability models relating the propensity to obtain syndicated loans from non-bank lenders to the riskiness of the borrowers (see Equation (2)). The dependent variable is an indicator of whether a firm borrows from a non-bank in a given year. Borrowers are classified as high-risk if the average all-in drawn spread is above the 75^{th} percentile within the headquarters country (column (1)) or within the 2-digit SIC industry (column (2)); or if the leverage is in top third tercile across all borrowers. Panel (a) reports bi-variate regressions with no fixed effects. Panel (b) adds country-industry-year fixed effects. Standard errors are clustered at the borrower level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3: **Non-banks supply less credit during financial crises**

VARIABLES	(1) log(credit)	(2) log(credit)	(3) log(credit)	(4) log(credit)	(5) log(credit)
crisis exposure	-0.460***	-0.395**	-0.187	-0.010	-0.023
	(0.168)	(0.162)	(0.185)	(0.082)	(0.074)
crisis exposure × non-bank		-0.679***	-0.790***	-0.380***	-0.314***
		(0.032)	(0.233)	(0.052)	(0.036)
Observations	1,222,273	1,222,273	1,220,620	1,220,523	1,220,491
R-squared	0.220	0.220	0.300	0.835	0.866
Lender*Borrower FE	✓	✓	✓	✓	✓
Year FE	✓	✓	-	-	-
Lender Parent*Year FE	-	-	✓	✓	✓
ILST FE	-	-	-	✓	-
Borrower*Year FE	-	-	-	-	✓

This table reports results at the lender-borrower-year level (see Equation (3)). The dependent variable is the log of new credit extended each year to each borrower. Crisis exposure is computed following Equation (1). Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 4: **Accounting for lending relationships and other potential determinants**

VARIABLES	(1) log(credit)	(2) log(credit)	(3) log(credit)	(4) log(credit)	(5) log(credit)
crisis exposure	-0.212***	-0.163***	-0.207***	0.003	-0.158***
	(0.061)	(0.058)	(0.053)	(0.080)	(0.057)
crisis exposure × non-bank	-0.167***	-0.124***	-0.118***	-0.282***	-0.106***
	(0.017)	(0.029)	(0.028)	(0.035)	(0.024)
relation: duration	-0.957***		0.274***		0.294***
	(0.050)		(0.031)		(0.032)
crisis exposure × duration	0.259***		0.052***		0.039***
	(0.021)		(0.017)		(0.014)
relation: frequency		-1.182***	-1.314***		-1.257***
		(0.067)	(0.080)		(0.084)
crisis exposure × frequency		0.222***	0.175***		0.174***
		(0.045)	(0.053)		(0.045)
industry lending share				1.849***	1.606***
				(0.171)	(0.145)
crisis exposure × industry lending share				0.036	0.132
				(0.148)	(0.133)
lender diversification				0.033	0.041
				(0.042)	(0.033)
crisis exposure × lender diversification				-0.024	-0.087**
				(0.046)	(0.038)
Observations	1,220,491	1,220,491	1,220,491	1,162,306	1,162,306
R-squared	0.871	0.879	0.879	0.869	0.880
Lender*Borrower FE	✓	✓	✓	✓	✓
Lender Parent*Year FE	✓	✓	✓	✓	✓
Borrower*Year FE	✓	✓	✓	✓	✓

This table reports results at the lender-borrower-year level (see Equation (3)). Columns (1)-(3) augment the baseline regression Equation (3) with measures of the strength of lending relationships (based on duration and intensity). Column (4) studies the role of industry specialization, with the share calculated as the amount of new lending extended by a lender to a 2-digit SIC industry as a share of total new lending originated by the same lender. Column (5) explores the importance of portfolio diversification, by including 1 minus the Herfindahl-Hirschman index of a lender's portfolio concentration in lending across borrower countries. The margin of analysis is the extensive margin. Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 5: **Spread and lending relationships**

VARIABLES	(1) spread	(2) duration spread	(3) duration spread	(4) intensity spread	(5) intensity spread
crisis	25.513***				
	(4.163)				
relation		-0.157	-0.060	-1.192***	-1.087***
		(0.115)	(0.125)	(0.199)	(0.219)
crisis × relation		-0.626***	-0.730***	-0.610***	-0.847***
		(0.078)	(0.112)	(0.132)	(0.132)
crisis × non-bank			-1.065		-1.695
			(2.060)		(2.390)
non-bank × relation			-1.451**		-1.740***
			(0.602)		(0.635)
crisis × non-bank × relation			1.872***		3.774***
			(0.209)		(0.382)
Observations	231,473	222,562	222,562	222,562	222,562
R-squared	0.869	0.990	0.990	0.990	0.990
Lender*Borrower FE	✓	✓	✓	✓	✓
Lender Parent*Year FE	✓	✓	✓	✓	✓
Borrower*Year FE	-	✓	✓	✓	✓

This table reports results at the lender-borrower-year level (see Equation (4)). The dependent variable is the average all-in-spread drawn between a lender-borrower pair, weighted by loan size. Column (1) includes the Laeven and Valencia (2020) financial crisis dummy as explanatory variable. Column (2) includes the duration of the lending relationship as the measure for relationship strength. Column (3) further includes interaction terms with the non-bank dummy. Columns (4) and (5) use relationship intensity. Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6: **Non-banks lend less to risky borrowers during crises**

VARIABLES	(1) DS country spread log(credit)	(2) DS country spread log(credit)	(3) DS industry spread log(credit)	(4) DS industry spread log(credit)	(5) CS lev log(credit)	(6) CS lev log(credit)
crisis exposure	-0.196**	-0.023	-0.187*	-0.023	0.021	0.020
	(0.093)	(0.042)	(0.094)	(0.041)	(0.127)	(0.137)
crisis exposure × non-bank	-0.087***	-0.027	-0.080***	-0.035	-0.779***	-0.495***
	(0.002)	(0.024)	(0.007)	(0.023)	(0.218)	(0.118)
exposure × high-risk borrower	0.185***	0.185***	0.061***	0.086***	-0.144***	0.046
	(0.008)	(0.039)	(0.007)	(0.018)	(0.034)	(0.028)
non-bank × high-risk borrower	0.176***	0.114***	0.094***	0.061***	0.087*	0.142***
	(0.012)	(0.013)	(0.015)	(0.011)	(0.052)	(0.050)
exposure × non-bank × high-risk borrower	-0.143***	-0.129***	-0.112***	-0.044**	-0.159**	-0.190***
	(0.026)	(0.013)	(0.016)	(0.019)	(0.071)	(0.043)
Observations	231,473	222,562	231,473	222,562	295,097	292,507
R-squared	0.778	0.938	0.778	0.938	0.455	0.698
Lender*Borrower FE	✓	✓	✓	✓	✓	✓
Lender Parent*Year FE	✓	✓	✓	✓	✓	✓
Borrower*Year FE	-	✓	-	✓	-	✓

This table reports results at the lender-borrower-year level (see Equation (3)). Risky borrowers are defined by a relatively high all-in-spread (above the 75^{th} percentile of all firms in the same country (column (1)-(2)) or in the same industry (column (3)-(4))). Column (5) and (6) define risk via a high-leverage indicator (upper tercile). Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7: **Real effect of non-bank dependence**

VARIABLES	(1) loan volume	(2) loan volume	(3) investment	(4) low connection loan volume	(5) low connection investment
crisis	-0.113**				
	(0.046)				
connected to non-bank		-0.551***	-0.000	-0.299***	-0.001
		(0.034)	(0.001)	(0.030)	(0.003)
crisis × connected to non-bank		-0.082**	-0.013***	-0.417***	-0.019***
		(0.040)	(0.003)	(0.059)	(0.003)
Observations	14,602	13,510	13,115	2,668	2,591
R-squared	0.139	0.247	0.333	0.488	0.444
Firm-level controls	✓	✓	✓	✓	✓
Borrower FE	✓	✓	✓	✓	✓
Year FE	✓	-	-	-	-
Borrower Ctry*Year FE	-	-	-	-	-
Borrower Ctry*Industry*Year FE	-	✓	✓	✓	✓

This table reports results at the borrower-year level (see Equation (5)). It shows the effects of having a connection to a non-bank during a crisis episode on firm-level outcome variables. The dependent variable in columns (1), (2), and (4) is the annual change in the total volume of syndicated lending. Columns (3) and (5) use the annual change in the investment rate, defined as the ratio between capital expenditure and fixed assets. Columns (4) and (5) focus on firms borrowing from a small number of lenders (first tercile of the distribution). Standard errors are clustered at the borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8: **Robustness tests – relationships**

VARIABLES	(1) log(credit)	(2) log(credit)	(3) credit line log(credit line)	(4) credit line + relation log(credit line)	(5) with LA info log(credit)	(6) LA*crisis log(credit)	(7) US log(credit)	(8) US log(credit)
crisis exposure	-0.001	-0.036	0.010	0.003	0.024	0.017		
	(0.065)	(0.057)	(0.027)	(0.032)	(0.034)	(0.031)		
crisis exposure × non-bank	-0.186***	-0.127***	-0.227***	-0.098***	-0.052**	-0.045*	-0.342**	-0.266**
	(0.015)	(0.023)	(0.023)	(0.037)	(0.024)	(0.025)	(0.143)	(0.110)
relation: amount	-0.532***	-0.295***						
	(0.029)	(0.034)						
crisis × amount	0.043	-0.016						
	(0.032)	(0.031)						
relation: duration		0.451***		0.279***	0.117***	0.109***		1.197***
		(0.024)		(0.046)	(0.012)	(0.011)		(0.175)
crisis × duration		0.021		0.039**	-0.027***	-0.025***		-0.261***
		(0.020)		(0.017)	(0.007)	(0.007)		(0.059)
relation: intensity		-0.930***		-0.940***	-0.080***	-0.083***		-2.090***
		(0.102)		(0.147)	(0.011)	(0.012)		(0.226)
crisis × intensity		0.144***		0.022	0.018	0.016		-0.274***
		(0.049)		(0.077)	(0.017)	(0.016)		(0.074)
lead arranger (LA)						0.255***		
						(0.022)		
crisis × lead arranger (LA)						-0.007		
						(0.018)		
crisis dummy						0.000		
						(0.000)		
Observations	1,220,491	1,220,491	1,220,491	1,220,491	360,225	360,225	65,300	65,300
R-squared	0.878	0.880	0.877	0.884	0.956	0.957	0.889	0.901
Lender*Borrower FE	✓	✓	✓	✓	✓	✓	✓	✓
Lender Parent*Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Borrower*Year FE	✓	✓	✓	✓	✓	✓	✓	✓

This table reports robustness checks on the value of non-bank lending relationship during crises. Columns (1) and (2) add one alternative measure of bilateral lending relationship intensity in each year – amount of lending normalized by total amount borrowed, both over the past five years. Columns (3) and (4) focus on the response of credit lines. Columns (5) and (6) restrict the sample to those with lead arranger (LA) information available and add a lead arranger dummy (and interaction with the banking crisis dummy). The margin of analysis is the extensive margin for columns (1)-(4) and (7)–(8) and the intensive margin for columns (5)-(6). Columns (7) and (8) restrict the sample to U.S. borrowers and lenders around the Great Financial Crisis. Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 9: **Further robustness tests**

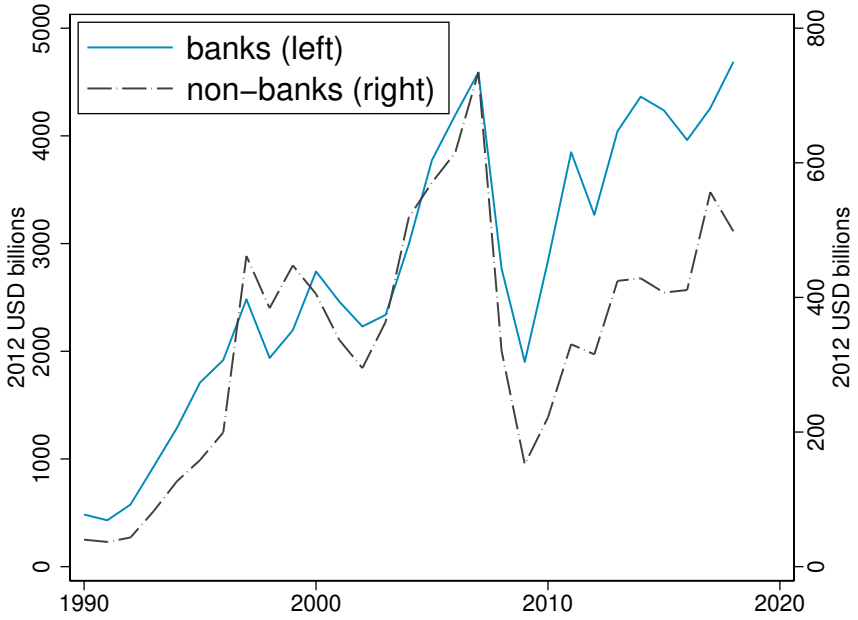
VARIABLES	(1) ctry level log(credit)	(2) public borrower log(credit)	(3) private borrower log(credit)	(4) no inv. bank log(credit)	(5) US/JP/UK lenders log(credit)	(6) major lenders log(credit)	(7) loan Δ credit	(8) ctry Δ credit	(9) intensive log(credit)
crisis exposure	-0.169	0.035	-0.067	-0.011	-0.096	-0.027	0.002	-0.083	-212**
	(0.156)	(0.073)	(0.062)	(0.056)	(0.063)	(0.067)	(0.060)	(0.177)	(0.095)
crisis exposure × non-bank	-0.378***	-0.348***	-0.324***	-0.368***	-0.217***	-0.267***	-0.329***	-0.216**	-0.107***
	(0.097)	(0.076)	(0.060)	(0.033)	(0.020)	(0.051)	(0.034)	(0.090)	(0.004)
Observations	163,881	435,872	580,340	1,184,108	658,166	900,549	1,220,491	163,881	360,294
R-squared	0.578	0.827	0.881	0.868	0.861	0.860	0.895	0.374	0.847
Lender*Borrower Ctry FE	✓	-	-	-	-	-	-	✓	
Lender*Borrower FE	-	✓	✓	✓	✓	✓	✓	-	✓
Lender Parent*Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Borrower Ctry*Year FE	✓	-	-	-	-	-	-	✓	
Borrower*Year FE	-	✓	✓	✓	✓	✓	✓	-	✓

This table reports various robustness checks and extensions. Column (1) collapses the data to lender-borrower country-year level and re-estimates Equation (3). Column (2)-(3) focus on the public and private borrower subset, respectively. Column (4) drops investment banks (classified as non-banks) from the analysis. Column (5) focuses on lenders headquartered in U.S., U.K. and Japan, and column (6) restricts the sample to lenders with at least 10 billion 2012 USD total lending over the sample period. Column (7) and (8) use the growth rate of new lending (extensive margin, $\Delta Credit_{l,m,t}/[0.5(Credit_{l,m,t} + Credit_{l,m,t-1})]$) as the independent variable, with m = borrower for column (7) and borrower country for column (8). Column (9) focuses on the intensive margin ($\log(credit)$). Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

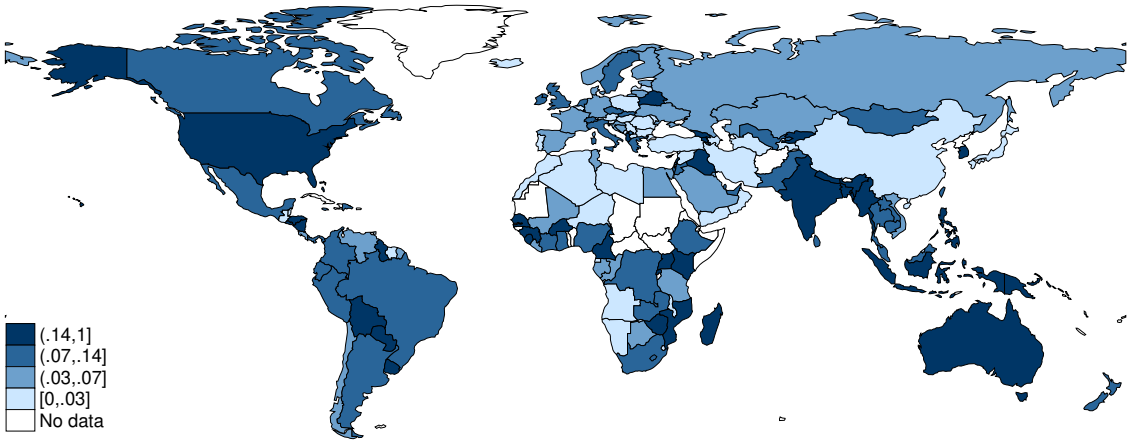
Online Appendix

Figure A1: **Non-bank lending across time and space**

(a) Bank and non-bank lending over time



(b) Country-level loan share of non-banks



Panel A1a plots total syndicated lending in 2012 USD billions by banks and non-banks over time. Panel A1b plots the share of syndicated lending (new credit) extended by non-banks to total syndicated credit by country, averaged over the sample period 1995-2018.

Table A1: **Summary statistics – Compustat sample**

Panel (a): Main variables

Variable	Obs	Mean	Std. Dev.	Min	Max	P25	P50	P75
connected to non-bank	43327	.343	.475	0	1	0	0	1
total syndicated loan volume	43327	1614.306	8117.456	.065	509062.9	72.668	255.891	903.99
total syndicated loan volume by non-banks	43327	178.397	1693.39	0	239620.3	0	0	43.377
total number of syndicated lenders	43327	15.488	31.002	1	1134	3	7	16
total number of syndicated non-bank lenders	43327	1.871	10.069	0	660	0	0	1
share of syndicated lenders that are non-banks	43327	.113	.238	0	1	0	0	.111
share of syndicated loan volume by non-banks	43327	.112	.241	0	1	0	0	.1
log(employees)	37191	1.282	1.923	-6.908	7.741	.02	1.361	2.6
log(total assets)	42819	6.955	1.908	-1.995	13.685	5.694	6.927	8.206
return on assets	42601	.063	.091	-.361	.286	.03	.066	.107
long-term debt to assets ratio	42861	.213	.164	0	.716	.085	.191	.31
short-term debt to assets ratio	42088	.283	.153	.037	.729	.167	.257	.374
leverage	42032	2.064	3.142	.114	24.283	.696	1.21	2.13
investment rate	41791	.126	.116	.006	.666	.053	.091	.155
sales growth	40385	.11	.278	-.754	1.302	-.013	.074	.199
log(sales per employee)	37074	5.595	1.005	3.113	8.423	4.978	5.524	6.153
interest coverage ratio	41412	22.009	53.54	-28.8	380.466	3.543	7.712	17.295

Panel (b): Differences between bank and non-bank borrowers

	no NB lender		**has NB lender**		**mean diff.**
	mean	sd	mean	sd	t
total syndicated loan volume	850.76	(4634.32)	3077.76	(12156.14)	-27.34
total syndicated loan volume by non-banks	0.00	(0.00)	520.32	(2861.15)	-30.69
total number of syndicated lenders	9.55	(15.41)	26.87	(46.38)	-57.26
total number of syndicated non-bank lenders	0.00	(0.00)	5.46	(16.62)	-55.42
share of syndicated lenders that are non-banks	0.00	(0.00)	0.33	(0.31)	-181.18
share of syndicated loan volume by non-banks	0.00	(0.00)	0.33	(0.32)	-175.43
log(employees)	1.08	(1.86)	1.66	(1.98)	-27.93
log(total assets)	6.70	(1.85)	7.45	(1.92)	-39.13
return on assets	0.06	(0.09)	0.06	(0.09)	1.33
long-term debt to assets ratio	0.19	(0.15)	0.26	(0.17)	-46.92
short-term debt to assets ratio	0.30	(0.15)	0.26	(0.15)	24.50
leverage	1.83	(2.74)	2.51	(3.77)	-21.02
investment rate	0.13	(0.12)	0.13	(0.11)	-1.54
sales growth	0.10	(0.27)	0.12	(0.29)	-5.28
log(sales per employee)	5.57	(0.98)	5.64	(1.04)	-6.24
interest coverage ratio	26.03	(59.24)	14.35	(39.43)	21.21
Observations	28472		14855		43327

This table reports summary statistics at the borrower-year (firm) level. The sample of firms include borrowers identifiable by both the Compustat and the Dealscan datasets. Panel (b) splits the borrowers into two groups, those that borrow from non-banks and those that do not, and) compares the differences in means by reporting t-statistics. We calculate the return on assets as operating income net of depreciation over total assets. Leverage is defined as long term debt plus current liabilities over equity. The interest rate coverage ratio is computed as earnings (EBITDA) over interest expenses.

Table A2: **Lead arranger and country / crisis exposure: Deal-level correlations**

Panel (a): Country exposure

VARIABLES	(1) all lenders P(lead arranger)	(2) bank only P(lead arranger)	(3) non-bank only P(lead arranger)	(4) all lenders: interaction P(lead arranger)
country exposure	-0.031	-0.033	-0.013	-0.033
	(0.065)	(0.069)	(0.081)	(0.069)
country exposure × non-bank				0.020
				(0.085)
Observations	1,030,231	915,750	114,481	1,030,231
R-squared	0.261	0.252	0.340	0.261
Lender Parent × Year FE	✓	✓	✓	✓

Panel (b): Crisis exposure

VARIABLES	(1) all lenders P(lead arranger)	(2) bank only P(lead arranger)	(3) non-bank only P(lead arranger)	(4) all lenders: interaction P(lead arranger)
crisis exposure	-0.316*	-0.338*	-0.179	-0.338*
	(0.182)	(0.194)	(0.159)	(0.194)
crisis exposure × non-bank				0.159
				(0.172)
Observations	1,030,231	915,750	114,481	1,030,231
R-squared	0.263	0.254	0.341	0.263
Lender Parent × Year FE	✓	✓	✓	✓

This table reports results at the syndicated deal level. Panel (a) compares the correlations between a lender's propensity of serving as the lead arranger and its exposure to the country of the borrower. Panel (b) focuses on the correlation between being the lead arranger and the lender's exposure to the borrower's financial crisis. The dependent variable is a dummy indicating whether a lender serves as the lead arranger (identified by the DealScan dataset) for a specific deal. Column (1) in both panels reports results from the entire sample of deals. Columns (2) restricts the sample to bank lenders and columns (3) to non-bank lenders. Columns (4) uses the entire sample of deals but adding the interaction between country or crisis exposure and the non-bank identifier to the regressions. Standard errors are clustered at the lender parent and borrower country level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

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