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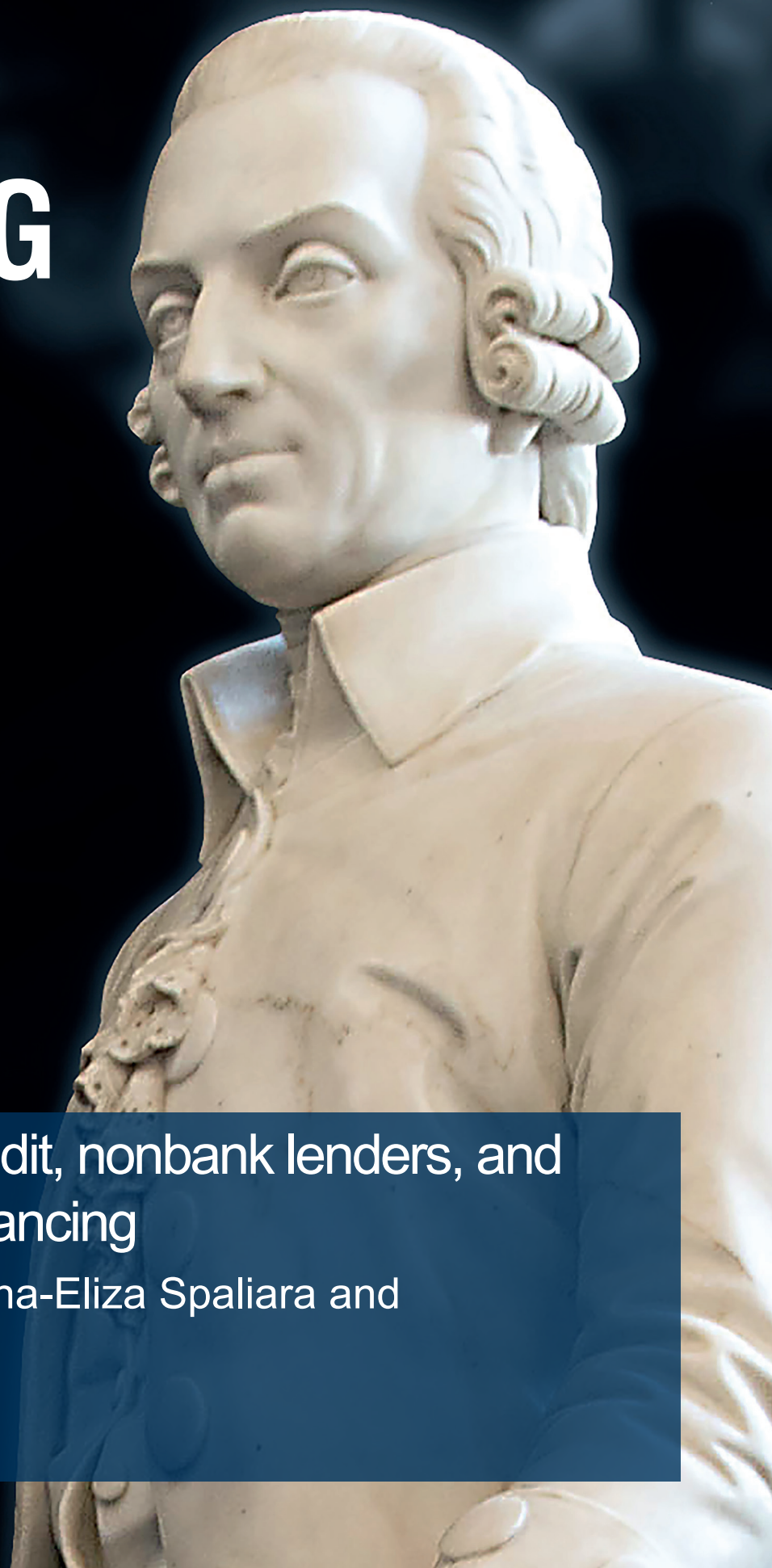

International bank credit, nonbank lenders, and access to external financing

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Abstract

Using a cross-country firm-bank dataset, we examine how an unexpected increase in bank capital requirements by the European Banking Authority (EBA) affects firms' financial choices. Our results first suggest that the regulatory shock implies a reduction in the supply of bank credit, with US firms affected the most. Yet, following the capital exercise, US firms are able to tap into the public bond markets and secure credit lines from nonbank financial institutions. This has implications for their capital structure and their real outcomes. These results suggest that diversified domestic loan markets, in which banks and nonbank financial institutions lend to corporations, can help overcome reductions in cross-border bank funding.

Keywords: International bank credit, nonbank lenders; external financing.

JEL Classification: G32, E22, F32, D22

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1 Introduction

Recent and previous financial crises highlight that disruptions in credit markets have large consequences on economic activity (see for detailed reviews Berger, Molyneux and Wilson, 2020; Gueller, Mariathasan, Mullier and Okatan, 2021). In principle, firms can switch to alternative sources of funding when bank lending is impaired. However, other sources of external financing are not perfect substitutes or may not be accessible (Diamond, 1991), especially during extreme economic events (Fernández, González and Suárez, 2018; Goel and Zemel, 2018). In this paper, we investigate how an unexpected increase in bank capital requirements affects firms' access to external financing, using a cross-country sample of bank-dependent public firms. In the first empirical step we use the technique in Khwaja and Mian (2008) to examine whether the EBA capital exercise induces a reduction in the bank credit supply to both US and non-US firms. In addition, we investigate the role nonbank financials play in filling the funding gap among banks. Specifically, we analyze whether bank retrenchment effectively constrains firms' access to credit, or whether firms can overcome reduced credit supply by issuing corporate bonds or securing loans from nonbank financial institutions. Finally, we investigate the real effects of the regulatory change, paying attention to corporate liquidity and investment policies.

For identification, we use an unexpected increase in bank capital requirements that affected only (a subset of) European Union (EU) banks, which allows us to isolate a supply shock to bank credit, independent of contemporaneous changes in firms' demand for financing. Specifically, we use deal-level (syndicated loan and bond) data to enhance the corporate debt structure, including the composition of bank creditors. Using firm-bank matched data for 2009Q3 to 2014Q1 we exploit the October 2011 EBA announcement, which increased the minimum Core Tier 1 ratio to 9% by the end of 2011 and to 10% by the end of 2012; it also triggered international deleveraging among EU banks.[1] The increase, which we call –"the

[1]Throughout the paper we mention that the requirement is imposed on EU banks, although it also affects banks in the European Economic Association (EEA), which includes the EU countries plus Iceland, Liechtenstein, and Norway.

EBA capital exercise"– was sizable and left some EU and all non-EU banks unaffected.[2] Importantly, the EBA capital requirements were set on a consolidated basis, so the affected banks could opt to shy away from domestic or international corporate customers.

To conduct the analysis, we construct a cross-country panel of bank-dependent firms, defined as those with at least one outstanding loan at the onset of the EBA capital exercise. Our sample includes companies that borrow from EBA-eligible banks with large shortfalls to address, as well as companies that have outstanding loans from non-EBA-affected banks. Therefore, we exploit that not all firms are affected in the same way, and the identification comes from cross-sectional differences in firms' exposures to EBA-affected banks and their corresponding shortfalls. We further narrow the sample by removing firms that do not have an outstanding loan vis-à-vis European banks. Additionally, we select firms that disclose financial information; that is, we choose public firms and other large private companies that are likely to have access to the bond markets. We end up with a sample of 2,830 firms, of which 1,117 are incorporated in the EU, 1,415 in the US, and 215 in other advanced economies. Hence, the final sample is very well suited to exploring a reduction in international bank credit, triggered by the tightening of bank capital requirements in the EU.

Our baseline findings suggest that banks with higher capital shortfalls reduce credit to all firms, hitting US firms the hardest. This finding sets the stage for the firm-level analysis, which proceeds as follows. First, we find that firms raise their nonbank credit lines and bond borrowing relative to the pre-policy period. Our study further documents that the US firms hit by the cut in EU bank lending and switching to nonbank loans modify their financing mix. Taken together, our main conclusion is that US firms are able to smooth the contraction in bank credit by resorting to nonbank financial intermediaries and increasing their bond issuance. Finally, firms that modify their nonbank credit lines raise moderately their investment, ROA and trade credit compared to the pre-policy period.

[2]This explains its appeal as an opportunity for analyzing domestic credit flows (Gropp, Mosk, Ongena and Wix, 2019) or banks' decisions to grant collateralized rather than uncollateralized loans (Degryse, Karapetyan and Karmakar, 2021).

Our paper makes two main contributions to the literature. First, we add to the literature investigating how shocks to bank lending affect corporate financial decisions. Becker and Ivashina (2014) show that bond issuance increases relative to bank financing when lending standards tighten. Goel and Zemel (2018) document that only high-quality firms switch to bonds when bank credit supply stalls. Fernández et al. (2018) show that nonbank private debt can partially substitute for the contraction in bank credit–in particular in countries with strong creditor rights. We go beyond these studies and analyze separately the evolution of bank term loans and credit lines (including undrawn commitments), and we document that a significant share of the contraction in international bank lending relates to term loans rather than credit lines offering new insights.

Second, we offer new evidence on how nonbank financial institutions cushion a reduction in international bank lending. Previous research shows that deposit-taking institutions are well-suited to provide liquidity insurance to corporates, because deposit flows and credit line drawdowns typically move in opposite directions (Kashyap, Rajan and Stein, 2002). In addition, evidence suggests that stricter bank regulation is related to an increase in nonbank lending (Buchak, Matvos, Piskorski and Seru, 2020) and in nonbank participation in the syndicated loan market (Irani, Iyer, Meisenzahl and Peydró, 2021). Our analysis finds that nonbank financial institutions smooth out fluctuations in bank credit supply. Hence, we posit that nonbank financial institutions compensate for the shortage of bank loans.

The remainder of the paper is structured as follows. Section 2 discusses institutional aspects concerning corporate borrowing and develops testable hypotheses. Section 3 describes the data and presents summary statistics. Section 4 describes our methodology. Section 5 presents the main empirical results. Section 6 provides robustness checks, and section 7 concludes.

2 Institutional background and hypotheses

2.1 Firms' financial choices

Understanding basic institutional aspects of corporate borrowing is important to explore the role domestic credit markets may play in international bank lending. A key insight is that large firms raise debt from three major sources: bond markets, bank lenders, and nonbank lenders.

Bond issuance is an important source of external financing, but it may not attenuate an adverse shock to bank credit for two reasons. The first, which is well known, is that loan markets better satisfy the funding needs of smaller, more opaque, or riskier companies (Diamond, 1991; Faulkender and Petersen, 2006). This reflects, respectively, that loans have lower flotation costs than bonds (e.g. no need to register a security), loan markets better address informational asymmetries between borrowers and lenders, and loan markets better handle liquidation and renegotiation in case of distress. Bond markets are appealing to large and public firms, as they can help raise large amounts of funds.[3] Consequently, switching from loans to bonds when bank credit is interrupted is difficult for many companies, including large ones and public ones, especially if they lack previous market experience (Goel and Zemel, 2018).

The second reason, often neglected, is that a significant fraction of bank loans are not term financing, but are credit line commitments, also known as revolving loans. Firms typically secure credit lines as a liquidity insurance, which eventually allows them to exploit potential business opportunities as they arise (Lins, Servaes and Tufano, 2010). Credit lines do not imply an effective disbursement at origination. Providing credit lines has been one of the traditional functions of banks, as they smooth liquidity demand on the asset side via credit lines, and on the liability side via sight deposits (Kashyap et al., 2002). Bond markets,

[3] An additional appealing characteristic of the bond markets is that they provide more financial flexibility to make investment decisions, which implies that creditors do not actively monitor how companies use the proceeds during the length of the debt contract (Rajan, 1992).

on the other hand, provide term financing and therefore are not a viable alternative to credit lines.

In summary, these aspects suggest that bond markets may not fully smooth a cut in bank credit when it dries up. Nonbanks may be a workable alternative as major providers of credit lines. Figure 1 shows the fraction of loans granted to non-US corporates (panel A) and US corporates (panel B), split by type of instrument and lender into four categories: bank term loans, bank credit lines, nonbank term loans, and nonbank credit lines. We observe that for US corporate borrowing, nonbanks provide around 20% of all credit lines. Thus, they may be in a good position to attenuate a bank funding shock.

2.2 The EBA capital exercise

The EBA capital exercise in October 2011 was aimed at restoring confidence in the EU banking sector by ensuring that banks were adequately capitalized to mitigate unexpected losses. The focus was primarily on banks' exposure to sovereign debt. Specifically, the EBA decision required a subset of European banks to raise their Core Tier 1 capital ratio to 9% by June 2012. This exercise occurred in the backdrop of adverse developments in European capital markets following the sovereign debt crisis.

The capital-exercise banks were selected to build additional capital buffers based on total assets, while leaving requirements unchanged for all other banks. In each country, the EBA sorted banks in descending order of their market share by total assets, such that the exercise covered at least 50% of the national banking sector. The EBA capital exercise was unexpectedly announced soon after the stress tests conducted in July 2011 (Mésonnier and Monks, 2015; Gropp et al., 2019; Blattner, Farinha and Rebelo, 2021; Degryse et al., 2021). Hence, the EBA capital exercise was plausibly unexpected and serves as a regulatory capital shock on bank credit supply to firms.

2.3 Hypotheses

We first seek to understand the response of banks exposed to the EBA capital exercise to the supply of credit to firms. There is a strand of work that shows that bank shocks matter for loan supply (e.g. Khwaja and Mian, 2008; Bentolila, Jansen, Jiménez and Ruano, 2018; Jiménez, Ongena, Peydró and Saurina, 2017). In the context of the EBA intervention, De Jonghe, Dewachter and Ongena (2020), Fraisse, Lé and Thesmar (2020) and Blattner et al. (2021) report a decline in corporate lending. However, financial shocks and capital constraints are transmitted internationally (Giannetti and Laeven, 2012; Cetorelli and Goldberg, 2011; De Haas and Van Horen, 2012, 2013) and can affect small and medium-sized enterprises' (SMEs) access to bank credit (Popov and Udell, 2012; Ongena, Peydró and Van Horen, 2015). This expectation is enhanced by some features of the EBA capital exercise, which we use to identify the shock to the supply of international bank credit. Specifically, the initiative aimed at ensuring that "bank adjustments did not contract the flow of lending to the EU's real economy" (EBA, 2011). Motivated by these considerations, we expect that the EBA regulatory shock contracts bank credit to firms incorporated outside the EU more heavily compared to their counterparts.

Second, we explore the channel through which the increase in bank capital requirements can negatively impact on corporates' access to bank credit. Specifically, we investigate whether banks cut credit lines, term loans, or both. Two aspects may condition their choice, and pull the final outcome in different directions. For one, term loans imply an effective disbursement, whereas credit lines constitute contingent liquidity. However, credit lines are more illiquid, because unlike term loans they cannot be sold in the secondary market after origination. Therefore, credit lines expose banks to stronger pipeline risks (Bord and Santos, 2012). Whether banks prefer to cut term loans or credit lines remains an empirical issue, but some aspects suggest that capital-constrained banks may be reluctant to extend credit lines. Indeed, credit line usage can sharply increase after adverse economic shocks (Greenwald, Krainer and Paul, 2012), putting significant pressure on banks' capital ratios.

Third, our expectation is that firms can compensate for reduced credit supply from banks by relying on certain nonbank sources of external financing. Specifically, investment banks borrow in wholesale funding markets, so they are heavily exposed to liquidity risks on the liability side. This reliance on short-term funding makes them similar to deposit-taking institutions and enables them to provide credit lines (Kashyap et al., 2002). In addition, prior literature shows that tighter bank regulation is associated with an increase in nonbank lending (Buchak et al., 2020) and in nonbank participation in the syndicated loan market (Irani et al., 2021). Also, recent evidence by Elliot, Meisenzahl and Peydró (2021) suggests that nonbank lenders act as shock absorbers from US monetary policy changes. Finally, when it comes to other sources of nonbank financing, we posit that bond markets provide an additional source of financing for larger companies when tight monetary conditions or adverse economic events restrict access to bank financing (Borensztein, Cowan, Eichengreen and Panizza, 2008; Becker and Ivashina, 2014).

The last hypothesis centers around the implications for firms' real activities. Most of the nonbanks providing credit lines are investment banks, which rely on wholesale short-term funding. Because nonbanks can raise short-term funding more quickly than banks, access to nonbank credit lines is likely to support firms' investment and growth, leaving their cash holdings unchanged.[4]

3 Data

3.1 Data description

We construct a firm-level quarterly panel for the period 2009Q3 to 2014Q1 by combining two data sources. We first obtain firms' financial statements from Capital IQ, including

[4]Having said this, if firms perceive that wholesale liabilities are more fickle than bank deposits, they may be reluctant to invest and thus hoard cash. Along these lines, banks with larger deposits and lower levels of short-term debt are less able to cope with large credit line drawdowns (Ivashina and Scharfstein, 2010; Cornett, McNutt, Strahan and Tehranian, 2011). Hence, we hypothesize that the uptake of nonbank credit lines will have real effects.

balance sheets, cash flow statements, income statements, key financial ratios, and reference data (sector, country of incorporation, etc). To enhance the capital structures that companies disclose in their financial statements, we retrieve information about 223,211 bonds and 229,608 syndicated loans from nonfinancial firms from Refinitiv SDC Platinum. In the syndicated loan data, we include both term loans and (potentially undrawn) credit lines. We exclude bridge loans, as they may expire before their original maturity date. To classify loans as term loans or credit lines, we use the description of the tranche facility provided by Refinitiv. Term loans include term financing for project finance or capital expenditures. Credit lines are all revolving line facilities, receivables, trade finance instruments (letters of credit), and liquidity lines. When the tranche simultaneously provides term financing and a credit line (around 1% of the observations), we split them pro-rata. We use the bond and syndicated loan data to generate firm-level credit stocks. Specifically, we produce three measures of outstanding debt: (1) bonds, (2) bank loans, and (3) loans from nonbank financial intermediaries (nonbanks).

We analyze borrowers (firms) and lenders (banks and nonbanks) on a consolidated basis, so an international loan is one in which the (ultimate) parent of the borrower and the lender are in different countries. The reason we consolidate all loans at the ultimate parent of the lender is that the EBA capital requirements were set on a consolidated basis.[5] Additionally we consolidate all loans and bonds at the ultimate parent of borrower to avoid biases as firms may borrow through SPVs incorporated overseas (Avdjiev, McCauley and Shin, 2016).[6]

Throughout the analysis we focus on the lead arranger, as it is in charge of monitoring borrowers and attracting investors (Sufi, 2007). When a loan has several lead arrangers, we treat each as a different lender. We classify lead arrangers as banks or nonbanks according to their funding structure, following the post-crisis definition of the shadow banking system (FSB, 2011; Pozsar, Adrian, Ashcraft and Boesky, 2012). Consequently, banks are deposit-taking institutions and other lenders relying on stable funding (e.g. savings banks). Nonbanks

[5] Additionally, many bank affiliates are subject to individual capital requirements.
[6] We do not observe loans or bonds issued by independent affiliates (i.e., listed firms).

include the rest of the lenders, the majority of which are investment banks (security-broker dealers).[7] To implement this classification, we use the NAICS and the TRBC system. Banks are those using NAICS code 5221, as are other banks that are not investment banks in the TRBC.[8]

We construct the list of creditors of each firm derived from syndicated loans, defined as those lenders with an outstanding loan to a firm. To assess if a loan is outstanding, we use issuance and maturity date. This measure of firm-bank dependency is therefore bilateral and time-varying. Using such list of creditors of each firm in each quarter, we impose three filters to define a homogeneous sample of bank-dependent firms. First, we define a firm as bank-dependent if it has an outstanding loan vis-á-vis a lead arranger banks. Second, we keep companies that have at least one outstanding loan vis-á-vis lead bank headquartered in the EU. This controls for potential assortative matching between firms and banks. This may be particularly important for non-EU firms, as those not borrowing from EBA banks may be very different –perhaps having a more regional focus. Third, we select only listed companies, or those that already disclose financial information.

We merge the firm-level measures of credit stocks with the accounting data from Capital IQ using firms' ISINs and LEIs, which uniquely identify them in both. Following normal selection criteria used in the literature, we control for the potential influence of outliers by excluding observations in the 1% upper and lower tails of the distribution of the regression variables. Our final sample includes 2,830 firms, of which 1,177 are based in the EEA, 1,415 are based in the US, and 215 are based in other developed economies.

[7]The group of nonbank lenders includes financial institutions subject to bank-like capital requirements but that do not take deposits. See Claessens, Pozsar, Ratnovski and Singh (2012) for a discussion.

[8]NAICS stands for the North American Industry Classification Scheme, which superseded the SIC in 1987. The NAICS maps the UN International Standard Industrial Classification of All Economic Activities (ISIC). TRBC stands for the Thomson Reuters Business Classification, which is a market-based system classifying firms into 10 economic sectors, 136 industries, and 837 activities. Appendix A2 provides further details on the sectoral classification of financial intermediaries.

3.2 Sample analysis

In table 1 we report descriptive statistics of the variables in the empirical models. We report these values for the whole sample. The bank-firm statistics highlight that the average outstanding loan in logs is 1.93 and our exposure measure is 0.05. At the firm-level, the average firm is well collateralized, holds considerable stock in bonds and bank loans, relies moderately on bank term loans and nonbank credit lines and has low level of nonbank term loans, trade credit and bank credit lines.

Figure 2 gives a preliminary glimpse at the evolution of term loans and credit lines over a long time period.[9] Both types of financing are important and show an upward trend, especially after 2011. In addition, we show the relative importance of credit lines and term loans raised by firms in figure 3. Inspecting the expected use of proceeds at origination, we observe that term loans and credit lines differ in their purpose. The former are for specific uses (e.g. to finance capital expenditures); the latter allow firms to secure liquidity and exploit business opportunities as they arise (Lins et al., 2010). This is reflected in the lack of detail in the intended use of credit lines at origination; often they are raised for "general corporate purposes."

4 Empirical strategy

4.1 EBA and the supply of bank credit

To identify how the policy exercise affects firms' liabilities, we need to analyze a supply shock to bank credit, which is uncorrelated with firms' demand for financing. Tackling this issue is challenging because many shocks to bank credit are large enough to impair the overall demand for credit. For example, around the same time as the EBA capital exercise, Ivashina, Scharfstein and Stein (2015) show that US money market funds sharply reduced their short-

[9] The importance of term loans and credit lines for firms is further highlighted in figures A1 and A2 in the appendix.

term lending to European banks, leading to significant violations of the euro-dollar covered interest parity and a drop in dollar lending by European banks. This affacted banks that relied more heavily on money market funds (Popov and Van Horen, 2015).

To address this issue, we identify the credit supply effects at the bank-firm level. We follow the established empirical literature on credit supply and run a Khwaja and Mian (2008)-style regression to identify how the EBA capital exercise affects bank credit supply, considering the observed and unobserved determinants of credit demand. We estimate the following equation:

$$logCredit_{ibt} = \beta_1 Shortfall_{b2011} + \alpha_{it} + \epsilon_{ibt} \tag{4.1}$$

where the dependent variable is the natural logarithm of outstanding credit from bank b to firm i at time t. The data span the period 2009Q3 to 2014Q1. $Shortfall$ is the bank-level capital shortfall estimated and published by the EBA in December 2011. α_{it} is a time-varying (firm*time) firm fixed effect that controls for all observed and unobserved heterogeneity (firm-level credit demand, firm quality, riskiness, etc.). Thus, we control for any firm-specific demand-side factors that might affect credit supply. The coefficient on β_1 indicates the extent to which banks with varying degrees of shortfall adjust their lending to the same borrower. Finally, we cluster the standard errors at the bank level.

4.2 The effect on bank credit

In the next empirical step we aggregate the firm-bank matched data at the firm-quarter level. We focus on the US sample of firms, which is an ideal laboratory for two main reasons. First, banks seem to cut international lending first, due to the "flight home effect," whereby they prefer to adjust their exposures to foreign corporations (Cetorelli and Goldberg, 2011; De Haas and Van Horen, 2012; Popov and Udell, 2012; Giannetti and Laeven, 2012). Hence, US firms are likely to be associated with the higher degree of fluctuations in bank credit supply.

Second, we recognize that corporate bond markets in the majority of jurisdictions are small and have limited liquidity (BIS, 2016; Bhatia, Mitra, Weber, Aiyar, de Almeida, Cuervo, Santos and Gudmundsson, 2019). In these jurisdictions the lack of substitution from bank loans toward bonds may just signal that markets lack depth and not that corporate bond markets cannot per se smooth cuts in bank credit. The US market, on the other hand, is large and liquid from the outset. Thus, it provides a viable alternative form of financing that can absorb credit disruptions. Formally, we estimate the following equation:

$$F_{it}^{X} = \beta_1 Exposed_i * Policy_t + \beta_2 Exposed_i * Post_t + \beta_3 Controls_{it-1} + \alpha_i + \gamma_{st} + \epsilon_{it} \quad (4.2)$$

where F_{it}^{X} denotes the stock of liabilities of type X for firm i in quarter t. The dependent variables, which are bank credit, bank term loans, and bank credit lines, are expressed in logarithms. *Exposed* takes the form of a Bartik-type variable to measure the exposure of firms to the EBA capital exercise.[10] We compute the exposure variable as follows:

$$Exposed_i = \sum z_{ibpre} \times Shortfall_{b2011}$$

where the pre-EBA importance of each bank to a firm (z_{ibpre}) is the "share" of the average amount of outstanding credit from EBA–affected banks to the total amount of credit from all banks over the pre-EBA capital exercise period (2009Q3-2011Q2). $Shortfall$ is the "shock". We date the EBA announcement in 2011Q3, because we use quarterly data, and the decision to implement the policy was taken in October 2011. *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise.[11] *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise.

[10] A burgeoning literature uses shift-share instruments, especially in economics and finance (see, for example, Goldsmith-Pinkham, Sorkin and Swift, 2020; Borusyak, Hull and Jaravel, 2021; Xu, 2021).

[11] The exercise started in 2011Q3 and ended in 2012Q2.

Our interest lies in the interactions between $Exposed^*Policy$ and $Exposed^*Post$, which show how firms' financial choices respond to EBA-affected banks' shortfall in the policy and the post-policy period. Obtaining negative coefficients for β_1 and β_2 would support the hypothesis that bank credit contracts for firms whose lenders are exposed to the EBA regulatory exercise.[12] To ease interpretation of the results, we standardize the dependent variable with its average value in 2010Q2.

The models include additional controls as follows: firm fixed effects (α_i) to account for unobserved firm heterogeneity and sector*time fixed effects (γ_{st}) to control for other industry and time-varying shocks. Finally, we cluster the standard errors at the firm level. We take into account factors that influence firms' choices of external financing: firm size (total assets), the ratio of tangible to total assets, and trade credit. We lag the firm-level controls by one time period to mitigate endogeneity concerns. Size accounts for the fact that larger firms typically have better access to external financing, as they are less likely to be financially constrained (Bose, McDonald and Tsoukas, 2019). In addition, the ratio of tangible assets to total assets proxies for firms' ability to pledge collateral for external financing. A stylized fact in the literature is that firms with more collateral are able to raise financing from banks and public markets more readily relative to their counterparts (Erel, Julio, Kim and Weisbach, 2012). Last, Casey and O'Toole (2014) show that during the global financial crisis, financially constrained firms in the euro-area used more trade credit as an alternative to bank lending than their unconstrained counterparts did. Amberg, Jacobson, von Schedvin and Townsend (2021) use a plausibly exogenous shock to liquidity demand for firms; they find that this shock leads to an increase in the use of trade credit and a decline in firms' cash accumulation. To satisfy this increased demand for trade credit financing, more trade credit needs to be extended. Garcia-Appendini and Montoriol-Garriga (2013) show that larger US firms indeed extended more trade credit to their financially constrained counterparts during

[12] An alternative modelling strategy consists of collapsing the time dimension of the quarterly dataset into two single-time periods. We opt for using our quarterly frequency and examine the dynamics of the transmission of the capital shock to firms.

the global financial crisis.

4.3 Implications for financial choices

To identify a potential switch in financing choices, we estimate equation 4.2 using as dependent variables three types of credit: bonds, nonbank term loans, and nonbank credit lines. In addition, given that firms, whose lenders are exposed to the EBA capital exercise-are likely to alter their financial mix, we investigate implications for firms' capital structure. We do so by estimating equation 4.2 using the following dependent variables: bank credit to total assets, bank term loans to total assets, bank credit lines to total assets, bonds to total assets, nonbank term loans to total assets, and nonbank credit lines to total assets.

4.4 EBA exercise and outcome variables

We now analyze how the EBA affects outcome variables. Specifically, we examine how firms' cash accumulation, investment, return on assets, and trade credit respond to increases in nonbank borrowing for firms borrowing from banks exposed to the EBA exercise. We estimate the following empirical model:

$$F_{it}^{X} = \beta_1 Increase_{NBCLi} * Policy_t + \beta_2 Increase_{NBCLi} * Post_t + \beta_3 Controls_{it-1} + \alpha_i + \gamma_{st} + \epsilon_{it} \tag{4.3}$$

where F_{it}^{X} is cash to total assets (CA), investment over property, plant and equipment (Investment), return on equity measured by net income to total assets (ROA), and trade credit as measured by accounts payable to total assets (TC). $Increase_{NBCL}$ is a binary variable that equals 1 for firms dependent on EBA-exposed banks and whose volume of nonbank credit lines to total assets increases in 2011Q3–2014Q1, and 0 otherwise. This variable is likely endogenous to firms' real activities. Hence, we apply an instrumental variable method (two-stage least squares 2SLS) to deal with the potential endogeneity of

our explanatory variable. As a plausible exogenous instrument for the increase in nonbank borrowing, we use the $Exposed_i$ Bartik instrument defined earlier. The intuition is that the exposure variable is correlated with the rise in nonbank credit lines, but does not directly affect firms' outcome variables. The main variables of interest are the interaction terms $Increase_{NBCL} * Policy$ and $Increase_{NBCL} * Post$, which reflect how during and after the exercise nonbank credit lines affect outcome variables for firms whose lenders are exposed to the policy change. The interactions will allow us to assess whether the effects on outcome variables are short or long term.

5 Results

5.1 EBA and the supply of credit

We first examine how the EBA exercise affects credit availability. Table 2 shows the results of estimating equation 4.1. In column 1 we investigate whether banks with higher capital shortfalls cut credit to all firms. The coefficient on $Shortfall$ points to a significant drop in credit if banks have to bring large capital shortfalls to zero. Columns 2 and 3 report the results when we split the sample between firms headquartered in the EU and the US, respectively. We find that the negative effect of the capital shortfall persists and becomes even stronger for US firms. Put differently, the estimates suggest that US firms that borrow from banks that have large capital shortfall to address face a tighter credit supply. In terms of economic magnitudes, we find that a 10% increase in the shortfall of the lending bank results in a 0.75% reduction in credit availability for EU firms, while US firms experience a drop in credit supply of 1.56%, which is approximately 2 times larger than the former value. Finally, in column 4 we present estimates of the double interaction term $Shortfall$*$US\ firms$ using on the whole sample. We find that the interaction term is negative and statically significant corroborating our main finding that US firms respond more strongly to the reduction of credit supply. Our findings support earlier research showing that deleveraging the financial sector

through reinforcement of banks' capital positions is likely to reduce bank lending (Brun, Fraisse and Thesmar, 2017; Jiménez et al., 2017; Gropp et al., 2019). Therefore, consistent with our first hypothesis, the EBA exercise translates into a reduced supply of loans to all firms, with US firms affected the most.

5.2 The impact of EBA exercise on term loans and credit lines

Having identified a link between EBA capital exercise and bank credit, our aim is to understand whether the constraints in access to bank credit among US firms occur through cuts to term loans or credit lines. To explore this issue empirically, we zoom into US firms and investigate how the policy reform affects their financial choices both during and after the implementation of the policy. Table 3 shows the results from the estimation of equation 4.2. Our key variables of interest are the interactions between *Exposed* and the time dummies *Policy* and *Post*.[13] The former dummy refers to the period in which the policy was implemented, and the latter indexes the post-reform period. Column 1 shows the results when we consider all types of loans, and columns 2 and 3 report bank term loans and credit lines, respectively.

The regression presented in column 1 demonstrates that firms borrowing from banks with capital shortfalls face a reduction in the uptake of all bank loans compared to the pre-EBA period. This finding echoes the results of the credit supply models discussed in the subsection earlier. Interestingly, the effect occurs during the implementation period and then diminishes. The results show qualitatively and quantitatively significant effects during the EBA exercise but the magnitude and significance of the interacted term declines in the post policy period. Based on the estimates in column 1, during the EBA capital exercise US firms, whose lenders are exposed to the EBA policy, witness a 27.5% reduction in bank loans, relative to the pre-EBA period but in the post policy period they experience a moderate reduction of 4.5%. When we use bank term loans as a dependent variable (column 2), the

[13]The pre-EBA period is our base category.

interaction term ($Exposed^*Policy$) is negative and statistically significant, which suggests that firms experience a contraction in bank term loans at the time of EBA exercise. Once again, the effect lessens after the policy intervention. The timing of the effect mirrors Becker and Ivashina (2014), who show that the contraction of bank debt to total debt takes place during the global financial crisis and improves shortly after. Finally, the interactions terms in column 3 are both statistically insignificant and quantitatively unimportant, suggesting that the evolution of bank credit lines does not differ between the pre- and post-EBA period.

In summary, our results support our second hypothesis and suggest that firms borrowing from banks exposed to large capital shortfalls during the EBA capital exercise, experience a decline in bank loans. This decline is more prominent in term loans than bank credit lines, which highlights how international lending shocks affect firms' financing mix.

5.3 Examining bonds and nonbank loans

We now consider whether bond markets or nonbank lenders can smooth the reduction in international bank credit that US firms experience. We estimate equation 4.2 for three components of nonbank credit and present the estimates in table 4. In the first column, we report point estimates using bonds as a dependent variable, and in the subsequent columns we rely on nonbank term loans and nonbank credit lines, respectively. We find that firms borrowing from EBA-exposed banks increase their bond issuance during the policy period. This is evident from the coefficient of the interaction term ($Exposed^*Policy$), which is positive and statistically significant. The effect is not only statistically significant, but also it is economically important. Specifically, the policy change leads to a 38.5% increase in bond issuance relative to the pre-policy period. Hence, it appears that bond markets provide a "spare tire" when bank funding to corporate falls, which corroborates with Becker and Ivashina (2014) and suggests that firms substitute bonds for bank loans when money is tight.

There is no notable difference in nonbank term loans, as the coefficients on the interaction terms in column 2 are statistically insignificant. The main change occurs in firms' reliance

on nonbank credit lines, shown in column 3. The interaction term pertaining to the EBA period is positive and highly significant. Furthermore, the economic impact is large, as the increase in nonbank credit lines borrowing relative to the pre-EBA period is 33%. In the aftermath of the policy period, firms' reliance on nonbank lines remains, but it slowly fades out as indicated by the magnitude and significance of the interaction ($Exposed^*Post$). The main conclusion is that firms that experience a contraction in credit after the regulatory exercise compensate by borrowing from US nonbanks. This finding extends the seminal study of Peek and Rosengren (1997) by highlighting the importance of nonbank credit lines and bond issuance. Importantly, our finding is in line with Irani et al. (2021), who show that shadow banking becomes more prominent following stricter capital requirements.

We also explore whether the observed funding pattern takes place across the board or is restricted to firms with previous access to the markets. Empirically, we analyze the evolution of bonds, nonbank term loans, and nonbank credit lines for two subsets of firms: those with previous access to each source of financing (the intensive margin, Panel A in table 5), and those with no prior market experience (the extensive margin, Panel B in table 5). Panel A shows that firms that borrow EBA-exposed banks increase their bond issuance and the uptake of nonbank credit lines during the EBA period. Specifically, the rise in bond borrowing is 27.5%, and borrowing through credit lines from nonbanks increases by 12% relative to the pre-policy period. Panel B shows that firms that lack track record, do not improve their borrowing relative to the pre-EBA period. The main message is that the growth in bond financing and nonbank credit lines that we identify for firms whose lenders were exposed to the EBA capital exercise, holds for the implementation period and for firms that could tap public markets in the past. In other words, track record reputation has a very important influence on firms' financial choices following the EBA policy change.

Next, we examine whether firms' capital structure changes as a result of bank deleveraging pressures, and nonbank financial intermediaries gaining prominence relative to banks. To address this issue, we modify our dependent variables and construct ratios of debt liabilities

to total assets.[14] We present the results in table 6. In Panel A we find that US firms borrowing from EBA-exposed banks reduce the proportion of bank loans and credit lines to total assets. To ascertain the magnitude, we find that the introduction of the capital exercise led to a decline in the bank loans and bank lines ratios by 11 and 26 percentage points, respectively. The reduction in bank credit supply weakens after the policy period. Further, in columns 1 and 3 of Panel B we show that during the EBA capital exercise, firms increase bonds and credit lines from nonbank financial intermediaries as a proportion of their total assets. The effect is economically meaningful because during the policy, bonds and the nonbank credit lines ratio rise by 32 and 29 percentage points, respectively.

5.4 EBA exercise and outcome variables

As a final test, we investigate whether modifications to firms' financial choices have real implications. We estimate equation 4.3 and illustrate the results in table 7. The first column shows the impact on cash accumulation, column 2 presents the results on investment, and columns 3 and 4 report the findings for ROA and trade credit, respectively. We focus on the sign and significance of the double-interaction terms ($IncreaseNBCL{*}Policy$ and $IncreaseNBCL{*}Post$), which reveal whether firms borrowing from banks affected by the capital exercise and experiencing an increase in nonbank credit lines are more likely to encounter a change in their outcome variables during and after the EBA exercise compared to the pre-policy period.

Our findings in column 1 suggest that firms appear not to alter their cash holdings following the policy intervention. In columns 2 and 3 we find positive and significant coefficients on the double-interaction term $IncreaseNBCL{*}Policy$, which implies that during the policy firms that modified their nonbank credit lines raised moderately their investment and ROA compared to the pre-policy period. Results in column 4 indicate that the rise in nonbank credit for firms borrowing from exposed banks led to a marginal increase in

[14] We winsorize the variables at 1% and 90% because the ratios are bounded at zero and are highly non-normal.

trade credit during the EBA exercise. Turning our attention to the post policy interaction, $IncreaseNBCL^{*}Post$, we continue to observe a rise in investment and ROA, which is however, modest. We interpret these findings as evidence that firms do not perceive nonbanks' funding structures as less stable. Quite the opposite, these facilities enable them to cushion the shock, helping firms grow faster than other firms dependent on EBA-affected banks, and without increasing their cash holdings. Last, to test the validity and the relevance of our instruments we report the Hansen J test of the overidentifying restrictions and the Kleibergen-Paap test statistic at the foot of the table of results. The diagnostic tests do not indicate any problems regarding the choice and relevance of our instruments.

6 Robustness checks

6.1 The role of the European debt crisis

One potential concern about the EBA capital exercise is that the contraction of bank credit (and subsequent expansion of nonbank loans) for EBA-exposed firms may reflect the impact of the European debt crisis on banks' lending policies. To better isolate how bank capital requirements related to sovereign-debt problems affect the flow of credit, we create the exposure variable excluding loans from Greece, Ireland, Italy, Portugal, and Spain (GIIPS) banks. The rationale stems from the fact that the sovereign debt crisis mostly affected banks in the periphery of Europe, which experienced deleveraging pressures during the first half of 2011 (Farinha, Spaliara and Tsoukas, 2019).

We rerun all the regressions using the new measure of exposure, which excludes the above-mentioned loans. We report the results in table 8. Our main results hold, and we conclude that the contraction in bank loans and term loans, as well as the increase in bonds and nonbank credit lines- in the policy period relative to the pre-policy period- reflects how bank capital requirements affect the flow of credit rather than the impact of the European debt crisis.

6.2 Subinvestment-grade ratings

Thus far, our sample pools together firms with investment-grade and subinvestment-grade (high-yield) ratings, ignoring potential heterogeneity at the firm-level. However, changes in financial and business risk have a different impact on creditworthiness across the groups of firms because the risk-weight of corporate loans depends on the borrower's rating.[15] To ensure that differences among firms do not drive our results, we remove firms rated as investment grade and reestimate our baseline models.

The results in table 9 corroborate our main findings. We find that firms exposed to EBA-affected banks reduce their term loans and they increase their borrowing through nonbank credit lines during the policy period. We conclude that our main findings hold when we use a sample that excludes the less-risky (investment-grade) firms.

7 Conclusion

Using a cross-country sample of bank-dependent public firms from several advanced economies, we study how firms' funding mix changes when foreign banks are hit by a liquidity shock. In doing so we distinguish between the two major sources of bank loans: term loans, and credit lines. For identification we examine how firms' liabilities vis-à-vis banks, nonbank lenders, and bond markets evolve after the EBA increased capital requirements on a consolidated level in 2011.

We show that the regulatory shock reduced the credit supply for all firms, with US firms taking the largest hit. Yet, when we distinguish among different types of credit, we find that the constraints concern only US firms' borrowing of term loans. In addition, we document that US firms were able to smooth out the shock by securing credit lines from US investment banks, and by tapping into corporate bond markets. This had an impact on firms' capital

[15] Specifically, the risk-weights by rating are: AAA to AA-, 20%; A+ to A-, 50%; BBB+ to BB-, 100%; below BB-, 150%; and unrated firms, 100%. We recover Standard and Poor's and Moody's credit ratings in 2013Q11.

structure and their real outcomes. Our results suggest that nonbank financial institutions compensate for shocks in bank financing. The general lesson is that a diversified loan market may be key to achieving a robust structure for corporate financing.

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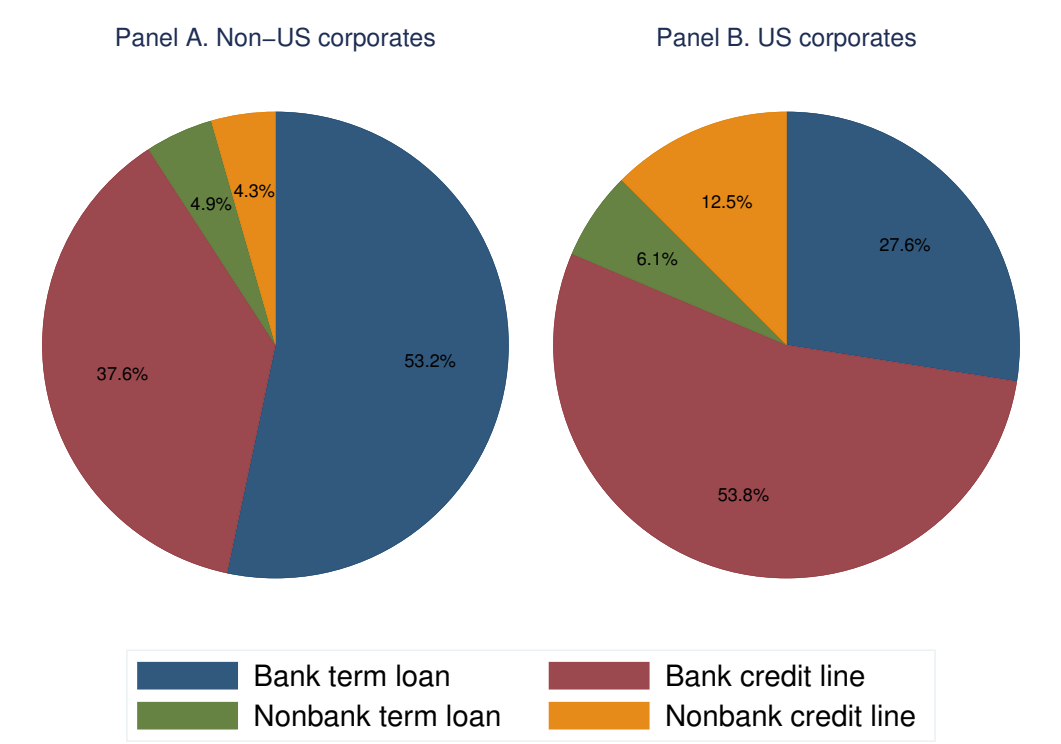

Figure 1: **Sources of financing by lender type.** This figure presents the fraction of term loans and credit lines from banks and nonbanks. Panel A shows loans to non-US corporates, and Panel B shows loans to US corporates.

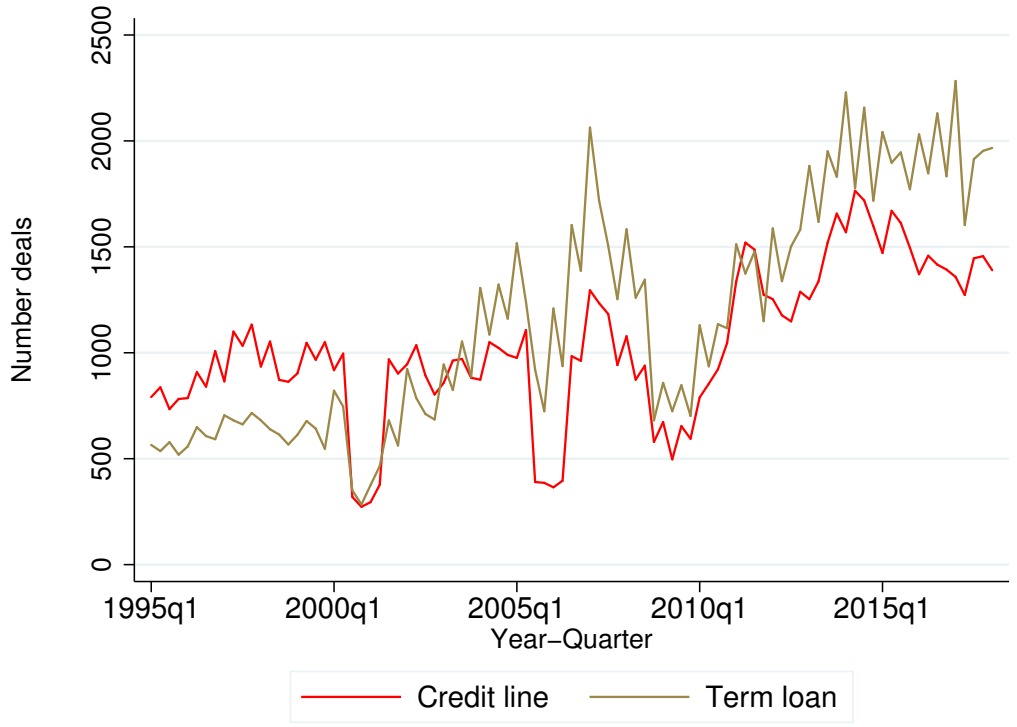

Figure 2: **Origination of credit lines and term loans.** This figure plots the number of deals originated per quarter.

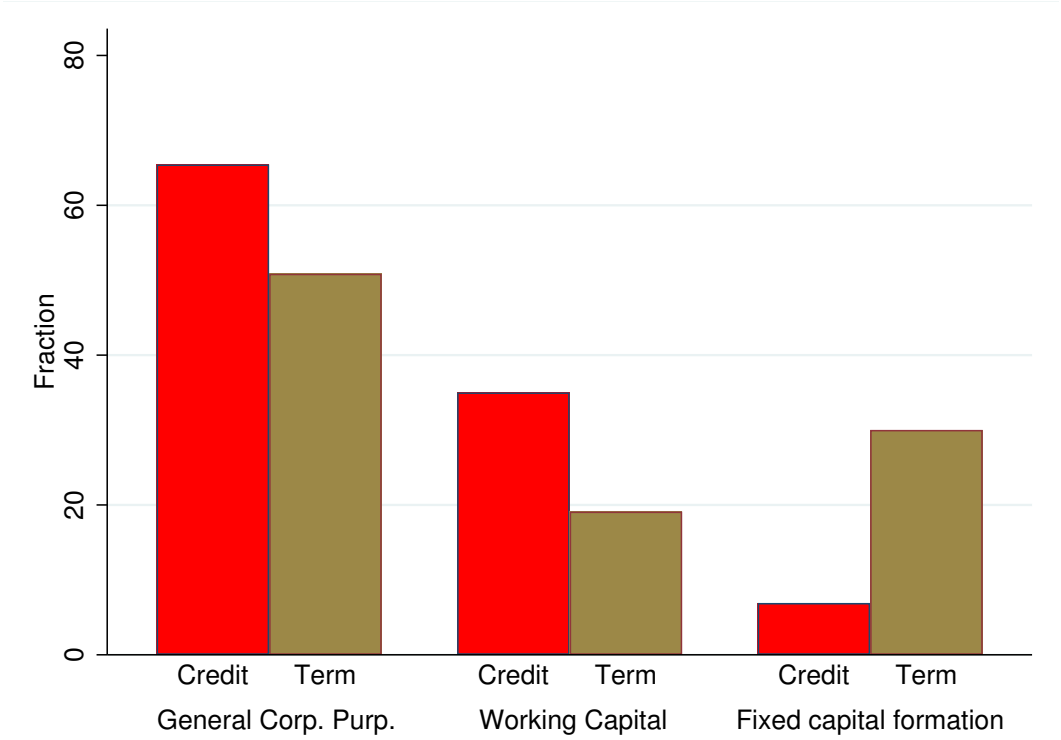

Figure 3: **Use of proceeds by loan type.** This figure charts the use of proceeds of term loans and credit lines, grouped into three categories: general corporate purposes, working capital, and fixed capital formation. Loans secured for refinancing or for financing buyouts are not included.

Table 1: Summary statistics

	Obs	Mean	StDev	p25	Median	p75
Bank-firm level						
Exposed	404,190	0.05	0.09	-0.12	0.02	0.06
Ln(Amount Outstanding)	404,190	1.93	4.27	0.15	0.58	1.88
Firm level						
Total Assets	12,227	0.14	0.69	-0.34	0.29	0.49
Tangible Assets	12,227	0.89	0.56	0.52	0.86	1.42
Trade Credit	12,227	0.46	3.80	0.09	0.15	0.21
Bank Loans	12,227	1.56	2.49	0.26	0.77	1.82
Bank Term Loans	12,227	0.54	1.12	0.00	0.11	0.42
Bank Credit Lines	12,227	0.25	1.32	0	0.03	0.32
Bonds	12,227	2.20	6.01	0.07	0.31	2.80
Nonbank Term Loans	12,227	0.21	0.97	0	0.03	0.12
Nonbank Credit Lines	12,227	0.71	2.32	0	0.13	0.79

Notes: The table presents summary statistics. See appendix A1 for precise definitions of the variables.

Table 2: EBA and supply of credit

	(1)	(2)	(3)	(4)
	Whole Sample	EU firms	US firms	Whole Sample
Shortfall	-0.090***	-0.075***	-0.156***	-0.073***
	(-10.22)	(-8.57)	(-7.75)	(-8.67)
Shortfall*US firms				-0.083***
				(-3.89)
Observations	404,190	109,669	191,503	404,190
R-squared	0.415	0.510	0.315	0.511
Firm*time FE	Yes	Yes	Yes	Yes

Notes: The table presents OLS regressions, where the dependent variable is the natural logarithm of outstanding credit from bank b to firm i. Shortfall is the bank-level capital shortfall estimated and published by the EBA. Robust t-statistics are in parentheses. Standard errors are clustered at the bank level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 3: Channels of adjustment: Bank credit

	(1)	(2)	(3)
	Bank Loans	Bank Term	Bank Lines
Exposed*Policy	-0.275***	-0.205**	-0.085
	(-2.98)	(-2.28)	(-0.95)
Exposed*Post	-0.065*	-0.052*	-0.048
	(-1.74)	(-1.69)	(-0.31)
Observations	12,227	12,227	12,227
R-squared	0.898	0.902	0.873
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes

Notes: The table presents OLS regressions, where the dependent variables are stock of bank credit (column 1), bank term loans (column 2), and bank credit lines (column 3). *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets, tangible assets to total assets and trade credit. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 4: Channels of adjustment: Nonbank credit

	(1)	(2)	(3)
	Bond	Nonbank Term	Nonbank Lines
Exposed*Policy	0.385**	0.056	0.334***
	(2.43)	(1.19)	(2.93)
Exposed*Post	-0.193	-0.234	0.074*
	(-1.27)	(-1.51)	(1.76)
Observations	12,227	12,227	12,227
R-squared	0.982	0.903	0.843
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes

Notes: The table presents OLS regressions, where the dependent variables are bonds (column 1), nonbank term loans (column 2), and nonbank credit lines (column 3). *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets, tangible assets to total assets and trade credit. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 5: Intensive and extensive borrowing margin

	Bond	Nonbank Term	Nonbank Lines
Panel A: Recurrent borrowers	(1)	(2)	(3)
Exposed*Policy	0.275**	0.065	0.122*
	(2.29)	(1.17)	(1.98)
Exposed*Post	-0.099	-0.271	-0.591
	(-0.29)	(-1.14)	(-1.23)
Observations	9,602	9,502	9,502
R-squared	0.982	0.902	0.838
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes
Panel B: Inexperienced borrowers			
Exposed*Policy	-0.119	0.085	0.056
	(-0.76)	(1.43)	(1.19)
Exposed*Post	-0.784	-0.493	-0.234
	(-1.51)	(-1.27)	(-1.11)
Observations	2,625	2,725	2,725
R-squared	0.951	0.982	0.903
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes

Notes: The table presents OLS regressions, where the dependent variables are bonds (column 1), nonbank term loans (column 2), and nonbank credit lines (column 3). The sample of firms in Panel A includes only those with previous access to each source of financing as of 2011Q2. In Panel B, the sample of firms includes only those without previous access to each source of financing as of 2011Q2. *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets, tangible assets to total assets and trade credit. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 6: The effect on firms' capital structure

	Bank Loans/TA	Bank Term/TA	Bank Lines/TA
Panel A: Bank credit	(1)	(2)	(3)
Exposed*Policy	-0.111**	-0.494	-0.269*
	(-2.00)	(-1.54)	(-1.96)
Exposed*Post	-0.027*	1.103	-0.087*
	(-1.78)	(0.70)	(-1.75)
Observations	12,070	12,070	12,070
R-squared	0.806	0.828	0.794
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes
	Bonds/TA	Nonbank Term/TA	Nonbank Lines/TA
Panel B: Nonbank credit			
Exposed*Policy	0.326**	0.191	0.291*
	(2.43)	(0.82)	(1.98)
Exposed*Post	0.431	-0.451	-0.600
	(1.02)	(-1.29)	(-0.65)
Observations	12,070	12,070	12,070
R-squared	0.929	0.826	0.772
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes

Notes: The table presents OLS regressions, where in Panel A the dependent variables are bank credit to total assets (column 1), bank term loans to total assets (column 2), and bank credit lines to total assets (column 3). In panel B the dependent variables are bonds to total assets (column 1), nonbank term loans to total assets (column 2), and nonbank credit lines to total assets (column 3). *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets, tangible assets to total assets and trade credit. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 7: EBA exercise and outcome variables

	CA	Investment	ROA	TC
	(1)	(2)	(3)	(4)
IncreaseNBCL*Policy	0.129	0.105**	0.092**	0.122*
	(1.64)	(2.15)	(2.28)	(1.81)
IncreaseNBCL*Post	-0.256	0.036*	0.039*	-0.216
	(-1.61)	(1.81)	(1.89)	(1.56)
Observations	12,037	12,072	12,069	12,152
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes	Yes
P-values of test statistics				
Hansen J	0.218	0.323	0.253	0.289
Kleibergen-Paap	0.011	0.006	0.005	0.001

Notes: The table presents instrumental variables (2SLS) regressions, where the dependent variables are cash to total assets (column 1), investment over property, plant, and equipment (column 2), return on assets, which is net income divided by total assets (column 3), and trade credit defined as accounts payable to total assets (column 4). The increase in nonbank borrowing (*IncreaseNBCL*) is instrumented using the "*Exposed*" variable. *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets and tangible assets to total assets. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. The Hansen J statistic is a test of the overidentifying restrictions under the null of instrument validity. The Kleibergen-Paap statistic is a weak identification test, where the null hypothesis is that the instruments are weak. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 8: Robustness: Excluding loans from GIIPS banks

	Bank Loans	Bank Term	Bank Lines
Panel A: Bank credit	(1)	(2)	(3)
Exposed*Policy	-0.218**	-0.178**	-0.560
	(-2.33)	(-2.29)	(-0.75)
Exposed*Post	-0.071	0.155	-0.098
	(-0.68)	(0.16)	(-0.33)
Observations	12,227	12,227	12,227
R-squared	0.876	0.841	0.880
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes
	Bonds	Nonbank Term	Nonbank Lines
Panel B: Nonbank credit			
Exposed*Policy	0.317**	0.193	0.253**
	(2.18)	(1.25)	(2.01)
Exposed*Post	0.381**	-0.139	-0.352
	(2.21)	(-1.64)	(-0.58)
Observations	12,227	12,227	12,227
R-squared	0.986	0.851	0.804
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes

Notes: The table presents OLS regressions, where in Panel A the dependent variables are bank credit (column 1), bank term loans (column 2), and bank credit lines (column 3). In panel B the dependent variables are bonds (column 1), nonbank term loans (column 2), and nonbank credit lines (column 3). *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets, tangible assets to total assets and trade credit. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 9: Robustness: Excluding investment-grade borrowers

	Bank Loans	Bank Term	Bank Lines
Panel A: Bank credit	(1)	(2)	(3)
Exposed*Policy	-1.048	-0.482*	-0.560
	(-1.33)	(-1.89)	(-0.75)
Exposed*Post	-0.071	0.155	-0.098
	(-0.68)	(0.16)	(-0.33)
Observations	6,429	6,429	6,429
R-squared	0.876	0.841	0.880
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes
	Bonds	Nonbank Term	Nonbank Lines
Panel B: Nonbank credit			
Exposed*Policy	1.717**	0.693	0.653**
	(1.88)	(1.25)	(2.01)
Exposed*Post	0.381**	-0.139	-0.352
	(2.21)	(-1.64)	(-0.58)
Observations	6,429	6,429	6,429
R-squared	0.986	0.851	0.804
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Sector*time FE	Yes	Yes	Yes

Notes: The table presents OLS regressions, where in Panel A the dependent variables are bank credit (column 1), bank term loans (column 2), and bank credit lines (column 3). In panel B the dependent variables are bonds (column 1), nonbank term loans (column 2), and nonbank credit lines (column 3). *Policy* is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise. *Post* is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise. Firm controls include total assets, tangible assets to total assets and trade credit. Robust t-statistics are in parentheses. Standard errors are clustered at the firm level. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Online Appendix for "International bank credit, nonbank lenders, and access to external financing"

January 22, 2022

A1 Data appendix

A1.1 Definition of the variables used

- *Bank Loans*: is the natural logarithm of stock of outstanding bank loans.
- *Nonbank Loans*: is the natural logarithm of stock of outstanding loans from nonbank financial intermediaries.
- *Bonds*: is the natural logarithm of stock of outstanding bonds.
- *Credit Lines*: is the natural logarithm of stock of outstanding credit lines (including undrawn).
- *Term Loans*: is the natural logarithm of stock of term loans.
- *Exposed*: is a Bartik variable to measure firm exposure to the EBA capital exercise, as defined on page 14.
- *Policy*: is a dummy that equals 1 for observations in the EBA policy period of 2011Q3 to 2012Q2, and 0 otherwise.
- *Post*: is a dummy that equals 1 for observations in the post-policy period of 2012Q3 to 2014Q1, and 0 otherwise.
- *Total Assets*: denotes the natural logarithm of firms' assets (in USD millions).
- *Tangible Assets*: is the ratio of net property, plant, and equipment to total assets (in USD millions).
- *Trade Credit*: is the ratio of accounts payables to total assets.
- *Cash*: is the ratio of cash to total assets.

- *Investment*: is the ratio of investment to capital.
- *Return on Assets*: is the ratio of net income to total assets.

A1.2 Sample selection

We use data from different sources. We gather from Refinitiv SDC Platinum the universe of 245,881 syndicated loans and 220,531 bonds issued by nonfinancial corporations. To identify them, we use the Thompson Reuters Business Classification (TRBC) definition of nonfinancial corporations, leaving aside financial and government bond issuers and loan borrowers.[1] We obtain from Refinitiv Eikon the hierarchical structure and sectoral classification of each of the entities in every syndicate loan and bond (immediate lender and immediate borrower of the borrower and lender). For all these entities, as well as their immediate and ultimate parents, we obtain the country of incorporation, as well as the NAICS codes and TRBC codes.[2] In order to retrieve entities' reference data from Refinitiv Eikon, we use mapping tables between the SDC CUSIP and their Thompson Reuters Permanent ID.

We use deal-level data to enhance the capital structure that firms disclose in their financial statements. To disentangle bank from nonbank loans, we follow Gropp, Mosk, Ongena and Wix (2019), and we define a full list of loan creditors of each firm in each quarter. We use this information to assess which firms are bank-dependent, and whether they had lending relationships with banks that were selected into the EBA capital exercise.[3]

[1] We use the TRBC schema at its highest level, and we expect it to be very similar to business classification schemas. In practice the filter leaves aside bonds and loans from entities whose ultimate parent companies are financial or affiliated with a government. State-owned enterprises are included in our sample.

[2] NAICS stands for the North American Industry Classification Scheme, which superseded the SIC in 1987. The NAICS maps the UN International Standard Industrial Classification of All Economic Activities (ISIC). Refinitiv provides the NAICS for non-US firms as well.

[3] Unlike Gropp et al. (2019), we use the Refinitiv SDC syndicated loan data, and not Dealscan, because

Of the 1.4 million bank-firm-loan shares in our data, we identify 375,316 distinct bank*firm pairs.[4] To compute the total amount of loans from EBA-affected banks, we estimate the proportion of total loans from European banks it represents. We obtain the list of banks subject to the additional capital requirements from the EBA report (EBA, 2011). Following Ivashina and Scharfstein (2010), we split pro-rata the total amount each lead arranger lends; beforehand, we split the loan amount pro rata between lead arrangers and other participants.[5]

A2 Sectoral classification of consolidated financial groups

In the paper we consolidate lenders at the ultimate parent level. We depart from this principle in a few cases, and consolidate up to the second-highest level, if the ultimate parent is the government (NAICS code 92, Public Administration), a charity (NAICS 81321, Grant Making and Giving Services), or a holding company (NAICS code 551112, Investment Holding Companies; NAICS code 523920, Investment Management and Fund Operators; NAICS code 55, Management of Companies and Enterprises).

The practical question is how to define the sectoral classification of these consolidated financial groups. This is particularly challenging in the case of US financial intermediaries, as they are complex and have many affiliates (Cetorelli and Goldberg, 2014; Goldberg and Meehl, 2019), which often belong to different subsectors. We use the sectoral classification of the parent company, and specifically the NAICS subsector, which we obtain from Refinitiv Eikon. The reason is that the sectoral classification of the parent company reflects the main activity of the group, as the "The principal activity of an economic entity is

the former allows a better integration into Refinitiv Eikon (e.g. obtaining sectoral classifications, hierarchical structure, or country of incorporation). We do not expect major differences in loan coverage between SDC and Dealscan. Both databases include a similar number of loans, and are distributed by Refinitiv.

[4] We identify 1.7 million lender-firm-shares, but 0.3 million correspond to nonbank firm shares.

[5] Lenders' shares are often unavailable in Refinitiv SDC data, as happens in Refinitiv Dealscan.

the activity that contributes most to the value added of the entity[..]" (quoted from UN, EC, IMF, OECD and WB (2008), which provides the ISIC guidelines in which the NAICS system is based).

Following this criterion, the majority of the lenders are financial companies classified under code 52 ("Finance and Insurance") and in the following subsectors: 522, Credit Intermediation and Related Activities; 523, Securities, Commodity Contracts, and Other Financial Investments and Related Activities (which include investment banks); 524, Insurance Carriers and Related Activities; and 525, Funds, Trusts, and Other Financial Vehicles.

We define banks financial intermediaries belonging to NAICS subsector 522. Most belong to the subsubsector of commercial banking (NAICS 5221). Nonbank financial intermediaries are companies in subsectors 523, 524, and 525. Consequently, bank loans are those from entities whose parent companies belong to NAICS subsector 522. Nonbank loans include loans from entities whose parent company is not in subsector 522.

Because financial groups are very complex, many consolidated financial groups in the banking sector have nonbank affiliates, and the other way around (Cetorelli and Goldberg, 2014). Specifically, US investment banks have bank affiliates, while US banks have nonbank affiliates.

By construction, our approach is different from the one followed in compilation of the Financial Accounts. The reason is that our units of analyses are the consolidated financial groups, but the Financial Accounts focus on institutional units. These are classified on a solo basis ie as "...an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities". For this reason, we cannot reconcile our classification either from the one in the FSB reports on nonbank financial intermediation, which use Financial Accounts as a

starting point.

In the syndicated loan market, banks arrange three-quarters of term loans (panel A, figure A2) and credit lines (panel B), but nonbank financial institutions arrange the remaining quarter. Within this group, investment banks arrange the majority (NAICS code 523). The role of other types of nonbank financial institutions is residual, in particular in the origination of credit lines.[6]

[6]NAICS code 523 encompasses investment banks (subsubsector 52311) and other entities involved in securities brokerage (subsubsector 52312), as well as commodity contract dealers (subsubsector 52313). In practice, investment banks are the only institutions active in the syndicated loan market.

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UN, EC, IMF, OECD and WB: 2008, *System of National Accounts 2008*, United Nations.

Figures

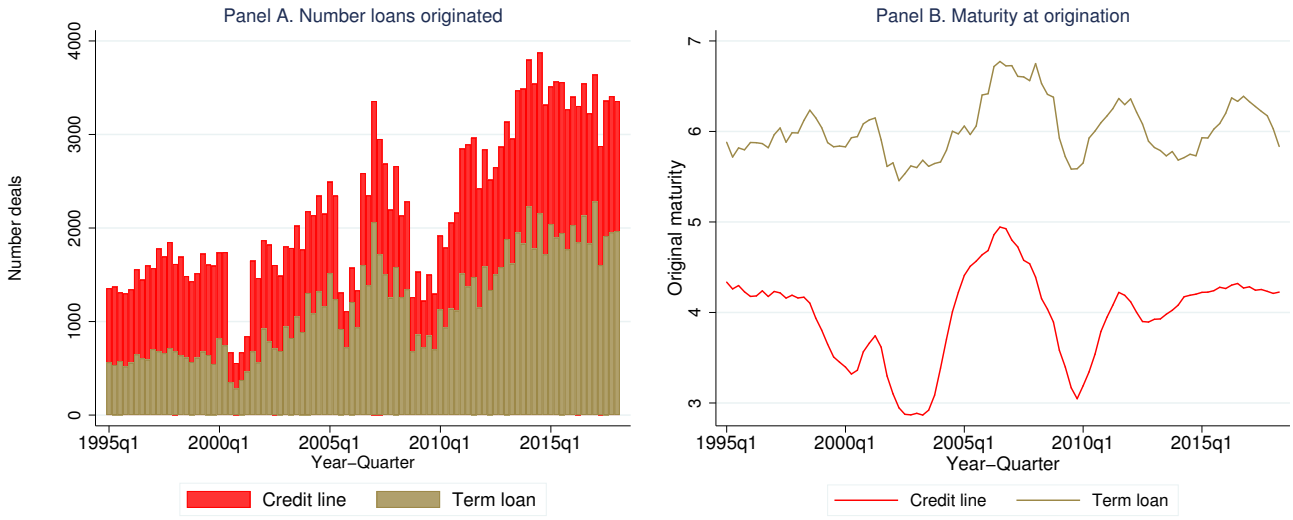

Figure A1: **Credit lines and term loans at origination.** This figure shows the number of loans originated per quarter (panel A), and the original maturity (panel B), for term loans and credit lines.

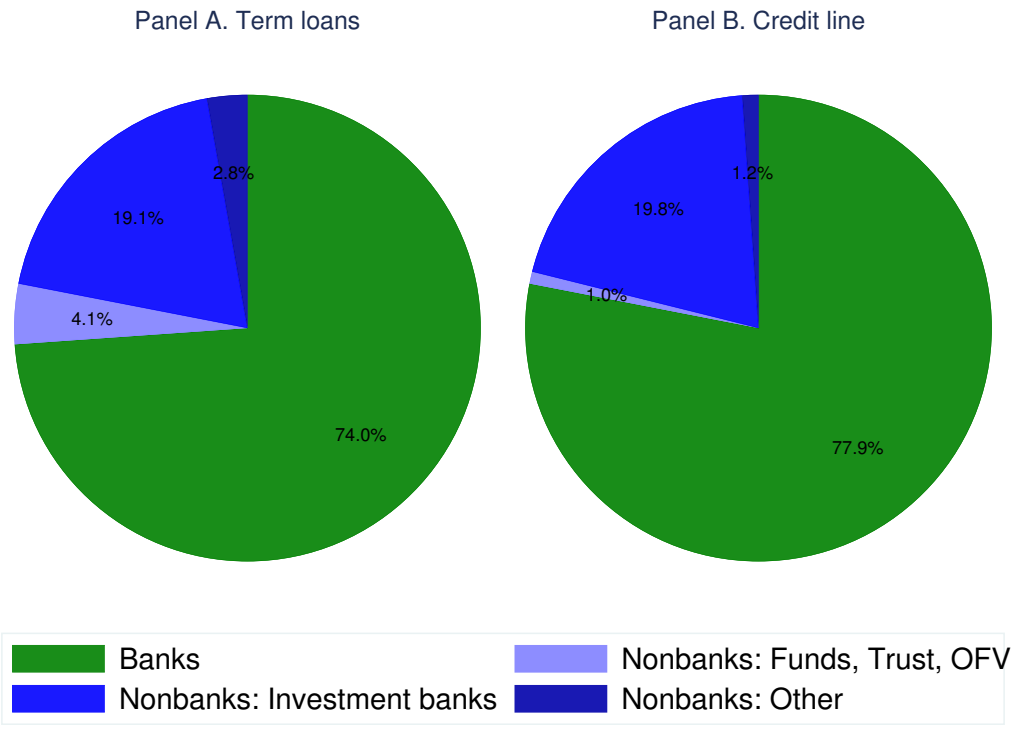

Figure A2: **Classification of loans' lead arrangers, by loan type.** This figure shows the fraction of loans originated by type of lender: banks; broker-dealers; trusts, funds, and other financial vehicles; and other. Panel A shows the breakdown for term loans, and Panel B shows the breakdown for credit lines.