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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 spillovers. For identification, we exploit monetary policy surprises and the global syndicated lending market, where detailed loan-level data allow us to compare the participation of banks and nonbanks in the same loan. When US policy tightens, dollar credit to non-US firms falls, but nonbanks increase credit supply (relative to banks), thereby mitigating the total credit reduction. This relative increase is stronger for riskier non-US firms, proxied by emerging market firms, high-yield firms, or firms in countries with stronger capital inflow restrictions. Finally, there are real effects associated with the international nonbank channel of monetary policy, as firms with better access to nonbank credit relatively increase total corporate debt, investment, and employment.

1. Introduction

Capital flows and credit growth are strongly correlated across countries (Calvo et al., 1996; Rey, 2013). Macroeconomic evidence suggests that this "global financial cycle" is largely driven by US monetary policy (Miranda-Agrippino and Rey, 2020): expansionary Federal Reserve monetary policy drives increases in lending and risky asset prices globally, while contractionary policy leads to a tightening of global financial conditions. The effect of US monetary policy on credit conditions elsewhere has thus been a concern for policymakers—especially those in emerging markets, where the spillover effects are most pronounced (Kalemli-Ozcan, 2019).

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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]

Existing literature has highlighted the role of the banking sector in propagating these international spillovers. 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. These bank lending effects are 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, *nonbank* financial intermediaries (NBFIs) have grown in importance in recent decades, and now account for nearly half of global financial assets (FSB, 2023). While institutional investors such as insurance companies, mutual funds, and pension funds primarily invest in bonds and equities, nonbanks also play a significant role in loan markets. According to FSB data, NBFIs hold around $18 trillion in loan assets, which corresponds to around 15% of total global loan assets. Despite this crucial role, there is scant evidence on how international lending by nonbanks responds to US monetary policy, and whether nonbanks propagate or absorb US monetary policy shocks via loan markets.

In this paper, we fill this gap by studying how US monetary policy affects lending to non-US corporates by nonbanks, relative to banks (depository institutions). This is ultimately an empirical question, as different theories offer contrasting predictions. On the one hand, Bruno and Shin (2015a,b) argue that tighter US monetary policy weakens the balance sheets of non-US firms with dollar liabilities. This could affect lending by banks and nonbanks in a similar way, suggesting that nonbanks could reinforce US monetary policy spillovers. On the other hand, tighter US monetary policy could cause deposits to flow from banks to nonbanks via money market funds (Drechsler et al., 2017; Xiao, 2020), resulting in more nonbank lending (Drechsler et al., 2022; Elliott et al., 2022). In addition, bank lending could be more sensitive to increases in risk induced by tighter monetary policy (Buchak et al., 2018b; Irani et al., 2021), especially for foreign lending (Giannetti and Laeven, 2012; De Haas and Van Horen, 2013). These factors suggest that nonbanks could attenuate the international bank lending and risk-taking channels.

Our analysis focuses on the syndicated lending market. Not only is this market important for the financing of large corporates – similar in size to the corporate bond market (Serena and Tsoukas, 2020) – but crucially for this paper, the structure of the market also allows us to *identify credit supply of banks versus nonbanks*. Syndicated loans are loans in which corporates borrow from multiple lenders at the same time, and our detailed loan-level dataset identifies whether a lender is a bank or a nonbank.[2] This allows us to identify credit supply effects by comparing 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 borrower-level credit demand Khwaja and Mian (2008), Chodorow-Reich (2014). Our main sample covers 30 years (1990–2019) and borrowers in 121 countries.

A second identification challenge is that US monetary policy is not exogenous, but is affected by economic conditions which might themselves affect bank and nonbank credit supply. We address this challenge by instrumenting US monetary policy using monetary policy *surprises* (Jarociński and Karadi, 2020). We also use the uninstrumented Fed Funds rate and Wu and Xia (2016) shadow rate in robustness tests, and we control for local and global macroeconomic and financial conditions.

We find that when US monetary policy tightens, nonbanks increase the supply of syndicated dollar credit to non-US corporates, relative to banks. The economic effect is large: a 25 basis point monetary tightening is associated with a relative increase in nonbank loan size of around 5%. Since we find that tighter US monetary policy reduces total credit to firms outside the US, these results imply that nonbank lenders attenuate the international transmission of US monetary policy. The relative increase in lending holds for both of the main types of nonbank lender in this market (investment banks and finance companies), US and non-US lenders, and within-border and cross-border dollar loans. The effect is driven by dollar loans specifically, with no significant increase in the supply of non-dollar loans, consistent with US monetary policy transmitting internationally via dollar funding markets.[3]

Our results are consistent with two mechanisms driving this substitution. First, tighter regulation implies that banks typically have lower risk tolerance than nonbanks (Buchak et al., 2018b; Irani et al., 2021), and banks typically cut foreign lending first in response to shocks (Giannetti and Laeven, 2012; De Haas and Van Horen, 2013). This suggests that international bank lending is likely to be more sensitive to increases in the credit risk of corporate borrowers caused by contractionary US monetary policy. Under this mechanism, we would expect the substitution from bank to nonbank credit to be stronger for loans to riskier borrowers. In line with this idea, we find that the relative increase in nonbank lending is larger for borrowers from emerging markets and borrowers paying higher yields on their loans. Similarly, using the capital controls dataset of Fernández et al. (2016), we find that the substitution is larger for borrowers in countries with stronger capital inflow restrictions—which also create risk in lending.

Our findings also support the funding-based mechanism proposed by Drechsler et al. (2017) and Xiao (2020), whereby tighter monetary policy causes deposit funding to flow from banks to nonbanks via money market funds. While those papers focus on the US, we provide suggestive evidence that a similar mechanism operates at the international level. Specifically, using the BIS International Debt Securities dataset, we show that when US monetary policy tightens, nonbank financial intermediaries headquartered outside

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

[2] Most lenders in this market are banks, but the quantity of nonbank lending is also very significant. For example, in 2019, the total global quantity of new syndicated lending was around $2.8 trillion, of which nonbanks provided around $265 billion. This compares to around $130 billion in the private credit market, which is the other main market in which nonbanks lend directly. Nonbanks play a much larger role in the secondary market for syndicated loans, but data on the secondary market is unavailable outside the US.

[3] When we expand the sample to include US borrowers in addition to non-US borrowers, we find that the strength of the substitution from bank to nonbank credit is equal across US and non-US borrowers.

of the US increase their funding via short-term dollar debt issuance relative to banks, consistent with a relative improvement in international dollar funding markets.

We next aggregate the loan-level dataset to the borrower level in order to study firm-level effects of differential access to nonbank credit. Soft information and lending relationships are important in the syndicated lending market (Sufi, 2007). This suggests that borrowers are more likely to benefit from the relative increase in nonbank credit supply if they already have existing relationships with nonbank lenders. Consistent with this idea, we find that when US monetary policy tightens, non-US firms that have previously borrowed from nonbanks are more likely to obtain a new dollar syndicated loan.[4] Matching the syndicated lending data to firm-level financial statements from Compustat Global, we find that after a monetary policy tightening shock, firms with previous nonbank relationships also experience a relative increase in total corporate debt. This measure includes all forms of debt (not just syndicated loans), such as corporate bonds. Finally, the relative increase in credit supply has real economic effects, as firms with previous nonbank relationships relatively increase investment and employment after a US monetary contraction.

Contributions to existing literature. Our paper contributes to the large recent literature on US monetary spillovers and the "global financial cycle" (Rey, 2013; Bruno and Shin, 2015a,b; Bernanke, 2017; Kalemli-Ozcan, 2019; Miranda-Agrippino and Rey, 2020). We complement these more macro-focused studies by providing micro evidence on the channels through which these spillovers occur. Our micro perspective allows us to show crucial heterogeneity in the response of different financial intermediaries – nonbank lenders vs. banks – to international spillovers from US monetary policy.[5]

We also contribute to the 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; Avdjiev et al., 2020; Bräuning and Ivashina, 2020). Our finding that nonbanks increase international lending relative to banks in response to tighter US monetary policy builds on domestic US evidence (Drechsler et al., 2022; Elliott et al., 2022); in particular, we closely follow the empirical approach of Elliott et al. (2022). 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), Maddaloni and Peydró (2011), Jiménez et al. (2012, 2014), Dell'Ariccia et al. (2017).

Our paper also adds to a growing literature exploring the drivers and implications of the recent growth of nonbank credit intermediation (Buchak et al., 2018b,a; Chen et al., 2018; Fleckenstein et al., 2021; Irani et al., 2021; Aldasoro et al., 2023). We extend this mostly US-focused literature by providing cross-country evidence, which highlights crucial differences in nonbank vs. bank lending across developed and emerging market economies, as well as differences in countries subject to stronger capital controls. Moreover, we highlight a setting where nonbank (versus bank) credit supply is more stable: nonbank lenders as global absorbers of US monetary policy.

The rest of the paper proceeds 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 banks and nonbanks. Section 4 provides evidence for the mechanisms underlying our results. Section 5 provides evidence on the impact of nonbank lending on firm-level total debt and real outcomes. Section 6 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 also one of the most important sources of corporate debt financing: it is similar in size to the corporate bond market (Serena and Tsoukas, 2020), and continues to dwarf the private credit market despite recent growth in the latter.[6] Syndicated lending is also 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.[7]

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

[4] In our loan-level regressions, adding borrower-quarter fixed effects does not change the estimated coefficient compared to regressions with borrower fixed effects only. This implies that unobserved time-varying borrower fundamentals (such as credit demand) are orthogonal to our main variable (the interaction between nonbanks and monetary policy). This suggests that, in our firm-level regressions where we cannot control for firm-time fixed effects but only for firm fixed effects, our results reflect a credit supply mechanism.

[5] Our paper also relates to literature on international portfolio flows, including the impact of US monetary policy (Chari et al., 2021) and macroprudential policy (Chari et al., 2022; Forbes et al., 2023). In contrast to that literature, we focus on lending by nonbanks, rather than investments in bonds and equities.

[6] According to Preqin data, annual global lending in the private credit market increased from around $30 billion in 2009 to a peak of around $250 billion in 2021. In contrast, we estimate that new global syndicated lending was around $2.8 trillion in 2019 (the last year of our sample).

[7] 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 (Table14A), and international bonds and notes (Table 14B).

the identity of the borrower, the identities of the lenders in the syndicate (including lead arrangers and participants), the type of facility (typically term loan or credit line), loan amount, maturity, currency, 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-year level. We convert all monetary variables to 2012 US dollars to avoid capturing any effects from inflation.

Since we are interested in international spillovers from US monetary policy, our main sample is dollar-denominated loans to borrowers headquartered outside the US.[8] As shown in Table A1 in the Online Appendix, 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 dollar in international trade and finance: 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 averages around $400bn, with fluctuations in aggregate issuance following a broadly pro-cyclical pattern (Figure A1). In our main sample, the average loan facility size is around $330 million, and the average borrower has around $12 billion in total assets.

Classifying banks and nonbanks. 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.[9] We manually reclassify a small number of important lenders that appear to be misclassified in DealScan. We drop international financial institutions (e.g. the World Bank) and development banks.

In our main sample (dollar-denominated loans to non-US borrowers), nonbanks account for around 7% of loan originations (Figure A1). But there is substantial variation in this share over time, with the nonbank share increasing to 13% in developed economies in 2004 and rising to 10% in emerging economies in 2018. Nonbanks play a much larger role in the secondary market for syndicated loans (Bord and Santos, 2012; Irani et al., 2021), but data on the secondary market is unavailable outside the US.

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. Investment banks include securities underwriting firms and broker-dealers.[10] Finance companies are wholesale financial institutions that specialise in industrial lending, including the financial services arms of some large industrial conglomerates (e.g. General Electric Capital Corp and Siemens Financial Services).

While nonbanks active in the secondary market (such as CLOs and mutual funds) typically specialise in term loans, investment banks and finance companies participate in both loan types in the primary market. On average, they lend to riskier borrowers than banks. We observe nonbank lenders headquartered in all regions of the world; most are based in developed economies (Table A2).

Key differences between banks and nonbanks. Banks and nonbanks differ in important ways that could affect their responsiveness to monetary policy. First, banks are more tightly regulated than nonbanks and so typically have lower risk tolerance (Buchak et al., 2018b; Irani et al., 2021). This suggests that bank lending is likely to be more sensitive to increases in the credit risk of corporate borrowers caused by contractionary monetary policy.

In addition, while banks typically receive much of their funding from retail depositors, investment banks and finance companies are entirely reliant on wholesale funding, including via international money markets. This implies that relative funding conditions for banks and nonbanks are likely to be sensitive to monetary policy. In particular, focusing on the US, Drechsler et al. (2017) show that an increase in the Fed Funds rate causes deposits to flow out of banks, as banks' market power allows them to raise deposit rates by less than the Fed Funds rate and hence benefit from higher net interest margins. These deposits flow to shadow banks such as money market funds, which in turn provide funding to 'downstream' nonbank lenders via wholesale money markets (Xiao, 2020).

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 compare 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).[11]

Second, while the borrower chooses the lead arranger, the other lenders (participants) are selected in a book-building process run by the lead arranger, and are therefore not chosen by the borrower (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 asymmetrically across lenders in response to demand shocks (Paravisini et al., 2015).

[8] We drop borrowers in offshore centres, based on the BIS country classification.

[9] We drop any remaining lenders for which DealScan does not provide a classification.

[10] We classify lenders at the entity/subsidiary level, rather than the parent/group level. So the major US broker-dealers are classified as investment banks throughout, even though their parent companies became bank holding companies during our sample period. Our results are robust to excluding observations where multiple lenders from the same group participate in the same loan.

[11] 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.

Table 1
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
Romer–Romer shocks (cumulative sum)	72	2.82	1.76	1.10	2.75	4.03
Taylor Rule residuals	120	0.00	1.63	−1.30	−0.10	1.18
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)	60 886	2.786	1.319	1.9	2.7	3.7
Nonbank lender	60 886	0.057	0.231	0.0	0.0	0.0
Investment bank lender	60 886	0.023	0.149	0.0	0.0	0.0
Finance company lender	60 886	0.023	0.148	0.0	0.0	0.0
Lead arranger	60 886	0.411	0.492	0.0	0.0	1.0
Participant	60 886	0.589	0.492	0.0	1.0	1.0
US lender	60 886	0.092	0.289	0.0	0.0	0.0
Non-US lender	60 886	0.908	0.289	1.0	1.0	1.0
Within-border loan	60 886	0.222	0.416	0.0	0.0	0.0
Cross-border loan	60 886	0.778	0.416	1.0	1.0	1.0
EME borrower	60 886	0.714	0.452	0.0	1.0	1.0
High yield borrower	50 262	0.376	0.484	0.0	0.0	1.0
Capital inflow restrictions	45 951	0.519	0.500	0.0	1.0	1.0
Tightening cycle	60 886	0.291	0.454	0.0	0.0	1.0
Loosening cycle	60 886	0.197	0.398	0.0	0.0	0.0
Annual borrower-level variables						
Past nonbank relationship	138 947	0.251	0.434	0.00	0.00	1.00
New loan indicator	138 947	0.068	0.251	0.00	0.00	0.00
Log(New credit)	9372	5.347	1.431	4.44	5.31	6.25
Log(Total debt)	128 620	5.191	2.206	3.90	5.25	6.63
Log(Total assets)	134 255	6.687	1.842	5.49	6.62	7.87
Log(PP&E)	133 634	5.313	2.178	4.02	5.37	6.73
Log(Employment)	86 590	1.062	1.867	−0.12	1.06	2.30
Country-level variables						
Log(Bank dollar deposits)	1,767	7.52	3.95	5.17	7.33	9.20
Log(Nonbank dollar debt)	1,872	6.49	2.21	5.03	6.67	8.08
Log(Nonbank non-dollar debt)	1,476	7.21	2.20	5.81	7.21	9.14
Syndicate structure variables						
Log(Bank borrowing)	8367	4.552	1.497	3.62	4.56	5.49
Log(Nonbank borrowing)	8367	1.054	1.708	0.00	0.00	2.17
Nonbank share	8367	0.076	0.180	0.00	0.00	0.07

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.

2.2. Other data sources

We match the DealScan syndicated lending dataset to several other data sources. Summary statistics are presented in Table 1.

Monetary policy measures. We measure the stance of US monetary policy using the Federal Funds rate. The Fed Funds rate is not exogenous, because it is affected by economic conditions which might themselves affect credit supply. We therefore instrument the Fed Funds rate using the 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; Bu et al., 2021; Döttling and Ratnovski, 2023).

We run robustness tests using several other measures of monetary policy, including the raw (uninstrumented) Fed Funds rate and the shadow rate of Wu and Xia (2016).

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's International Financial Statistics dataset: real GDP growth, CPI

inflation, the monetary policy rate,[12] 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 (Bruno and Shin, 2015a,b; Rey, 2013; Miranda-Agrippino and Rey, 2020): the Federal Reserve dollar index, and the VIX (a measure of equity market volatility).

Capital controls. To consider the impact of capital controls, we use the dataset of Fernández et al. (2016). This provides annual country-level measures of a range of capital flow restrictions for the period 1995–2019, based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

Compustat. In order to study firm-level real effects, we match DealScan to borrower-level financial statements from 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).

Bank and nonbank funding flows. To investigate changes in the liabilities side of bank and nonbank balance sheets, we collect country-level data on short-term dollar funding of non-US banks and nonbanks. For banks, we use the dataset on dollar deposits at non-US banks constructed by Levy Yeyati (2006), which provides annual country-level data for 1991–2009. For nonbanks, we use the BIS International Debt Securities dataset, which provides quarterly country-level data on international debt instruments issued by nonbank financial intermediaries for the period 1993–2019.

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:

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

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; among other things, these variables control for local economic and financial crises. 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.

First stage. The Fed Funds rate is not exogenous, because it responds to economic conditions that are likely to also 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 Eq. (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 A3 in the Online Appendix. The cumulative Jarocinski–Karadi shocks are very highly predictive of the Fed Funds rate, resulting in large Kleibergen and Paap (2006) F-statistics.

Main results. Our main instrumental variable regression results for Eq. (1) are shown in Table 2. 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 1–4).[13] In our baseline regression including the full set of controls (column 4), we find that a 25 basis point monetary tightening is associated with a reduction in bank lending of around 3%. Also consistent with existing studies, we find that the reduction in lending is larger for borrowers in emerging markets (column 5).[14]

In columns 6 and 7, we find that the estimated response to monetary policy is robust to controlling for other factors typically associated with the global financial cycle: the strength of the dollar (Bruno and Shin, 2015b), and financial market volatility (Bruno and Shin, 2015a; Rey, 2013). This suggests a direct transmission channel from US monetary policy to international bank lending.

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.

[12] 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.

[13] The sample size drops considerably in column 4 because the full set of local macroeconomic control variables is not available for all countries in all time periods.

[14] In column 5, Fed Funds_{t-1} and $\text{Fed Funds}_{t-1} \times \text{EME}_b$ are instrumented with JK_{t-1} and $\text{JK}_{t-1} \times \text{EME}_b$.

Table 2
Impact of US monetary policy on global lending by banks.

Dependent variable:	Log(New credit amount)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fed Funds	−0.141***	−0.119***	−0.130***	−0.124***	−0.088***	−0.128***	−0.124***
	(0.014)	(0.010)	(0.016)	(0.022)	(0.032)	(0.023)	(0.022)
Fed Funds × EME borrower					−0.062*		
					(0.037)		
Dollar index						−0.004	
						(0.003)	
VIX							−0.001
							(0.004)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country fixed effects	No	Yes	–	–	–	–	–
Borrower industry fixed effects	No	Yes	–	–	–	–	–
Borrower fixed effects	No	No	Yes	Yes	Yes	Yes	Yes
Lender macro controls	No	No	No	Yes	Yes	Yes	Yes
Borrower macro controls	No	No	No	Yes	Yes	Yes	Yes
Observations	55,798	53,055	54,924	35,723	35,723	35,723	35,723
Kleibergen–Paap F-statistic	3,989.0	3,706.4	1,213.0	735.3	348.1	818.3	793.1

Notes: The table shows instrumental variable regression results for Eq. (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. 'EME borrower' is an indicator variable for borrowers headquartered in emerging markets. 'Fed Funds' is instrumented with the lagged cumulative sum of Jarociński and Karadi (2020) US monetary policy shocks. '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: GDP growth, inflation, monetary policy rate, and exchange rate appreciation against the dollar. Similarly for borrower macro controls. Borrower 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%.

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.

Our baseline regression specification is:

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

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 lagged 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.

First stage. 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 Eq. (3) is:

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

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 A4 in the Online Appendix. Again, the first-stage regressions exhibit very high predictive power.

Main results. Table 3 presents instrumental variable regression results for Eq. (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 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 25 basis point monetary policy tightening increases nonbank lending by around 5% relative to banks. Columns 5

Table 3
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	0.105***	0.102***	0.096***	0.188***	0.185***	0.182***	0.115**	0.114**
	(0.020)	(0.022)	(0.017)	(0.057)	(0.055)	(0.055)	(0.051)	(0.054)
Nonbank lender × Dollar index					−0.003			
					(0.003)			
Nonbank lender × VIX						0.004		
						(0.003)		
Fed Funds								−0.126***
								(0.022)
Lender fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower fixed effects	Yes	Yes	–	–	–	–	–	Yes
Quarter fixed effects	Yes	Yes	–	–	–	–	–	No
Borrower × Quarter fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	No
Lender country × Quarter fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	No
Lender macro controls	No	Yes	–	–	–	–	–	Yes
Borrower macro controls	No	Yes	–	–	–	–	–	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	57,990	38,226	56,585	36,954	36,954	36,954	24,102	38,226
Kleibergen–Paap F-statistic	256.0	224.1	307.2	36.4	51.3	40.0	84.2	12.4

Notes: The table shows instrumental variable regression results for Eq. (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. 'Fed Funds' is 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: 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%.

and 6 show that the result is robust to controlling for the strength of the dollar and the VIX.[15] The result is also robust to only including the 1990–2006 sample period (column 7). This implies that the result is not driven by the global financial crisis, nor by post-crisis regulatory changes such as the Volcker Rule or Basel III.

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.[16] 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 2, we find that a 25 basis point tightening leads to a reduction in bank lending of around 3%; 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.

Nonbank heterogeneity. We next disaggregate the data to understand whether our results are driven by a specific type of nonbank lender, a specific type of loan, or whether the lender is the syndicate lead. Table 4 shows the results of these 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.[17] In column 2, we estimate separate coefficients for the two main types of loan facility – credit lines and term loans – and again find that the relative increase in nonbank credit supply holds for both types.[18] In column 3, we estimate separate coefficients for lenders that are lead arrangers in the loan versus lenders that are merely participants.[19] The relative increase in nonbank credit supply holds for both lead arrangers and participants,

[15] The result is also robust to controlling for the global factor of Miranda-Agrippino and Rey (2020) and the risk aversion and uncertainty indices of Bekaert et al. (2022).

[16] 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$_{t-1}$.

[17] In particular, this suggests that our finding is unlikely to be related to non-loan aspects of the borrower–lender relationship. For example, if a lender also underwrites the borrower's bonds, then this could lead to conflicts of interest, informational economies of scope, or cross-selling. However, this situation would be much more likely for investment banks than finance companies. The fact that we find very similar results for both lender types therefore suggests that these factors are not driving our results.

[18] While nonbanks active in the secondary market (such as CLOs and mutual funds) typically specialise in term loans, the main nonbanks in the primary market participate in both loan types.

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

Table 4
Nonbank heterogeneity.

Dependent variable:	Log(New credit amount)		
	(1)	(2)	(3)
Investment bank lender × Fed Funds	0.208**		
	(0.083)		
Finance company lender × Fed Funds	0.185***		
	(0.069)		
Nonbank lender × Fed Funds × Credit line		0.124**	
		(0.057)	
Nonbank lender × Fed Funds × Term loan		0.100*	
		(0.055)	
Nonbank lender × Fed Funds × Lead arranger			0.217***
			(0.065)
Nonbank lender × Fed Funds × Participant			0.147***
			(0.057)
Lender fixed effects	Yes	Yes	Yes
Borrower × Quarter fixed effects	Yes	Yes	Yes
Lender country × Quarter fixed effects	Yes	Yes	Yes
Lender macro controls × Nonbank lender	Yes	Yes	Yes
Borrower macro controls × Nonbank lender	Yes	Yes	Yes
Lower-order interactions	–	Yes	Yes
Observations	36,615	31,301	36,954
Kleibergen–Paap F-statistic	9.8	8.2	17.4

Notes: The table shows instrumental variable regression results for Eq. (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. In column 1, nonbank lenders that are neither investment banks nor finance companies are dropped. In column 2, loan facilities that are neither credit lines nor term loans are dropped. 'Nonbank lender' is an indicator variable equal to one for nonbank lenders and zero for banks. '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: 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%.

with a somewhat larger impact for lead arrangers. Taken together, these results suggest that our main finding is robust across lender and loan types.

Alternative monetary policy measures. All the regressions presented so far measure US monetary policy using the Fed Funds rate instrumented by the cumulative Jarociński and Karadi (2020) shocks. In Table A5, we consider several alternative measures.

In column 1, we estimate the OLS version of our baseline regression, i.e. we use the uninstrumented Fed Funds rate. In column 2, we measure US monetary policy using the shadow rate of Wu and Xia (2016), which incorporates the effects of unconventional monetary policy at the zero lower bound. In column 3 and 4, we consider two alternative approaches to extracting the exogenous component of monetary policy. In column 3, we use the cumulative sum of Romer and Romer (2004) shocks as updated by Miranda-Agrippino and Ricco (2021). In column 4, we use deviations in the Fed Funds rate from an empirically estimated Taylor Rule, i.e. residuals from a regression of the level of the Fed Funds rate on the US output gap (as estimated by the CBO) and PCE inflation. In each case, we again find that a monetary tightening is associated with a relative increase in nonbank lending.

In column 5, we return to our IV specification, but estimate separate coefficients for periods of US monetary tightening and loosening. Specifically, we define indicator variables equal to one during periods when the Fed Funds target rate was being increased or reduced respectively, and interact each of these indicators with our main variable of interest.[20] The positive relationship between the Fed Funds rate and nonbank lending holds during both tightening and loosening cycles, with a somewhat larger effect during tightening cycles.

Heterogeneity by currency and nationality. The sample considered so far consists of dollar-denominated loans to non-US borrowers. In Table 5, we explore how the relative response of banks and nonbanks varies across currencies and borrower and lender nationalities.

If the relative increase in nonbank credit supply is driven by conditions in dollar funding markets, then we would expect it to primarily apply to dollar-denominated lending, rather than lending in other currencies. In column 1, we therefore expand the sample to include loans in all currencies to non-US borrowers.[21] Consistent with a mechanism involving dollar funding markets, the relative expansion in nonbank credit is driven by dollar lending specifically: we do not observe a statistically significant increase in

[20] We drop periods when the target rate was held constant for a sustained period of time.

[21] As for all monetary variables in our dataset, we convert non-dollar loans to 2012 dollar values.

Table 5
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	0.086***			
	(0.030)			
Nonbank lender × Fed Funds × Non-dollar loan	0.039			
	(0.029)			
Nonbank lender × Fed Funds × US borrower		0.344***		
		(0.086)		
Nonbank lender × Fed Funds × Non-US borrower		0.334***		
		(0.085)		
Nonbank lender × Fed Funds × US lender			0.239***	
			(0.062)	
Nonbank lender × Fed Funds × Non-US lender			0.153***	
			(0.058)	
Nonbank lender × Fed Funds × Within-border loan				0.145***
				(0.054)
Nonbank lender × Fed Funds × Cross-border loan				0.201***
				(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
Observations	124,171	140,999	36,954	36,954
Kleibergen–Paap F-statistic	21.5	13.0	17.0	18.5

Notes: The table shows instrumental variable regression results for Eq. (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. '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: 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%.

lending in other currencies. The difference between the estimated coefficients for dollar and non-dollar loans is significant at the 5% level.

Meanwhile, columns 2–4 demonstrate that within dollar lending, our main result is very robust across borrower and lender nationalities. 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 is very similar for international borrowers and 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 holds for both US and non-US lenders, with a somewhat larger effect for US lenders. 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.[22]

4. Mechanisms

The results above show that when US monetary policy tightens, the provision of dollar credit to non-US borrowers shifts from banks to nonbank lenders. Our findings are consistent with two mechanisms driving this substitution: one involving differences in risk tolerance, and one involving differences in funding structure.

4.1. Risk tolerance

Banks are more tightly regulated than nonbanks and so typically have lower risk tolerance (Buchak et al., 2018b; Irani et al., 2021). This suggests that bank lending is likely to be more sensitive to increases in the credit risk of corporate borrowers caused by US monetary policy tightening, particularly for international lending, which banks typically cut first in response to shocks (Giannetti and Laeven, 2012; De Haas and Van Horen, 2013). Indeed, existing literature on the international risk-taking channel of monetary policy demonstrates that banks reduce lending to riskier borrowers more when monetary policy tightens (Morais et al., 2019; Bräuning

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

Table 6
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	0.078***	0.146***	0.081***	0.181***	0.073***	0.126**
	(0.021)	(0.052)	(0.018)	(0.059)	(0.018)	(0.057)
Nonbank lender × Fed Funds × EME borrower	0.040*	0.086***				
	(0.022)	(0.027)				
Nonbank lender × Fed Funds × High yield borrower			0.039**	0.020		
			(0.018)	(0.023)		
Nonbank lender × Fed Funds × Capital inflow restrictions					0.060**	0.094***
					(0.026)	(0.028)
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	Yes	No	Yes	No	Yes
Lender macro controls × Nonbank lender	No	Yes	No	Yes	No	Yes
Borrower macro controls × Nonbank lender	No	Yes	No	Yes	No	Yes
Lower-order interactions	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57,495	36,954	47,845	29,597	43,090	32,035
Kleibergen–Paap F-statistic	165.6	19.4	143.4	20.8	85.3	11.9

Notes: The table shows instrumental variable regression results for Eq. (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. 'High yield borrower' is an indicator variable for borrowers whose average loan spread in the quarter is greater than the median. 'Capital inflow restrictions' is an indicator variable for borrowers in countries that have financial credit inflow restrictions, using the measure of Fernández et al. (2016). '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: 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%.

and Ivashina, 2020). If this mechanism is playing a role in driving our results, then we would expect the substitution from bank to nonbank credit to be stronger for riskier borrowers.

To test this hypothesis, we start by measuring borrower risk at the country level. In columns 1 and 2 of Table 6, 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—who are typically most vulnerable to US monetary policy spillovers (Calvo et al., 1996; Kalemli-Ozcan, 2019).[23] We find that the relative increase in nonbank credit supply is substantially larger for emerging market borrowers. The coefficient estimates in column 2 suggest that when US monetary policy tightens by 25 basis points, nonbanks increase lending by around 4% for developed market borrowers and 6% 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.'[24] 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 3 and 4).

Finally, we consider the impact of capital controls, using the dataset of Fernández et al. (2016). We interact our variable of interest with an indicator variable for borrowers in countries with financial credit inflow (FCI) restrictions, which restrict the ability of corporates to obtain cross-border credit. We find that the substitution from bank to nonbank credit is larger for these borrowers (columns 5 and 6), consistent with the idea that when US monetary policy tightens, banks retrench more from loans that involve greater frictions, while nonbanks are better able to continue providing these loans.

In short, these results suggest that the relative increase in nonbank credit supply is stronger for riskier loans, consistent with differences in bank and nonbank risk tolerance. That is, nonbanks attenuate the international risk-taking channel of US monetary policy.

4.2. Funding structure

Banks and nonbanks differ fundamentally in terms of their funding structure. Banks typically receive much of their funding from retail depositors, whereas investment banks and finance companies are entirely reliant on wholesale funding, including international money markets. In particular, investment banks rely heavily on repo funding, and finance companies are important issuers of commercial paper (Pozsar et al., 2013; Benmelech et al., 2017). Money market funds (MMFs) are key investors in both of these instruments.

[23] We classify countries using the BIS Locational Banking Statistics classification.

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

Table 7
Impact of US monetary policy on dollar funding of non-US banks and nonbanks.

Dependent variable:	ΔLog(Bank dollar deposits)		ΔLog(Nonbank dollar debt)		ΔLog(Nonbank non-dollar debt)	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔFed Funds	−0.010	−0.011	0.114***	0.109***	0.000	−0.015
	(0.009)	(0.009)	(0.029)	(0.036)	(0.117)	(0.125)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country macro controls	No	Yes	No	Yes	No	Yes
Observations	1,627	1,080	1,747	1,636	1,377	1,330
Kleibergen–Paap F-statistic	168.2	178.5	21.9	20.8	18.7	23.2

Notes: The table shows instrumental variable regression results for Eq. (5) estimated at the country-year level (columns 1 and 2) or country-quarter level (columns 3–6). The sample consists of non-US countries from 1991 to 2009 (columns 1 and 2) or 1993 to 2019 (columns 3–6). The dependent variable is the growth rate of dollar deposits at non-US banks (columns 1 and 2), growth rate of short-term dollar debt instruments issued by non-US nonbank financial intermediaries (columns 3 and 4), or growth rate of short-term non-dollar debt instruments issued by non-US nonbank financial intermediaries (column 5 and 6). 'ΔFed Funds' is the change in the Fed Funds rate. This is instrumented with the Jarociński and Karadi (2020) US monetary policy shocks. Macro controls are lags of the following country-level variables: GDP growth, inflation, monetary policy rate, and exchange rate appreciation against the dollar. Standard errors are clustered by country and year (columns 1 and 2) or country and quarter (columns 3–6), and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%.

Conceptually, our results are therefore also consistent with the funding-based mechanism of Drechsler et al. (2017) and Xiao (2020). Following a monetary tightening, banks use their deposit market power to raise deposit rates by less than the Fed Funds rate and hence benefit from higher net interest margins. Meanwhile, shadow banks such as money market funds, who face a more yield-sensitive clientele, pass on the rate rise more fully. As a result, MMF yields increase relative to bank deposit rates, which causes deposits to flow from banks to MMFs. These MMFs in turn provide short-term funding to 'downstream' nonbank lenders via money market instruments such as commercial paper and repo, which enables nonbanks to increase real economy lending relative to banks. Drechsler et al. (2017) and Xiao (2020) provide granular evidence consistent with this mechanism in the domestic US context.

In Table 7, we provide suggestive evidence that a similar mechanism operates at the international (non-US) level. We estimate country-level panel regressions of the form:

$$\Delta\text{Log(Funding)}_{c,t} = \alpha_c + \beta\Delta\text{Fed Funds}_t + \gamma\text{Macro controls}_{c,t-1} + \varepsilon_{c,t}, \tag{5}$$

where the dependent variable is the growth rate of a country-level measure of bank or nonbank funding (i.e. based on the liabilities side of financial intermediaries); α_c is a country fixed effect; $\Delta\text{Fed Funds}_t$ is the change in the Fed Funds rate (instrumented with the Jarocinski–Karadi shocks); and $\text{Macro controls}_{c,t-1}$ is a vector of lagged country-level macro control variables: GDP growth, inflation, the monetary policy rate, and exchange rate appreciation. The sample consists of non-US countries (the sample period varies depending on data availability). We cluster standard errors by country and time (year or quarter).

In columns 1 and 2, the dependent variable is the annual growth rate of dollar deposits at non-US banks for the sample period 1991–2009, from the dataset of Levy Yeyati (2006). In columns 3–6, the dependent variable is the quarterly growth rate of international money market instruments issued by non-US nonbank financial intermediaries for the period 1993–2019, from the BIS International Debt Securities dataset. Columns 3 and 4 consider dollar debt instruments, whereas columns 5 and 6 consider non-dollar debt instruments.

We find that a US monetary tightening is associated with a small reduction in dollar deposit growth at non-US banks, although this effect is statistically insignificant (columns 1 and 2). Meanwhile, there is a significant increase in dollar money market issuance by non-US nonbanks (columns 3 and 4): a 100 basis point tightening is associated with an increase in issuance of around 11%. That is, in response to a US monetary tightening, short-term dollar funding of nonbanks increases relative to banks, consistent with the domestic US patterns documented by Drechsler et al. (2017) and Xiao (2020).

The increase in nonbank dollar debt issuance could be demand-driven (nonbanks seek more funding because they have improved investment opportunities) or supply-driven (dollar funding conditions improve for nonbanks). However, in columns 5 and 6, we find that there is no change in *non-dollar* money market issuance by nonbanks. That is, the increase in nonbank issuance is specific to dollar debt, consistent with a supply-driven mechanism working through dollar money markets.

5. Firm-level results

Section 3 establishes that nonbank credit supply increases relative to bank credit supply in response to tighter US monetary policy. In this section we aggregate the loan-level dataset to the borrower level in order to study firm-level effects of differential access to nonbank credit.

Relationships are important in the syndicated lending market (Sufi, 2007). Lead arrangers monitor borrowers over time and share the information with other syndicate members (Gustafson et al., 2021), meaning that lenders accumulate soft information about their borrowers. Borrowers are therefore more likely to benefit from the relative increase in nonbank credit supply if they already have relationships with nonbank lenders.

Table 8
Impact of past nonbank relationships on firm-level outcomes.

Dependent variable:	Loan indicator (1)	Loan size (2)	Total debt (3)	Total assets (4)	PP&E (5)	Employment (6)
Nonbank relation × Fed Funds	0.021***	0.017	0.045***	0.008**	0.014*	0.014*
	(0.007)	(0.029)	(0.015)	(0.004)	(0.008)	(0.007)
Borrower fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes
Country × Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls × Nonbank relation	Yes	Yes	Yes	Yes	Yes	Yes
Observations	110,358	4,854	104,619	109,321	108,875	79,954
Kleibergen–Paap F-statistic	16.8	239.8	17.0	16.7	16.8	14.2

Notes: The table shows instrumental variable regression results for Eq. (6) estimated at the borrower-year level. The sample consists of non-US firms from 1991 to 2019, excluding financial services, public sector, 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 3–6 are from Compustat Global: log of total debt (column 3); log of total assets (column 4); log of property, plant, and equipment (column 5); and log of employment (column 6). '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 lagged log(total assets), lagged return-on-assets, and nonbank relation. Macro controls are lags of the following variables for the country of the borrower: GDP growth, inflation, monetary policy rate, and exchange rate appreciation against the dollar. Standard errors are clustered by borrower and year, and shown in parentheses. *, **, and *** indicate significance at 10%, 5% and 1%.

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:[25]

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

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), return-on-assets, and nonbank relation. 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 ensures 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.

Table 8 shows estimated regression results for Eq. (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 policy tightens, non-US firms that have previously borrowed from nonbanks are more likely to obtain a new loan. A 25 basis point tightening is associated with a 0.5 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 mainly occurs on the extensive margin, rather than the intensive margin.[26]

The dependent variables in columns 3–6 are from Compustat Global. We find that a 25 basis point increase in US monetary policy is associated with a 1.2% increase in total corporate debt (column 3) for firms with nonbank relationships relative to firms without such relationships. This measure includes all forms of debt (not just syndicated loans), and therefore 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 from banks.

This differential access to credit results in a relative expansion of total assets for firms with nonbank relationships (column 4). Finally, we find evidence that the relative increase in nonbank credit supply has significant real economic effects, as firms with existing nonbank lending relationships increase fixed assets (column 5) and employment (column 6) relative to firms without nonbank relationships.[27]

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

[26] In Table A6 in the Online Appendix, we decompose the syndicate composition of new dollar loans. Conditional on obtaining a new dollar loan, 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). That is, in line with our loan-level results, there is substitution from bank to nonbank credit at the borrower level. However our results in Table 8 suggest that these intensive-margin impacts are small relative to impacts on the extensive margin.

[27] In Table A7, we show the results for the overall effects of monetary policy on firm-level outcomes (without country-year fixed effects). These show that borrowers experience negative real and credit effects when US monetary policy tightens.

In summary, the results in this section suggest that firms with existing relationships with nonbank lenders are better able to obtain 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.

6. Conclusions

Growing evidence that US monetary policy has important effects on financial conditions and economy activity globally (Rey, 2013; 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 (the US) 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 an international *bank* lending channel and an international risk-taking channel in propagating these spillovers. We show that nonbank financial intermediaries attenuate both of these channels via the syndicated lending market, implying that US monetary policy spillovers are weaker once nonbank lenders are taken into account. These findings suggest that firms with better access to nonbank credit are less exposed to the capital flow volatility stemming from US monetary policy spillovers.

Our results have important implications for theory and policy, and suggest several areas for future research. First, in an international setting, we show that nonbank credit supply is more stable than bank credit supply in response to US monetary policy tightening, especially for riskier firms, emerging market firms, and firms in countries with stronger capital inflow restrictions. Policy and research should take this into account.

Second, several recent papers have found that nonbank lenders are more fragile in financial crises (Fleckenstein et al., 2021; Irani et al., 2021; Aldasoro et al., 2023). These papers and our results on increased nonbank risk-taking suggest the potential for important financial stability trade-offs. For example, when accessing nonbank credit, there may be a trade-off between improved access to credit during times of US monetary policy tightening, versus more fragility during financial crises, particularly given our finding that nonbanks (which are less regulated and more fragile than banks) focus their higher credit supply on riskier borrowers. Assessing the optimal mix of bank and nonbank credit is beyond the scope of this paper, but is a crucial area for future research to aid policy evaluation.

Third, our results raise questions about the role and design of public interventions in credit markets, including restrictions on capital flows (Adrian et al., 2022).

Declaration of competing interest

Authors have no conflict of interest.

Data availability

https://data.mendeley.com/datasets/ynvc9bwrt9/1.

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Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jinteco.2024.103908.

References

Adrian, T., Gopinath, G., Gourinchas, P.-O., Pazarbasioglu, C., Weeks-Brown, R., 2022. Why the IMF is updating its view on capital flows. IMF blog.

Aldasoro, I., Doerr, S., Zhou, H., 2023. Non-Bank Lending During Crises. BIS Working Papers 1074, Bank for International Settlements.

Allen, F., Rogoff, K., 2011. Asset prices, financial stability and monetary policy. In: The Riksbank's Inquiry into the Risks in the Swedish Housing Market. Sveriges Riksbank.

Avdjiev, S., Gambacorta, L., Goldberg, L., Schiaffi, S., 2020. The shifting drivers of global liquidity. J. Int. Econ. 125 (C), 103324.

Bekaert, G., Engstrom, E.C., Xu, N.R., 2022. The time variation in risk appetite and uncertainty. Manage. Sci. 68 (6), 3975–4004.

Benmelech, E., Meisenzahl, R.R., Ramcharan, R., 2017. The real effects of liquidity during the financial crisis: Evidence from automobiles. Q. J. Econ. 132 (1), 317–365.

Bernanke, B.S., 2012. U.S. monetary policy and international implications. Speech by Chairman of the Board of Governors of the Federal Reserve System.

Bernanke, B.S., 2017. Federal Reserve policy in an international context. IMF Econ. Rev. 65 (1), 1–32.

Bharath, S.T., Dahiya, S., Saunders, A., Srinivasan, A., 2011. Lending relationships and loan contract terms. Rev. Financ. Stud. 24 (4), 1141–1203.

Bord, V.M., Santos, J., 2012. The rise of the originate-to-distribute model and the role of banks in financial intermediation. Econ. Policy Rev. (Jul), 21–34.

Bräuning, F., Ivashina, V., 2020. U.S. monetary policy and emerging market credit cycles. J. Monetary Econ. 112 (C), 57–76.

Bruche, M., Malherbe, F., Meisenzahl, R.R., 2020. Pipeline risk in leveraged loan syndication. Rev. Financ. Stud. 33 (12), 5660–5705.

Bruno, V., Shin, H.S., 2015a. Capital flows and the risk-taking channel of monetary policy. J. Monetary Econ. 71 (C), 119–132.

Bruno, V., Shin, H.S., 2015b. Cross-border banking and global liquidity. Rev. Econom. Stud. 82 (2), 535–564.

Bu, C., Rogers, J., Wu, W., 2021. A unified measure of fed monetary policy shocks. J. Monetary Econ. 118 (C), 331–349.

Buchak, G., Matvos, G., Piskorski, T., Seru, A., 2018a. The Limits of Shadow Banks. NBER Working Paper 25149, National Bureau of Economic Research.

Buchak, G., Matvos, G., Piskorski, T., Seru, A., 2018b. Fintech, regulatory arbitrage, and the rise of shadow banks. J. Financ. Econ. 130 (3), 453–483.

Calvo, G., Leiderman, L., Reinhart, C., 1996. Inflows of capital to developing countries in the 1990s. J. Econ. Perspect. 10 (2), 123–139.

Caruana, J., 2012. Policymaking in an interconnected world. Speech at the Federal Reserve Bank of Kansas City's 36th Jackson Hole Economic Policy Symposium.

Cetorelli, N., Goldberg, L., 2012. Banking globalization and monetary transmission. J. Finance 67 (5), 1811–1843.

Chari, A., Dilts Stedman, K., Forbes, K., 2022. Spillovers at the extremes: The macroprudential stance and vulnerability to the global financial cycle. J. Int. Econ. 136 (C), S0022199622000149.

Chari, A., Dilts Stedman, K., Lundblad, C., Karolyi, A., 2021. Taper tantrums: Quantitative easing, its aftermath, and emerging market capital flows. Rev. Financ. Stud. 34 (3), 1445–1508.

Chava, S., Roberts, M., 2008. How does financing impact investment? The role of debt covenants. J. Finance 63 (5), 2085–2121.

Chen, K., Ren, J., Zha, T., 2018. The nexus of monetary policy and shadow banking in China. Amer. Econ. Rev. 108 (12), 3891–3936.

Chodorow-Reich, G., 2014. The employment effects of credit market disruptions: Firm-level evidence from the 2008-9 financial crisis. Q. J. Econ. 129 (1), 1–59.

Cohen, G.J., Dice, J., Friedrichs, M., Gupta, K., Hayes, W., Kitschelt, I., Lee, S.J., Marsh, W.B., Mislang, N., Shaton, M., Sicilian, M., Webster, C., 2021. The U.S. syndicated loan market: Matching data. J. Financ. Res. 44 (4), 695–723.

Coibion, O., 2012. Are the effects of monetary policy shocks big or small? Am. Econ. J.: Macroecon. 4 (2), 1–32.

De Haas, R., Van Horen, N., 2013. Running for the exit? International bank lending during a financial crisis. Rev. Financ. Stud. 26 (1), 244–285.

Dell'Ariccia, G., Laeven, L., Suarez, G.A., 2017. Bank leverage and monetary policy's risk-taking channel: Evidence from the United States. J. Finance 72 (2), 613–654.

Doerr, S., Schaz, P., 2021. Geographic diversification and bank lending during crises. J. Financ. Econ. 140 (3), 768–788.

Döttling, R., Ratnovski, L., 2023. Monetary policy and intangible investment. J. Monetary Econ. 134 (C), 53–72.

Drechsler, I., Savov, A., Schnabl, P., 2017. The deposits channel of monetary policy. Q. J. Econ. 132 (4), 1819–1876.

Drechsler, I., Savov, A., Schnabl, P., 2022. How monetary policy shaped the housing boom. J. Financ. Econ. 144 (3), 992–1021.

Elliott, D., Meisenzahl, R.R., Peydró, J.-L., Turner, B.C., 2022. Nonbanks, Banks and Monetary Policy: U.S. Loan-Level Evidence since the 1990s. CEPR Discussion Paper 14989, Centre for Economic Policy Research.

Fernández, A., Klein, M., Rebucci, A., Schindler, M., Uribe, M., 2016. Capital control measures: A new dataset. IMF Econ. Rev. 64 (3), 548–574.

Fischer, S., 2015. The Federal Reserve and the global economy. Speech by Vice Chair of the Board of Governors of the Federal Reserve System.

Fleckenstein, Q., Gopal, M., Gutierrez Gallardo, G., Hillenbrand, S., 2021. Nonbank lending and credit cyclicality. Working Paper.

Forbes, K., Friedrich, C., Reinhardt, D., 2023. Stress relief? Funding structures and resilience to the covid shock. J. Monetary Econ. 137 (C), 47–81.

FSB, 2023. Global monitoring report on non-bank financial intermediation. Financial Stability Board.

Gadanecz, B., 2004. The syndicated loan market: structure, development and implications. BIS Q. Rev. (4), 75–89.

Giannetti, M., Laeven, L., 2012. The flight home effect: Evidence from the syndicated loan market during financial crises. J. Financ. Econ. 104 (1), 23–43.

Gustafson, M.T., Ivanov, I.T., Meisenzahl, R.R., 2021. Bank monitoring: Evidence from syndicated loans. J. Financ. Econ. 139 (2), 452–477.

IMF, 2022. Review of the institutional view on the liberalization and management of capital flows. IMF Policy Paper.

Irani, R.M., Iyer, R., Meisenzahl, R.R., Peydró, J.-L., 2021. The rise of shadow banking: Evidence from capital regulation. Rev. Financ. Stud. 34 (5), 2181–2235.

Jarociński, M., Karadi, P., 2020. Deconstructing monetary policy surprises – The role of information shocks. Am. Econ. J.: Macroecon. 12 (2), 1–43.

Jiménez, G., Ongena, S., Peydró, J.-L., Saurina, J., 2012. Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. Amer. Econ. Rev. 102 (5), 2301–2326.

Jiménez, G., Ongena, S., Peydró, J.-L., Saurina, J., 2014. Hazardous times for monetary policy: What do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking? Econometrica 82 (2), 463–505.

Kalemli-Ozcan, S., 2019. U.S. Monetary Policy and International Risk Spillovers. NBER Working Paper 26297, National Bureau of Economic Research.

Khwaja, A., Mian, A., 2008. Tracing the impact of bank liquidity shocks: Evidence from an emerging market. Amer. Econ. Rev. 98 (4), 1413–1442.

Kleibergen, F., Paap, R., 2006. Generalized reduced rank tests using the singular value decomposition. J. Econometrics 133 (1), 97–126.

Levy Yeyati, E., 2006. Financial dollarization: evaluating the consequences. Econ. Policy 21 (45), 62–118.

Maddaloni, A., Peydró, J.-L., 2011. Bank risk-taking, securitization, supervision, and low interest rates: Evidence from the Euro-area and the U.S. lending standards. Rev. Financ. Stud. 24 (6), 2121–2165.

Miranda-Agrippino, S., Rey, H., 2020. U.S. monetary policy and the global financial cycle. Rev. Econom. Stud. 87 (6), 2754–2776.

Miranda-Agrippino, S., Ricco, G., 2021. The transmission of monetary policy shocks. Am. Econ. J.: Macroecon. 13 (3), 74–107.

Morais, B., Peydró, J.-L., Roldán-Peña, J., Ruiz-Ortega, C., 2019. The international bank lending channel of monetary policy rates and QE: Credit supply, reach-for-yield, and real effects. J. Finance 74 (1), 55–90.

Ongena, S., Peydró, J.-L., Van Horen, N., 2015. Shocks abroad, pain at home? Bank-firm-level evidence on the international transmission of financial shocks. IMF Econ. Rev. 63 (4), 698–750.

Paravisini, D., Rappoport, V., Schnabl, P., 2015. Specialization in Bank Lending: Evidence from Exporting Firms. NBER Working Paper 21800, National Bureau of Economic Research.

Peek, J., Rosengren, E., 1997. The international transmission of financial shocks: The case of Japan. Amer. Econ. Rev. 87 (4), 495–505.

Powell, J.H., 2013. Advanced economy monetary policy and emerging market economies. Remarks at the Federal Reserve Bank of San Francisco.

Pozsar, Z., Adrian, T., Ashcraft, A., Boesky, H., 2013. Shadow banking. Econ. Policy Rev. (Dec), 1–16.

Rajan, R., 2005. Has financial development made the world riskier? In: Proceedings - Economic Policy Symposium - Jackson Hole, Federal Reserve Bank of Kansas City.
Rajan, R., 2014. Competitive monetary easing – is it yesterday once more?. Remarks at the Brookings Institution.
Ramey, V., 2016. Macroeconomic shocks and their propagation. In: Handbook of Macroeconomics, vol. 2, Elsevier, pp. 71–162.
Rey, H., 2013. Dilemma, not trilemma: The global financial cycle and monetary policy independence. In: Jackson Hole Symposium, Federal Reserve Bank of Kansas City.
Roberts, M.R., 2015. The role of dynamic renegotiation and asymmetric information in financial contracting. J. Financ. Econ. 116 (1), 61–81.
Romer, C., Romer, D., 2004. A new measure of monetary shocks: Derivation and implications. Amer. Econ. Rev. 94 (4), 1055–1084.
Serena, J.-M., Tsoukas, S., 2020. International Bank Lending and Corporate Debt Structure. BIS Working Paper 857, Bank for International Settlements.
Sufi, A., 2007. Information asymmetry and financing arrangements: Evidence from syndicated loans. J. Finance 62 (2), 629–668.
Wu, J.C., Xia, F.D., 2016. Measuring the macroeconomic impact of monetary policy at the zero lower bound. J. Money Credit Bank. 48 (2–3), 253–291.
Xiao, K., 2020. Monetary transmission through shadow banks. Rev. Financ. Stud. 33 (6), 2379–2420.