Nonbank Lenders as Global Shock Absorbers: Evidence from US Monetary Policy Spillovers*

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Abstract

We show that nonbank lenders act as global shock absorbers from US monetary policy tightening spillovers. For identification, we use loan-level data from the global syndicated lending market and US monetary policy surprises. We find that when US monetary policy tightens, nonbank lenders increase the supply of dollar credit to non-US borrowers, relative to banks. This partially mitigates the total reduction in dollar credit supply. The substitution is stronger for emerging market borrowers and riskier borrowers. However this increased risk-taking is not driven by particularly fragile nonbank lenders nor by zombie lending. Moreover, the credit substitution has real effects, as borrowers with existing relationships with nonbank lenders increase total debt, investment, and employment relative to borrowers without such relationships. Our results therefore suggest that having more diversified funding providers (nonbanks in addition to banks) reduces the volatility in capital flows and economic activity resulting from the global financial cycle.

Keywords: Nonbank lending; Banks; Monetary policy transmission; International monetary policy spillovers; Global financial cycle.

JEL classification: E51, E52, F34, F42, G21, G23.

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1 Introduction

Capital flows and credit growth are strongly correlated across countries (Calvo et al., 1996; Rey, 2015). Macroeconomic evidence suggests that this "global financial cycle" is largely driven by US monetary policy (Miranda-Agrippino and Rey, 2020): expansionary Federal Reserve policy drives increases in lending and risky asset prices globally, while contractionary policy leads to a tightening of global financial conditions. Meanwhile, rapid credit growth—often driven by capital inflows—is the best predictor of financial crises (Jorda et al., 2011; Schularick and Taylor, 2012). The potential for US monetary policy to affect credit conditions in other countries has therefore been a source of significant concern for policymakers—especially those in emerging markets, where the spillover effects are most pronounced (Kalemli-Ozcan, 2019). Indeed, BIS General Manager Caruana (2012), Reserve Bank of India Governor Rajan (2014) and the IMF (2022) have highlighted the potential for US monetary policy spillovers to lead to financial stability risks and macroeconomic volatility globally.[1]

It is therefore crucial to understand the channels through which these spillovers occur. Existing literature has highlighted the role played by the banking sector. When US monetary policy tightens, international bank lending declines (Bruno and Shin, 2015a)—that is, there is an international bank lending channel of monetary policy. The effect is stronger for lending to riskier borrowers and emerging market borrowers (Morais et al., 2019; Bräuning and Ivashina, 2020), suggesting an international risk-taking channel. However, in recent decades, *nonbank* financial intermediaries have grown in importance, accounting for 50% of global financial assets as of 2019 (FSB, 2020). Despite this growth, there is scant evidence on how lending by international nonbank financial intermediaries responds to US monetary policy, and whether nonbanks act as global shock propagators or absorbers.

In this paper, we fill this gap by studying how US monetary policy affects lending to non-US firms by nonbanks, relative to banks (depository institutions). This is ultimately an empirical question, because different theories offer starkly different predictions. On the one hand, several papers argue that US monetary policy affects international bank lending via its impact on lender risk aversion and borrower balance sheet strength. Contractionary US monetary policy leads to higher volatility, which tightens Value-at-Risk constraints (Bruno and Shin, 2015a); and causes dollar appreciation, which weakens the balance sheets of non-

[1]Federal Reserve policymakers have also debated the implications of US monetary policy spillovers: see, for example, Bernanke (2012), Powell (2013) and Fischer (2015).

US firms with dollar liabilities (Bruno and Shin, 2015b). These mechanisms could work in a similar way for both banks and nonbanks, suggesting that the presence of nonbank lenders could reinforce the international transmission of US monetary policy.

On the other hand, recent micro-studies of the domestic US monetary transmission mechanism suggest that banks and nonbanks respond to monetary policy differently due to specific frictions in funding markets. An increase in the Fed Funds rate causes deposits to flow out of banks, due to market power in deposit markets (Drechsler et al., 2017). These deposits flow to shadow banks such as money market funds, which in turn provide funding to 'downstream' nonbank lenders (Xiao, 2020). This enables nonbanks to increase real economy lending relative to banks (Elliott et al., 2020). If a similar mechanism operates at the international level, then nonbank lenders could attenuate US monetary spillovers, with nonbanks substituting for the reduction in bank credit supply.

Empirically distinguishing between these theoretical predictions is challenging because banks and nonbanks might lend to borrowers with different characteristics, and US monetary policy might affect the credit demand of these borrowers differently. To isolate credit supply effects, we therefore study the global syndicated lending market—a setting in which corporates borrow from multiple lenders (both banks and nonbanks) at the same time. This allows us to compare how banks and nonbanks lend to the same firm in the same period (even in the same loan), and how this varies with US monetary policy. Specifically, we use borrower-quarter fixed effects to control for time-varying borrower characteristics, including credit demand (Khwaja and Mian, 2008; Chodorow-Reich, 2014).

A second challenge is that US monetary policy is not exogenous, but is affected by domestic and global economic conditions, which might themselves affect bank and nonbank credit supply. We address this challenge by instrumenting US monetary policy using the series of monetary policy *surprises* constructed by Jarociński and Karadi (2020).[2] In addition, we control for local economic conditions in both the borrower country and lender country, and control for other global factors that are often associated with the global financial cycle (dollar strength, volatility, risk aversion, uncertainty). Our main sample covers 30 years (1990–2019) and borrowers in 121 countries.

We find that when US monetary policy tightens, nonbanks increase the supply of syndicated dollar credit to non-US borrowers, relative to banks. The economic effect is large: a 100 basis point monetary tightening is associated with a relative increase in nonbank loan size of

[2]We also use the uninstrumented Fed Funds rate and Wu and Xia (2016) shadow rate in robustness tests.

around 20%. In other words, nonbank lenders attenuate the international transmission of US monetary policy. The result is robust to controlling for credit demand using borrower-quarter fixed effects, controlling for local and global measures of economic conditions, and using a range of measures of US monetary policy. The relative increase in nonbank lending holds for both of the main types of nonbank lender in this market (finance companies and investment banks), US and non-US lenders, and within-border and cross-border dollar loans.

Our finding that nonbanks increase credit supply relative to banks when US monetary policy tightens is consistent with the funding mechanisms proposed by Drechsler et al. (2017) and Xiao (2020), whereby tighter monetary policy leads to an improvement in nonbank funding conditions relative to banks. We also find that the effect is driven by dollar loans specifically, with no significant increase in the supply of non-dollar loans, providing further support for a mechanism that works through dollar funding markets.

We next show that the relative increase in nonbank lending is stronger for riskier borrowers: specifically, borrowers from emerging markets and borrowers paying higher yields on their loans. Put another way, nonbank lenders attenuate not only the international bank lending channel of monetary policy, but also the international risk-taking channel identified by Bruno and Shin (2015a), Morais et al. (2019), Bräuning and Ivashina (2020) and Miranda-Agrippino and Rey (2020). However, we find no evidence that the relative expansion of nonbank lending is associated with an increase in destabilising or zombie lending: the increase is no larger for nonbanks with particularly unstable funding structures, for shorter maturity loans, or for loans to borrowers with lower ex-ante or ex-post profitability.

We next aggregate the loan-level dataset to the borrower-quarter level in order to study the overall strength of substitution from bank to nonbank credit. In line with our loan-level results, we find that when US monetary policy tightens, total bank lending to a given borrower falls, while total nonbank lending increases, leading to an increase in the nonbank share of total lending. However, total borrower-level credit falls. That is, borrowers substitute from bank to nonbank credit, but the substitution is incomplete.

This incomplete substitution could reflect reduced credit demand. However it could also reflect informational frictions. The syndicated loan market relies on soft information (Sufi, 2007), and nonbank lenders make up a relatively small proportion of the primary market. They are therefore likely to focus their increased credit supply on borrowers about whom they have better information. To test this idea, we study whether credit supply increases more for borrowers that have established relationships with nonbank lenders in the past. We find that

when US monetary policy tightens, non-US borrowers that have previously borrowed from nonbanks are more likely to obtain a new dollar syndicated loan. Matching the syndicated lending data to firm-level financial statements from Compustat Global, we find that borrowers with existing nonbank relationships also experience a relative increase in total balance sheet debt, suggesting that borrowers without such relationships are unable to use other debt markets (e.g. bonds) to perfectly substitute for a reduction in syndicated credit supply. Finally, the relative increase in credit supply has real economic effects, as borrowers with nonbank relationships increase fixed assets and employment after a US monetary contraction relative to borrowers without nonbank relationships.

Taken together, our loan-level and firm-level results suggest that nonbank lenders counteract the cyclical volatility in international bank credit supply, especially for the most vulnerable borrowers, and therefore act as shock absorbers from US monetary policy spillovers. Our results therefore suggest that having more diversified funding providers (nonbanks in addition to banks) reduces the volatility in capital flows and economic activity resulting from the global financial cycle.

Contributions to existing literature

Our paper contributes to the large recent literature on US monetary spillovers and the "global financial cycle" (McCauley et al., 2015; Bruno and Shin, 2015a,b; Rey, 2015; Bernanke, 2017; Kalemli-Ozcan, 2019; Avdjiev and Hale, 2019; Iacoviello and Navarro, 2019; Miranda-Agrippino and Rey, 2020). We complement these macro studies by providing micro evidence on the channels through which these spillovers can occur. In particular, our micro perspective allows us to demonstrate important heterogeneity in the response of different financial intermediaries (nonbank lenders vs banks) to US monetary policy.

We also add to empirical literature studying the international transmission of shocks to financial intermediaries (Peek and Rosengren, 1997; Giannetti and Laeven, 2012; De Haas and Van Horen, 2013; Ongena et al., 2015; Doerr and Schaz, 2021), in particular monetary policy shocks (Cetorelli and Goldberg, 2012; Morais et al., 2019; Bräuning and Ivashina, 2020). Our finding that nonbanks increase international lending relative to banks in response to contractionary US monetary policy mirrors recent evidence in the domestic US context (Elliott et al., 2020; Drechsler et al., 2022). This provides suggestive evidence that the mechanisms underlying the bank and nonbank lending channels of monetary policy identified

in the US (Drechsler et al., 2017; Xiao, 2020) also operate at the international level.[3]

Our paper also adds to a growing literature exploring the drivers and implications of the recent growth of nonbank credit intermediation (Pozsar et al., 2013; Moreira and Savov, 2017; Buchak et al., 2018a,b; Nelson et al., 2018; Fuster et al., 2019; Irani et al., 2020). We extend this literature by providing cross-country evidence, which highlights important differences in nonbank vs bank lending across developed and emerging market economies.

The rest of the paper is structured as follows. Section 2 describes the international syndicated lending market and the datasets that we use. Section 3 provides loan-level evidence on the differential response to US monetary policy by bank and nonbank lenders. Section 4 provides evidence on the impact of nonbank lending on firm-level credit and real outcomes. Section 5 concludes.

2 Empirical setting and data sources

2.1 The international syndicated lending market

To compare how international bank and nonbank lending responds to US monetary policy, we study the global syndicated lending market. Syndicated loans are loans extended to one borrower (primarily non-financial corporates) by multiple lenders (including both banks and nonbanks), making this an ideal setting to study how lending by different financial intermediaries responds to monetary policy. This market is a very significant source of cross-border credit: according to BIS data, syndicated loans comprised 30% of total global cross-border debt issuance in 2012:Q4, and 46% for emerging markets.[4]

We obtain loan-level data on global syndicated loan originations from Refinitiv LPC's DealScan dataset for the period 1990–2019. In a typical syndicated loan, the borrower takes out a "package" that includes several loan "facilities". The group of lenders is known as the syndicate, and includes at least one lead arranger, who negotiates the terms of the loan and recruits other lenders (known as participants) via a book-building process. DealScan provides detailed information on individual loan facilities, including the identity of the borrower, the identities of the lenders in the syndicate (including lead arrangers and participants), the

[3] Our results on risk-taking by banks and nonbanks are also related to the literature on the bank risk-taking channel of monetary policy, e.g. Rajan (2005); Allen and Rogoff (2011); Borio and Zhu (2012); Jiménez et al. (2012, 2014); Dell'Ariccia et al. (2017).

[4] Following Gadanecz (2004) and De Haas and Van Horen (2013), we define total cross-border debt issuance as the sum of international syndicated lending (BIS Table 10), international money market instruments (Table 14A), and international bonds and notes (Table 14B).

type of facility (typically term loan or credit line), loan amount, maturity, and interest rate. Following Roberts (2015), we drop observations that we identify as likely to be amendments to existing loans, because these do not necessarily involve new credit. We then collapse the dataset to the borrower-lender-currency-quarter level. In order to study firm-level outcomes, we collapse the dataset again to the borrower-quarter or borrower-year level.[5]

Since we are interested in international spillovers from US monetary policy, our main sample is dollar-denominated loans to borrowers headquartered outside of the US.[6] As shown in Table 1, 65% of loans to non-US borrowers are denominated in the borrower's local currency. However foreign-currency loans are predominantly denominated in US dollars, reflecting the dominant position of the US dollar in international trade and finance (Gopinath and Stein, 2021): 74% of foreign-currency loans to non-US borrowers are denominated in dollars, with this share rising to 84% for emerging market borrowers. Over our sample period, annual dollar-denominated loan issuance to non-US borrowers has averaged around $400bn, with fluctuations in aggregate issuance following a broadly pro-cyclical pattern (Figure 1, Panel A).

DealScan includes a lender classification, which allows us to classify most lenders as banks (depository institutions) or nonbanks. We classify the following DealScan lender types as banks: African bank, Asia-Pacific bank, Eastern European / Russian bank, foreign bank, Middle Eastern bank, mortgage bank, thrift / S&L, US bank, Western European bank, and unclassified lenders with the word "bank" in the name. All other types of lender are classified as nonbanks. We manually reclassify a small number of large lenders that appear to be misclassified in DealScan. Lenders for which DealScan does not provide a classification are dropped. In our main sample (dollar-denominated loans to non-US borrowers), of the lenders that we classify as banks and for which DealScan also provides an SIC code, 96% have two-digit SIC code 60 (depository institution) and 2% have four-digit SIC code 6712 (bank holding company).

In our main sample, nonbanks account for around 7% of loan originations (Figure 1, Panel B). But there is substantial variation in this share across time and countries, with the nonbank share increasing to 13% in developed economies in 2004, and rising to 10% in emerging economies in 2018. While DealScan only provides information on the primary syndicated lending market, there is also an active secondary market, where nonbanks play a

[5] We convert all monetary variables to 2012 US dollars to avoid capturing any effects from inflation.
[6] We drop borrowers in offshore centres, based on the BIS country classification.

much larger role (Bord and Santos, 2012; Irani et al., 2020).

The large majority of nonbanks in the primary market are investment banks and finance companies, which account for around one-half and one-third of nonbank loan originations, respectively. In contrast to banks—which typically receive much of their funding from retail depositors—these nonbanks are wholly reliant on wholesale funding. We also observe a small number of loan originations by institutional investors and other funds, but these investors are usually only active in the secondary market. We observe nonbank lenders headquartered in all regions of the world; most are based in developed economies (Table 2).

Identifying credit supply effects An important challenge to identifying the differential credit *supply* response of banks and nonbanks to US monetary policy is that banks and nonbanks might lend to borrowers with different characteristics, and US monetary policy might affect the credit *demand* of these borrowers differently. Two features of the syndicated lending market allow us to cleanly isolate the credit supply response.

First, syndicated loans are extended by multiple lenders to one borrower. This allows us to exploit within-borrower variation by comparing how different lenders lend to the same firm at the same time. Specifically, we use borrower-quarter fixed effects to control for time-varying borrower characteristics, including credit demand (Khwaja and Mian, 2008; Chodorow-Reich, 2014; Gao and Jang, 2020).[7]

Second, while the borrower chooses the lead arranger, the other lenders in the syndicate (participants) are selected in a book-building process run by the lead arranger, and are therefore beyond the borrower's control (Bruche et al., 2020). This ensures that the composition of the syndicate is supply-driven, and alleviates concerns that borrowers might vary their credit demand across lenders in response to credit demand shocks (Paravisini et al., 2015).

2.2 Other data sources

We match the DealScan syndicated lending dataset to several other data sources. Summary statistics for the variables used in the regressions are presented in Table 3.

Monetary policy measures We measure the stance of US monetary policy using the Federal Funds rate. However the Fed Funds rate is not exogenous, because it is affected

[7]Firms very rarely take out more than one loan package in the same quarter, so these borrower-quarter fixed effects are essentially loan package fixed effects.

by domestic and global economic conditions which might themselves affect credit supply. We therefore instrument the Fed Funds rate using the series of US monetary policy shocks constructed by Jarociński and Karadi (2020). Jarocinski and Karadi use high-frequency changes in short-term interest rate derivatives prices around FOMC policy announcements to isolate unexpected shocks to monetary policy, and then use information from equity prices to purge these shocks from the effects of information about the economic outlook that is released alongside the policy announcements.

The dependent variable in our loan-level regressions is based on the level of new loan issuance, which cannot easily be converted into changes because individual firms take out loans infrequently. We therefore use the level of the Fed Funds rate in our regressions, and to convert the Jarocinski-Karadi shock series into a level series we take the cumulative sum, in line with recent macro literature (Coibion, 2012; Ramey, 2016; Cloyne and Hürtgen, 2016; Nelson et al., 2018).

In robustness tests, we run OLS regressions using the raw (uninstrumented) Fed Funds rate, as well as the shadow rate of Wu and Xia (2016), which adjusts the Fed Funds rate to incorporate the effects of unconventional monetary policy at the zero lower bound.

Macroeconomic control variables To control for local economic conditions in the borrower country and lender country, we collect quarterly country-level macroeconomic variables from the IMF International Financial Statistics dataset: real GDP growth, CPI inflation, the monetary policy rate,[8] and quarterly exchange rate appreciation or depreciation against the dollar. We also collect data on other global factors typically associated with the global financial cycle (Rey, 2015; Bruno and Shin, 2015a,b; Miranda-Agrippino and Rey, 2020): the Federal Reserve dollar index, and the VIX (a measure of equity market volatility).

Compustat In order to study firm-level real effects, we match DealScan to borrower-level financial statements from Compustat North America and Compustat Global using the updated link provided by Chava and Roberts (2008). We extend this link using a matching algorithm based on firm names, countries, and SIC codes, following an approach similar to Cohen et al. (2021).

[8] We use the central bank policy rate where available, and the money market rate, central bank discount rate, or short-term government bond rate otherwise.

3 Loan-level results

In this section we use the loan-level syndicated lending data to estimate the differential response of international bank and nonbank credit supply to US monetary policy.

3.1 International bank lending

We start by estimating the response of international bank lending to US monetary policy. We drop nonbank lenders from the sample and estimate the following regression:

$$\text{Log(New credit)}_{b,l,t} = \alpha_b + \delta_l + \beta \text{Fed Funds}_{t-1} + \gamma \text{Macro controls}_{b,l,t-1} + \varepsilon_{b,l,t} \quad (1)$$

where $\text{Log(New credit)}_{b,l,t}$ is the log of the total amount of new dollar syndicated credit extended by lender l to borrower b in quarter t. We measure US monetary policy using the lagged Fed Funds rate. We control for time-invariant borrower and lender characteristics using borrower fixed effects α_b and lender fixed effects δ_l. And we control for local macroeconomic conditions (one-quarter lags of GDP growth, inflation, monetary policy rate, and exchange rate appreciation) in both the borrower country and lender country. The sample consists of dollar-denominated loans from banks (in any country) to non-US borrowers from 1990 to 2019. We cluster standard errors by borrower, lender, and quarter.

The Fed Funds rate is not exogenous, because it responds to economic conditions that are also likely to affect credit supply. We therefore instrument the Fed Funds rate using the cumulative sum of the US monetary policy shocks constructed by Jarociński and Karadi (2020). The first-stage regression corresponding to equation (1) is:

$$\text{Fed Funds}_{t-1} = \kappa_b + \eta_l + \phi \text{JK}_{t-1} + \lambda \text{Macro controls}_{b,l,t-1} + \omega_{b,l,t} \quad (2)$$

where JK_{t-1} is the cumulative sum of the Jarocinski-Karadi shocks. Regression results for several versions of this first-stage regression are reported in Table 4, columns 1–3. The cumulative Jarocinski-Karadi shocks are very highly predictive of the level of the Fed Funds rate, resulting in large Kleibergen and Paap (2006) F-statistics and implying that our setup does not suffer from a weak instruments problem (Stock and Yogo, 2005).

Instrumental variable regression results for equation (1) are shown in Table 5. Consistent with existing evidence (Morais et al., 2019; Bräuning and Ivashina, 2020), we find that banks cut international lending in response to contractionary US monetary policy. This

result holds across different sets of fixed effects and control variables (columns 1–3).[9] In our baseline regression including the full set of controls (column 3), we find that a 100 basis point monetary tightening is associated with a reduction in bank lending of around 13%.[10] Also consistent with existing studies, we find that the reduction in lending is larger for borrowers in emerging markets (column 4).[11]

In columns 5 and 6, we find that the estimated response to monetary policy is robust to controlling for other factors typically associated with the global financial cycle (with the coefficient estimate remaining very stable across specifications): the strength of the dollar (Bruno and Shin, 2015b) and financial market volatility (Rey, 2015; Bruno and Shin, 2015a). This suggests a direct transmission channel from US monetary policy to international bank lending.[12]

Overall these results suggest that banks transmit the effects of US monetary policy globally, and particularly to emerging markets. That is, there is an international bank lending channel and international risk-taking channel of US monetary policy.

3.2 International nonbank lending

We now add nonbank lenders to the sample to estimate how nonbanks respond to US monetary policy relative to banks. In Section 3.1 above, where we only include bank lenders, we control for borrower characteristics using borrower fixed effects. These fixed effects do not fully control for demand, because the credit demand of different borrowers is likely to change differently over time. However, once we add nonbank lenders to the sample, we observe both banks and nonbanks lending to the same borrower at the same time, meaning that we can now include borrower-quarter fixed effects to control for credit demand. That is, we can isolate differential credit supply effects by comparing how bank and nonbank credit provision to the same borrower varies with US monetary policy.

Our baseline regression specification is:

$$\text{Log(New credit)}_{b,l,t} = \alpha_{b,t} + \delta_l + \beta\,(\text{Nonbank}_l \times \text{Fed Funds}_{t-1}) + \gamma\text{Controls}_{b,l,t-1} + \varepsilon_{b,l,t} \quad (3)$$

[9] The sample size drops considerably in column 3 because the full set of local macroeconomic control variables is not available for all countries in all time periods.

[10] In these regressions we do not yet include borrower-quarter fixed effects, so some of this reduction could reflect reduced credit demand. We introduce borrower-quarter fixed effects when we compare nonbank to bank lending below.

[11] In column 4, Fed Funds$_{t-1}$ and Fed Funds$_{t-1} \times$ EME$_b$ are instrumented with JK$_{t-1}$ and JK$_{t-1} \times$ EME$_b$.

[12] The result is also robust to controlling for the risk aversion and uncertainty indices of Bekaert et al. (2019).

where $\text{Log(New credit)}_{b,l,t}$ is the log of the total amount of new dollar syndicated credit extended by lender l to borrower b in quarter t. Nonbank_l is an indicator variable equal to one for nonbank lenders and zero for banks. The coefficient β therefore provides an estimate of how nonbank lending changes relative to bank lending when US monetary policy tightens. Borrower-quarter fixed effects $\alpha_{b,t}$ control for observed and unobserved time-varying borrower characteristics, including credit demand. Lender fixed effects δ_l control for time-invariant lender characteristics, such as business model. We also include lender country-quarter fixed effects to control for economic conditions in the lender country. Finally, we include interactions between the nonbank lender indicator and a vector of macroeconomic controls (GDP growth, inflation, monetary policy rate, exchange rate appreciation) for both the borrower country and lender country. The sample consists of dollar loans to non-US borrowers over 1990–2019. Standard errors are clustered by borrower, lender, and quarter.

As before, we instrument the Fed Funds rate with the cumulative sum of Jarociński and Karadi (2020) monetary policy shocks. Specifically, the first-stage regression corresponding to equation (3) is:

$$\text{Nonbank}_l \times \text{Fed Funds}_{t-1} = \kappa_{b,t} + \eta_l + \phi\,(\text{Nonbank}_l \times \text{JK}_{t-1}) + \lambda \text{Controls}_{b,l,t-1} + \omega_{b,l,t} \quad (4)$$

where JK_{t-1} is the cumulative sum of the Jarocinski-Karadi shocks. Regression results for several versions of this first-stage regression are reported in Table 4, columns 4- 7. Again, the first-stage regressions exhibit very high predictive power.

Table 6 presents instrumental variable regression results for equation (3). We find that when US monetary policy tightens, nonbanks increase international lending relative to banks. In other words, nonbank lenders attenuate the international transmission of US monetary policy. This result is robust to including different sets of fixed effects and macroeconomic control variables (columns 1–4). And the effect is large: the coefficient estimate in our baseline specification including borrower-quarter fixed effects (column 4) suggests that a 100 basis point monetary policy tightening increases nonbank lending by nearly 20% relative to banks. Columns 5 and 6 show that the result is robust to controlling for the strength of the dollar and the VIX, which are other factors often associated with the global financial cycle.[13] The result is also robust to only including the 1990–2006 sample period (column 7), implying that the result is not driven by the financial crisis.

[13]The result is also robust to controlling for the risk aversion and uncertainty indices of Bekaert et al. (2019).

In column 8, we drop time fixed effects so that we can also include the uninteracted level of the Fed Funds rate, which is again instrumented with the cumulative Jarocinski-Karadi shocks.[14] In this regression, the coefficient on Fed Funds$_{t-1}$ provides an estimate of the impact of a monetary tightening on lending by banks, while the coefficient on Nonbank$_l$ $\times$ Fed Funds$_{t-1}$ provides an estimate of the impact of a monetary tightening on lending by nonbanks relative to banks. Consistent with the results in Table 5, we find that a 100 basis point tightening leads to a reduction in bank lending of around 13%; column 8 suggests that nonbank lending is, in contrast, almost completely unaffected by the monetary tightening. That is, international nonbank lending is much more stable than bank lending in response to US monetary policy.

The relative increase in nonbank lending in response to tighter US monetary policy is consistent with the funding mechanisms proposed by Drechsler et al. (2017) and Xiao (2020), whereby tighter monetary policy causes deposits to flow from banks to nonbank intermediaries (such as money market funds) that invest in wholesale funding markets, resulting in an improvement in funding conditions for nonbank lenders relative to banks.[15] Meanwhile, our finding that conditional on US monetary policy, banks and nonbanks do not respond differently to dollar strength (column 5) or to financial market volatility (columns 6) is consistent with the borrower balance sheet and lender risk aversion mechanisms of Bruno and Shin (2015a,b), which could work in the same way for banks and nonbanks.[16]

Table 7 shows the results of several further robustness tests. In column 1, we keep only the two main types of nonbank lender—investment banks and finance companies, which account for around one-half and one-third of nonbank loan originations, respectively—and estimate separate coefficients for these two types. We find that the relative increase in credit supply holds for both types, and is of a very similar magnitude. In column 2, we estimate separate coefficients for lenders that are lead arrangers in the loan versus lenders that are merely participants.[17] We find that the relative increase in nonbank credit holds for both lead arrangers and participants, with a somewhat larger impact for lead arrangers.

[14] That is, Fed Funds$_{t-1}$ and Nonbank$_l \times$Fed Funds$_{t-1}$ are instrumented with JK$_{t-1}$ and Nonbank$_l \times$JK$_{t-1}$.

[15] Drechsler et al. (2017) find that banks use their market power in deposit markets to raise deposit rates by less than the Fed Funds rate, which causes some deposits to be withdrawn. In Xiao (2020), shadow banks face a more yield-sensitive clientele than banks, and hence pass more of the rate rise through to depositors, which attracts more deposits.

[16] In Bruno and Shin (2015b), dollar appreciation weakens the balance sheets of non-US borrowers with dollar liabilities, which reduces the capacity of banks to lend to these borrowers. Bruno and Shin (2015a) argue that an increase in volatility tightens Value-at-Risk constraints and hence restricts bank lending.

[17] We identify lead arrangers following the classification in Bharath et al. (2011).

Data on the quantity of credit provided by individual lenders is often missing in DealScan. In column 3, we therefore impute missing values of the dependent variable using an allocation algorithm proposed by De Haas and Van Horen (2013): for loans with missing lender quantities, we allocate half of the total loan quantity to the lead arrangers and half to the participants. This reflects the stylised fact that lead arrangers typically provide a larger quantity of credit than participants (Ivashina, 2009). We again find that nonbanks increase lending relative to banks when US monetary policy tightens.

All of the regressions presented so far measure US monetary policy using the Fed Funds rate instrumented by the cumulative Jarociński and Karadi (2020) shocks. In column 4 we run the OLS version of this regression, i.e. using the uninstrumented Fed Funds rate. We again observe a relative increase in nonbank lending when US monetary policy tightens. The estimated effect size is smaller when using OLS rather than IV; this could reflect the fact that the (uninstrumented) Fed Funds rate also reflects economic conditions, and so provides a noisier measure of the causal effects of monetary policy than the Jarociński and Karadi (2020) shocks. In column 5 we measure US monetary policy using the shadow rate of Wu and Xia (2016) (again using OLS), which incorporates the effects of unconventional monetary policy at the zero lower bound. Again, we find that a monetary tightening is associated with a relative increase in nonbank lending.

3.3 Heterogeneity by currency and nationality

The sample considered so far consists of dollar-denominated loans to non-US borrowers. In Table 8, we explore how the relative response of banks and nonbanks to US monetary policy varies across currencies and borrower and lender nationalities. In column 1, we expand the sample to include loans in all currencies to non-US borrowers. Consistent with a mechanism involving dollar funding markets, we find that the relative expansion in nonbank credit is driven by dollar-denominated lending specifically: we do not observe a statistically significant increase in lending in other currencies. The difference between the estimated coefficients for dollar and non-dollar loans is significant at the 5% level. In column 2, the sample consists of dollar-denominated loans to borrowers in all countries, i.e. including US borrowers. We find that the relative increase in nonbank lending to international borrowers is very similar to the effect for domestic US borrowers.

In columns 3 and 4, we return to our main sample of dollar loans to non-US borrowers.

In column 3, we find that the relative increase in nonbank lending is driven by both US and non-US lenders, with a somewhat larger effect for US lenders. In response to a 100 basis point US monetary tightening, US nonbanks increase lending by around 24% relative to US banks, while non-US nonbanks increase lending by around 15% relative to non-US banks. Finally, in column 4, we find that the effect is similar for within-border loans (defined as loans where the borrower and lender are headquartered in the same country) and cross-border loans, with relative increases in nonbank lending of around 14% and 20%, respectively.[18] Taken together, the results in Table 8 suggest that our key finding is robust across borrower and lender nationalities.

3.4 Heterogeneity by borrower risk

The results above establish that nonbank credit substitutes for bank credit when US monetary policy tightens. In this subsection, we consider how the strength of this substitution varies with borrower risk.

In columns 1–3 of Table 9, we interact our main variable of interest ($\text{Nonbank}_l \times \text{Fed Funds}_{t-1}$) with an indicator variable for borrowers in emerging markets, using the BIS Locational Banking Statistics classification. We find that the relative increase in nonbank credit supply is substantially larger for emerging market borrowers, which are those typically seen as most vulnerable to volatility from the global financial cycle (Calvo et al., 1996; Kalemli-Ozcan, 2019). The coefficient estimates in column 3 suggest that when US monetary policy tightens by 100 basis points, nonbanks increase lending by around 15% for developed market borrowers and 23% for emerging market borrowers, relative to banks.

We next consider a borrower-level measure of risk that can vary within countries. Each year, we compute the median syndicated loan spread, and we define borrowers whose average loan spread is greater than the median as 'high yield.'[19] We find some evidence that the relative increase in nonbank lending is larger for these high yield borrowers, although this result is sensitive to control variables (columns 4–6).

In short, the results in Table 9 suggest that the relative increase in nonbank credit supply is stronger for riskier borrowers. This suggests that nonbanks attenuate the international risk-taking channel of US monetary policy.

[18] Around 80% of loans in our main sample (dollar loans to non-US borrower) are cross-border.

[19] We use DealScan's all-in drawn spread, which includes fees and the spread over Libor paid on each dollar drawn.

An important question from a policy perspective is whether this increased risk-taking by nonbanks is likely to increase borrower vulnerabilities, or alternatively sustain 'zombie' firms. Table 10 presents suggestive evidence that this is not the case. In column 1, we include an interaction variable for nonbank lenders that typically have more unstable funding structures, i.e. a heavy reliance on short-term or runnable funding.[20] Such lenders might be less able to fulfil their commitments or roll-over funding in the event of stress. We find no evidence that the increase in lending is stronger for these more unstable nonbank lenders. In column 2, we test whether the increase in nonbank lending varies with the maturity of the loan: an increased reliance on short-term funding might make borrowers more vulnerable if capital flows dry up in the future. Again, we find no relationship between the expansion of nonbank lending and loan maturity. Finally, in columns 3 and 4, we interact our main variable with measures of the borrower's ex-ante and ex-post profitability, specifically return-on-assets in the year before (column 3) and after (column 4) the loan. We find no evidence that the increase in nonbank credit supply is stronger for less profitable firms, suggesting that nonbanks are not increasingly engaging in zombie lending.[21]

In summary, our loan-level evidence suggests that nonbank lenders mitigate the reduction in international dollar credit supply when US monetary policy tightens. The relative increase in nonbank credit supply is stronger for riskier borrowers. But we find no evidence that it is associated with an increase in destabilising or zombie lending.

4 Firm-level results

The previous section established that when US monetary policy tightens, nonbanks increase the supply of dollar credit to non-US borrowers, relative to banks. In this section we first aggregate the loan-level dataset to the borrower-quarter level in order to study the overall strength of substitution from bank to nonbank credit. We then estimate firm-level real effects of the relative expansion of nonbank credit.

[20] Following Irani et al. (2020), these are defined as investment banks, hedge funds, and mutual funds. In our sample, this group is dominated by investment banks, because very few hedge funds and mutual funds appear in the primary market.

[21] In unreported results, we also find no relationship with an indicator variable for borrowers that are ex-ante or ex-post loss-making.

4.1 Firm-level credit

In order to estimate the overall strength of substitution from bank to nonbank credit, we aggregate to the borrower-quarter level by summing over total dollar credit, total dollar credit from banks, and total dollar credit from nonbanks. We estimate regressions of the following form:

$$\text{Outcome}_{b,t} = \alpha_b + \beta \text{Fed Funds}_{t-1} + \gamma \text{Macro controls}_{b,t-1} + \varepsilon_{b,t}, \tag{5}$$

where $\text{Outcome}_{b,t}$ is a measure of total dollar credit at the borrower-quarter level; α_b is a borrower fixed effect; Fed Funds_{t-1} is the lagged Fed Funds rate instrumented with the cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks; and $\text{Macro controls}_{b,t-1}$ is a vector of lagged macroeconomic variables for the borrower's country: GDP growth, inflation, the monetary policy rate, and exchange rate appreciation. The sample consists of non-US borrowers for the period 1990 to 2019. We cluster standard errors by borrower and quarter.

Estimated regression results for equation (5) are shown in Table 11. We find that when US monetary policy tightens, total dollar bank lending to a given borrower falls (columns 1 and 2), while total nonbank lending increases (columns 3 and 4), leading to an increase in the nonbank share of total dollar lending (columns 5 and 6). Column 6 suggests that a 100 basis point monetary tightening is associated with an increase in the nonbank share of 0.8 percentage points (this is a substantial increase, given that the mean of nonbank share is 7.4%). That is, in line with our loan-level results, there is substitution from bank to nonbank credit at the borrower level. However, total borrower-level credit falls (columns 7 and 8), meaning that the substitution is incomplete.[22]

4.2 Nonbank relationships and firm-level real effects

The incomplete substitution from banks to nonbanks documented above could reflect demand, since borrowers might reduce dollar credit demand when US monetary policy tightens. However it could also reflect informational frictions. Relationships are important in the syndicated lending market (Sufi, 2007). Lead arrangers monitor borrowers over time and share the information with other syndicate members, meaning that lenders accumulate soft information about their borrowers (Gustafson et al., 2021). Borrowers are therefore more

[22] The dependent variables in columns 1–6 are only observed for loans where the individual lender quantities are observed, whereas the dependent variable in columns 7 and 8 is observed for all loans. This explains why the sample size is larger in columns 7 and 8.

likely to benefit from the relatively increased credit supply after a US monetary contraction if they have existing relationships with nonbank lenders.

To test this idea, we measure past nonbank relationships by constructing an indicator variable equal to one for firms that have borrowed from nonbank lenders in a previous syndicated loan. We then match this firm-level variable to annual financial statements data from Compustat Global, and estimate regressions of the following form at the firm-year level:[23]

$$\begin{aligned}\text{Outcome}_{b,t} = \alpha_b + \delta_{c,t} + \beta\,(\text{Nonbank relation}_{b,t} \times \text{Fed Funds}_{t-1}) \\ + \gamma_1\,(\text{Nonbank relation}_{b,t} \times \text{Macro controls}_{b,t-1}) + \gamma_2 \text{Firm controls}_{b,t-1} + \varepsilon_{b,t},\end{aligned} \tag{6}$$

where $\text{Nonbank relation}_{b,t}$ is our indicator variable for past nonbank lending relationships. We interact this variable both with the lagged Fed Funds rate and with a vector of lagged macroeconomic control variables for the firm's country. We instrument the interaction term $\text{Nonbank relation}_{b,t} \times \text{Fed Funds}_{t-1}$ with $\text{Nonbank relation}_{b,t} \times \text{JK}_{t-1}$, where JK_{t-1} is the lagged cumulative sum of Jarocinski-Karadi shocks. We control for local economic shocks with country-year fixed effects $\delta_{c,t}$. To control for firm characteristics, we include firm fixed effects α_b and lagged values of log(total assets) and return-on-assets. The sample consists of non-US firms from 1991 to 2019. We only include firms that appear as borrowers in DealScan at least once: this is to ensure that we are comparing firms with or without nonbank relationships, rather than with or without access to the syndicated credit market in general. We drop financial services firms and utilities. Standard errors are clustered by firm and year.

Table 12 shows estimated regression results for equation (6) across a range of dependent variables. The dependent variable in column 1 is an indicator variable equal to one if the firm obtains a new dollar syndicated loan. We find that when US monetary policy tightens, non-US firms that have previously borrowed from nonbanks are more likely to obtain a new loan. A 100 basis point tightening is associated with a 2.1 percentage point increase in the probability of obtaining a new loan (mean = 6.8%). We do not, however find any significant effect on loan size conditional on obtaining a loan (column 2). That is, the relative increase in syndicated credit supply mainly occurs on the extensive margin, rather than the intensive margin.

The dependent variables in columns 3–7 are from Compustat Global. We find that a 100

[23] We use annual rather than quarterly data because Compustat has better firm coverage at annual frequency, and only provides employment data at annual frequency.

basis point increase in US monetary policy is associated with a 4.6% increase in total balance sheet debt (column 3) and a 0.6 percentage point increase in leverage (column 4) for firms with nonbank relationships relative to firms without such relationships. This suggests that firms without nonbank relationships are unable to use other debt markets (such as bonds) to fully substitute for a reduction in syndicated credit supply.

This differential access to credit results in a relative expansion of total assets for firms with nonbank relationships (column 5). Finally, we find evidence that the relative increase in nonbank credit supply has real economic effects, as firms with existing nonbank lending relationships increase fixed assets (column 6) and employment (column 7) relative to firms without nonbank relationships.

In summary, the results in this section suggest that borrowers with existing relationships with nonbank lenders are better able to issue new dollar syndicated loans when US monetary policy tightens, and that this improved access to credit is associated with relative growth in total assets, fixed assets, and employment.

5 Conclusions

Growing evidence that US monetary policy has important effects on financial conditions and economy activity globally (Rey, 2015; Bruno and Shin, 2015a; Miranda-Agrippino and Rey, 2020), and especially in emerging markets (Calvo et al., 1996; Kalemli-Ozcan, 2019), has inspired significant debate among policymakers—both in the "core" country from which the most significant monetary shocks emanate (Bernanke, 2012; Powell, 2013; Fischer, 2015) and in the emerging economies to which they flow (Rajan, 2014). Recent research has highlighted the role of the banking sector in transmitting US monetary policy internationally (Morais et al., 2019; Bräuning and Ivashina, 2020). But there is scant evidence on how international *nonbank* lending responds to US monetary policy. This is an important gap, because nonbanks are playing an increasingly large role in credit markets, and it is theoretically ambiguous as to whether they would respond to US monetary policy in a similar way to banks. In particular, while some theories suggest that nonbank lenders could reinforce international monetary policy spillovers (Bruno and Shin, 2015a,b), others suggest that nonbanks could act as global shock absorbers (Drechsler et al., 2017; Xiao, 2020).

We address this question using loan-level data for the global syndicated lending market, which crucially allows us to control for credit demand and hence identify the differential sup-

ply response of banks and nonbanks to US monetary policy. Focusing on dollar-denominated loans to non-US borrowers over the period 1990–2019, we find that nonbanks increase credit supply relative to banks when US monetary policy tightens, and hence attenuate the reduction in total credit supply. The substitution from bank to nonbank credit is stronger for emerging market borrowers and riskier borrowers. This increased risk-taking is not, however, associated with particularly destabilising forms of lending, nor with zombie lending.

The syndicated lending market is subject to important informational frictions, and we find that these frictions limit the relative increase in nonbank credit, leading to real effects. Specifically, borrowers with existing relationships with nonbank lenders are better able to issue new dollar syndicated loans when US monetary policy tightens, and this improved access to credit is associated with relative growth in total assets, fixed assets, and employment.

Overall, our results suggest that nonbank lenders act as shock absorbers from US monetary policy spillovers, and that having more diversified funding providers (nonbanks in addition to banks) reduces the volatility in capital flows and economic activity resulting from the global financial cycle.

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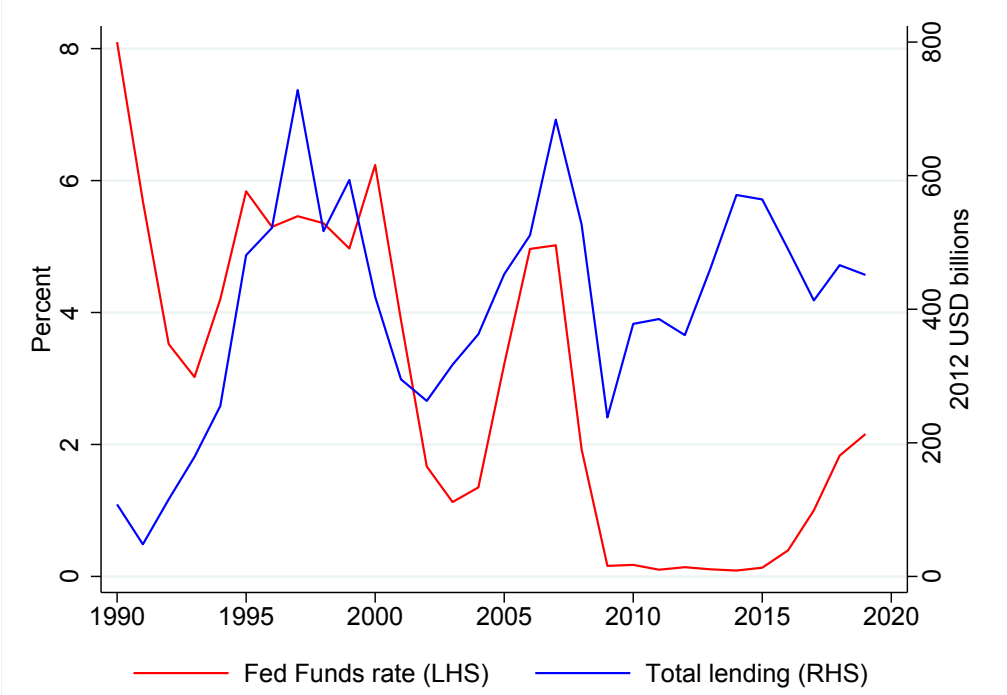
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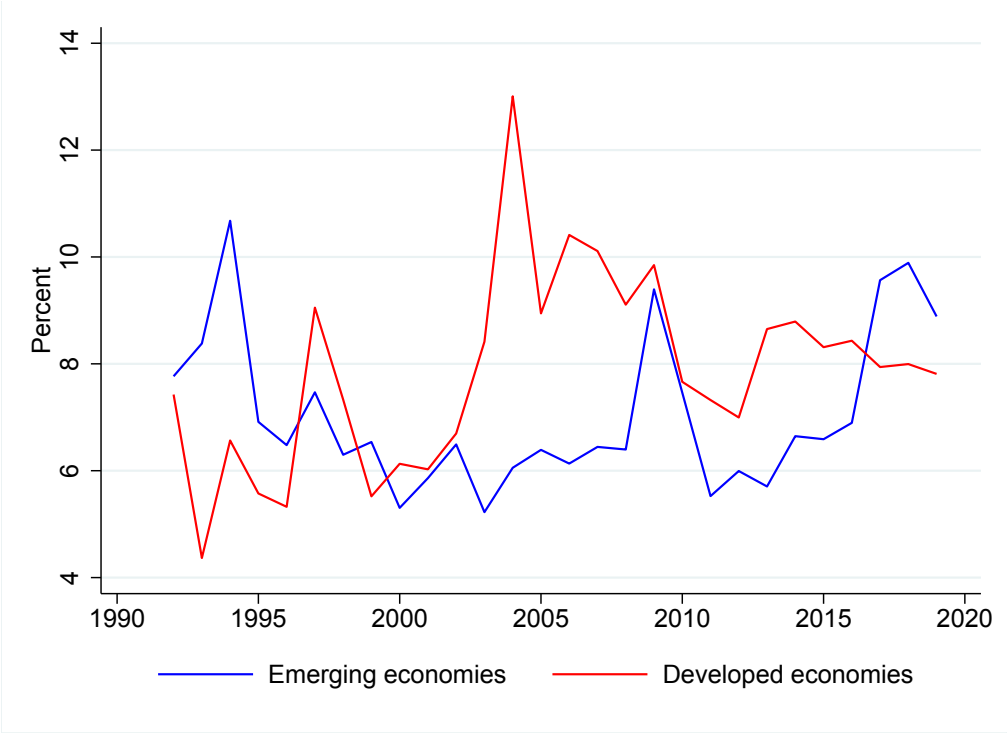
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Figure 1: International dollar syndicated lending

(a) Total international dollar syndicated loan issuance



(b) Nonbank share of lending



Notes: Panel A shows annual total dollar-denominated syndicated loan issuance to non-US borrowers. Panel B shows the nonbank share of lending (based on number of loan facilities). The country classifications (emerging and developed) refer to the borrower country, and are based on the BIS Locational Banking Statistics classification. Offshore centres and observations identified as likely to be amendments to existing loans are dropped.
Source: DealScan.

Table 1: Borrowers and loans by borrower region

Region	# Borrowers	# Loans	Percent of loans in		
			Dollar	Local	Other
Developed economies					
Asia and Pacific	12,079	37,888	6	87	7
Europe	16,036	54,952	18	70	12
North America	2,851	8,787	40	57	3
TOTAL:	30,966	101,627	15	75	10
Emerging economies					
Africa and Middle East	1,741	4,628	69	18	13
Asia and Pacific	12,057	29,173	36	58	6
Europe	1,630	5,058	56	11	32
Latin America and Caribbean	2,272	4,980	88	11	2
TOTAL:	17,700	43,839	48	43	9
GLOBAL TOTAL:	48,666	145,466	25	65	9

Notes: The table shows the number of borrowers and loan facilities by borrower region, and the percentage of loan facilities denominated in US dollars, local currency (i.e. the currency of the borrower), and other currencies. The sample consists of loans to non-US borrowers over 1990–2019. The country classifications are based on the BIS Locational Banking Statistics classification. Offshore centres and observations identified as likely to be amendments to existing loans are dropped. Currency shares are based on number of loan facilities.
Source: DealScan.

Table 2: Lenders and loans by lender region

Region	Number of lenders		Number of loans	
	Bank	Nonbank	Bank	Nonbank
Developed economies				
Asia and Pacific	539	108	24,823	1,235
Europe	1,697	316	106,886	4,286
North America	875	694	37,867	8,908
TOTAL:	3,111	1,118	169,576	14,429
Emerging economies				
Africa and Middle East	354	65	10,112	617
Asia and Pacific	1,417	173	29,918	1,125
Europe	268	22	2,645	78
Latin America and Caribbean	233	34	2,696	291
TOTAL:	2,272	294	45,371	2,111
GLOBAL TOTAL:	5,383	1,412	214,947	16,540

Notes: The table shows the number of lenders and loan originations by lender region, split by lender type (bank or nonbank). The sample consists of dollar loans to non-US borrowers over 1990–2019. The country classifications are based on the BIS Locational Banking Statistics classification. Offshore centres and observations identified as likely to be amendments to existing loans are dropped.
Source: DealScan.

Table 3: Regression summary statistics

Statistic:	Obs	Mean	Std dev	p25	p50	p75
Macroeconomic variables						
Fed Funds effective rate	120	2.90	2.37	0.39	2.44	5.25
Jarocinski-Karadi shocks (cumulative sum)	118	-1.43	0.56	-1.82	-1.49	-0.98
Wu-Xia shadow rate	120	2.51	2.75	0.47	2.43	5.10
Dollar index	120	87.45	9.58	81.42	87.92	93.08
VIX	120	19.16	7.11	13.82	17.18	22.57
Loan-level variables						
Log(New credit amount)	61619	2.792	1.322	1.9	2.7	3.7
Log(New credit imputed amount)	183666	3.095	1.379	2.1	3.1	4.0
Nonbank lender	183966	0.069	0.253	0.0	0.0	0.0
Investment bank lender	183966	0.032	0.177	0.0	0.0	0.0
Finance company lender	183966	0.023	0.150	0.0	0.0	0.0
Unstable nonbank lender	183966	0.033	0.178	0.0	0.0	0.0
Lead arranger	183966	0.439	0.496	0.0	0.0	1.0
Participant	183966	0.561	0.496	0.0	1.0	1.0
US lender	183966	0.144	0.351	0.0	0.0	0.0
Non-US lender	183966	0.856	0.351	1.0	1.0	1.0
Within-border loan	183966	0.207	0.405	0.0	0.0	0.0
Cross-border loan	183966	0.793	0.405	1.0	1.0	1.0
EME borrower	183966	0.574	0.494	0.0	1.0	1.0
High yield borrower	127689	0.488	0.500	0.0	0.0	1.0
Log(Maturity)	172514	1.172	0.843	0.5	1.4	1.6
RoA_{t-1} (%)	73675	10.567	7.253	5.5	9.5	14.5
RoA_{t+1} (%)	75258	9.912	7.034	5.1	9.1	13.5
Quarterly borrower-level variables						
Log(Total borrowing)	27452	5.109	1.346	4.23	5.08	5.95
Log(Bank borrowing)	8485	4.576	1.481	3.64	4.56	5.50
Log(Nonbank borrowing)	8485	1.044	1.705	0.00	0.00	2.10
Nonbank share	8485	0.074	0.175	0.00	0.00	0.07
Annual borrower-level variables						
Past nonbank relationship	139141	0.251	0.434	0.00	0.00	1.00
New loan indicator	139141	0.068	0.251	0.00	0.00	0.00
Log(New credit)	9390	5.346	1.430	4.44	5.31	6.25
Log(Total debt)	128803	5.192	2.204	3.90	5.25	6.63
Leverage	134433	0.280	0.191	0.14	0.26	0.40
Log(Total assets)	134438	6.687	1.842	5.49	6.62	7.86
Log(PP&E)	133817	5.313	2.177	4.02	5.37	6.73
Log(Employment)	86627	1.061	1.867	-0.12	1.06	2.30

Notes: The table shows summary statistics for the variables used in the regressions. The sample consists of dollar loans to non-US borrowers over 1990–2019. Offshore centres and observations identified as likely to be amendments to existing loans are dropped.

Table 4: Selected first-stage regressions

Sample:	Bank lenders only			Bank and nonbank lenders			
Dependent variable:	Fed Funds			Nonbank lender × Fed Funds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
JK	3.974***	4.336***	4.281***				
	(0.219)	(0.209)	(0.244)				
Nonbank lender × JK				3.854***	3.969***	3.972***	2.209***
				(0.339)	(0.337)	(0.345)	(0.440)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country fixed effects	No	-	-	Yes	-	-	-
Borrower industry fixed effects	No	-	-	Yes	-	-	-
Quarter fixed effects	No	No	No	Yes	Yes	-	-
Borrower fixed effects	No	Yes	Yes	No	Yes	-	-
Borrower-quarter fixed effects	No	No	No	No	No	Yes	Yes
Lender country-quarter fixed effects	No	No	No	No	No	No	Yes
Lender macro controls	No	No	Yes	-	-	-	-
Borrower macro controls	No	No	Yes	-	-	-	-
Lender macro controls × Nonbank	No	No	No	No	No	No	Yes
Borrower macro controls × Nonbank	No	No	No	No	No	No	Yes
Observations	56,512	55,614	36,343	56,632	58,706	58,189	37,577
Number of borrowers	5,976	5,102	3,849	5,584	5,240	5,182	3,880
Number of lenders	2,495	2,468	1,942	2,683	2,716	2,701	2,073
R^2	0.750	0.919	0.930	0.764	0.794	0.807	0.901
Kleibergen-Paap F-statistic	4,104.2	1,240.2	743.9	230.1	256.0	247.0	36.9

Notes: Columns 1–3 show regression results for equation (2). These are the first-stage regressions corresponding to columns 1–3 of Table 5. Columns 4–7 show regression results for equation (4). These are the first-stage regressions corresponding to columns 1–4 of Table 6. The regressions are estimated at the borrower-lender-quarter level. The sample consists of dollar-denominated loans from lenders in any country to non-US borrowers from 1990 to 2019. In columns 1–3 only bank lenders are included; in columns 4–7 both bank and nonbank lenders are included. 'Fed Funds' is the Fed Funds rate. 'JK' is the cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. Lender macro controls are the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Similarly for borrower macro controls. Industry is defined by four-digit SIC code. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 5: Impact of US monetary policy on global lending by banks

Dependent variable:	Log(New credit amount)					
	(1)	(2)	(3)	(4)	(5)	(6)
Fed Funds	-0.142***	-0.131***	-0.126***	-0.089***	-0.130***	-0.126***
	(0.014)	(0.016)	(0.022)	(0.032)	(0.022)	(0.022)
Fed Funds × EME borrower				-0.063*		
				(0.036)		
Dollar index					-0.004	
					(0.003)	
VIX						-0.001
						(0.004)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower fixed effects	No	Yes	Yes	Yes	Yes	Yes
Lender macro controls	No	No	Yes	Yes	Yes	Yes
Borrower macro controls	No	No	Yes	Yes	Yes	Yes
Observations	56,512	55,614	36,343	36,343	36,343	36,343
Number of borrowers	5,976	5,102	3,849	3,849	3,849	3,849
Number of lenders	2,495	2,468	1,942	1,942	1,942	1,942
Kleibergen-Paap F-statistic	4,104.2	1,240.5	743.9	352.4	832.2	801.7

Notes: The table shows instrumental variable regression results for equation (1) estimated at the borrower-lender-quarter level. The sample consists of dollar-denominated loans from banks (in any country) to non-US borrowers from 1990 to 2019. The dependent variable is the log of the total amount of new dollar syndicated credit extended by a lender to a borrower in a quarter. 'Fed Funds' is the lagged Fed Funds rate, instrumented with the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. 'EME borrower' is an indicator variable for borrowers headquartered in emerging markets, based on the BIS country classification. 'Fed Funds × EME borrower' is instrumented with the interaction between 'EME borrower' and the lagged cumulative Jarocinski-Karadi shocks. 'Dollar index' is the lagged Federal Reserve US dollar index. 'VIX' is the lagged CBOE Volatility Index. Lender macro controls are one-quarter lags of the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Similarly for borrower macro controls. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 6: Impact of US monetary policy on global lending by nonbanks relative to banks

Dependent variable:	Log(New credit amount)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nonbank lender × Fed Funds	0.063***	0.104***	0.102***	0.186***	0.184***	0.181***	0.117**	0.113**
	(0.024)	(0.020)	(0.018)	(0.057)	(0.054)	(0.055)	(0.051)	(0.054)
Nonbank lender × Dollar index					-0.003			
					(0.003)			
Nonbank lender × VIX						0.004		
						(0.003)		
Fed Funds								-0.128***
								(0.022)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country fixed effects	Yes	-	-	-	-	-	-	-
Borrower industry fixed effects	Yes	-	-	-	-	-	-	-
Quarter fixed effects	Yes	Yes	-	-	-	-	-	No
Borrower fixed effects	No	Yes	-	-	-	-	-	Yes
Borrower-quarter fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	No
Lender country-quarter fixed effects	No	No	No	Yes	Yes	Yes	Yes	No
Lender macro controls	No	No	No	-	-	-	-	Yes
Borrower macro controls	No	No	No	-	-	-	-	Yes
Lender macro controls × Nonbank	No	No	No	Yes	Yes	Yes	Yes	Yes
Borrower macro controls × Nonbank	No	No	No	Yes	Yes	Yes	Yes	Yes
Sample end	2019	2019	2019	2019	2019	2019	2006	2019
Observations	56,632	58,706	58,189	37,577	37,577	37,577	24,395	38,864
Number of borrowers	5,584	5,240	5,182	3,880	3,880	3,880	2,174	3,978
Number of lenders	2,683	2,176	2,701	2,073	2,073	2,073	1,512	2,162
Kleibergen-Paap F-statistic	230.1	256.0	247.0	36.9	52.0	40.6	85.4	12.6

Notes: The table shows instrumental variable regression results for equation (3) estimated at the borrower-lender-quarter level. The sample consists of dollar-denominated loans from banks and nonbank lenders (in any country) to non-US borrowers from 1990 to 2019 (1990 to 2006 in column 7). The dependent variable is the log of the total amount of new dollar syndicated credit extended by a lender to a borrower in a quarter. 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. 'Fed Funds' is the lagged Fed Funds rate, instrumented with the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. 'Nonbank lender × Fed Funds' is instrumented with the interaction between 'Nonbank lender' and the lagged cumulative Jarocinski-Karadi shocks. 'Dollar index' is the lagged Federal Reserve US dollar index.'VIX' is the lagged CBOE Volatility Index. Lender macro controls are one-quarter lags of the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Similarly for borrower macro controls. Industry is defined by four-digit SIC code. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 7: Global lending by nonbanks relative to banks – alternative measures

Dependent variable:	Log(New credit amount)				
Loan share:	Actual	Actual	Imputed	Actual	Actual
Estimation	IV	IV	IV	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Investment bank lender × Fed Funds	0.208**				
	(0.083)				
Finance company lender × Fed Funds	0.183***				
	(0.068)				
Nonbank lender × Fed Funds × Lead arranger		0.219***			
		(0.065)			
Nonbank lender × Fed Funds × Participant		0.148***			
		(0.056)			
Nonbank lender × Fed Funds			0.079**	0.039**	
			(0.032)	(0.017)	
Nonbank lender × Wu-Xia					0.036***
					(0.013)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes
Borrower-quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Lender country-quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Lender macro controls × Nonbank	Yes	Yes	Yes	Yes	Yes
Borrower macro controls × Nonbank	Yes	Yes	Yes	Yes	Yes
Lower-order interactions	-	Yes	-	-	-
Observations	37,232	37,577	129,927	37,753	37,747
Number of borrowers	3,852	3,880	10,361	3,893	3,829
Number of lenders	2,001	2,073	3,526	2,079	2,079
Kleibergen-Paap F-statistic	10.0	17.7	29.7	-	-
R^2	-	-	-	0.890	0.890

Notes: The table shows regression results for equation (3) estimated at the borrower-lender-quarter level. The sample consists of dollar-denominated loans from banks and nonbank lenders (in any country) to non-US borrowers from 1990 to 2019. In column 1, nonbank lenders that are neither investment banks nor finance companies are dropped. The dependent variable is the log of the total amount of new dollar syndicated credit extended by a lender to a borrower in a quarter. In column 3, missing values of the dependent variable are imputed using the approach of De Haas and Van Horen (2013). 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. 'Investment bank lender' and 'finance company lender' are indicator variables for investment bank lenders and finance company lenders, respectively. 'Lead arranger' and 'participant' are indicator variables for lead arrangers and participant lenders, respectively. 'Fed Funds' is the lagged Fed Funds rate. 'Wu-Xia' is the lagged US shadow rate of Wu and Xia (2016). In columns 1–3, interactions involving the Fed Funds rate are instrumented with the corresponding interactions involving the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. In columns 4 and 5, the regressions are estimated by OLS. Lender macro controls are one-quarter lags of the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Similarly for borrower macro controls. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 8: Global lending by nonbanks relative to banks – by currency and nationality

Dependent variable:	Log(New credit amount)			
	(1)	(2)	(3)	(4)
Nonbank lender × Fed Funds × Dollar loan	0.087***			
	(0.029)			
Nonbank lender × Fed Funds × Non-dollar loan	0.040			
	(0.029)			
Nonbank lender × Fed Funds × US borrower		0.342***		
		(0.086)		
Nonbank lender × Fed Funds × Non-US borrower		0.331***		
		(0.084)		
Nonbank lender × Fed Funds × US lender			0.237***	
			(0.062)	
Nonbank lender × Fed Funds × Non-US lender			0.153***	
			(0.057)	
Nonbank lender × Fed Funds × Within-border loan				0.144***
				(0.053)
Nonbank lender × Fed Funds × Cross-border loan				0.199***
				(0.057)
Lender fixed effects	Yes	Yes	Yes	Yes
Borrower-quarter fixed effects	Yes	Yes	Yes	Yes
Lender country-quarter fixed effects	Yes	Yes	Yes	Yes
Lender macro controls × Nonbank lender	Yes	Yes	Yes	Yes
Borrower macro controls × Nonbank lender	Yes	Yes	Yes	Yes
Lower-order interactions	Yes	Yes	Yes	Yes
Observations	125,555	141,666	37,577	37,577
Number of borrowers	16,044	11,510	3,880	3,880
Number of lenders	4,058	3,680	2,073	2,073
Kleibergen-Paap F-statistic	22.1	13.0	17.3	18.8

Notes: The table shows instrumental variable regression results for equation (3) estimated at the borrower-lender-quarter level, with additional interaction terms. The sample consists of loans in all currencies to non-US borrowers (column 1), dollar-denominated loans to borrowers in all countries (column 2), and dollar-denominated loans to non-US borrowers (columns 3 and 4). The sample period is 1990 to 2019. The dependent variable is the log of the total amount of new syndicated credit extended by a lender to a borrower in a quarter. 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. 'Dollar loan' is an indicator variable for loans denominated in US-dollars. 'US borrower' is an indicator variable for borrowers headquartered in the US. 'US lender' is an indicator variable for lenders headquartered in the US. 'Within-border loan' is an indicator variable for loans where the borrower and lender are headquartered in the same country. 'Fed Funds' is the lagged Fed Funds rate. All interactions involving the Fed Funds rate are instrumented with the corresponding interactions involving the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. Lender macro controls are one-quarter lags of the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate appreciation against the dollar. Similarly for borrower macro controls. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 9: Global lending by nonbanks relative to banks – by borrower risk

Dependent variable:	Log(New credit amount)					
	(1)	(2)	(3)	(4)	(5)	(6)
Nonbank lender × Fed Funds	0.077***	0.163***	0.146***	0.080***	0.185***	0.177***
	(0.021)	(0.061)	(0.052)	(0.018)	(0.060)	(0.058)
Nonbank lender × Fed Funds × EME borrower	0.039*	0.076***	0.083***			
	(0.022)	(0.029)	(0.026)			
Nonbank lender × Fed Funds × High yield borrower				0.040**	0.041*	0.022
				(0.018)	(0.022)	(0.022)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower-quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Lender country-quarter fixed effects	No	No	Yes	No	No	Yes
Lender macro controls	No	Yes	-	No	Yes	-
Lender macro controls × Nonbank lender	No	Yes	Yes	No	Yes	Yes
Borrower macro controls × Nonbank lender	No	Yes	Yes	No	Yes	Yes
Lower-order interactions	Yes	Yes	Yes	Yes	Yes	Yes
Observations	58,189	38,377	37,577	48,342	30,781	30,047
Number of borrowers	5,182	3,929	3,880	3,862	2,811	2,781
Number of lenders	2,701	2,144	2,073	2,383	1,878	1,813
Kleibergen-Paap F-statistic	165.5	14.7	19.7	140.8	15.4	21.1

Notes: The table shows instrumental variable regression results for equation (3) estimated at the borrower-lender-quarter level, with additional interaction terms. The sample consists of dollar-denominated loans from banks and nonbank lenders (in any country) to non-US borrowers from 1990 to 2019. The dependent variable is the log of the total amount of new dollar syndicated credit extended by a lender to a borrower in a quarter. 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. 'EME borrower' is an indicator variable for borrowers in emerging markets, based on the BIS classification. 'High yield borrower' is an indicator variable for borrowers whose average loan spread in the quarter is greater than the median. 'Fed Funds' is the lagged Fed Funds rate. All interactions involving the Fed Funds rate are instrumented with the corresponding interactions involving the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. Lender macro controls are one-quarter lags of the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Similarly for borrower macro controls. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 10: Global lending by nonbanks – no evidence of destabilising or zombie lending

Dependent variable:	Log(New credit amount)			
	(1)	(2)	(3)	(4)
Nonbank lender × Fed Funds	0.176***	0.162***	0.165**	0.154**
	(0.054)	(0.050)	(0.070)	(0.068)
Nonbank lender × Fed Funds × Unstable nonbank lender	0.023			
	(0.044)			
Nonbank lender × Fed Funds × Log(Maturity)		0.020		
		(0.014)		
Nonbank lender × Fed Funds × RoA_{t-1}			-0.002	
			(0.002)	
Nonbank lender × Fed Funds × RoA_{t+1}				-0.002
				(0.003)
Lender fixed effects	Yes	Yes	Yes	Yes
Borrower-quarter fixed effects	Yes	Yes	Yes	Yes
Lender country-quarter fixed effects	Yes	Yes	Yes	Yes
Lender macro controls × Nonbank lender	Yes	Yes	Yes	Yes
Borrower macro controls × Nonbank lender	Yes	Yes	Yes	Yes
Lower-order interactions	Yes	Yes	Yes	Yes
Observations	37,577	36,880	15,118	15,768
Number of borrowers	3,880	3,777	1,377	1,394
Number of lenders	2,073	2,050	1,125	1,164
Kleibergen-Paap F-statistic	14.3	18.2	8.0	11.1

Notes: The table shows instrumental variable regression results for equation (3) estimated at the borrower-lender-quarter level, with additional interaction terms. The sample consists of dollar-denominated loans from banks and nonbank lenders (in any country) to non-US borrowers from 1990 to 2019. The dependent variable is the log of the total amount of new dollar syndicated credit extended by a lender to a borrower in a quarter. 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. 'Unstable nonbank lender' is an indicator variable equal to one for investment banks, hedge funds, and mutual funds. 'Log(Maturity)' is the log of the loan maturity. RoA_{t-1} and RoA_{t+1} are the borrower's return-on-assets in the year before and after the loan, respectively. 'Fed Funds' is the lagged Fed Funds rate. All interactions involving the Fed Funds rate are instrumented with the corresponding interactions involving the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. Lender macro controls are one-quarter lags of the following variables for the country of the lender, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Similarly for borrower macro controls. Standard errors are clustered by borrower, lender, and quarter, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

Table 11: Impact of US monetary policy on firm-level syndicated credit

Dependent variable:	Bank borrowing		Nonbank borrowing		Nonbank share		Total borrowing	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fed Funds	-0.115***	-0.074***	0.033*	0.070^{+}	0.003*	0.008**	-0.023**	-0.052***
	(0.018)	(0.026)	(0.018)	(0.042)	(0.002)	(0.003)	(0.009)	(0.013)
Country fixed effects	Yes	-	Yes	-	Yes	-	Yes	-
Borrower fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,671	2,938	6,671	2,938	6,671	2,938	22,676	13,742
Number of borrowers	4,742	1,009	4,742	1,009	4,742	1,009	12,925	3,991
Kleibergen-Paap F-statistic	227.5	302.3	227.5	302.3	227.5	302.3	206.3	250.4

Notes: The table shows instrumental variable regression results for equation (5) estimated at the firm-quarter level. The sample consists of non-US firms from 1990 to 2019. The dependent variable is the log of the total amount of new dollar syndicated credit from banks (columns 1 and 2), the log of the total amount of new dollar syndicated credit from nonbanks (column 3 and 4), the nonbank share of new dollar syndicated credit (column 5 and 6), and the log of the total amount of new dollar syndicated credit (column 7 and 8). The dependent variable in columns 7 and 8 is based on all loans, whereas the dependent variables in columns 1–6 are based only on loans where individual lender quantities are observed. 'Fed Funds' is the lagged Fed Funds rate, instrumented with the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. Macro controls are one-quarter lags of the following variables for the country of the borrower, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Standard errors are clustered by borrower and quarter, and shown in parentheses. $^{+}$, *, **, and *** indicate significance at 11%, 10%, 5% and 1%, respectively.

Table 12: Impact of past nonbank relationships on firm-level outcomes

Dependent variable:	Loan indicator	New credit	Total debt	Leverage	Total assets	PP&E	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nonbank relation × Fed Funds	0.021***	0.015	0.046***	0.006**	0.008**	0.014*	0.014*
	(0.007)	(0.029)	(0.015)	(0.002)	(0.004)	(0.008)	(0.008)
Borrower fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls × Nonbank relation	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	110,527	4,867	104,786	109,483	109,488	109,042	79,991
Number of borrowers	6,844	1,274	6,751	6,797	6,797	6,790	6,187
Kleibergen-Paap F-statistic	16.8	239.6	17.0	16.7	16.7	16.7	14.2

Notes: The table shows instrumental variable regression results for equation (6) estimated at the firm-year level. The sample consists of non-US firms from 1991 to 2019, excluding financial services, utilities, and firms that never appear as borrowers in DealScan. The dependent variables in columns 1 and 2 are from DealScan: indicator variable equal to one if the firm obtains a new dollar syndicated loan (column 1); and log of the total amount of new dollar syndicated credit, conditional on obtaining a new loan (column 2). The dependent variables in columns 3–7 are from Compustat Global: log of total debt (column 3); leverage (column 4); log of total assets (column 5); log of property, plant, and equipment (column 6); and log of employment (column 7). 'Nonbank relation' is an indicator variable equal to one for firms that have borrowed from nonbank lenders in the syndicated credit market in a previous year. 'Fed Funds' is the lagged Fed Funds rate. 'Nonbank relation × Fed Funds' is instrumented with the interaction between 'Nonbank relation' and the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. Borrower controls are lags of log(total assets), return-on-assets, and nonbank relation. Macro controls are lags of the following variables for the country of the borrower, obtained from the IMF: GDP growth, inflation, monetary policy rate, and exchange rate apprecation against the dollar. Standard errors are clustered by borrower and year, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.