NBER WORKING PAPER SERIES

U.S. MONETARY POLICY AND EMERGING MARKET CREDIT CYCLES

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Working Paper 25185
http://www.nber.org/papers/w25185

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2018

We are grateful for detailed feedback from Olivier Darmouni (discussant), José Fillat, Linda Goldberg, Gita Gopinath, ebnem Kalemli-Ozcan, Ralf Meisenzahl (discussant), Joe Peek, Vincenzo Quadrini (discussant), and Jesse Schreger. We thank participants at the 2018 AFA Meetings, European Central Bank's Credit, Banking and Monetary Policy Conference, West Coast Workshop on International Finance, World Bank-ASBA Long-Term Lending Conference and seminar series at Bocconi University, Central Bank of Italy, the Federal Reserve Bank of Boston, the Federal Reserve Bank of New York, George Washington University, MIT, Temple University, and University of New Hampshire for helpful comments. We are also grateful to Eric Swanson for sharing data on monetary policy shocks. Finally, we thank Kovid Puria for excellent research assistance. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Boston, the Federal Reserve System, or the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w25185.ack

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NBER Working Paper No. 25185
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JEL No. E52,F34,F44,G21

ABSTRACT

Foreign banks' lending to firms in emerging market economies (EMEs) is large and denominated predominantly in U.S. dollars. This creates a direct connection between U.S. monetary policy and EME credit cycles. We estimate that over a typical U.S. monetary easing cycle, EME borrowers experience a 32-percentage-point greater increase in the volume of loans issued by foreign banks than do borrowers from developed markets, followed by a fast credit contraction of a similar magnitude upon reversal of the U.S. monetary policy stance. This result is robust across different geographies and industries, and holds for U.S. and non-U.S. lenders, including those with little direct exposure to the U.S. economy. EME local lenders do not offset the foreign bank capital flows, and U.S. monetary policy affects credit conditions for EME firms, both at the extensive and intensive margin. Consistent with a risk-driven credit-supply adjustment, we show that the spillover is stronger for riskier EMEs, and, within countries, for higher-risk firms.

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1. Introduction

For emerging market economies (EMEs), foreign bank loans are by far the most important category of cross-border capital flows, and they are denominated primarily in U.S. dollars. As of 2015, International Monetary Fund (IMF) data indicate that loans represent about half of all external liabilities of emerging market countries. By comparison, foreign bond and equity portfolio investments combined represent only about 20 percent. Much of the foreign lending comes from banks headquartered in developed economies: Bank for International Settlements (BIS) data show that roughly a third of all external liabilities of emerging market countries are held by U.S., European, and Japanese banks. Moreover, the volume of these claims has nearly doubled since the onset of the global financial crisis, reaching about $7 trillion in 2016. Consistent with the general dominance of the U.S. dollar in international trade (e.g., Goldberg and Tille 2008; Gopinath 2016) and finance (e.g., Shin 2012), we document that over 80 percent of the cross-border loans to EMEs are denominated in U.S. dollars.[1] This dollarization of cross-border credit prevails over time and across different geographic regions and industries.

Given the economic significance of U.S. dollar lending by global banks to EME firms, U.S. monetary policy plays an important role as a "push factor" for the credit cycles in these economies through its impact on U.S. interest rates. In particular, by setting the federal funds rate, U.S. monetary policy sets the short end of the dollar yield curve, thereby crucially affecting the supply of credit through banks' dollar funding cost (e.g., Bernanke and Gertler 1995). Moreover, U.S. monetary policy influences the yields on longer-term dollar investments due to the expectation hypothesis and direct measures that affect the slope of the yield curve (such as unconventional monetary policy). Fig. 1 illustrates the basic correlation between cross-border loans to EMEs and

[1] Throughout the paper, we use the BIS country classification when referring to "EMEs."

U.S. federal funds rate from 1980 through 2015. The significant correlation—tightening/easing of U.S. monetary policy is associated with contraction/expansion in cross-border credit to EMEs—holds in levels and in changes.

[FIGURE 1]

The aggregate results in Fig. 1, while suggestive, could also be explained by relative changes in investment opportunities around the world or by compositional shifts in the investor base in a given country. Instead, in this paper, we use micro data: DealScan data on global syndicated loan issuance covering corporate lending to firms from a wide range of countries, including 119 EMEs, between 1990:Q1 and 2016:Q3. Consistent with the previous literature for individual EMEs—e.g., Ioannidou et al. (2015) evidence for Bolivia, Morais et al. (2017) evidence for Mexico, Baskaya et al. (2017) evidence for Turkey—we find that U.S. monetary policy easing is associated with a general increase in cross-border loan volumes by global banks. Importantly, we show that easing U.S. monetary policy leads to a large and significant differential increase in cross-border loan volume to EME borrowers, by the same global bank, in the same quarter, net of borrower fixed effects. This differential effect amounts to larger lending volumes of about 2 percentage points per 25-basis-point decrease in the U.S. federal funds rate. During a typical monetary easing/tightening cycle in our sample period, the federal funds target rate is adjusted by about 4 percentage points. Given our estimates, this would amount to an additional increase/decline in loan volumes to emerging market borrowers of a sizable 32 percentage points. More generally, when we look at the underlying country-level macroeconomic variables instead of an EME indicator, we find that cross-border bank flows to higher-yielding markets (e.g., higher GDP growth, higher interest rate spread) are more sensitive to changes in U.S. monetary policy.

Global dollar bank flows to EMEs are also influenced by longer-term U.S. interest rates, which triggers banks' portfolio rebalancing toward riskier assets (e.g., Rajan 2005). In particular, we find that—holding constant the level of the yield curve set by the short-term policy rate—a reduction in the term spread (the difference between the 10-year Treasury yield and the federal funds rate) is associated with a strong flow of dollar capital into EME credit markets. This effect holds throughout the sample period, but is particularly relevant during the zero-lower-bound (ZLB) period when the Federal Reserve kept the federal funds rate at zero and eased monetary policy through unconventional measures that directly impacted long-term rates. Because of the ZLB constraint on the federal funds rate, we also show that unconventional U.S. monetary policy easing during the ZLB period, as measured by the Wu and Xia (2016) shadow rate, strongly pushes dollar capital into the EMEs. Consistent with the special role of U.S. monetary policy, we find that changes in Eurozone interest rates have an effect on euro-denominated credit, but do not have a significant effect on dollar-denominated credit, to EME borrowers.

Monetary policy is intrinsically connected to economic fundamentals (Romer and Romer 2004). To show that the differential relationship identified between U.S. monetary policy and dollar-denominated credit flows to EMEs is causal and not driven by relative or absolute changes in investment opportunities, we proceed in several steps. First, we account for economic conditions in the lender's home country and its potential differential impact of EMEs vs. developed market economies (DMEs). Second, we use the monetary policy shocks as in Gürkaynak et al. (2005) to instrument the federal funds rate. Third, to rule out potentially different correlations between EME credit demand and U.S. economic conditions, we confirm that the results hold for loans to EME borrowers from (i) both non-tradable and tradable industries, (ii) sectors that produce goods and services with a low country-level export share, (iii) economies with low international trade overall,

and (iv) economies with weak trade ties to the United States. Similarly, the results are robust to restricting the sample to global lenders with marginal direct exposure to U.S. economy. We verify that the effect holds for all geographic regions.

We further show that global bank flows driven by U.S. monetary policy affect EME credit conditions at the firm level. In particular, we confirm that the contraction of credit by global banks is not offset by an increase in credit by local banks, but leads to a general credit contraction, increase in interest rate spreads, and lower probability of refinancing for EME borrowers. Our estimates indicate that during a typical U.S. monetary policy cycle, EME borrowers experience a 14-percentage-point stronger contraction in credit volume, a 38-basis-point stronger increase in interest rate spreads, and a 6-percentage-point lower refinancing probability than DME borrower. To highlight the macroeconomic risks of foreign credit outflows from EMEs, it is important to keep in mind that the average maturity of a syndicated loan is four to five years and tends to be stable over time. This means that, on average, time to refinancing is substantially shorter than a typical time to reversal of U.S. monetary policy stance. We also find that, within the emerging markets, U.S. monetary policy tightening leads to higher interest rate spreads and a lower probability of refinancing maturing loans for emerging market borrowers with a higher reliance on foreign banks. Finally, we find that EME infrastructure financing by foreign banks is also sensitive to U.S. monetary policy.

Our core result establishes an economically large, supply-driven differential effect in the spillover to high-yield, emerging markets (as compared to developed economies). There are a few channels that lead to increased risk-taking by banks in response to monetary policy easing. First, there is what the Federal Reserve has been calling “prudent risk-taking” or “productive risk-taking”, a channel that is consistent with traditional portfolio allocation models: lower policy rates

make riskier investments more attractive. Within the United States, this is an intended consequence of U.S. monetary policy. Instead, we show that there are unintended and sizable effects outside the United States as well; a point that has been at the core of the debate among the central bankers.[2] Second, our results could be also consistent with what is known as "reaching for yield", that is a shift toward riskier investments driven by frictions within financial intermediaries (here, global banks). Third, there is the so called "risk-taking channel of monetary policy" (e.g., Adrian and Shin 2010; Bruno and Shin 2015) which postulated that lower interest rates ease banks' VaR constraint, thereby increasing banks' risk-bearing capacity. Consistent with a bank risk-taking explanation of the differential sensitivity of cross-border bank flows across markets, we also show that, when U.S. monetary policy eases, within a given country, foreign bank credit supply expands more to riskier borrowers. That said, our results do not draw a sharp distinction between different risk-taking explanations. In particular, the results in our paper are not a test of reaching-for-yield, but instead we focus on illustrating a distinct and strong sensitivity of emerging markets to risk-driven expansion and contraction of global dollar credit supply.

At a high level, our paper contributes to the large economic literature on international spillovers via capital flows, monetary policy transmission, and the role of global financial intermediaries (e.g., Cetorelli and Goldberg 2012 or, more recently, Buch et al. 2018 and Temesvary et al. 2018). Most directly, our work expands empirical evidence of a "global financial cycle" that is linked to economic conditions in the "center country" (Rey 2013), and the special role that banks play in this context. The vast empirical literature on this subject had followed two approaches. First, there is cross-country analysis using aggregate data. In particular, using a VAR approach, Miranda-Agrippino and Rey (2015) show the importance to global asset prices of the cross-border

[2] For example, "Banker showdown: Bernanke tells off India's Rajan, CNBC, April 10, 2014. More recently, "Powell Warns against Overstating Impact of Fed Policy on Global Financial Conditions," *Wall Street Journal*, May 8, 2018.

transmission of U.S. monetary policy via financial intermediaries. In addition, McCauley et al. (2015) use aggregate data to study the effect of U.S. monetary policy on global dollar credit. Related to the special role of U.S. monetary policy, Takáts and Temesvary (2016), using aggregate BIS data, study the role of currency denomination in the transmission of international monetary policy. The aggregate analysis however is susceptible to several critiques. In particular, the composition of the sample of EME borrowers is likely to be changing through the cycle. Thus, the second strand of research referenced earlier uses micro data to study EME credit cycles, and had relied on the credit registry data available for individual countries (Ioannidou et al. 2015; Morais et al. 2017; Baskaya et al. 2017).

Our study is the first to use firm-level, cross-country evidence in a sample covering more than 25 years of global loan issuance, emphasizing the differential transmission of U.S. monetary policy for emerging and developed economies through the balance sheet of global banks, and the special role of the U.S. dollar as the currency of choice for global lending.[3] Given our focus on the differential sensitivity of emerging market economies to the transmission of U.S. monetary policy, this paper expands work by Forbes and Warnock (2012), Fratzscher (2012), and Ahmed and Zlate (2014) that has highlighted the importance of U.S. economic conditions, in particular U.S. monetary policy, for capital flows into emerging markets from a bond and equity flow perspective.

Finally, our work contributes to the literature on credit cycles in emerging market economies and the implications for financial stability and economic development. E.g., Acharya et al. (2015)

[3] There are two other studies using the same data, studying cross-border monetary policy transmission but focusing on issues other than the unique role of U.S. monetary policy, and its impact on EMEs. Demirgüç-Kunt, Horváth, and Huizinga (2017) study the role of global banks' charters in foreign markets for the cross-border transmission of monetary policy. Bräuning and Ivashina (2017) examine monetary policy spillovers in major developed economies, emphasizing the interaction with the currency markets.

and Shin (2016) highlight the risks to financial stability when emerging market borrowers sharply increase dollar leverage during periods of strong capital inflows.

The remainder of the paper is organized as follows: In Section 2, we present stylized facts on cross-border lending to EMEs. In Section 3, we establish our main result on the effect of U.S. monetary policy on cross-border lending to EMEs. In Section 4, we discuss the consequences of foreign bank funding dependence by EMEs. Section 5 concludes.

2. U.S. dollar cross-border lending to EMEs

Foreign bank lending represents a significant fraction of foreign capital inflows to EMEs. As mentioned in the introduction, according to data from the IMF International Investment Position, loans represent about 50 percent of all EMEs' external liabilities.[4] By comparison, Fig. 2 (a) shows that, in 2015, portfolio (vs. direct) bond investment in EMEs represented only about 15 percent of external liabilities, and portfolio equity investment represented about less than 5 percent (these numbers refer to the median values across EMEs). Beyond the composition, bank and broader fund flows display a strong correlation: from 1990 onward, the correlation of loan flows to EMEs with equity and bond flows to EMEs is about 0.50. (This relationship is weaker in the 1980s.) This is consistent with the fact that the core results presented in this paper hold in both the DealScan dataset (which includes primarily data on large corporate loans) and the BIS dataset (which includes data on all claims held by banks.)

[FIGURE 2]

Global bank flows are particularly important for EMEs. Combining the IMF data with the BIS Consolidated Banking Statistics, Fig. 2 (b) shows that about a third of all external liabilities of

[4] Data on total external liabilities are collected from the IMF statistics and include all claims of foreigners on a given country, including all equity and debt instruments.

emerging markets are held by large global banks, twice as large a proportion as claims of global banks on developed markets.[5] Moreover, the relative importance of cross-border bank claims for developed-market countries has decreased from 2005 (beginning of the detailed BIS data) to 2015, but the trend has been the opposite for emerging markets. Consistent with Giannetti and Laeven (2012), the BIS data also show that the total volume of foreign bank claims for developed market countries increased from $12 billion in 2005 to $25 trillion in 2008, but then declined steadily to $16 trillion in 2016. In contrast, claims on emerging market countries increased more than threefold throughout the entire sample, from about $2 trillion in 2005 to about $7 trillion in 2016. A similar pattern emerges from DealScan syndicated loan issuance data, the core data for our study. Table 1 presents the sample composition by country. Throughout the period from 1995:Q1 through 2016:Q3, there is a strong and persistent reliance of EME firms on foreign bank credit with more than 80 percent of all loan commitments to EME firms were provided by foreign banks, while the share was below 50 percent for developed economies.

The importance of global bank flows to EMEs points to the potential exposure of these markets to foreign monetary policy. Moreover, because of the dollar dominance of bank capital flows to EMEs, it is U.S. monetary policy that is likely to be most relevant due to its strong effect on nominal U.S. interest rates. The last three columns in Table 1 show the country-level currency composition of cross-border credit, making it clear that the dominance of dollar-denominated credit is a global phenomenon: from 1990:Q1 through 2016:Q3, the share of dollar-denominated cross-border loans issued to emerging market borrowers is about 87 percent for Africa, 95 percent for the Americas, 81 percent for Asia, and 71 percent for Europe (a smaller dollar share goes hand-

[5] BIS Consolidated Banking Statistics contains cross-border claims as reported by banks from 21 developed countries. (Claims by banks from the only three emerging market countries in the sample are small.) The reported cross-border claims include all types of bank loans, but also other debt instruments and equity claims.

in-hand with a higher euro share). Table 2.A shows that, for each region, the dollar dominance of cross-border credit holds broadly across borrowers from all industries (based on the 1-digit SIC code) and is not confined to the tradable sectors.[6]

As Table 2.B illustrates, the dollar reliance in the broader set of assets held by foreign banks is lower than what we see for corporate loans; yet the majority of claims on emerging markets are still denominated in U.S. dollars. Other currencies, including local currencies, the British pound, or the Japanese yen, play a negligible role. The data come from BIS Locational Banking Statistics and include all claims held by foreign banks including bonds, equities, and non-corporate loans. This adds external validity to our results. For comparison, we report the stock of syndicated loans constructed by aggregating the most recent term loans in the DealScan sample that mature after 2016:Q3. Finally, in Fig. 3, we highlight that dependence on dollar-denominated credit is a persistent phenomenon that goes back at least two decades. Overall, the evidence presented here substantially expands what we knew from earlier work, which was focused much smaller set of EMEs.

[TABLES 1-2 & FIGURE 3]

3. U.S. monetary policy and cross-border lending

3.1. Data

In our main analysis, we use Thompson Reuters DealScan database of global syndicated corporate loan issuance covering a wide range of countries between 1990:Q1 and 2016:Q3. Deal Scan data reports individual loan issuance, identifying individual borrowers and their home country, lenders in the syndicate, and contractual details including the loan amount, currency denomination, maturity and interest rate. Syndicated loans are funded by a group of lenders and

[6] Note that the same currency patterns hold for syndicated loans originated by local banks; however, while syndicated credit is an important part of cross-border lending, it is likely to be a small fraction of domestic lending in EMEs.

are a good representation of loans to large corporate borrowers, since diversification (i.e., the size of the loan) is the primary reason for loan syndication.[7] According to Gadanecz and Von Kleist (2002), the estimated outstanding stock of syndicated loans held by foreign banks amounts to about 50 percent of all outstanding cross-border bank claims on Latin America and developing Europe, and to around 100 percent of all outstanding cross-border bank claims on Asia and the Africa-Middle East region. Thus, while syndicated loan data does not include small loans, it captures an economically important share of cross-border bank credit to emerging markets. (From here, unless stated otherwise, by referring to "loans" we will be referring to loans captured in the DealScan data.)

We consolidated banks at the bank-parent level, so a loan made by a local office of a Spanish bank in Peru to a Peruvian firm is counted as a "cross-border" loan. DealScan data also captures foreign banks engaging in direct lending (in this example, a Spanish office of a Spanish bank) in EMEs. E.g., in the data, we see substantial lending activity by French and Japanese banks in Peru; neither group has offices in Peru. Throughout the analysis, we consider only lenders with relatively large commitments on a given loan.[8] The loan amount for a given bank in a given syndicate is computed on a pro-rata basis; e.g., in a $150 million loan with three large commitments by banks, each bank is assumed to contribute $50 million. Finally, loan issuance data are collapsed to the quarterly frequency. About 2 percent of all borrowers have more than one loan from a given bank in a given quarter; in such a case, we aggregate the amounts.

3.2. Benchmark results

[7] DealScan actually includes a few large bilateral loans, but the sample primarily consists of syndicated loans (including "club deals", the lower end of syndication).

[8] That is, we exclude lenders whose role in the syndicate is identified as merely "participant." Having a syndicate role other than "participant" qualifies a lender for league tables which are an important marketing tool in the market. Ivashina (2009) provides a detailed discussion of different syndicate roles and reporting of loan commitments in DealScan.

Building on the economic significance of both cross-border bank lending and dollar-denominated lending, we now focus on establishing across-market spillover of U.S. monetary policy with the focus on the differential effect for EMEs. The dependent variable in Tables 3 through 5 is the logarithm of the total amount of cross-border dollar lending, $log(L_{jit})$, by a bank j to a firm i in a quarter t.

[TABLE 3]

Table 3 presents our benchmark results. Panel A, column (1) shows the basic relationship between the federal funds rate and global banks' lending abroad: the easing of U.S. monetary policy pushes bank flows into foreign markets, while the tightening of U.S. monetary policy reduces banks' investment in foreign countries. Our hypothesis is that U.S. monetary policy has a differential effect on the bank capital flows to EMEs. Column (2) reports the basic decomposition of the total effect between developed and emerging markets, showing that, while directionally the results are consistent across the groups, the effect on emerging markets is roughly twice as large as the effect on developed markets. The coefficient estimates indicate that a 25-basis-point decrease in the federal funds rate increases cross-border loan volumes to firms in DMEs by about 2.3 percent, while EME firms experience an increase of about 4.9 percent, a highly significant differential effect of 2.6 percentage points (the *t*-statistic is 6.43).

All the subsequent results in Table 3 focus on identifying the differential effect of U.S. monetary policy on EMEs building on the following regression:

$$\text{Log}\big(Loan\ Amount_{jit}\big) = \beta \cdot U.S.Interest\ Rate_t \cdot EME_i + D_{jt} + D_i + \epsilon_{jit}, \qquad (1)$$

where the dependent variable is the logarithm of the loan amount granted by bank j to firm i in quarter t. D_{jt} is a bank*quarter fixed effects (that is, we estimate an intercept for each bank in a given quarter), and D_i is a borrower fixed effects. Inclusion of borrower fixed effects helps us

dealing with a demand-driven explanation of changes in credit behavior by accounting for compositional shifts in the borrower sample, such as firms' size group, location and industry. Inclusion of bank-quarter fixed effects allows us to control for time-varying bank heterogeneity, such as individual bank health, changes in business models, or macroeconomic conditions in the lender's home country. Bank-quarter fixed effects also net out any common time variation, e.g., related to global credit demand factors driven by the global business cycle, general changes in cross-border loan volumes or changes in the value of the dollar over time. The key coefficient of interest is β, which measures the differential change in EME loan volumes relative to DME loan volumes (in percentage points) for a unit change in the U.S. interest rate.

Column (3) corresponds to equation (1). As before, we find that EME loan volumes react significantly more strongly to U.S. monetary policy changes than do DME loan volumes. In economic terms, the coefficient in column (3) implies that a 25-basis-point easing in the U.S. federal funds rate increases the volume of cross-border loans to borrowers from emerging markets by an additional 2 percentage points, compared with borrowers from developed markets. Because of the fixed effects, the identification of the effect is driven by the differential loan volumes to borrowers from emerging and developed countries of a given bank in the same quarter, net of borrower-specific time-invariant characteristics.

U.S. monetary policy is typically a response to economic conditions; the Fed might ease monetary policy precisely when economic activity in the United States and other developed markets is low and credit demand is weak. Thus, the differential response of loan volume in EME vs. DME countries shown in column (3) could be driven by correlated macroeconomic conditions in the lenders' home countries. To reflect this possibility, we add in column (4), and each subsequent regression, the lender's home country GDP growth, CPI inflation, and Consensus

Economics forecasts of one-year-ahead economic growth, all interacted with the EME dummy (since each regression includes lender*quarter fixed effects). The results are remarkably robust to the inclusion of these additional controls, both economically and statistically.

In column (5) and (6), we provide additional robustness checks on the effect of U.S. monetary policy on emerging market loan volumes by instrumenting the federal funds rate with monetary policy shocks. In particular, we use the two monetary policy shocks introduced by Gürkaynak, Sack, and Swanson (2005), which can be interpreted as surprise components of the current federal funds rate target and the future path of U.S. monetary policy. These shocks are identified from high-frequency asset price changes in a narrow 30-minute window around Federal Open Market Committee (FOMC) statements and, hence, qualify as exogenous instruments (e.g., see Gertler and Karadi 2015; Miranda-Agrippino and Rey 2015). In particular, movements in a tight time window around FOMC statements are likely to be unrelated to changes in both U.S. and foreign economic conditions. In line with the rest of our data, we aggregate the monetary policy shocks to a quarterly frequency and use these aggregated monetary policy shocks as instruments for the federal funds rate. In column (5), we use 2 lags of the monetary policy shocks as instruments and find that our coefficient estimate is roughly similar to our baseline specification in column (4): a 25-basis-point easing in the U.S. federal funds rate increases the volume of cross-border loans to borrowers from emerging markets by an additional 2 percentage points, compared with borrowers from developed markets. Column (6) shows that the finding is qualitatively robust to using 4 lags of the monetary policy shocks.[9]

[9] Kleinbergen-Paap *LM*-statistic of 9.45 (*p*-value of 0.05) in column (5) and 22.25 (*p*-value of 0.004) in column (6), as well as the Hansen *J*-test statistics of 2.46 (*p*-value of 0.482) in column (5) and 11.52 (*p*-value of 0.117) in column (6) confirm that the instruments are relevant and valid.

Our baseline result in column (4) is based on using the federal funds rate as a measure of the stance of U.S. monetary policy. Indeed, the federal funds rate has been the primary tool of U.S. monetary policy for most periods in our sample. Moreover, this policy rate anchors the short end of the yield curve, thereby having a strong impact on the dollar funding cost of global banks, which is a key determinant of banks' dollar lending decisions.[10] But banks lend long-term, so term spread is important for their overall profitability. So, in column (7), in addition to the policy rate, we also include the term spread—the difference between the 10-year U.S. Treasury yield and the federal funds rate—as a direct measure of the slope of the yield curve. The coefficient estimates show that the impact of the federal funds rate (the level of the yield curve) stays qualitatively similar, but becomes quantitatively stronger with a differential effect on EME loan volumes of 3.9 percentage points per 25-basis-point change in the federal funds rate. These magnitudes correspond to the partial effects of the federal funds rate, holding constant the level of the term spread. Historically, the term spread increased when the Fed eased monetary policy by lowering short-term rates. Results in column (4) reflect economic magnitudes that account for the co-movement in the term spread and the federal funds rate.

The coefficient estimate on the term spread is negative. Hence, holding constant the level of the yield curve (short rate), a smaller slope of the yield curve is associated with a significant increase in EME lending volumes. This finding is intuitive and is consistent with indications of risk-driven capital flow: when alternative returns on dollar assets are low (low longer-term yields), bank capital is pushed into higher-yielding emerging market economies. Quantitatively, we estimate that a 1 percentage point decrease of the term spread is associated with an additional

[10] If global banks have only limited access to direct dollar funding and borrow dollars in the FX swap market (synthetic funding), the interest rates implicit in currency markets are closely linked to U.S. monetary policy (as reflected in the covered interest parity). Even when deviations from covered interest parity exist, changes in the dollar interest rate are strongly reflected in the price of dollar hedges.

increase in EME lending volumes (relative to DME lending volumes) of about 16 percentage points; such a decline in the term spread was observed from December 2008 to June 2013, when the Fed first indicated tapering of its asset purchases.[11]

In column (8), we confirm that the connection between emerging market capital flows and U.S. monetary policy is not a recent phenomenon but holds throughout our sample, including the period before the federal funds rate was pushed to zero in 2008:Q4. Note that the coefficient estimates in this earlier part of the sample are economically and statistically smaller when compared with the estimates for the full sample (*t*-statistic of 2.28). In column (9), we look at the period from 2008:Q4 to 2015:Q3 when the federal funds rate was at the zero lower bound (ZLB). During this period, the federal funds rate was not the only tool of monetary policy, as the Fed conducted additional monetary easing through unconventional policies, including forward guidance and large-scale asset purchases. In fact, during this period, the Fed committed to keeping policy rates at zero for an extended period of time. Therefore, during this period, we use the Wu and Xia (2016) federal funds shadow rate, which provides a single measure that takes into account unconventional monetary policy measures during the ZLB period. We find that this additional easing in U.S. monetary policy during the ZLB period increased emerging markets lending volumes significantly more than cross-border loan volumes to developed markets. Indeed, the coefficient estimate is roughly similar to the estimate of the federal funds rate reported in column (4). (Results in column (4) are similar if we replace the federal funds rate with the shadow rate during the ZLB period.)

As we have shown, the estimates in Panel A are robust to instrumenting the federal funds rate with monetary policy shocks and to the inclusion of lender-country macro controls (interacted with the EME dummy). In the Internet Appendix, we take a closer look at the geographic breakdown

[11] A *t*-test shows that the effect of the U.S. Interest Rate is not statistically different from the effect of the U.S. term spread (*t*-statistic of 0.253).

of emerging market countries and find that our baseline effect holds across all geographical regions. We also replicate the result for borrowers from different industries and show that the significantly stronger effect of U.S. monetary policy on EME lending holds for both borrowers from the non-tradable and the tradable sectors. These results already suggest that our findings unlikely to be driven by changes in international trade, or other region and industry-specific elements. In Table 3.B we provide further evidence to reinforce this point by replicating the result in Panel A, column (7), for different subsamples. In particular, we exclusively look at loans originated by non-U.S. banks to non-U.S. borrowers. Furthermore, we consider only loans by non-U.S. banks with a low exposure to the U.S. economy. The idea is that banks with low exposure to the U.S. economy are serving the borrowers whose investment opportunities are not directly affected by changes in U.S. economic conditions.

We measure a bank's exposure to the U.S. economy by the share of the number of cross-border loans to U.S. borrowers relative to all cross-border loans over our sample period. (Results are robust to measuring banks' U.S. exposure based on a rolling window instead.) Specifically, we define low-U.S.-exposure banks as banks with less than 5 percent (and, as a robustness check, 10 percent) of loans to U.S. borrowers. These low-U.S.-exposure banks account for roughly 10 percent of all loans in our sample (25 percent for the 10-percent-exposure cutoff). The first two columns of Table 3.B show that, for non-U.S. banks with low direct exposure to the U.S. economy, the significantly stronger increase of EME loan volumes continues to hold. In column (2)—loans by non-U.S. banks with less than 5 percent of their loans to U.S. borrowers—we find a significant, albeit quantitatively and statistically weaker (*t*-statistic of 2.10), differential effect for EMEs.

In columns (3) to (6), we look at loans originated to EME firms that are unlikely to be affected by changes in investment opportunities in the U.S. economy. Specifically, in column (3), we look

at loans to EME firms from the non-tradable sectors based on the 1-digit SIC classification as reported in DealScan. In column (4), we identify, for each EME country separately, borrowers that produce goods and services that have a low export share relative to all exports of each country (goods and services with an export share smaller than the 25th percentile of the within-country distribution). In column (5), we look at loans to EME firms from countries with low trade (trade relative to the country's GDP smaller than the 25th percentile of the cross-country distribution), and in column (6), we look at loans to EME firms from countries with low trade with the United States (U.S. trade relative to the country's total trade smaller than the 25th percentile of the cross-country distribution). Country-level data on trade statistics are presented in Table 1. A decline in economic activity in the United States (correlated with an easing monetary policy) is likely to negatively affect U.S. suppliers and EME exporters more broadly. This suggests a positive correlation between U.S. economic conditions and EME loan demand, which should bias our estimates downward. The results in Table 3.B show that once we focus on loans by non-U.S. banks with low U.S. exposure to borrowers that are unlikely to have a strong link to U.S. economic conditions (and hence their time-varying loan demand is orthogonal to U.S. economic conditions), we see that the differential effect of U.S. monetary policy on EME loan volumes indeed becomes larger and statistically more significant. E.g., when we focus on loans to EME firms from countries that have weak trade linkages with the United States, the coefficient on the federal funds rate is over twice the size of the estimate based on the full sample of loans (column 7 in Panel A), with the difference been statistically significant (*t*-statistic of 2.15). Economically, these borrowers experience a sizable 8.7-percentage-point stronger loan volume increase when the federal funds rate decreases by 25 basis points compared with a similar DME firm.

Table 3 only looks at the contemporaneous effect of the monetary policy. We have also looked at the persistence of the differential effect for EMEs. We found that the effect indeed persists, but gradually diminishes in the span of three quarters, a horizon that is consistent with the effect of U.S. monetary policy on credit market conditions reported in other studies (e.g., Gertler and Karadi 2015). Our baseline specification also treats the effects of tightening and easing U.S. monetary policy cycles as symmetric. In Fig. 4, we depart from this assumption and show response of cross-border loan volume differentials to EME firms through a typical U.S. monetary policy easing (Panel a) and tightening (Panel b) cycles. To examine this effect, we estimate regressions where we model the loan volume differential as a fractional polynomial in the length of the policy cycle (in quarters) while controlling for bank*quarter fixed effects and firm fixed effects. Panel (a) shows that, during an easing cycle, loan issuance to EME borrowers slowly increases relative to DME borrowers throughout the easing period. In contrast, Panel (b) shows that, during a tightening cycle, there is a fast retrenchment of capital from EMEs resulting in a sudden decline in EME loan volumes (relative to DME loan volume).

[FIGURE 4]

So far, we used a coarse measure to identify EME borrowers, based on the BIS classification. In Table 4.A, we look instead at the underlying country characteristics (compiled from World Bank information), examine how these characteristics interact with U.S. monetary policy and affect global banks' cross-border loan issuance across markets. In column (1), we find that borrowers from countries with higher GDP growth receive generally larger loan volumes. Moreover, as the negative coefficient on the interaction term indicates, borrowers in these countries are also more sensitive to capital in/out-flows when U.S. monetary policy eases/tightens. Similarly, high-GDP-growth countries are more sensitive to global bank flows when the U.S. term spread changes. The

estimate on the interaction term indicates that sensitivity to the U.S. federal funds rate increases by about 0.6 percentage points when the borrower country's GDP growth increases by 1 percentage point. In columns (2), we show that the stronger sensitivity of bank flows to U.S. monetary policy holds when we use another measure for a high-yield market—the difference between the borrower country's interest rate and the U.S. federal funds rate. The estimate on the interaction term indicates that the sensitivity to U.S. interest rate changes increases by about 0.4 percentage points when the interest spread increases by 1 percentage point. In column (3), we measure high-yield markets by the lagged rating for long-term sovereign debt of the borrower's home country collected from Fitch Ratings. The negative coefficient on the interaction term shows that loan volumes to high-risk countries increase more strongly than loan volumes to low-risk countries if U.S. interest rates decrease, in terms of both a lower federal funds rate and a lower term spread. On the other hand, in column (4), we do not find a differential responsiveness when we consider higher growth in their national stock market index as a proxy for high-yield markets.

[TABLE 4]

In Table 4.B, we provide evidence that U.S. monetary policy does not only differentially affect cross-border lending across countries, but also across borrowers *within* a given country depending on firm risk. Specifically, we use the loan spread (relative to the 3-month LIBOR rate), and, to remove a country-level component, we subtract: (i) the mean loan spread in the country of the borrower during the same quarter (i.e., $\text{Spread}_{it} - \sum_I \text{Spread}_{it}$), and (ii) the historical annual country risk premium obtained from A. Damodaran (i.e., $\text{Spread}_{it} - \text{CRP}_I$). Both measures are proxies for the firm's relative riskiness within a given country and quarter.[12] In column (1), we

[12] In the U.S. context, credit ratings had been shown to have a very high explanatory power for syndicated loan spreads (e.g., Ivashina 2009).

find that loan volumes increase for high risk firms within a given country-quarter when U.S. monetary policy eases. The results indicate that for a 25-basis-point decrease in the federal funds rate, loan volumes increase by about 1 percentage point more to firms with a 1-pecentage point higher spread (relative to the country-quarter mean spread). Similar effects are found for the U.S. term spread. Note that we include country*time fixed effects instead of firm fixed effects because we want to explain the variation across firms in a given country-quarter. Column (2) shows that the estimates become quantitatively and statistically somewhat stronger when we include industry*quarter fixed effects, thereby looking in addition to the within country also at the within industry variation in loan volumes in a given quarter. Columns (3) and (4) show that similar results are found if we measure firm risk as the spread to the country risk premium. (Note the change in sample because data on country risk premia are only available as of 2000.)

3.3. Specialness of U.S. monetary policy

U.S. monetary policy affects banks' overnight dollar funding cost and can influence the yield on alternative longer-term dollar investments. Given that cross-border lending to EMEs is denominated primarily in dollars, we postulate that U.S. monetary policy plays a special role in driving global dollar credit flows to EMEs. In Table 5, we provide further evidence on the specialness of U.S. monetary policy by looking at monetary policy in the euro area.

[TABLE 5]

Historically, there has been strong co-movement between monetary policy decisions taken by the Fed and those taken by the European Central Bank (ECB). Between 1999 (the introduction of the euro) and 2016, the correlation between the euro overnight interest rate (EONIA) and the federal funds rate is 0.81 and the correlation of the 10-year term spreads is 0.60. It is therefore not surprising that if we just replace the U.S. variables with their equivalents for the euro area, the

results will be economically and statistically similar, see column (1) of Table 5. Instead, in specification (2), we expand our baseline specification (Table 3.A, column 7) to include both dollar and euro interest rates and term spreads. We find that the estimates of the euro-related variables are close to zero and are statistically insignificant, while the coefficients on the dollar variables remain economically large and statistically significant. In specification (3), we exclude U.S. lenders from the sample and show that non-U.S. banks also adjust their dollar lending to EMEs in response to changes in U.S. monetary policy. The estimates are economically very similar to those for the full sample. In column (4), we show that the results also hold for quarters with the opposite movement in monetary policy stance; e.g., quarters when the United States was in a tightening cycle and the euro area was in an easing cycle.[13] From 1999:Q1 through 2016:Q3, there are 20 such quarters when the stance of U.S. and euro-area monetary policy differed. Finally, in column (5), we look at the euro-denominated cross-border lending of U.S. banks to non-euro borrowers and confirm that for this currency the euro interest rate does matter. (The sample is substantially smaller given the limited international role of euro-denominated lending and different constraints imposed by the analysis.) This result is consistent with Ongena, Shindele, and Vonnak (2018) who, in the European context, find that foreign monetary policy is relevant only for the loans in the corresponding foreign currency.

The core results of this paper are established using micro data on global syndicated loan issuance, which allows for a narrow identification of the effects of U.S. monetary policy on global loan issuance. While this cannot be done with aggregate BIS data, it is nevertheless informative to examine whether a similar relationship between U.S. monetary policy and global bank capital flows to emerging markets holds, especially given that the BIS data are not constrained to

[13] We define a tightening/easing cycle based on quarters when the policy rate increased/decreased and all subsequent quarters where the rate was not decreasing/increasing until a reversal of policy occurred.

syndicated credit, but instead include all forms of claims held by the banks. The results presented in the Internet Appendix confirm that using the aggregate BIS data similar effects are found in terms of economic magnitudes and statistical significance. This finding also helps to dilute the concern that loan origination to the same firm could shift from syndication to bilateral transactions which are not comprehensively covered in DealScan data. Also in the Internet Appendix, we examine the role of countries' financial openness using the Chinn and Ito (2006) index. In line with Rajan (2014), our results show that, while financially more open countries receive generally larger inflow of foreign bank capital, flows to these countries are also more sensitive to U.S. monetary policy changes.

4. Consequences of foreign credit dependence

We next analyze the extent to which the large capital inflows during periods of U.S. monetary easing and the subsequent retrenchment of foreign capital during a U.S. monetary policy contraction affect the credit conditions of EME borrowers at the firm level. After all, at the individual-firm level, inflows and outflows of foreign capital may just lead to a substitution between foreign and domestic lenders, leaving overall firm-level funding conditions unchanged. Thus, studying substitution effects at the individual-firm level is crucial to assess the dependence of local credit cycles in emerging markets on the stance of U.S. monetary policy.

[TABLE 6]

In Table 6, we present the analysis of borrowing conditions at the firm level. In Panel A, we look at the differential borrowing conditions for EME versus DME firms. The key dependent variable is the logarithm of the total amount of dollar lending to a firm in a given quarter (that is, $log(L_{it})$) by (a) all foreign banks (columns 1), (b) all domestic banks (column 2), and (c) all banks (columns 3 and 4).

In columns (1) through (3), we focus on firms with both foreign and local creditors in a given quarter to estimate a substitution between foreign and local creditors. In columns (1), the estimates show that the change in the cross-border credit volume in response to U.S. monetary policy is stronger for firms from emerging markets than for firms from developed market economies. The coefficient estimate indicates that in response to a decline in the U.S. federal funds rate of 25 basis points, cross-border lending volumes to EME firms increase by 4.5 percentage points more than the respective cross-border volumes to comparable DME firms. (This amounts to an average reduction of $17 million.) We estimate a quantitatively similar effect for a reduction in the U.S. term spread. On the other hand, if U.S. monetary policy tightens, local banks do not offset the contraction in foreign bank credit by increasing their lending volumes to local EME firms (column 2). Indeed, we find that not only foreign, but also local dollar credit contracts. Our estimate indicates that local lenders reduce their lending by 3.5 percentage points per 25-basis-point increase in the federal funds rate, and a qualitatively similar but economically somewhat smaller effect of the term spread. Statistically, the responses to both changes in the federal funds rate and the term spread are not significantly different for local and foreign banks. Overall, due to the strong reduction of foreign bank credit and the lack of substitution between local and foreign lenders, U.S. monetary policy tightening of 25 basis points leads to a 4.2-percentage-point stronger overall decline in dollar credit for emerging market firms (column 3) than for developed market firms. While the lack of substitution might not be surprising in the banking context, this result is in sharp contrast to findings that for securities markets, local investors (at least partly) offset a decline in foreign holdings (see Forbes and Warnock 2012). The lack of substitution, in turn, magnifies the overall effect that foreign capital withdrawal might have on the economy (Caballero and Simsek 2017).

In column (4), we broaden our sample and consider any firm that obtained cross-border funding in a given quarter; that is, firms that are exposed to global bank capital flows. Also in the broader sample, EME firms experience significantly stronger loan volume changes in response to U.S. monetary policy than do DME firms. The estimated coefficient indicates an additional reduction of about 1 percentage point per 25-basis-point increase in the federal funds rate. In columns (5), we estimate the effect of U.S. monetary policy changes on the interest rate spread paid by firms on their dollar borrowing, which we compute as the average all-in-drawn spread to the 3-month LIBOR rate based on all loans taken out by the borrower in a given quarter. (The sample changes from column (4) to (5) because the interest rate data are not available for all loans.) The positive point estimate shows not only that EME firms face higher sensitivity of volumes than DME firms, but also that the price of credit is more sensitive to changes in U.S. interest rates for EME firms than for DME firms. Our estimate indicates that a 25-basis-point increase in the federal funds rate increases the interest rate spread by 2.4 basis points more for EME firms than for comparable DME firms. We estimate a quantitatively similar effect of a change in the term spread.

The results on credit volumes and spreads (columns 1 through 5) take into account only granted loans (intensive margin of credit) and do not capture the extensive margin of credit (new loan issuance). In column (6), we estimate the probability of refinancing maturing loans to EME firms. More precisely, for each firm that we observe in the data, we look at those quarters where an existing dollar loan matures. To mitigate concerns about exit of firms from the sample (e.g., due to mergers or bankruptcy), we only consider firms which we continue to observe at a later period in our database. (Removing this constraint does not have a material impact on our estimates.) The dependent variable in column (6) is a dummy equal to one when we observe a new loan to the firm, and zero otherwise. The results show that when U.S. interest rates increase, EME firms are

significantly less likely to refinance their maturing debt compared to DME firms. The estimated coefficients suggests that an increase in the federal funds rate by 25 basis points decreases the refinancing probability of EME firms by 40 basis points more than for a similar DME firm. Relative to the average refinancing probability in our sample (20 percent), this means a reduction of additional 2 percent for EME firms compared with DME firms. Similarly, an increase in longer term rates (term spread) strongly decrease the probability of refinancing for EME firms by 118 basis points (or 5.7 percent when compared to the mean).

Intuitively, EME firms that are more dependent on foreign bank credit may be more affected than other EME firms by fluctuations in cross-border capital flows triggered by U.S. monetary policy changes. To test this intuition, we restrict our sample to EME firms and compute for each firm its dependence on foreign bank credit. More precisely, for each firm-quarter, we compute the number of foreign banks that lent to the firm (relative to the total number of banks that lent to that firm) in the last quarter when the firm was obtaining a loan. The explanatory variable of interest is the interaction term between this foreign bank-reliance measure and the U.S. federal funds rate. The results are reported in Table 6.B.

In columns (1), we focus on the logarithm of the total volume of dollar borrowing by an EME firm in a given quarter. In unreported results, we verify that in the sample constrained to EME firms—consistent with our previous results—the U.S. interest rate is negatively associated with the borrowing amounts. Moreover, firms with more reliance on foreign banks borrow larger amounts. Our focus is, however, on the interaction term between the U.S. interest rate and the foreign bank-reliance variable. In column (1), we find a negative coefficient estimate indicating that firms with a higher reliance on foreign- bank credit experience a larger decline in lending volumes when U.S. monetary policy tightens than similar firms with a lower reliance on foreign

banks. However, the estimated coefficient is not significant at the 10 percent level. In columns (2), we analyze the interest rate spreads of EME firms, depending on their past foreign bank reliance. The point estimates indicate that in general EME firms with higher foreign bank reliance pay smaller interest rate spreads (a one-standard-deviation larger foreign bank share reliance is associated with a 25-basis-point lower spread). However, they also experience a larger sensitivity of spreads with respect to both changes in the federal funds rate and the U.S. term spread. E.g., if the federal funds rate increases by 25 basis points, we estimate that a firm with a one-standard-deviation larger foreign bank reliance would face a 1.2-basis-point larger increase in spreads (14.43*0.32*0.25), while a similar increase in the term spread would lead to a 1.9-basis-point larger increase in spreads (25.392*0.32*0.25).

Finally, in column (3), we find that if U.S. monetary policy tightens, EME firms with higher foreign bank reliance also face a significantly lower probability of refinancing their maturing loans relative to other EME firms. A 25-basis-point increase in U.S. interest rates lowers the probability of refinancing by about 60 basis points for each standard deviation (0.29) increase in foreign bank reliance (-0.090*0.25*0.29). This corresponds to a 2 percent reduction when compared with the average probability of refinancing of 31.9 percent in our sample. Moreover, we also find that changes in the term spread transmit differentially to EME firms' probability of refinancing, depending on their past foreign bank reliance, with a quantitatively similar effect than what we found for the federal funds rate.

As a final reflection, in the Internet Appendix, we look at the financing of large infrastructure projects, that is, projects related to the provision of essential services that are relevant for the broader economic development and growth of an economy. The idea is to look at lending to a segment that has an unambiguous impact on the real economy. It is also a segment that is likely to

be very sensitive to the availability of foreign bank financing (e.g., Ehlers 2014, World Bank 2016). Indeed, the alternative to privately syndicated credit is loans from multinational institutions, which tend to follow a very different and intense compliance process.[14] It is also broadly acknowledged that global infrastructure needs largely exceed infrastructure investments, a gap that is anticipated to increase in the future.[15] So, whereas some skepticism might remain as to how hard it is to find alternative financing for corporate investing or whether this type of credit is beneficial in first place, infrastructure investment is high-impact investment for which it is very difficult to find a substitute for global banks' funding. Infrastructure lending is an important part of our sample: DME banks have increased investment in infrastructure projects in EMEs during the last 25 years, rising to a total volume of $25.8 billion in 2014, which equals 13.5 percent of all new loan volumes committed to EME borrowers. In the Appendix, we show that an easing of U.S. monetary policy increases loan origination of infrastructure projects in EMEs to a significantly greater degree than in developed markets.

5. Conclusions

The mandates of central banks are typically focused on domestic economic conditions and do not account for potential international spillovers. There are some isolated examples of collaboration among monetary authorities of major currency areas, but EMEs remain outside of these coordination efforts. Following the 2008 financial crisis, this issue has resurfaced in the public debate in the context of large capital inflows into EMEs associated with unprecedented monetary policy accommodation in major currency areas, through both conventional and

[14] As an example, failure to close a private syndication due to the unravelling of the 2008 financial crisis led to a roughly two-year delay in raising debt funding from multinationals for a construction project of the Egyptian Refinery Corporation.

[15] For example, http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/bridging-global-infrastructure-gaps.

unconventional measures. Rajan (2014) postulates that emerging market countries wish for stable global capital inflows instead of flows pushed in by foreign monetary policy and points that is unlikely that local policy measures will be effective to counteract the global forces. But substantial skepticism about whether a global macro-prudential approach to monetary policy is necessary still remains among economists and monetary authorities (e.g., Bernanke 2013).

In this paper, we provide evidence on the dominance of dollar-denominated credit in cross-border lending. Outstanding shares of foreign banks' dollar credit for African, American, and Asian emerging economies are over 90 percent. Even for emerging Europe, this number is 60 percent. This point highlights the special role that U.S. monetary policy plays in the formation of credit cycles in EMEs (and the limited role of the local monetary policy). We also show that the availability of foreign bank credit to EME firms—by far the largest category of foreign capital channeled through financial intermediaries into EMEs—is strongly connected to U.S. monetary policy. This effect disproportionately affects EME borrowers as compared with borrowers in developed markets. We estimate that, during a typical monetary easing cycle over which the Fed cuts its target rate by about 4 percentage points, the increase in loan volumes to emerging market borrowers exceeded the flow into developed markets by 32 percent. On the flip side, a monetary policy tightening would pull out bank flows from emerging markets and lead to a strong contraction of foreign credit in emerging markets. The granularity of the data allows us to control for borrower time-invariant characteristics as well as for bank-quarter level effects in lending. We show that the effect holds for non-U.S. banks, for banks with very small exposure to the United States in their portfolio, for EME borrowers in the non-tradable industries, for borrowers in countries with limited trade linkages to the United States, and overall—and only for U.S.-dollar-denominated credit.

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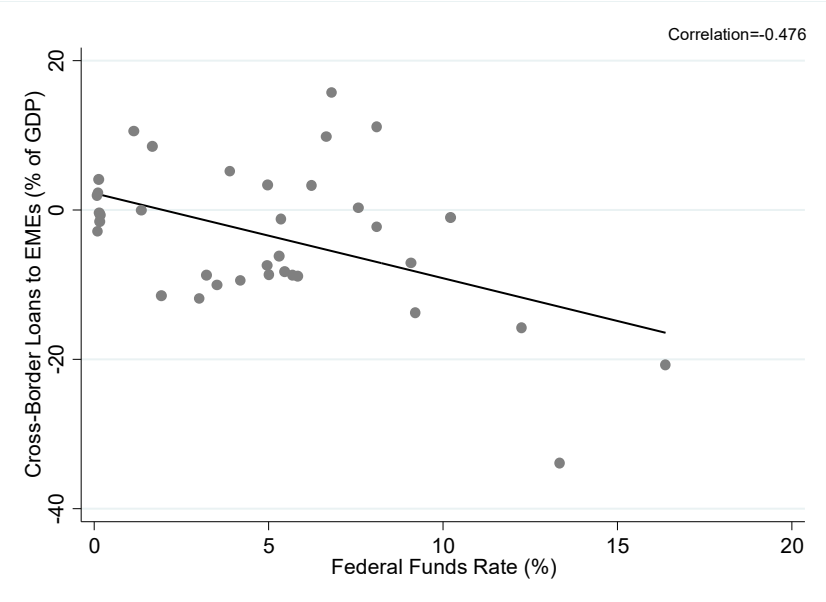
Relationship in levels



Relationship in changes

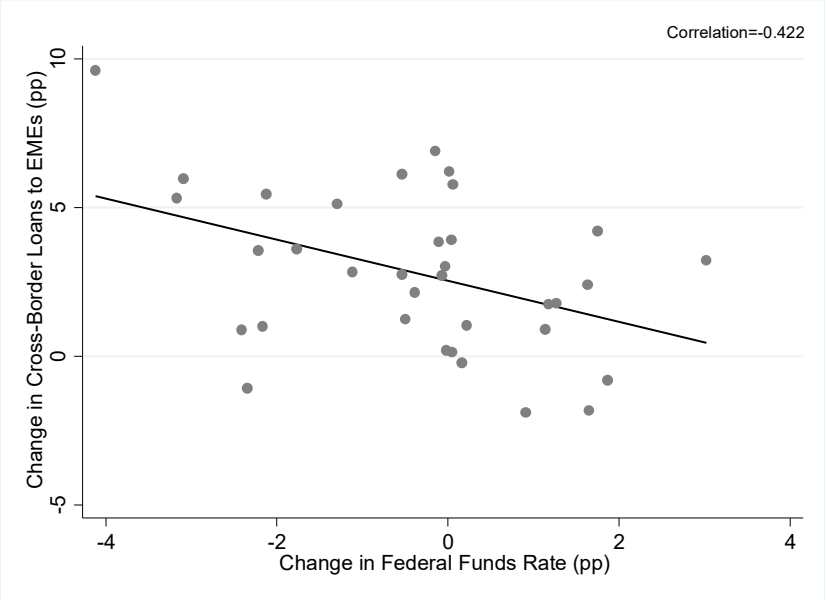
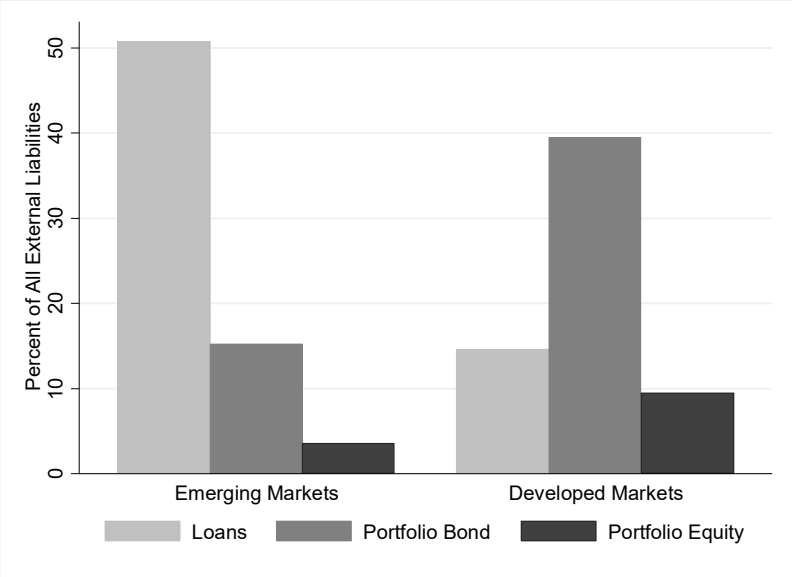


Fig. 1. Cross-border loans to emerging markets and U.S. monetary policy: 1980–2015. This figure shows the relationship between cross-border loans to emerging market economies (EMEs) and U.S. monetary policy. Data on cross-border loans are compiled from the IMF International Investment Positions and cover the period from 1980 to 2015. Each observation in the plots corresponds to the median across 43 EMEs.

a) All external liabilities: breakdown by instrument (2015)



b) Importance of foreign banks (% of all external liabilities)

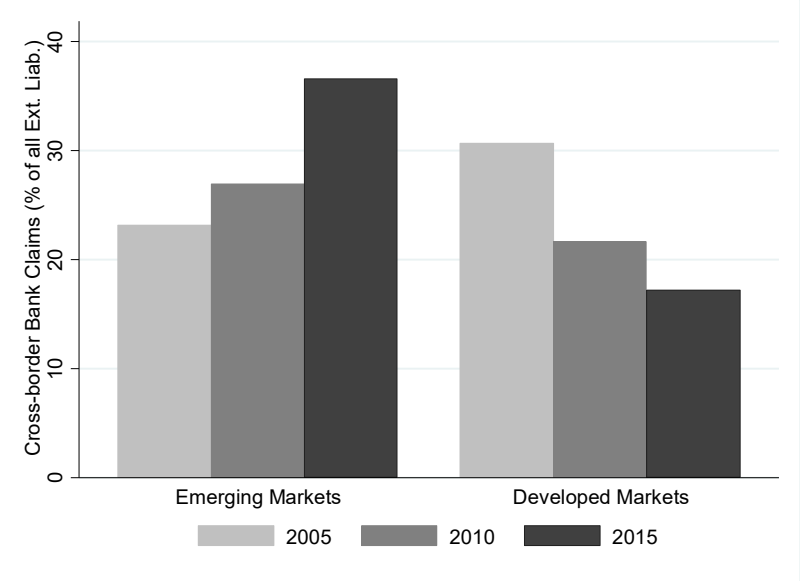
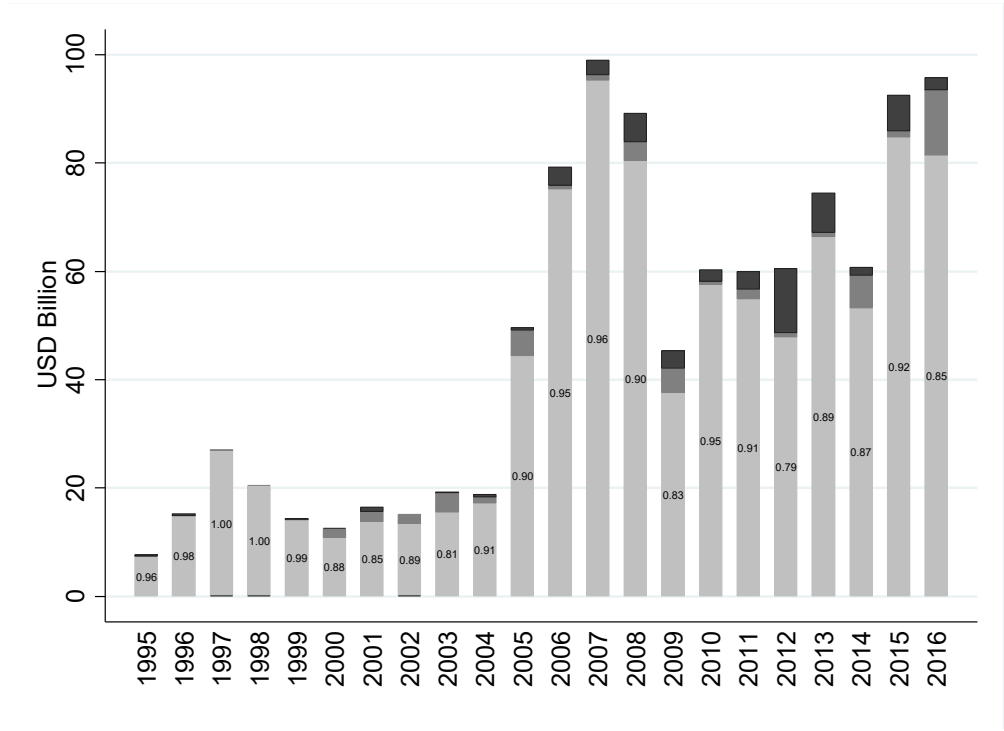
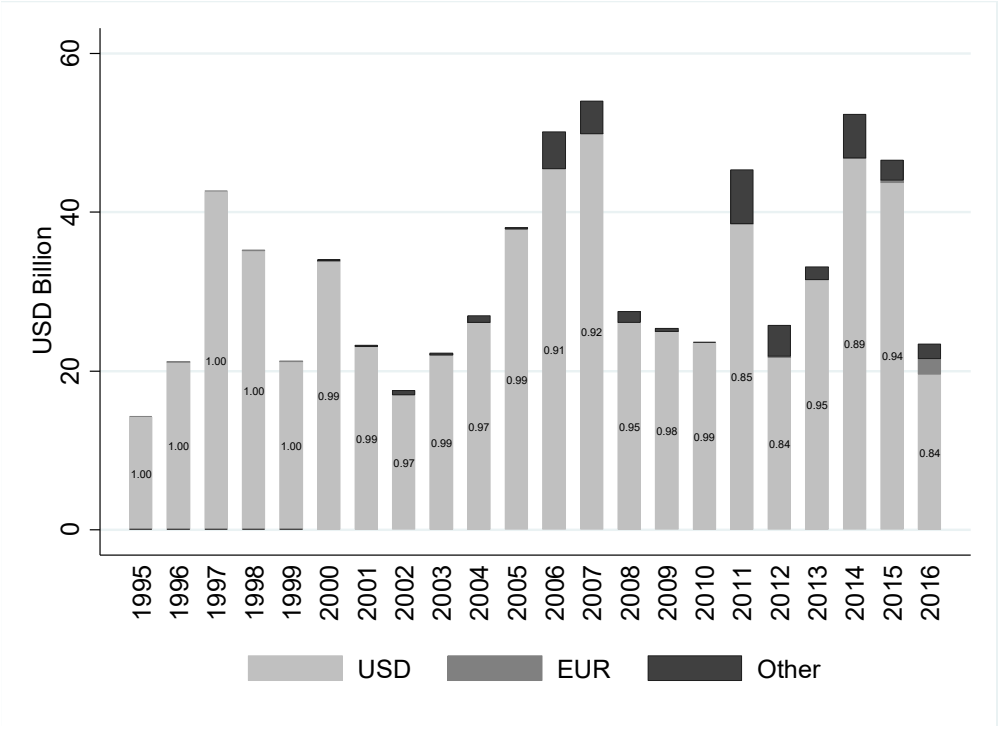


Fig. 2. Composition of cross-border claims on emerging and developed markets economies. Both figures show the median values within each country group. Data on external liabilities are compiled from the IMF International Investment Position. Data on cross-border bank claims are compiled from the BIS Consolidated Banking Statistics. The sample in both figures contains the same set of 29 DMEs and 43 EMEs.

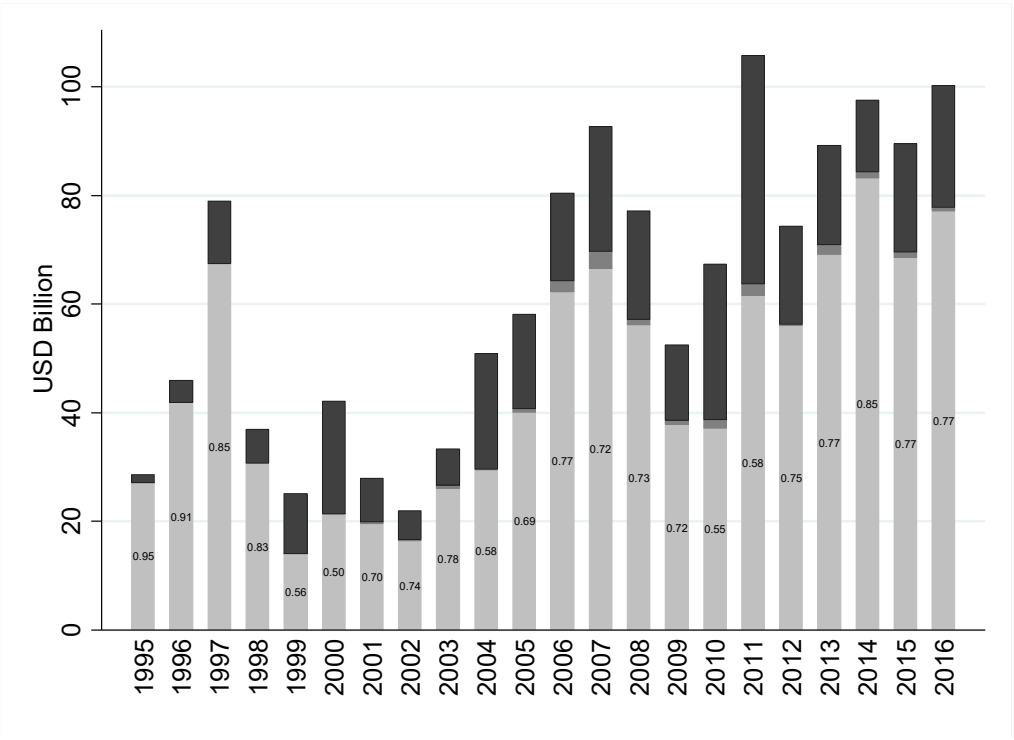
Emerging Africa



Emerging America



Emerging Asia



Emerging Europe

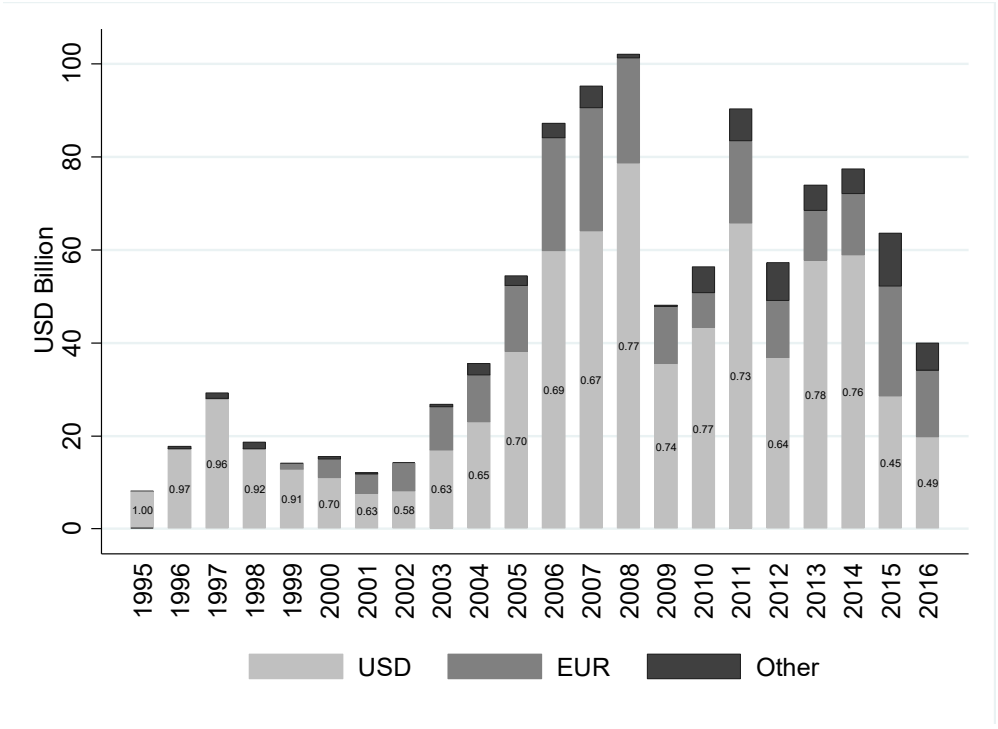
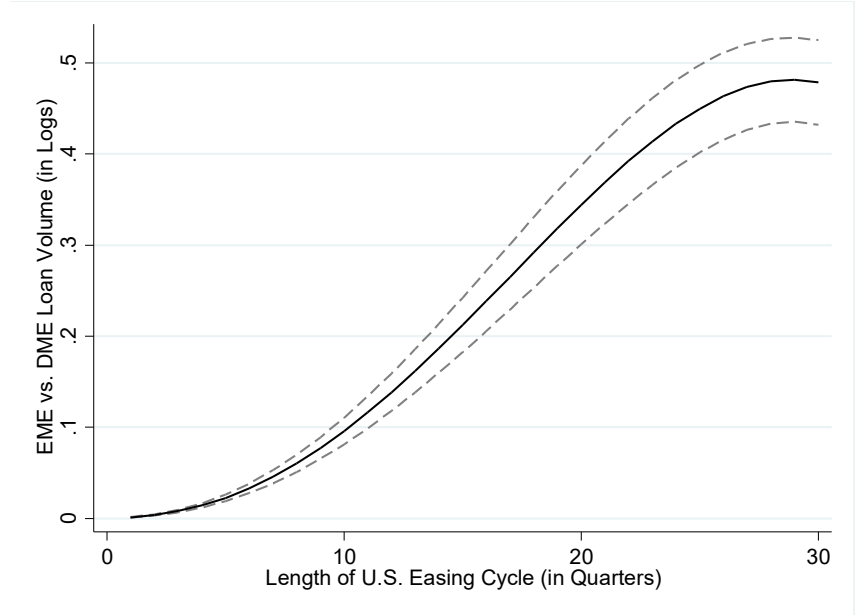


Fig. 3. Currency breakdown of cross-border syndicated loans to emerging market economies. The labels for light grey (lower) bars correspond to the share of loans that are denominated in U.S. dollars. Country groups are based on the BIS classification. Offshore centers are excluded from the sample.

a) U.S. monetary policy easing cycle



b) U.S. monetary policy tightening cycle

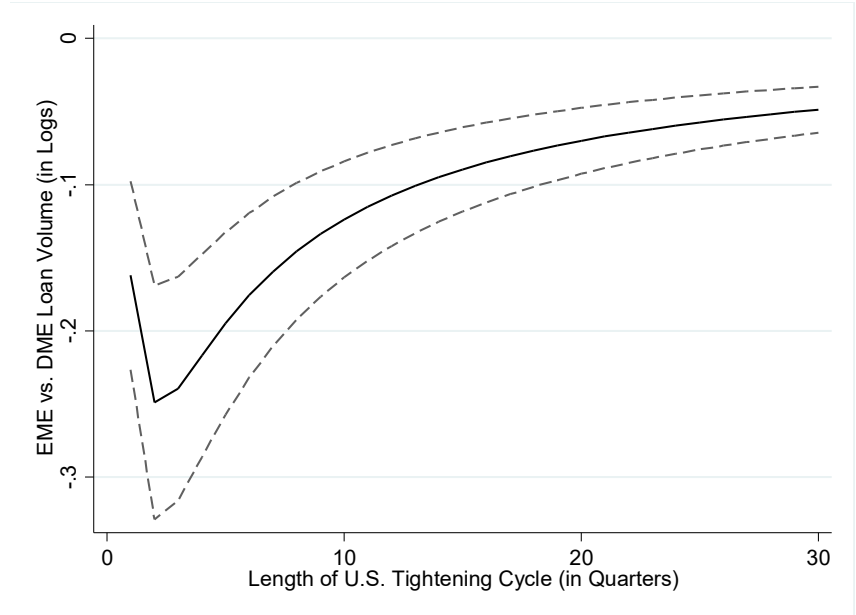


Fig. 4. Foreign credit supply response through the easing and tightening cycle of U.S. monetary policy. The solid line represents the predicted log loan volumes differential of EME borrowers (relative to DME borrowers) for the corresponding quarter of easing (panel (a)) and tightening (panel (b)) cycle of the U.S. monetary policy. The estimated regression is a fractional polynomial where the optimal polynomial degree is selected based on lowest deviance model (Stata default setting). The regression is estimated separately for U.S. easing and tightening cycles and controls for bank*quarter and firm fixed effects. Dashed lines represent 95 percent confidence bounds.

Table 1
Country-level information on syndicated cross-border loans to EMEs.

Country	# Firms	# Loans	Total Trade (% of GDP)	U.S. Trade (% of Total Trade)	Share of Loans in		
					USD	EUR	Other
Africa							
Algeria	7	15	47.6%	13.6%	93.3%	6.7%	0.0%
Angola	9	35	72.1%	29.5%	82.9%	8.6%	8.6%
Burundi	1	3	27.3%	3.2%	100.0%	0.0%	0.0%
Cameroon	8	13	29.9%	6.5%	69.2%	30.8%	0.0%
Congo	2	5	35.5%	3.4%	100.0%	0.0%	0.0%
Egypt	62	141	25.6%	11.3%	90.1%	4.3%	5.7%
Gabon	4	6	63.2%	32.9%	66.7%	16.7%	16.7%
Ghana	32	80	37.6%	8.0%	97.5%	1.3%	1.3%
Guinea	3	5	49.5%	11.9%	100.0%	0.0%	0.0%
Iran	17	51	26.6%	1.6%	74.5%	23.5%	2.0%
Iraq	3	6	61.3%	15.1%	50.0%	0.0%	50.0%
Israel	43	97	51.2%	22.6%	86.6%	9.3%	4.1%
Ivory Coast	16	23	60.2%	6.7%	91.3%	4.3%	4.3%
Jordan	19	23	78.8%	9.1%	87.0%	0.0%	13.0%
Kenya	20	28	34.8%	5.5%	82.1%	10.7%	7.1%
Kuwait	52	98	72.8%	10.1%	99.0%	0.0%	1.0%
Liberia	36	46	961.0%	5.5%	84.8%	2.2%	13.0%
Mali	5	15	37.7%	2.8%	33.3%	66.7%	0.0%
Morocco	13	16	45.1%	5.3%	81.3%	18.8%	0.0%
Mozambique	4	20	46.1%	4.9%	90.0%	5.0%	5.0%
Namibia	6	8	63.9%	2.8%	100.0%	0.0%	0.0%
Nigeria	51	84	28.9%	25.6%	96.4%	0.0%	3.6%
Oman	58	101	81.7%	4.4%	95.0%	1.0%	4.0%
Qatar	55	122	74.0%	4.2%	97.5%	1.6%	0.8%
Saudi Arabia	82	135	59.8%	16.4%	91.9%	4.4%	3.7%
Senegal	5	6	45.8%	3.0%	83.3%	16.7%	0.0%
Seychelles	1	5	92.8%	3.2%	80.0%	20.0%	0.0%
South Africa	127	321	25.2%	8.7%	73.5%	5.3%	21.2%
Tanzania	11	16	31.8%	3.1%	93.8%	0.0%	6.3%
Togo	1	2	54.5%	2.7%	50.0%	50.0%	0.0%
Tunisia	20	31	69.2%	4.0%	67.7%	29.0%	3.2%
United Arab Emirates	185	411	85.8%	5.5%	89.8%	3.9%	6.3%
Zambia	14	25	52.3%	3.8%	84.0%	4.0%	12.0%
Zimbabwe	11	16	57.4%	5.0%	100.0%	0.0%	0.0%
Total:	994	2,009			87.2%	5.5%	7.3%
Americas							
Argentina	196	372	19.4%	13.1%	95.7%	0.3%	4.0%
Bolivia	6	8	44.6%	18.1%	100.0%	0.0%	0.0%
Brazil	338	636	18.5%	19.3%	95.3%	0.5%	4.2%
Chile	207	417	48.9%	18.0%	96.6%	0.2%	3.1%
Colombia	91	158	23.2%	34.9%	96.8%	0.0%	3.2%
Costa Rica	12	15	64.2%	39.7%	100.0%	0.0%	0.0%
Dominican Republic	12	16	41.6%	49.0%	100.0%	0.0%	0.0%
Ecuador	9	10	39.6%	36.7%	100.0%	0.0%	0.0%
El Salvador	14	17	53.1%	40.9%	100.0%	0.0%	0.0%
Guatemala	13	16	44.4%	38.8%	100.0%	0.0%	0.0%
Honduras	4	12	54.9%	43.5%	100.0%	0.0%	0.0%

Jamaica	11	13	61.4%	42.0%	92.3%	0.0%	7.7%
Mexico	368	790	41.9%	68.8%	92.4%	0.3%	7.3%
Nicaragua	2	3	53.7%	23.9%	100.0%	0.0%	0.0%
Paraguay	3	4	49.6%	7.1%	100.0%	0.0%	0.0%
Peru	89	118	30.3%	25.1%	97.5%	0.0%	2.5%
Trinidad and Tobago	12	18	80.2%	44.5%	100.0%	0.0%	0.0%
Uruguay	14	16	31.1%	9.1%	100.0%	0.0%	0.0%
Venezuela	52	92	41.6%	41.4%	96.7%	0.0%	3.3%
Total:	1,505	2,731			95.2%	0.3%	4.6%
Asia							
Armenia	5	9	57.9%	8.9%	88.9%	11.1%	0.0%
Azerbaijan	21	59	63.3%	4.4%	93.2%	5.1%	1.7%
Bangladesh	21	30	24.5%	11.3%	86.7%	0.0%	13.3%
Cambodia	10	14	69.3%	12.2%	85.7%	0.0%	14.3%
China	1,051	1,704	61.8%	14.1%	75.4%	0.2%	24.5%
Georgia	7	10	52.5%	5.5%	100.0%	0.0%	0.0%
India	482	1,120	21.6%	11.6%	82.9%	2.0%	15.2%
Indonesia	655	1,224	37.9%	12.2%	92.6%	0.7%	6.8%
Kazakhstan	60	174	59.4%	2.9%	93.7%	4.6%	1.7%
Korea (South)	429	1,187	61.5%	19.1%	83.9%	2.8%	13.3%
Malaysia	339	523	132.7%	15.0%	63.5%	0.8%	35.8%
Mongolia	14	23	51.2%	5.2%	91.3%	0.0%	8.7%
Myanmar	4	9	44.1%	2.8%	100.0%	0.0%	0.0%
Pakistan	56	97	26.3%	11.4%	52.6%	0.0%	47.4%
Papua New Guinea	12	21	55.5%	4.0%	85.7%	0.0%	14.3%
Philippines	171	351	55.5%	21.8%	76.6%	0.3%	23.1%
Sri Lanka	21	49	47.9%	14.1%	91.8%	0.0%	8.2%
Tajikistan	7	10	100.7%	1.9%	100.0%	0.0%	0.0%
Thailand	411	801	83.5%	13.1%	78.5%	0.9%	20.6%
Turkmenistan	6	8	50.8%	4.1%	75.0%	0.0%	25.0%
Uzbekistan	13	21	40.6%	3.5%	76.2%	9.5%	14.3%
Vietnam	126	235	86.2%	6.1%	93.2%	0.9%	6.0%
Total:	4,047	7,679			81.3%	1.2%	17.5%
Europe							
Belarus	15	38	100.6%	1.5%	71.1%	26.3%	2.6%
Bulgaria	40	69	79.3%	2.5%	4.3%	92.8%	2.9%
Croatia	55	146	57.3%	2.4%	32.9%	63.0%	4.1%
Czech Republic	118	203	117.9%	2.3%	38.4%	23.2%	38.4%
Hungary	97	243	102.5%	2.8%	48.1%	45.7%	6.2%
Kosovo	5	10	20.7%	0.5%	0.0%	100.0%	0.0%
Poland	128	271	51.8%	2.4%	37.3%	35.8%	26.9%
Romania	94	169	54.4%	3.1%	43.8%	47.3%	8.9%
Russia	390	1,166	39.5%	5.2%	87.7%	7.5%	4.9%
Serbia	7	8	52.0%	1.7%	12.5%	87.5%	0.0%
Turkey	231	918	29.6%	7.1%	84.6%	13.6%	1.7%
Ukraine	79	202	74.0%	3.3%	92.1%	6.9%	1.0%
Total:	1,338	3,443			70.7%	21.6%	7.7%

Notes: The table is based on syndicated cross-border loans issued from 1990:Q1 to 2016:Q3. Country groups are based on the BIS classification. Offshore centers are excluded from the sample. We also exclude countries with only non-repeat borrowers and four countries with missing trade data. Currency shares are based on loan counts. *Trade* is the average value of the sum of imports and exports of goods as a percentage of GDP. *U.S. Trade* is the average value of traded goods (imports plus exports) with the United States as a percentage of total traded goods. Data on trade and GDP are compiled from the IMF.

Table 2
Currency breakdown of cross-border bank loans.

Panel A: Cross-Border Loan Issuance by Industry and Region, 1990:Q1–2016:Q3

Region:	U.S. Dollar Shares			
	EME: Africa	EME: Americas	EME: Asia	EME: Europe
Tradable:				
Agriculture, Forestry and Fishing	75.6%	95.9%	80.6%	86.4%
Mining	91.2%	97.4%	92.9%	85.4%
Manufacturing	82.5%	95.6%	73.8%	63.3%
Non-Tradable:				
Construction	84.4%	79.6%	64.8%	31.5%
Transp., Communic., Electric, Gas, Sanitary	82.8%	95.9%	77.5%	49.6%
Wholesale Trade	88.0%	88.9%	72.6%	42.4%
Retail Trade	80.0%	90.5%	56.2%	34.7%
Finance, Insurance, Real Estate	91.5%	98.7%	79.1%	80.6%
Services	67.4%	92.9%	68.2%	33.6%
Public Administration	72.3%	85.0%	49.7%	69.0%

Panel B: Outstanding Cross-Border Loans as of 2016:Q3

	Cross-Border Loans (Source: DealScan)					Cross-Border "Bank Claims" (Source: BIS)				
Currency:	USD	EUR	GBP	JPY	Other	USD	EUR	GBP	JPY	Other
Region:										
EME: Africa	88.8%	5.3%	0.1%	0.8%	4.9%	65.5%	12.7%	3.9%	1.0%	16.9%
EME: Americas	91.3%	1.1%	0.0%	0.7%	6.9%	75.6%	4.4%	0.2%	1.7%	18.2%
EME: Asia	69.7%	1.3%	0.7%	4.2%	24.0%	51.9%	5.0%	0.3%	1.3%	41.5%
EME: Europe	56.0%	30.9%	0.0%	0.6%	12.5%	31.9%	38.8%	0.5%	1.1%	27.7%
DME	69.8%	19.7%	5.0%	0.7%	4.8%	43.3%	36.9%	4.9%	4.9%	10.1%

Notes: Country groups are based on the BIS classification. Offshore centers are excluded from the sample. Industry classification is based on the 1-digit SIC code as reported in DealScan. Figures in Panel A are based on all loans issued between 1990:Q1 and 2016:Q3 and reported in DealScan. In Panel B, we report figures computed from our DealScan sample, and, for comparison, figures compiled from BIS data. DealScan tracks loan issuance; thus, statistics reported in the first five columns of Panel B are based on the estimated volume of outstanding claims as of 2016:Q3. Note that the BIS data include all outstanding cross-border claims held by banks (including equities and bonds).

Table 3
Global banks' cross-border dollar lending in emerging markets.

Panel A: Full samples

	(1)	(2)	(3)	(4)	IV (5)	IV (6)	(7)	Pre-ZLB (8)	ZLB (9)
U.S. Interest Rate	–0.144***	--	--	--	--	--	--	--	--
	(–11.49)								
U.S. Interest Rate * DME	--	–0.090***	--	--	--	--	--	--	--
		(–9.98)							
U.S. Interest Rate * EME	--	–0.194***	–0.079***	–0.075***	–0.090**	–0.068**	–0.156***	–0.105***,(a)	--
		(–9.66)	(–7.78)	(–7.40)	(–2.14)	(–2.61)	(–12.86)	(–5.87)	
U.S. Term Spread * EME	--	--	--	--	--	--	–0.153***	–0.126***,(b)	--
							(–7.00)	(–4.73)	
U.S. Shadow Rate * EME	--	--	--	--	--	--	--	--	–0.059**
									(–2.49)
EME	--	–0.951***	--	--	--	--	--	--	--
		(13.43)							
Bank-Country Inflation * EME	--	--	--	0.020	0.019	0.016	0.031*	0.026	–0.012
				(0.95)	(0.82)	(0.73)	(1.71)	(1.29)	(–0.47)
Bank-Country GDP Growth * EME	--	--	--	0.032**	0.032**	0.027*	0.030**	0.011	0.015
				(2.40)	(2.00)	(1.90)	(2.31)	(0.65)	(1.19)
Bank-Country Macro Forecast * EME	--	--	--	–0.057***	–0.049**	–0.060***	–0.040***	–0.048***	–0.024**
				(–4.75)	(–2.00)	(–3.38)	(–4.20)	(–4.02)	(–2.15)
Fixed Effects:									
Borrower (D_i)	--	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank * Quarter (D_{jt})	--	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	171,276	171,276	159,033	154,737	148,518	147,959	154,737	114,505	38,964
R-squared	0.067	0.301	0.821	0.832	0.827	0.830	0.829	0.827	0.837

(a) *t*-statistic for difference in coefficients on *U.S. Interest Rate * EME* in columns 8 and 7 is 2.28**.

(b) *t*-statistic for difference in coefficients on *U.S. Term Spread * EME* in columns 8 and 7 is 0.76.

Panel B: Dollar lending by banks with low exposure to the U.S. economy

Banks' Loan Exposure to U.S.:	< 10%	< 5%	< 5%	< 5%	< 5%	< 5%
Borrowers:			Non-Tradable Industry	Sectors with Low Export Share	Country with Low Trade Overall	Country with Low Trade with U.S.
	(1)	(2)	(3)	(4)	(5)	(6)
U.S. Interest Rate * EME	–0.157***	–0.090**	–0.096**	–0.158**	–0.108**	–0.347***
	(–5.63)	(–2.10)	(–2.05)	(–2.17)	(–2.59)	(–4.21)
U.S. Term Spread * EME	–0.188***	–0.128**	–0.142**	0.027	–0.112*	–0.528***
	(–4.51)	(–1.99)	(–2.06)	(0.10)	(–1.85)	(–4.81)
Fixed Effects:						
Borrower (D_i)	Yes	Yes	Yes	Yes	Yes	Yes
Bank * Quarter (D_{jt})	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Country Macro Variables * EME	Yes	Yes	Yes	Yes	Yes	Yes
t-statistic for difference of coefficients (vs. Panel A, Column 7):						
U.S. Interest Rate * EME	0.01	1.37	1.14	0.02	1.03	2.15***
U.S. Term Spread * EME	0.69	0.34	0.14	0.63	0.59	3.15***
Observations	25,631	9,345	7,595	2,315	4,052	3,115
R-squared	0.875	0.903	0.905	0.924	0.908	0.926

Notes: The dependent variable is the logarithm of the dollar loan amount originated by a bank *j* to a firm *i* in a quarter *t*. *U.S. Interest Rate* is the federal funds rate (in percent). *U.S. Term Spread* is the difference between the 10-year U.S. Treasury yield and the federal funds rate (in percentage points); that is, the slope of the yield curve. *Shadow Rate* is a single measure of monetary policy during the zero-lower bound period constructed by Wu and Xia (2016). *EME* is a dummy variable that equals one if the firm is located in an emerging market country (as defined by BIS), and zero otherwise. *DME* is a dummy that equals one if the borrower is located in a developed market country, and zero otherwise. The sample in Panel A, columns (1)–(4) and (7), and all columns in Panel B covers the period from1990:Q1 through 2016:Q3. Panel A, Columns (5) and (6) show the results when the federal funds rate is instrumented by 2- and 4-lags of monetary policy shocks as in Gürkaynak, Sack, and Swanson (2005) for the period from 1992:Q1 through 2015:Q4; see text for details. The sample in Panel A, column (8) covers the pre-ZLB period from 1990:Q1 through 2008:Q3. Panel A, column (9), shows that our main result holds during the period when the federal funds rate was at the zero lower bound (2008:Q4–2015:Q3). Panel B replicates the results in Panel A, column (7), while focusing on non-U.S. lenders and non-U.S. borrowers that are unlikely to be connected to the U.S. economy. Non-U.S. banks with low U.S. exposure are identified based on the number of loans to U.S. borrowers in the entire sample (relative to all loans). Column (3) contains only EME borrowers from the non-tradable sectors based on the SIC 1-digit classification as reported in DealScan. Column (4) contains only EME borrowers from sectors that produce goods and services with an export share below the 25th percentile (based on the distribution of export shares of all goods and services for each borrower country). Column (5) contains only loans to EME borrowers from countries with an average total trade-to-GDP share below the 25th percentile of the cross-country distribution (see Table 1). Column (6) contains only loans to EME borrowers from countries with the average U.S. trade share (relative to total trade) below the 25th percentile of the cross-country distribution (see Table 1). *Bank-Country Macro Variables* are as in Panel A and include inflation, GDP growth, and Consensus Economics 1-year ahead forecast of GDP growth in the lender's home country. Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4
U.S. monetary policy and global banks' lending in high-yield markets.

Panel A: High-yield markets

	"High–Yield Market" Defined Using:			
	GDP Growth	Interest Rate Spread	Country Rating	Equity Returns
	(1)	(2)	(3)	(4)
U.S. Interest Rate * "High-Yield Market"	–0.006***	–0.004***	–0.012***	–0.026
	(–3.28)	(–4.00)	(–7.23)	(–0.75)
U.S. Term Spread * "High-Yield Market"	–0.008**	–0.002	–0.011***	–0.011
	(–2.23)	(–1.29)	(–4.16)	(–0.19)
"High-Yield Market"	0.042***	0.023***	–0.003	0.068
	(3.62)	(3.41)	(–0.22)	(0.37)
Fixed Effects:				
Borrower (D_i)	Yes	Yes	Yes	Yes
Bank * Quarter (D_{jt})	Yes	Yes	Yes	Yes
Bank-Country Macro Variables * "High-Yield Market"	Yes	Yes	Yes	Yes
Observations	148,484	133,972	129,755	134,222
R-squared	0.822	0.819	0.807	0.800

Panel B: High-yield firms (within host country)

	"High–Yield Firm" Defined Using:			
	Loan Spread to Average Rate in Country-Quarter		Loan Spread to Country Risk Premium	
	(1)	(2)	(3)	(4)
U.S. Interest Rate * "High-Yield Firm"	–0.043***	–0.049***	–0.019**	–0.034***
	(–8.35)	(–10.84)	(–2.63)	(–5.15)
U.S. Term Spread * "High-Yield Firm"	–0.052***	–0.055***	–0.028**	–0.038***
	(–5.13)	(–5.89)	(–2.64)	(–3.87)
"High-Yield Firm"	0.037	0.038	0.001	0.027
	(1.33)	(1.52)	(0.03)	(1.08)
Fixed Effects:				
Bank * Quarter (D_{jt})	Yes	Yes	Yes	Yes
Firm-Country * Quarter (D_{it})	Yes	Yes	Yes	Yes
Firm-Sector * Quarter (D_{St})	--	Yes	--	Yes
Bank-Country Macro Variables * "High-Yield Firm"	Yes	Yes	Yes	Yes
Observations	148,484	133,972	129,755	134,222
R-squared	0.822	0.819	0.807	0.800

Notes: As in Table 3, the dependent variable is the logarithm of the dollar loan amount originated by a bank *j* to a firm *i* in a quarter *t*. In Panel A, *GDP Growth*, *Interest Rate Spread*, *Country Rating,* and *Equity Returns* describe the home country of the borrower and correspond to lagged values of GDP growth, the spread between the local EME interest rate and the U.S. federal funds rate, stock-market index growth, and the sovereign debt rating ("AAA"=1, "AA+"=2, etc.). Growth rates are in percentage terms. (The underlying sample changes from columns 1 through 4 due to data availability.) In Panel B, *Loan Spread to Average Rate in Country-Quarter* is the loan spread (relative to 3M LIBOR rate) minus the average loan spread in the country of the borrower during the same quarter. *Loan Spread to Country Risk Premium* is the loan spread (relative to 3M LIBOR rate) minus the historical country risk premium computed and maintained by Aswath Damodaran (http://www.stern.nyu.edu/~adamodar/New_Home_Page/dataarchived.html). All other variables are as in Table 3. Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5
Specialness of U.S. monetary policy for cross-border dollar credit.

Loan Currency:	USD	USD	USD	USD	EUR
			Non-U.S. Banks, Non-U.S. Borrowers		U.S. Banks, Non-EU Borrowers
	(1)	(2)	(3)	(4)	(5)
Euro Interest Rate * EME	–0.131***	–0.016	–0.024	--	–0.246*
	(–7.60)	(–0.50)	(–0.58)		(–1.85)
Euro Term Spread * EME	–0.030	0.029	0.051	--	–0.132
	(–1.13)	(1.05)	(1.31)		(–0.73)
U.S. Interest Rate * EME	--	–0.174***	–0.175***	–0.166***	–0.080
		(–5.17)	(–3.66)	(–3.53)	(–0.47)
U.S. Term Spread * EME	--	–0.202***	–0.246***	–0.303***	–0.303
		(–4.88)	(–4.16)	(–3.76)	(–1.21)
Fixed Effects:					
Borrower (D_i)	Yes	Yes	Yes	Yes	Yes
Bank * Quarter (D_{jt})	Yes	Yes	Yes	Yes	Yes
Bank-Country Macro Variables * EME	Yes	Yes	Yes	Yes	Yes
Observations	113,277	113,277	51,091	16,809	210
R-squared	0.825	0.826	0.843	0.887	0.940

Notes: This table highlights the special role of U.S. monetary police for global dollar credit. As in Table 3, the dependent variable is the logarithm of the dollar loan amount originated by a bank *j* to a firm *i* in a quarter *t*. *Euro Interest Rate* is the overnight rate EONIA (in percent). *Euro Term Spread* is the difference between the 10-year generic euro-area bond yield and the euro overnight rate (in percentage points). *U.S. Interest Rate* is the federal funds rate (in percent). *U.S. Term Spread* is the difference between the 10-year U.S. Treasury yield and the federal funds rate (in percentage points). Columns (3) and (4) exclude U.S. banks and U.S. borrowers from the sample. Column (4) includes only quarters where U.S. monetary policy was easing and ECB monetary policy was tightening (or vice versa). Column (5) looks at euro-denominated loans by U.S. firms to non-EU borrowers. The sample covers the period from 1999:Q1 (introduction of the euro) until 2016:Q3. All other variables are as in Table 3. Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6
Foreign and local bank activity and overall credit terms.

Panel A: EME vs. DME

Sample:	Firm-Quarters with Foreign and Domestic Lenders			Firm-Quarters with Foreign Lenders		
Dependent Variable:	Log (Borrowing Amount)			Log (Borrowing Amount)	Interest Rate Spread	Probability of Refinancing
	Lending by Foreign Banks	Lending by Local Banks	All Banks	All Banks	All Banks	All Banks
	(1)	(2)	(3)	(4)	(5)	(6)
U.S. Interest Rate * EME	–0.178***	–0.140*** [(a)]	–0.169***	–0.036***	9.402***	–0.016***
	(–7.57)	(–4.93)	(–8.03)	(–3.10)	(4.61)	(–3.86)
U.S. Term Spread * EME	–0.182***	–0.096** [(b)]	–0.159***	–0.023	10.007***	–0.047***
	(–5.15)	(–2.32)	(–5.03)	(–1.20)	(2.82)	(–3.84)
Fixed Effects:						
Borrower (D_i)	Yes	Yes	Yes	Yes	Yes	Yes
Quarter (D_t)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,754	24,754	24,754	40,134	30,829	50,564
R-squared	0.750	0.793	0.782	0.783	0.803	0.370

[(a)] *t*-statistic for difference in coefficient on *U.S. Interest Rate * EME* in columns (1) and (2) is 1.04.
[(b)] *t*-statistic for difference in coefficient on *U.S. Term Spread * EME* in columns (1) and (2) is 1.57.

Panel B: Within EME variation in borrowing conditions depending on past foreign bank reliance

Dependent Variable:	Log (Borrowing Amount)	Interest Rate Spread	Probability of Refinancing
	(1)	(2)	(3)
Past Foreign Bank Reliance	0.200	–75.645***	0.312**
	(1.11)	(–3.57)	(2.12)
Past Foreign Bank Reliance * U.S. Interest Rate	–0.042	14.430***	–0.090***
	(–1.19)	(3.78)	(–3.18)
Past Foreign Bank Reliance * U.S. Term Spread	–0.017	25.392***	–0.082*
	(–0.27)	(3.42)	(–1.70)
Fixed Effects:			
Borrower (D_i)	Yes	Yes	Yes
Quarter (D_t)	Yes	Yes	Yes
Observations	5,227	3,469	3,106
R-squared	0.732	0.790	0.359

Notes: *Log(Borrowing Amount)* is the logarithm of the total dollar borrowing (in billion) at the firm-quarter level. *Interest Rate Spread* is the average all-in-drawn spread to the 3M LIBOR rate (in bps) of all dollar loans the borrower received in a given month. *Probability of Refinancing* is a dummy variable equal to one if an EME firm obtains a new loan in the quarter when an earlier loan matures and zero otherwise. In Panel B, *Past Foreign Bank Reliance* is the share of global banks' lending to the firm in the last quarter the firm was borrowing. All other variables are as in Table 3. In both panels, the sample period covers 1990:Q1 through 2016:Q3. Robust *t*-statistics are in parentheses. Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

INTERNET APPENDIX

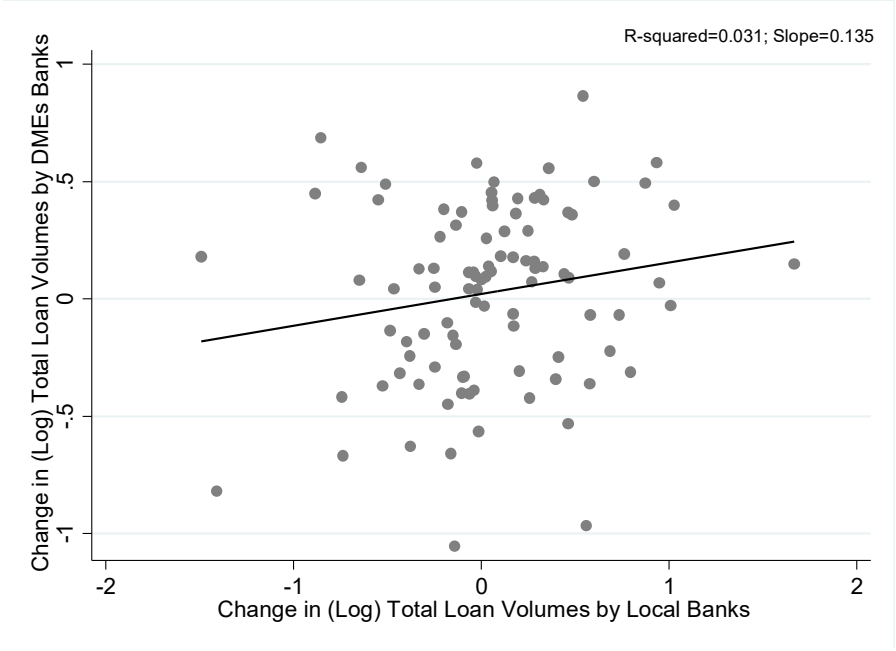


Fig. A.1. Lending to EMEs by foreign DME banks vs. local banks. The figure depicts the changes in the (logarithm of) syndicated loan volumes to EME borrowers by local lenders (horizontal axis) and DME/foreign lenders (vertical axis). Each data point corresponds to the change in lending by local and foreign banks in one quarter. The sample covers the period from 1990:Q1 to 2016:Q3.

Table A.1
Global banks' EME lending by region and industry.

	U.S. Interest Rate * EME	*t*-stat.	Obs.	*R*-squared
	Panel A: Split by Region			
EME: Africa	–0.083***	(–5.24)	108,837	0.761
EME: Americas	–0.050***	(–3.48)	110,576	0.756
EME: Asia	–0.090***	(–7.49)	122,865	0.823
EME: Europe	–0.081***	(–4.78)	115,527	0.796
	Panel B: Split by Industry			
Tradable				
Agriculture, Forestry and Fishing	–0.135***	(–3.61)	5,797	0.944
Mining	–0.047**	(–2.18)	15,117	0.755
Manufacturing	–0.113***	(–7.07)	35,651	0.824
Non-Tradable				
Construction	–0.058	(–0.91)	734	0.943
Transp., Communic., Electric, Gas, Sanitary	–0.051***	(–2.78)	28,970	0.774
Wholesale Trade	–0.085**	(–2.06)	3,154	0.862
Retail Trade	–0.038	(–0.45)	2,462	0.833
Finance, Insurance, Real Estate	–0.053***	(–3.14)	38,621	0.874
Services	0.038	(0.86)	10,747	0.780
Public Administration	0.241*	(1.73)	951	0.874

Notes: In this table we replicate the baseline result in Table 3, column (4) for borrowers from different regions and industries; that is, each coefficient reported in this table corresponds to the same regression estimated based on different subsamples. *U.S. Interest Rate* is the federal funds rate. *EME* is a dummy variable that equals one if the firm is located in the corresponding emerging market region (as defined by BIS), and zero otherwise. Offshore centers are excluded from the sample. Industry classification is based on the 1-digit SIC code as reported in DealScan. The sample covers the period from 1990:Q1 through 2016:Q3. Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

The result is economically and statistically weaker only for Latin America (the point estimate is about two-thirds of the estimated average effect). This is in line with Takáts (2010), who points out that, unlike in other EMEs, the expansion of international banks in Latin America mainly took the form of increased domestic currency lending by local affiliates, making cross-border bank lending relatively less important for these regions.

Takáts, E., 2010. Cross-Border Bank Lending to Emerging Market Economies. BIS Working Papers No. 54.

Table A.2
BIS cross-border claims by banks from developed countries.

Dependent Variable:	(Log) Claims on Firms (Nonbank Private Sector)				(Log) Claims on Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
U.S. Interest Rate	–0.095***	--	--	--	--	--
	(–5.63)					
U.S. Interest Rate * DME	--	–0.011	--	--	--	--
		(–0.60)				
U.S. Interest Rate * EME	--	–0.129***	–0.103***	–0.211***	–0.171***	–0.371***
		(–7.20)	(–10.28)	(–12.60)	(–11.55)	(–16.28)
U.S. Term Spread * EME	--	--	--	–0.193***	--	–0.356***
				(–6.19)		(–8.59)
EME	--	–1.784***	--	--	--	--
		(–43.93)				
Fixed Effects:						
Quarter (D_t)	--	--	--	--	--	--
Bank Country (D_J)	--	--	--	--	--	--
Borrower Country (D_I)	--	--	Yes	Yes	Yes	Yes
Bank Country * Quarter (D_{Jt})	--	--	Yes	Yes	Yes	Yes
Observations	43,206	43,206	43,204	43,204	40,416	40,416
R-squared	0.004	0.113	0.945	0.945	0.908	0.910

Notes: The purpose of this table is to confirm the robustness of the main result in Table 3, using data on all forms of bank claims on firms (and not just syndicated credit). This sample also covers a larger set of countries. These data are collected from the BIS Consolidated Banking Statistics. The dependent variable is the logarithm of the claim amount held by a developed market banking sector on a given country in a given quarter. *U.S. Interest Rate* is the federal funds rate (in percent). *U.S. Term Spread* is the difference between the 10-year U.S. Treasury yield and the federal funds rate (in percentage points). *EME* is a dummy variable that equals one if the firm is located in an emerging market country (as defined by BIS), and zero otherwise. *DME* is a dummy that equals one if the borrower is located in a developed market country, and zero otherwise. The sample covers the period from 2005:Q1 through 2016:Q3, which is the period for which the data are publically available. Robust *t*-statistics are in parentheses. The estimate of the constant is not shown. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table A.3
U.S. monetary policy and EME financial openness.

Dependent Variable:	(Log) Claims on Firms (Nonbank Private Sector)				
	(1)	(2)	(3)	(4)	(5)
U.S. Interest Rate	–0.117***	–0.080***	--	--	--
	(–6.32)	(–4.11)			
Financial Openness Index	0.286***	0.375***	0.416***	0.463***	0.215
	(2.81)	(3.50)	(4.28)	(4.16)	(1.43)
U.S. Interest Rate * Financial Openness Index	--	–0.071***	–0.070***	–0.081***	–0.066**
		(–9.21)	(–8.17)	(–5.27)	(–2.47)
U.S. Term Spread * Financial Openness Index	--	--	--	–0.018	–0.034
				(–0.68)	(–0.87)
Country Rating (1=AAA, 2= AA+, etc.)	--	--	--	--	–0.082***
					(–3.44)
Fixed Effects:					
Bank Country (D_J)	Yes	Yes	--	--	--
Borrower Country (D_I)	Yes	Yes	Yes	Yes	Yes
Bank Country * Quarter (D_{Jt})	--	--	Yes	Yes	Yes
Observations	22,049	22,049	22,008	22,008	14,750
R-squared	0.500	0.500	0.525	0.525	0.516

Notes: The dependent variable is the logarithm of the claim amount held by a developed market banking sector on a given emerging market country in a given quarter. *U.S. Interest Rate* is the federal funds rate (in percent). *U.S. Term Spread* is the difference between the 10-year U.S. Treasury yield and the federal funds rate (in percentage points). *Financial Openness Index* measures the capital account openness of the host country. The index ranges from zero to one, with zero indicating the lowest financial openness and one indicating the highest financial openness. *Country Rating* is the lagged sovereign debt rating of the host country. The sample covers quarterly claims on emerging market countries from 2005:Q1 through 2014:Q4. Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table A.4
U.S. monetary policy and infrastructure-related credit in emerging markets

	Project Finance Loans				Corporate Loans					
	All Projects		Infrastructure-Related		Infrastructure Sector (WB)		Infrastructure Sector (BIS)		Maturity > 5Y	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
U.S. Interest Rate	–0.050**	--	–0.068**	--	–0.003	--	–0.005	--	–0.022**	--
	(–2.60)		(–2.60)		(–0.24)		(–0.50)		(–2.20)	
U.S. Interest Rate * EME	–0.084***	–0.087***	–0.063*	–0.055*	–0.044	–0.059**	–0.066***	–0.079***	–0.057***	–0.070***
	(–3.28)	(–3.77)	(–1.95)	(–1.92)	(–1.56)	(–2.08)	(–4.03)	(–4.87)	(–3.37)	(–4.63)
EME	–0.010	0.021	–0.151	–0.063	--	--	--	--	--	--
	(–0.11)	(0.24)	(–1.24)	(–0.55)						
Fixed Effects:										
Quarter (D_t)	--	Yes	--	Yes	--	Yes	--	Yes	--	Yes
Bank (D_j)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower (D_i)	--	--	--	--	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,494	10,493	6,458	6,458	20,340	20,340	68,220	68,220	72,850	72,850
R-squared	0.177	0.292	0.206	0.359	0.705	0.730	0.693	0.716	0.768	0.787

Note: The dependent variable is the logarithm of the dollar loan amount originated by a given bank to a given firm in a given quarter. *U.S. Interest Rate* is the federal funds rate (in percent). *EME* is a dummy variable that equals one if the firm is located in an emerging market country (as defined by BIS), and zero otherwise. The sample covers loans by developed countries banks during the period from 1990:Q1 through 2016:Q3. We use different methods to identify infrastructure-related projects, including the maturity of the loan and sector of the borrower. In columns (3) and (4), we restrict the sample to infrastructure-related projects as classified in World Bank (2016). In columns (5)–(7) we look at corporate loans to borrowers from infrastructure-relevant sectors, based on the classifications by the World Bank (2016) and the BIS (Ehlers 2014). Columns (9) and (10) focus on corporate loans with maturity longer than 5 years, given that infrastructure-related credit is typically of long maturity. Given that the structure of the investment where the assets of the sponsor are ring-fenced and repeated projects by the same sponsor are rare, we do not include borrower fixed effects in Columns (1)–(4). Robust *t*-statistics are in parentheses. Standard errors are clustered at the quarter level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.