We analyze the impact of monetary policy on cross-border bank flows for a large sample of countries over two decades. We find evidence in favor of a cross-border risk-taking channel, as the monetary policy stance of source countries is an important determinant of cross-border bank flows. A relatively tighter monetary policy in source countries prompts banks to reallocate their lending toward safer foreign counterparties. The cross-border reallocation of credit is more pronounced for source countries with lower-capitalized banks. Also, the reallocation is directed toward foreign borrowers in relatively safer destinations, such as advanced economies or economies with investment-grade sovereign ratings. (JEL E52, F34, F36, G21)

Received XXXX XX, XXXX; editorial decision XXXX XX, XXXX by Editor XXXXXXXXXXXX.

The literature pays a great deal of attention to the transmission of monetary policy through domestic banks (Dell'Ariccia et al., 2017; Jimenez et al., 2014; Kashyap and Stein, 2000), but less is known about

We thank Itay Goldstein and two anonymous referees for very useful feedback and suggestions. We also thank Jason Allen, Greg Bauer, Allen Berger, Falk Brauning, Mark Carey, Luis Cataro, Stijn Claessens, Juan Contreras, Sally Davies, Gaston Gelos, Linda Goldberg, John Kandrac, Vasso Ioannidou, Seung Lee, Andrew Levin, Marco Lo Duca, Patrick McGuire, Camelia Minoiu, Josef Schroth, Larissa Schaefer, Penelope Smith, Rhiannon Sowerbutts, Viktors Stebunovs, Joao Sousa, Garima Vasishtha, and Julieta Yung for helpful comments. We thank Kelly Posenau for outstanding research assistance. The views stated herein are those of the authors and are not necessarily the views of the Federal Reserve Board or the Federal Reserve System. Send correspondence to Ricardo Correa, ricardo.correa@frb.gov.
the cross-border transmission of monetary policy through global banks. Several empirical studies have documented the cross-border implications of the bank lending channel, often from the perspective of U.S. monetary policy as a global factor (see Brauning and Ivashina, 2020b; Cetorelli and Goldberg, 2012a; Temesvary et al., 2018, among others). However, there is less international evidence on the risk-taking channel, whereby the relative stance of monetary policy shapes the risk characteristics of loans to domestic and foreign borrowers, and hence drives the banks’ international portfolio allocations (Bruno and Shin, 2015a; Den Haan et al., 2007). The goal of this paper is to study the workings of the risk-taking channel in an international context.

We inform our analysis of cross-border bank flows by revisiting well-established theories that posit how the stance of monetary policy affect banks’ supply of credit, that is, the bank lending and the risk-taking channels. Under the bank lending channel, a monetary tightening affects the supply of credit through the banks’ cost of funding (Bernanke and Gertler, 1995). As the monetary tightening prompts banks to substitute reservable deposits with uninsured liabilities, banks encounter higher costs of funding and reduce their overall supply of credit (Kashyap et al., 1993).

More recently, the views on the monetary transmission mechanism have evolved to incorporate the risk-taking channel, which focuses on the quality of credit supplied by banks rather than its quantity. Under the risk-taking channel, higher interest rates may increase the banks’ perception of risk or decrease their risk tolerance, and therefore lower the desired amount of risk in their portfolios (Borio and Zhu, 2012; Bruno and Shin, 2015a). We view the effect of the risk-taking channel as the overall effect of three subchannels: the portfolio channel, the risk-shifting channel, and the franchise value channel. Under the portfolio channel, banks rebalance loan portfolios toward relatively safer assets in response to tighter monetary policy, and rebalance toward risky assets in response to easier monetary policy (Fishburn and Porter, 1976). The effect unfolds as higher interest rates reduce the borrowers’ collateral values, income, and net worth. However, the extent of banks’ risk-taking behavior may depend on their capitalization level. On the one hand, as noted by Dell’Ariccia et al. (2014), the risk-shifting channel can mitigate the portfolio channel, especially for banks with relatively low capital; that is, banks with low capital may be more willing to tolerate risk during episodes of a tighter monetary policy due to their limited liability incentive, which shields banks’ shareholders from bearing losses in full. On the other hand, a franchise value (the present value of banks’ future rents) effect may mitigate the portfolio channel for banks with relatively high capital; that is, because of relatively high capital requirements, banks may have lower franchise values, weaker incentives to monitor...
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investments, and hence may be more willing to tolerate risk (Hellman et al., 2000; Repullo, 2004). In sum, the unconditional effect of the risk-taking channel is driven by the portfolio channel theory, which states an unambiguous negative relation between interest rates and risk taking. The effect of monetary policy on risk taking conditional on banks' capital levels is ambiguous, as on net, the risk-shifting and franchise value incentives may mitigate or complement the portfolio channel effect for banks depending on their capital positions.

We test the implications of the risk-taking channel, not the bank lending channel, in an international context. Cetorelli and Goldberg (2012b), among others (see Section 1), have already explored the bank lending channel. While the bank lending channel concerns the total supply of credit, the risk-taking channel explains the composition of banks' portfolios. In an international context, the bank-lending channel is driven by the joint effects of the global financial cycle and the monetary policy cycle(s). We abstract from the role of the global financial cycle to better isolate the compositional shifts in global banks' portfolios attributed to the risk-taking channel. Specifically, we examine how the relative stance of monetary policy across multiple source economies affects the cross-border supply of bank credit and the global composition of banks' credit portfolios.1 We consider the following research questions: First, does cross-border lending behave differently than domestic bank lending, and hence do banks in source countries rebalance their portfolios internationally in response to domestic monetary policy? Second, how does monetary policy interact with bank capital in driving the cross-border portfolio reallocations? Third, how does monetary policy interact with the risk characteristics of foreign borrowers, and are these interactions consistent with the risk-taking channel?

Our hypotheses are guided by the three components of the risk-taking channel, which we apply to an international context. First, we expect that during episodes of relatively tighter monetary policy in source countries, which erode the net worth and increase the relative riskiness of domestic borrowers, global banks rebalance their portfolios toward foreign borrowers, which become relatively safer. As a result, cross-border lending should be more robust to monetary tightening than domestic lending. Second, as domestic borrowers become relatively riskier, the risk-shifting effect would imply less cross-border lending by banks with less capital, because the limited liability incentive enhances their tolerance for risk. On the contrary, the franchise value effect would

1 Countries that report their claims on foreign borrowers are the source countries from which credit originates. Thus, we use the terms “reporting,” “source,” and “origin” interchangeably when describing countries. Similarly, “counterparties” refer to the “recipient” or “destination” country for these credit flows.
imply more cross-border lending by banks with less capital, because the lower cost of capital and the higher franchise values enhance their incentive to monitor and curtail risks. Third, when monetary policy becomes relatively tighter in a source country, we expect more cross-border lending to borrowers in relatively safer foreign destinations and less lending to borrowers in risky foreign destinations. In testing these hypotheses, our paper benefits from the use of a novel data set on cross-border and domestic banking flows between multiple source and recipient countries, which allows us to compare the responses of domestic and cross-border bank lending to the stance of domestic monetary policy. Importantly, we focus on the role of domestic monetary policy across multiple source countries in a given quarter, which permits us to take into account the influence of global liquidity and risk aversion factors on cross-border lending.

Our results are as follows. First, we find that global banks increase cross-border lending by more than domestic lending, and thus rebalance their loan portfolios toward foreign borrowers in response to relatively tighter domestic monetary conditions. Second, this result is stronger for banks with relatively lower capital. That is, banks with lower capital levels rebalance their credit portfolios toward foreign borrowers by more in response to a tighter monetary stance in their home country. These effects are economically significant, as a one-percentage-point higher monetary policy rate in source countries boosts the growth differential between banks’ cross-border and domestic claims on nonbank borrowers by 15% on average. In addition, these adjustments are twice as large in source countries with lower-capitalized banks. Third, when looking only at the cross-border component of banks’ credit portfolios, we find that tighter domestic monetary policy conditions are associated with an overall increase in cross-border lending. Quantitatively, a one-percentage-point higher monetary policy rate in source countries is associated with 3% and 10% higher cross-border flows to foreign bank and nonbank borrowers. Importantly, banks’ portfolio rebalancing is correlated with the cross-sectional risk of borrowers in destination countries. Although the data set only provides a coarse decomposition of cross-border lending by loan type, the characteristics of recipient countries are indicative of the relative riskiness of foreign borrowers. We find that a relatively tighter domestic monetary policy stance is associated with stronger reallocations toward foreign borrowers in relatively safer destinations, such as those classified as advanced economies or those that have investment-grade sovereign rating status.

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2 The mean growth differential between banks’ cross-border and domestic claims on nonbank borrowers is 2.875 percentage points.
Overall, our results are consistent with the risk-taking channel in an international context. As monetary policy becomes relatively tighter in a source country, which increases the relative riskiness of domestic borrowers, banks reallocate their portfolios toward safer destinations abroad. This pattern is consistent with the traditional portfolio channel. Moreover, banking sectors with lower capital levels rebalance their portfolios by more in response to tighter domestic monetary policy. This result is consistent with the franchise value effect, whereby higher franchise values increase the payoff associated with prudent investing, which on average dominates the risk-shifting incentives associated with limited liability for the banks in our sample.

Our paper differentiates itself and contributes to the literature in three ways. First, empirical studies have focused on either domestic bank lending or cross-border bank flows, but without jointly analyzing the two types of lending. As our research question addresses the international rebalancing of global banks’ portfolios, we need to compare domestic with cross-border bank lending. We combine the data on cross-border lending from the Bank for International Settlements (BIS) with data on bank credit to the domestic private nonbank sector (also from the BIS), and with data on bank credit to the domestic public sector (from national sources). As a result, we can analyze the differential response of cross-border and domestic bank flows to monetary policy as a reflection of international portfolio rebalancing. We also allow for this differential response to vary with the capitalization of banking sectors from source economies, and with the risk characteristics of borrowers from recipient countries, which are two dimensions that shape the international risk-taking channel.

Second, the dyadic (i.e., bilateral) structure of the BIS cross-border lending data allows to identify the role of domestic monetary policies as a key driver of global banks’ supply of cross-border credit, rather than just focusing on global factors, such as U.S. monetary policy, the broad dollar exchange rate, or the VIX. In fact, our robustness results suggest that country-specific factors, such as the monetary policy in source countries, act simultaneously and can partially mitigate the effect of global factors on cross-border banking flows. This approach differentiates our paper from some of the related literature, which focuses on the relation between aggregate banking flows and movements in these global factors (Avdjiev et al., 2020; Bruno and Shin, 2015a; Cerutti et al., 2017; Miranda-Agrippino and Rey, 2015; Rey, 2016). Figure 1 provides a graphical representation of our contribution. The chart plots the four-quarter cumulative cross-border bank flows of BIS reporting banking sectors and the U.S. policy rate. As noted previously, most papers have analyzed the relation between the height of the bars, that is, the value of total aggregate cross-border flows across countries or regions, and global
factors. Our paper focuses on the composition of those bars, that is, the relation between the supply of credit by banks from each individual country and the stance of the corresponding domestic monetary policies. While the question of aggregate cross-border credit supply is more suited to explanations based on the bank lending channel, the composition of cross-border credit is more likely to be explained by the risk-taking channel of monetary policy, as discussed earlier.

Lastly, our data also allows us to control for credit demand in recipient countries, which is generally a challenge in the literature on international capital flows. Otherwise, the supply-driven changes in cross-border lending attributed to monetary policy in source countries may be confounded with changes driven by credit demand in the recipient countries. The dyadic data provides a convenient way to separate the factors driving supply from those driving demand by using fixed effects, which is similar in nature to the methodology applied to firms by Khwaja and Mian (2008). Moreover, these data allow us to use the level of the policy rate as a measure of the stance of a country’s monetary policy advocated by Bernanke and Mihov (1998). Other studies, focusing typically on one country’s monetary policy, have used the change in the policy rate as their main measure. However, the policy rate changes are not well suited for our empirical design, because the comparison of changes in policy rates across multiple source countries is more difficult to interpret than comparing the levels of the policy rate, after controlling for the domestic determinants of monetary policy, such as inflation and gross domestic product (GDP) growth.

1. Literature Review

Our paper is related to the empirical literature that examines the role of global banks in the transmission of monetary policy across the countries in which they operate. One stream of this literature studies the transmission of monetary policy through the bank lending channel, often in the context of monetary policy in advanced economies, such as the United States. Under this channel, a monetary tightening prompts banks to substitute reservable deposits with uninsured liabilities, which increases funding costs and reduces credit supply. Even if monetary tightening does not affect the supply of reserves, banks with market power may raise deposit rates by less than the increase in the monetary policy rate, which prompts deposits to flow out of the banking system and leads to a contraction in bank lending (Drechsler et al., 2017).³

³ In addition, monetary tightening can affect banks’ funding costs through banks’ balance sheet channel. A tighter monetary policy may erode banks’ net worth through lower cash
Taking the bank lending channel to an international context, Bruno and Shin (2015a,b) use the BIS locational banking statistics (LBS) and find that U.S. monetary policy loosening is associated with an increase in global banks’ leverage and an acceleration of bank capital flows to foreign economies. With more granular data, Temesvary et al. (2018) provide evidence for a global bank lending channel in response to U.S. monetary policy through the international activities of U.S. banks. Cetorelli and Goldberg (2012a) show that U.S. global banks are able to counteract changes in U.S. monetary policy by engaging in internal liquidity management with their foreign offices. Similarly, Brauning and Ivashina (2020b) find that U.S. monetary loosening is followed by increased cross-border dollar lending activities of global banks. While we control for overall trends driven by the bank lending channel and global factors, these are not the focus of our paper.

A second stream of related literature studies the effect of monetary policy on banks’ loan portfolio allocations through the risk-taking channel (Borio and Zhu, 2012). Using aggregate data for Canada and the United States, Den Haan et al. (2007, 2009) show that a monetary tightening prompts banks to reallocate their portfolios away from loans deemed relatively risky, such as consumer and residential real estate loans, and toward loans deemed relatively safer, such as commercial and industrial loans. Similarly, empirical studies show that a monetary tightening increases risk aversion (Bekaert et al., 2013) and discourages the origination of risky loans (Dell’Ariccia et al., 2017; Paligorova and Santos, 2017). In an international context, Bruno and Shin (2015a,b) document a risk-taking channel whereby U.S. monetary loosening leads to emerging market currency appreciation relative to the U.S. dollar, which in turn reduces the riskiness of foreign borrowers and increases banks’ incentives to lend to them. Our study differs from Bruno and Shin (2015a,b) in that we focus on the global allocation of bank portfolios rather than on the specific banking flows to emerging markets. In addition, we focus on the importance of source country monetary policy, rather than on the role of U.S. monetary policy as a global factor. However, our results are consistent and complement those in Bruno and Shin (2015a,b), since our empirical setup accounts for the coexistence of their channel in addition to ours.

A small literature studies the impact of financial conditions in multiple source countries on cross-border banking flows. Brauning and Ivashina (2020a) focus on the elevated hedging costs from currency mismatches between global banks’ funding and investment activities. Because of inflows and lower asset valuations due to the higher discount factor (Bernanke and Gertler, 1995). In a similar vein, Disyatat (2011) shows that banks with lower capital ratios may face a steeper external finance premium as monetary policy tightens, and therefore reduce credit origination.
these hedging costs, global banks react to a relatively lower interest rate on excess reserves (IOER) in their home country by increasing foreign reserves and decreasing lending in foreign markets. Cerutti et al. (2017) highlight the role of interbank funding spreads and yield curves, in addition to monetary policy rates, and look at the role of financial conditions not just in the United States, but also in the United Kingdom and the euro area. They find a positive relationship between the real U.S. federal funds rate and cross-border banking flows. Giannetti and Laeven (2012) study the role of interbank funding spreads from a broad range of source countries, rather than the role of monetary policy rates. Our results are consistent in that we also find a negative relationship between the LIBOR-OIS spreads of source countries and cross-border bank flows. However, while controlling for those spreads, we still find a positive average relationship between monetary policy in source countries and cross-border bank flows.

Lastly, our results are consistent with those from coordinated studies of the cross-border transmission of monetary policy using micro-banking data from multiple countries, such as the recent International Banking Research Network (IBRN) initiative (Buch et al., 2019). Using confidential data from 17 countries, the project shows a portfolio rebalancing effect that dominates the results—at least for periods of conventional monetary policy—and whose relative importance varies across countries, thus highlighting the importance of a multicountry perspective. Our paper is consistent with these results in that, while controlling for the bank lending channel, we document the risk-taking channel in a unified study of multiple source and recipient country pairs, whose strength varies with country-level characteristics pertaining to the lending banks’ capitalization and the riskiness of foreign borrowers.

2. Data Sources and Summary Statistics

2.1 Data sources
The main data source used in the paper is the confidential LBS by residence, compiled by the BIS and shared with the central banks of reporting countries. The LBS database contains quarterly data on the aggregate cross-border claims and liabilities of banks residing in 45 reporting countries to counterparties in roughly 200 countries (Bank for International Settlements, 2013). The first-difference of cross-border bank claims, which are already adjusted for exchange rate fluctuations and breaks-in-series by the BIS, gives the corresponding bank flows from reporting/source/origin to
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counterparty/destination/recipient countries. We normalize flows by the lagged outstanding claims, thus obtaining a measure equivalent to the growth of claims.

One advantage of the BIS data compared to the banking flows collected from balance of payments statistics is the detailed breakdown by reporting and counterparty countries, hence the dyadic structure of the data organized by source-destination country pairs. The claims and liabilities on counterparty countries are further detailed by currency, instrument (loan and debt securities), and sector of the counterparty (bank or nonbank). Thus, the dyadic structure allows us to disentangle changes in cross-border bank flows that are driven by supply factors specific to the source countries from those arising from changes in the demand for credit from the destination countries. Since multiple source countries report claims on borrowers from the same destination country in a given quarter, we can control for factors affecting the demand for credit using fixed effects and thus isolate supply factors that vary across source countries. Another advantage of the LBS data is that the cross-border claims denominated in multiple currencies are expressed in U.S. dollars and adjusted for exchange rate changes, which allows us to compute cross-border flows that abstract from exchange rate fluctuations over time.

The LBS data set includes observations dating back to 1977. However, some countries, particularly emerging market economies, started reporting these data in the early 2000s. This limitation, along with data availability for the explanatory variables, constraints our sample to the period between 1995:Q1 and 2014:Q2 for 29 reporting countries and 76 counterparty countries.

We also exclude from our

4 Adjusting for breaks-in-series is necessary because the reporting requirements and the population of reporting institutions change over time.

5 In the BIS definition, loans include all loans granted, working capital provided to branches/subsidiaries, and deposits with other banks, including those with their own affiliates (interoffice positions). This instrument category also includes repurchase transactions (repos), financial leases, promissory notes, nonnegotiable debt securities (e.g., nonnegotiable CDs), subordinated loans (including subordinated nonnegotiable debt securities), and reporting banks’ holdings of notes and coins that are in circulation. Debt securities are negotiable instruments other than loans and deposits, equity securities, investment fund shares or units, and financial derivatives. Nonbanks include nonfinancial sectors (government sector, nonfinancial corporations, and households) and nonbank financial institutions (special purpose vehicles, hedge funds, securities brokers, money market funds, pension funds, insurance companies, financial leasing corporations, central clearing counterparties, unit trusts, other financial auxiliaries, development banks and export credit agencies).

6 Note that the currency composition of cross-border claims is also reported, which allows the BIS to calculate the exchange-rate-adjusted cross-border claims expressed in U.S. dollars for each reporting country. This is akin to a real measure of bank claims that strips out any currency variation.

7 Table A1 in the appendix presents the list of countries included in the sample and the number of observations per country. Reporting countries from emerging markets have fewer
sample the BIS reporting countries that are classified as offshore centers with the exception of Hong Kong, which we classify as an advanced economy, and Singapore, which we classify as an emerging market.\footnote{Offshore centers are typically used by corporations or banks to arrange financial transactions whose funds are redirected elsewhere for their final use (Avdjiev et al., 2014). The pass-through nature of offshore centers makes their monetary policy irrelevant to the banking flows originated in these locations. Although we exclude these countries as reporters, their cross-border bank flows are significantly correlated with those of advanced and emerging country reporters. Their inclusion, if it were feasible, is unlikely to affect the main results of the paper.}

One drawback of the LBS data set is that it does not include data on historical claims of domestic banks on borrowers residing in their home country. The absence of this information keeps us from computing banks’ portfolio shares allocated to domestic and foreign economies. Since some of our tests aim to assess whether banks substitute domestic for foreign claims, we overcome this limitation by constructing a new data set of bank claims on the domestic nonbank sector. These domestic claims include both loans and debt securities. Thus, the composition of domestic claims is consistent with the composition of cross-border claims provided by the LBS. To construct the series of bank claims on the domestic nonbank sector, we use two sources of data: First, we use data on bank credit to the private nonfinancial sector, also provided by the BIS (Dembiermont et al., 2013). Second, we collect data on domestic banks’ claims, loans and securities holdings vis-à-vis the public sector from national sources, which are consistent with the BIS methodology used to construct the cross-border claims. The resultant series are used to compute the growth in banks’ domestic claims on nonbank borrowers, which are compatible with the growth in banks’ cross-border claims on nonbank borrowers described above.

An alternative to the LBS is the BIS consolidated banking statistics (CBS), which aggregate claims by the banks’ nationality rather than their location and exclude cross-border intragroup positions. We prefer the LBS because they are conceptually more suitable to our research questions, as they allow to establish a more direct link between the source countries’ monetary policy and the banks’ resultant cross-border portfolio adjustments, which are likely to include changes in intragroup positions. For our purpose, the LBS particularly dominates the CBS when the foreign offices of global banks are more exposed to local monetary policy shocks in host countries (Cetorelli and Goldberg, 2012a), and when they follow decentralized business strategies relative to the parent group (Argimon et al., 2019). From a technical standpoint, the CBS also have a number of drawbacks, as they are not adjusted for observations for two reasons. First, most of these reporting countries started reporting the locational banking statistics in the early 2000s. Second, emerging market reporters have fewer counterparty countries per quarter, 21 on average, than do advanced economies, 45 on average.

8 Offshore centers are typically used by corporations or banks to arrange financial transactions whose funds are redirected elsewhere for their final use (Avdjiev et al., 2014). The pass-through nature of offshore centers makes their monetary policy irrelevant to the banking flows originated in these locations. Although we exclude these countries as reporters, their cross-border bank flows are significantly correlated with those of advanced and emerging country reporters. Their inclusion, if it were feasible, is unlikely to affect the main results of the paper.
exchange rate fluctuations and are prone to breaks-in-series that are difficult to adjust.

We also collect data on central banks’ target or effective policy rates, our main explanatory variable of interest, directly from central banks or databases published by the International Monetary Fund. Some monetary authorities do not target specific rates, in which case we use the rate most widely used by market participants. For euro area countries, we use the individual countries’ policy rates until the introduction of the euro, and the rate for Main Refinancing Operations (minimum bid rate) set by the European Central Bank (ECB) for the rest of the sample period. For additional controls, we collect country-specific macroeconomic and financial variables such as real GDP growth, inflation, domestic credit growth, the sovereign-debt-to-GDP ratio, and bank equity returns from multiple sources, including Datastream, Haver Analytics, and Bloomberg. The appendix defines all variables.

2.2 Summary statistics

Table 1 presents a set of summary statistics for cross-border bank flows (computed as the growth in cross-border claims) and for other variables used in our empirical tests. We drop reporting-counterparty country pairs where the minimum outstanding claims in a given quarter are less than $5 million. The growth in cross-border claims is expressed in percentage points and winsorized at the 2.5 percentile. As shown in Table 1, the growth in the quarterly cross-border claims vis-à-vis all sectors average 4% during our sample period. By type of counterparties, the flows to banks averaged around 8.9%, while the cross-border flows to nonbanks averaged 4.7%. The growth in claims to banks was not only larger but also more dispersed than the growth in claims to nonbanks, as inferred by their standard deviations. In contrast to cross-border flows, the growth of domestic claims on nonbanks was only 1.8% and had a lower standard deviation.

Table 1 also reports summary statistics for all variables used in the regressions grouped by reporting and counterparty countries. Given that the sample of counterparty countries includes a higher number of emerging market economies relative to the sample of reporting countries, it is not surprising that the monetary policy and inflation rates are higher for the counterparty group, just like for domestic credit growth, bank equity returns, and real GDP growth.

9 The cross-border flows to bank and nonbank borrowers do not sum to the flows to all sectors, which also include “nonallocated” flows as a third category.
3. Methodology

This section outlines the econometric specifications used to test the risk-taking channel in an international context. In Section 3.1, we start by describing the main specification for the portfolio channel, a subchannel of the risk-taking channel, which focuses on the effect of monetary policy on the composition of banks’ credit portfolios across domestic and cross-border exposures. While controlling for credit demand, the rebalancing of credit away from domestic borrowers and toward foreign recipients, when monetary policy is relatively tighter in source countries, would support the portfolio channel hypothesis. In Section 3.2, we discuss a specification that evaluates how the cross-border credit reallocation relates to bank capitalization in source economies, which speaks for the relative strength of the risk-shifting and the franchise value channels. Finally, in Section 3.3, we introduce an additional specification to test the portfolio channel hypothesis. Since the portfolio channel suggests that a relatively tighter domestic monetary policy stance boosts cross-border lending to safer foreign borrowers, the specification tests whether cross-border credit indeed flows to those safer jurisdictions as monetary policy tightens.

3.1 The cross-border portfolio channel of monetary policy

To analyze the portfolio channel of monetary policy in an international context, we first examine banks’ decision to reallocate their loan portfolios across domestic and foreign borrowers as a function of the domestic monetary policy stance. For this purpose, we use data on domestic and cross-border credit to nonbank borrowers to construct the dependent variable in the following specification:

\[
Creditflows_{ijt} = \alpha Policyrate_{repit} - 1 + \gamma Domestic_i + \beta Policyrate_{repit} - 1 \times Domestic_i + \delta_i X_{repit} - 1 + \zeta_t + \epsilon_{ijt},
\]

where the dependent variable represents the growth of bank claims from a source country \( i \) to a destination country \( j \) during quarter \( t \). Thus, the dependent variable in our analysis is not the dollar amount of credit flows, but the growth of bank claims, which is equivalent to the credit flows from country \( i \) to country \( j \) normalized by the corresponding lagged claims. Importantly, \( Creditflows_{ijt} \) represents cross-border credit flows when \( i \neq j \), and domestic credit flows when \( i = j \). Since we only have data on banks’ domestic credit to nonbanks, we narrow the analysis to cross-border credit flows to these counterparties.
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The main regressor of interest is the lagged nominal monetary policy rate in the source countries, \( \text{Policyrate}_{it-1} \).\(^{10}\) It enters the regression both by itself and interacted with the Domestic\(_i\) indicator variable, which takes the value of one when the dependent variable measures domestic credit flows (when \( i=j \)) and zero for cross-border flows (when \( i \neq j \)). We use the lagged monetary policy rate expressed in levels rather than changes, to capture the relative stance of monetary policy across source countries at a given point in time (Bernanke and Mihov, 1998). Also, nominal rates are preferred to real rates when estimating the determinants of cross-border bank flows, because banks typically calculate their expected profits using nominal rates rather than real rates (Shiller, 2007). In addition, the selection of a relevant price deflator in the context of cross-border monetary policy poses challenges.\(^{11}\) That said, the degree of financial tightness associated with nominal rates also depends on domestic inflation, which motivates the inclusion of the lagged inflation rate in source countries as an explanatory variable in \( X_{it-1} \).

The effect of domestic monetary policy is described by the coefficient \( \alpha \) for cross-border flows and by the combined value of \( \alpha + \beta \) for domestic credit flows. A negative coefficient estimate for \( \beta \) would be consistent with portfolio rebalancing from domestic to cross-border lending in response to a relatively tighter domestic monetary policy stance.

In addition to specification (1), we also implement a more parsimonious alternative specification to more directly test for the differential responses of cross-border and domestic credit to domestic monetary policy:

\[
\text{Creditgrowthdiff}_{ijt} = \alpha \text{Policyrate}_{it-1} + \delta' X_{it-1} + \zeta_j + \epsilon_{ijt},
\]

(2)

where \( \text{Creditgrowthdiff}_{ijt} \) is the difference between the growth rate of cross-border and domestic claims on nonbank borrowers, \( i \) and \( j \) indicate the source and destination country, respectively, and \( t \) denotes time at the quarterly frequency. In this specification, the coefficient \( \alpha \) captures the differential response of cross-border and domestic credit flows to the domestic monetary policy stance in source countries, with a positive value indicating portfolio rebalancing from domestic to cross-border lending in response to a relatively tighter domestic monetary policy stance, in line with the portfolio channel.

\(^{10}\) In the robustness results provided in Section 5, we use shadow rates as an alternative measure of the monetary policy stance and LIBOR-OIS as a measure of bank funding costs.

\(^{11}\) One can use deflators for either the home or the host country depending on whether the bank profits for the loan would be repatriated or reinvested in the host country, but the profit allocation is not observable.
Importantly, cross-border bank flows are also affected by demand conditions in the destination country. If tighter monetary policy in source countries overlaps with a credit boom abroad, an increase in cross-border flows could be explained by an increase in foreign credit demand and not by the tighter domestic monetary policy. To control for time-varying demand across destination countries, we make use of the dyadic structure of our data and include counterparty × year-quarter fixed effects ($\zeta_{jt}$). The identification of demand factors is driven by the variation in cross-border flows sent by different source countries to the same destination country in a given year-quarter. Therefore, our use of dyadic data allows us to achieve a cleaner identification of the impact of supply factors, including monetary policy, on cross-border flows compared with studies using balance-of-payment data.\(^{12}\)

While the counterparty × year-quarter fixed effects control for demand conditions in the destination countries, the domestic monetary policy stance in source countries depends on domestic macroeconomic conditions that could also affect the cross-border flows. Therefore, omitted variable bias may affect the coefficient for the source country’s monetary policy rate as a driver of cross-border flows. We address this type of bias in two ways. First, we control for a set of macroeconomic factors in source countries that may affect the monetary policy stance, either directly or indirectly, such as real GDP growth, inflation, and credit growth, which are included in $X_{\text{rep}t-1}^-$. Second, in the robustness analysis discussed later, we use the euro area as a special case, where the optimal monetary policy rates for individual member countries may diverge from the policy rate set for the euro area as a whole.\(^{13}\) The weaker relation between some euro area source countries’ macroeconomic conditions and the euro area monetary policy rate may allow for a cleaner identification of the role of the latter factor as a driver of credit flows.

We also include an additional set of source country controls in $X_{\text{rep}t-1}^-$ that are described in the extant literature to affect cross-border credit flows. For instance, a higher domestic government debt-to-GDP ratio, a proxy for sovereign vulnerabilities, might be indicative of banks’ lesser ability or willingness to expand lending abroad. We

\(^{12}\) A potential concern with this identification strategy is that banks from different reporting countries may face different borrowers in the same counterparty country, which would prevent us from controlling for the demand for cross-border flows using only fixed effects. However, as shown by Cerutti et al. (2015), an important fraction of cross-border claims on nonbanks are intermediated through the global syndicated loan market. Borrowers on this market are likely to be more homogeneous, as they have to satisfy minimum credit quality standards to secure funds from global banks.

\(^{13}\) The ECB conducts its monetary policy to be consistent with overall euro area conditions (Maddaloni and Peydró, 2011). However, as the business cycles of individual euro area economies have been at times unsynchronized, the ECB policy actions may have been too loose for faster-growing member states, but too tight for slower-growing member states.
also use country-level bank equity returns at the quarterly frequency to measure the health of the banking system and its ability to extend credit (Ghosh et al., 2014). Another important control is the change in bilateral exchange rates between country pairs, as appreciating destination currencies may encourage cross-border flows denominated in the source country’s currency. Appreciating foreign currencies would enhance borrowers’ balance sheets and their demand for credit. We also control for the financial center status of source countries, namely, Hong Kong, Luxembourg, the United Kingdom, the United States, and Singapore. In addition, we include an indicator variable for whether a source country is part of the euro area, where cross-border credit may behave differently because capital is free to move within the region.

The monetary policy rate is an informative indicator of the monetary policy stance under normal circumstances. However, in our sample period, three central banks implemented unconventional monetary policy measures after their reference rate hit the effective lower bound, namely, Japan, the United Kingdom, and the United States. For these three countries, we construct an indicator variable, \( QE_{rep} \), equal to one for the duration of the quantitative easing program and zero otherwise. In the robustness section, we also consider the possibility of a change in the risk-taking channel following the GFC by performing tests separately for the pre- and post-GFC periods.

The standard errors in our specifications are double-clustered at the reporting and counterparty country levels, which is one of the most conservative clustering setups (Cameron and Miller, 2014). Clustering at the source country level accounts for the autocorrelation of the monetary policy rate and other macro variables over time, while clustering at the counterparty level accounts for the correlation of cross-border flows for the same destination country.

3.2 Risk-shifting versus franchise value effects: Bank capital in source countries

To examine the relative strength of the risk-shifting and franchise value effects in shaping the risk-taking channel, we evaluate whether the cross-border portfolio reallocation varies with bank capitalization in source countries. We estimate the following specification:

\[
\text{Credit growth diff}_{ijt} = \alpha \text{Policy rate}_{rep,t-1} + \beta \text{Policy rate}_{rep,t-1} \times \text{Banking}_{rep,t-1} + \gamma \text{Banking}_{rep,t-1} + \delta' X_{rep,t-1} + \zeta_{jt} + \epsilon_{ijt},
\]

(3)

14 The ECB launched its public sector asset purchases program in 2015:Q1, which is outside the sample period of our paper.
The dependent variable is the differential in the growth rate of credit to cross-border and domestic nonbank borrowers. The specification is similar to equation (2) except for the added interaction between the domestic monetary policy rate and $\text{Banking}_{i,t-1}$, which allows the banking sector characteristics from each source country $i$ to affect the relation between domestic monetary policy and cross-border portfolio reallocations.

The variable $\text{Banking}_{i,t-1}$ consists of several alternative measures of bank capitalization and exposure to risk aggregated at the source country level. First, we use the measure of systemic risk SRISK developed by Brownless and Engle (2017), which shows the amount of capital that a financial institution would need to raise in order to function normally under stress. Therefore, SRISK, aggregated across banks in a given country, reflects the extent of under-capitalization of the banking sector. To reduce their SRISK, banks can raise more capital, decrease their size, or decrease their exposure to risk. Given the heterogeneous size of banking sectors, we scale SRISK by the GDP of source countries, and construct an indicator variable $\text{HighSRISK}_{rep}$ that equals one when the ratio is higher than the sample median value in a given year and zero otherwise.

Second, we use bank equity capital relative to total assets in the source country to construct an indicator variable $\text{LowCapital}_{rep}$ that equals one for countries below the sample median of equity capital in a given year and zero otherwise, based on data from Lee et al. (2020).

Third, $\text{HighHousing}_{rep}$ is an indicator variable equal to one for source countries with a higher share of residential mortgage loans in total domestic credit than the sample median, based on data from the BIS. Given that mortgage loans are more likely to have fixed rates than comparable commercial and industrial loans, we expect banks in source countries with relatively large mortgage portfolios to be more prone to reallocate lending toward foreign borrowers. As higher interest rates in more mortgage-oriented countries may reduce banks’ net interest margins and affect their capital positions, banks have an incentive to adjust their loan portfolios toward floating-rate borrowers including those located abroad (Den Haan et al., 2007).

As discussed in the introduction, the risk-shifting channel predicts that cross-border portfolio reallocation toward safety is more sensitive to the stance of domestic monetary policy for source economies with more capitalized banking sectors, as shareholders have more “skin in the game”. On the contrary, the franchise value effect predicts that portfolio reallocation toward safety is more sensitive in source countries with less capitalized banking sectors, which face lower capital costs, potentially due to lower regulatory requirements, and hence have higher franchise values. In this specification, a positive coefficient estimate for $\alpha$ would
be consistent with the portfolio rebalancing channel like in specification (2), as banks rebalance away from domestic assets and toward relatively safer foreign borrowers in response to tighter domestic monetary policy. At the same time, a positive $\beta$ estimate on the interaction between $\text{Banking} rep_{it-1}$ and $\text{Policy rate} rep_{it-1}$ would suggest that banking sectors with higher SRISK, lower capital, or more exposure to mortgage loans engage in more portfolio rebalancing, which would be consistent with the franchise value channel. On the contrary, a negative $\beta$ estimate would imply that better capitalized banks rebalance more, which is in line with the risk-shifting channel.

### 3.3 Additional tests for the cross-border portfolio channel: Risk characteristics in destination countries

The portfolio channel suggests that banks reallocate cross-border credit predominantly toward safer foreign borrowers in response to a relatively tighter monetary policy stance in the source country. Therefore, in addition to specifications (1) and (2) introduced in Section 3.1, we test whether the relationship between cross-border credit flows and domestic monetary policy depends on counterparty risk in the destination countries as follows:

$$\text{Cross-border credit flows}_{ijt} = \alpha \text{Policy rate} rep_{it-1} + \beta \text{Policy rate} rep_{it-1} \times \text{Risk cp}_{jt-1} + \gamma' X rep_{it-1} + \delta' X rep_{it-1} \times \text{Risk cp}_{jt-1} + \zeta_{jt} + \epsilon_{ijt},$$  

(4)

where $\text{Cross-border credit flows}_{ijt}$ is defined as the cross-border flows to borrowers in all sectors, to banks, or to nonbanks.

Importantly, we interact the domestic monetary policy rate in each source country $i$ with an indicator variable $\text{Risk cp}_{jt-1}$ reflecting the riskiness of foreign borrowers aggregated for each destination country $j$. Specifically, $\text{Risk cp}_{jt-1}$ is a time-varying indicator variable that takes the value of one if the destination country has a speculative-grade sovereign credit rating in a given year-quarter and zero otherwise.\(^{15}\) Alternatively, it equals one if the destination country is classified as an emerging market economy in a given year-quarter according to the International Monetary Fund’s World Economic Outlook, and zero otherwise.\(^{16}\) Thus, a negative estimate for coefficient $\beta$ on the

---

\(^{15}\) We use time-varying sovereign credit ratings from S&P Global Market Intelligence. These ratings have been shown to be a good predictor of sovereign credit risk (Reinhart (2002)). As sovereign ratings typically determine the ceiling for other debt issuers within a country (Almeida et al. (2017)), they are a good measure of overall country-credit risk.

\(^{16}\) For the classification of countries, we rely on the International Monetary Fund (2019). We adjust the allocation of countries to emerging markets in earlier years using older editions of the World Economic Outlook.
interaction term would indicate that banks reallocate cross-border credit away from foreign borrowers in countries with speculative-grade ratings or emerging market status—and toward those in countries with investment-grade or advanced economy status—during episodes of tighter domestic monetary policy, providing further evidence for the portfolio channel. The overall effect of monetary policy on cross-border flows to speculative-grade countries or countries with emerging market status is captured by the sum of $\alpha$ and $\beta$.

4. Empirical Results

To test the risk-taking channel hypotheses in an international context, consistent with our discussion in the methodology section, we begin by presenting the empirical results on the differentiated response of domestic and cross-border lending to the domestic monetary policy stance in Section 4.1. Specifically, our first hypothesis is that during episodes of relatively tighter monetary policy in source countries, global banks rebalance away from domestic credit and toward cross-border credit, as predicted by the portfolio channel. Second, in Section 4.2, we examine whether the cross-border credit reallocation is stronger for source countries with either strongly or weakly capitalized banking sectors, as predicted by the risk-shifting and the franchise value channels. Third, in Section 4.3, we examine whether a tighter stance of monetary policy prompts banks to reallocate cross-border credit toward safer foreign destinations.

4.1 Portfolio reallocation between domestic and cross-border credit

To analyze the domestic and cross-border allocation of banks’ credit portfolios, we stack the data on cross-border flows with that on domestic credit flows to nonbank borrowers. As discussed in the data section, each one of these series is calculated by taking the growth rate of the corresponding claims. With these data, we estimate specification (1), which examines whether cross-border credit flows are affected differently than domestic credit flows by a tighter monetary policy stance in source countries.

Table 2 presents the results. To capture the differential effect of the monetary policy stance on cross-border and domestic credit flows, we interact $Lagpolicyraterep$ with a Domestic indicator variable, which takes the value of one for domestic lending to nonbanks and zero for cross-border lending to nonbanks. In column 1, the positive coefficient estimate for $Lagpolicyraterep$ suggests that cross-border credit flows to nonbanks are higher when the domestic monetary policy stance is relatively tighter. Quantitatively, when the domestic monetary policy
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rate is higher by one percentage point in a given source country, the cross-border claims grow, on average, by 0.53 percentage points more. Given that the average growth of cross-border claims to nonbank borrowers is 4.68%, this result implies that the one-percentage-point higher domestic monetary policy in a given source country boosts the cross-border flows to nonbank borrowers by 11% on average, a sizeable increase.\footnote{This specification captures the average effect across monetary policies of many source countries. To address the possibility that the monetary policy rate has heterogeneous effects, in Table IA.1 of the Internet Appendix, we modify our main specification and interact the \textit{Lag policy rate rep} with a four-category indicator variable for the euro area, the United Kingdom, other countries, and the United States (the omitted group), as reporting countries. The coefficient for \textit{Lag policy rate rep} by itself shows the effect of the U.S. monetary policy on cross-border flows originated in the United States. The coefficient for \textit{Lag policy rate rep} \times \textit{Euro area} shows the incremental effect that the euro area policy rate has on flows originated in euro area countries relative to the coefficient for \textit{Lag policy rate rep}. A comparison of the estimates of monetary policies across these four groups of countries reveals that the impact of U.K. monetary policy on the growth differential between cross-border and domestic credit is even stronger than that for the United States, while the effects of the euro area and other countries’ monetary policies are virtually the same as the effect of the U.S. monetary policy rate.}

[Insert Table 2 here]

Importantly, also in column 1 of Table 2, the negative coefficient for the interaction term between the monetary policy rate and the domestic indicator suggests that domestic and cross-border lending respond differently to domestic monetary tightening. While the link between domestic monetary policy and cross-border credit flows is positive, the result suggests that domestic credit flows are significantly less sensitive to the domestic monetary policy stance. The result supports our hypothesis that banks reallocate their portfolios from domestic toward cross-border lending in response to tighter domestic monetary policy, as predicted by the bank portfolio channel in the international context.

Column 2 shows the results for specification (2), whereby the dependent variable is defined as the difference between the growth of cross-border and domestic claims on nonbank borrowers. The positive and statistically significant coefficient estimate reaffirms that banks reallocate their portfolios from domestic to cross-border lending during episodes of tighter domestic monetary policy, which is consistent with the findings in column 1.\footnote{There may be a concern about the degree of overlap between banks originating the cross-border and domestic credit. Merging the data on banks’ cross-border and domestic credit is a key strength of our paper. Doing so allows us to study the bank portfolio channel in a cross-border setting. Because the BIS data sets are aggregated at the level of lending countries, rather than at the more granular level of lending banks paired with borrowing countries, one cannot ensure a perfect overlap between the set of lending banks originating the two types of credit. It may be the case that domestic credit is originated by both small and large banks, whereas only the larger banks supply cross-border credit. In the absence of granular bank data, we construct a subsample of lending countries for which the overlap between the banks providing domestic and cross-border loans is relatively large. In Table}

Quantitatively, a one-percentage-point higher

17

18
monetary policy rate in source countries adds 0.44 percentage points to the growth differential between cross-border and domestic claims on nonbank borrowers; put differently, it boosts the average growth differential by 15%.\textsuperscript{19} To isolate the relation between credit flows and monetary policy rates, we control for the macroeconomic conditions to which the source countries’ monetary policy usually responds, such as GDP growth, inflation, and credit growth.\textsuperscript{20} While the coefficient for the lagged GDP growth is positive and statistically significant suggesting that credit grows faster during domestic economic expansions, we still find a positive link between domestic monetary policy and cross-border banking flows. Since the dependent variable in specifications (1) to (3) includes both cross-border and domestic credit, we include domestic credit growth as an explanatory variable only in specification (4) discussed later, where domestic credit is absent from the dependent variable. As noted in Section 3.1, the nominal exchange rate between source and destination countries may be an important determinant of cross-border flows. In particular, positive changes in a source country’s nominal exchange rate (reflecting bilateral appreciation for the destination country’s currency relative to the source country) are associated with more cross-border bank flows; however, the coefficient in our specification is not statistically significant.

To examine whether the relationship between monetary policy and cross-border banking flows has been stable over time, we reestimate our regression specifications in columns 1 and 2 with data before and after the GFC. As seen in columns 3 and 5, the cross-border flows became somewhat more sensitive to the source countries’ monetary policy stance in the postcrisis period, reflecting stronger reallocation. As seen from columns 4 and 6, the differential sensitivity between cross-border and domestic credit also increased postcrisis. Notice that since we rely on counterparty\(\times\)year-quarter fixed effects to control for changes in credit demand, these estimates are identified in the cross-section of source countries that have a common counterparty country in a given year-quarter.

\textsuperscript{19} From Table 1, the growth differential between cross-border and domestic claims on nonbanks is obtained as 4.675 - 1.800 = 2.875 percentage points.

\textsuperscript{20} As a robustness check, we reestimate the above specification in Table IA.3 in the Internet Appendix with the credit-to-GDP gap and output gap instead of the real GDP growth and the domestic credit growth.
4.2 Portfolio reallocation and bank capital in source countries

In the previous section, we highlighted supporting evidence showing that banks rebalance their credit portfolio toward foreign borrowers during episodes of tighter domestic monetary policy. Per the risk-taking channel, these actions could be driven by the need to insulate banks’ balance sheets from the risks posed by tighter domestic monetary conditions. In this section, we move to our second research question. Using specification (3), we examine whether the cross-border credit reallocation is stronger for source countries with either strongly or weakly capitalized banking sectors. In the risk-shifting channel, banks with low capital positions may tolerate risk when monetary policy is tight due to their limited liability and they should reallocate their portfolios toward domestic lending. While in the franchise value channel, banks with low capital may actually take less risk due to higher franchise values and reallocate their portfolios toward safer foreign jurisdictions.

Table 3 shows the results. In column 1, we use the high systemic risk indicator variable $HighRISK$ and its interaction with the $Lagpolicyrate_{rep}$. The positive coefficient for this interaction term suggests that banking sectors with larger capital shortfalls under stress rebalance their portfolios more toward foreign borrowers in response to a relatively tighter stance of domestic monetary policy, which is consistent with the franchise value channel. The effect is economically sizeable: a one-percentage-point higher domestic monetary policy adds 0.97 percentage points to the credit growth differential between cross-border and domestic nonbank borrowers in high SRISK source countries, relative to only 0.414 percentage points in low SRISK countries. Relative to the historical average, the tighter stance of monetary policy boosts the growth differential between cross-border and domestic claims by 34% for source countries with high SRISK, but only by 14% for low-SRISK source countries.

The negative coefficient for $HighRISK$ also shows that source countries with higher systemic risk in their banking sectors generally have faster-growing domestic rather than cross-border claims.

[Insert Table 3 here]

In column 2 of Table 3, we show the results using the indicator variable $LowCapital$, which takes the value of one when the source countries’ banks have an aggregate capital-to-assets ratio below the sample median.

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21 The number of observations in Table 3 is lower than that in Table 2 because of the lack of data availability for SRISK, bank capital, and housing, all of which are used to construct the three dummy variables of interest.

22 The 0.97-percentage-point addition to the growth differential for high SRISK countries is obtained by summing the coefficients for $Lagpolicyrate_{rep}$ and $Lagpolicyrate_{rep} \times HighSRISK_{rep}$. In Table 1, the average growth differential between cross-border and domestic claims on nonbanks is 2.875 percentage points. Therefore, the 0.97-percentage-point change is equivalent to a 34% increase in this growth differential.
and zero otherwise. Both qualitatively and quantitatively, the results are similar to those with \textit{HighSRISK} and consistent with the franchise value effect. When the domestic policy rate is higher by one percentage point, source countries with low bank capital originate twice the amount of extra cross-border credit relative to domestic credit than source countries with high bank capital. The tighter stance of monetary policy adds 0.88 percentage points to the credit growth differential between cross-border and domestic credit flows for source countries with low bank capital, but only 0.465 percentage points for source countries with high capital.\footnote{The number for low bank capital countries is obtained by summing the coefficients for \textit{Lagpolicyrate} and \textit{Lagpolicyrate} × \textit{LowCapital}.}

Similarly, banks in countries with larger mortgage portfolios may be more prone to tilt lending toward cross-border nonbank borrowers when domestic monetary policy is relatively tighter, for the reasons discussed in Section 3.2. In column 3 of Table 3, we interact the domestic monetary policy variable with an indicator variable reflecting a high share of housing credit for each source country. The coefficient estimate on the interacted term is positive and statistically significant, suggesting that banks from source countries with more exposure to long-term assets, such as mortgage loans, on average, rebalance more toward cross-border nonbank borrowers in response to tighter domestic monetary policy. The result is in line with the findings in Den Haan et al. (2007), where banks rebalance away from real estate loans and into commercial and industrial loans domestically as monetary policy tightens.

Overall, the results are consistent with our hypothesis that banks use their international exposures to adjust their balance sheets because of changes in macroeconomic risk. In light of our research hypotheses, our finding that portfolio rebalancing from domestic to cross-border credit is more prevalent for source countries with high capital shortfalls under stress or low bank capital, supports the franchise value channel rather than the risk-shifting channel.

4.3 Cross-border flows and counterparty risk in destination countries

The portfolio rebalancing channel suggests that banks reallocate cross-border flows predominantly toward foreign borrowers in safer destination countries in response to a relatively tighter monetary policy stance in the source country. Therefore, turning to our third research question, we test whether the relationship between cross-border credit and monetary policy depends on counterparty risk in the destination countries.

Before deploying interactions with counterparty risk characteristics, Table 4 presents simple estimates for the relationship between domestic
monetary policy and cross-border bank flows, based on specification (4) without interacted terms.\textsuperscript{24} In column 1, the dependent variable is the growth of cross-border claims on borrowers in all sectors of the recipient countries (bank, nonbank, and unallocated sectors). The coefficient for $LagPolicyRateRep$ shows that a one-percentage-point higher monetary policy rate in a given source country is associated with a 0.31-percentage-point increase in the growth of cross-border claims. Given that bank flows are 3.97\% of claims on average, this impact is economically significant, as it implies about 8\% larger flows.\textsuperscript{25} In addition, in columns 2 and 3, we split the cross-border flows into those to bank and nonbank borrowers, respectively. We find that a one-percentage-point higher monetary policy rate in the source country leads to a 0.25-percentage-point increase in the growth of cross-border claims on banks and 0.46-percentage-point increase in the growth of cross-border claims on nonbank counterparties. Once again, the impact is economically significant, as it represents 3 and 10\% larger flows, respectively. These results are consistent with those for cross-border flows to nonbank borrowers presented in Table 2.\textsuperscript{26}

To test whether the relationship between domestic monetary policy and cross-border lending depends on counterparty risk, we estimate specification (4) with interaction terms. We first assess the degree of rebalancing toward investment and speculative-grade destination countries and then, as an alternative, we also explore the rebalancing toward destination countries with advanced and emerging market economy status. We expect banks to adjust their portfolios toward investment-grade and advanced countries as monetary policy in source countries becomes relatively tighter.\textsuperscript{27}

\textsuperscript{24} We focus on the cross-border bank flows across source-destination country pairs only, while abstracting from the comparison with domestic credit. The approach has the advantage of a more comprehensive coverage of foreign borrowers in both bank and nonbank sectors than in Table 2. In contrast, a comparison of cross-border with domestic credit would narrow the analysis to nonbank borrowers only.

\textsuperscript{25} The positive relation between cross-border flows and the monetary policy rate is broadly consistent with some of the findings in Argimon et al. (2019), Auer et al. (2019), and Lindner et al. (2019), who use bank-level data for Canada, Germany, the Netherlands, Spain, and the United States to assess the effect of the international bank portfolio channel. In three of these countries, the authors find a positive and statistically significant relation between cross-border lending and the change in policy rates.

\textsuperscript{26} Given the number of euro area participants in our sample, as both reporting and counterparty countries, one may be concerned that our results are influenced by the banks in these jurisdictions. Although we include a euro area indicator variable to account for the role of the single market, there may be other unobservable traits in these countries that we are not capturing and could bias our results. In unreported results, we confirm that our findings are robust to excluding reporting countries in the euro area or reporting counterparty country pairs within the euro area.

\textsuperscript{27} This coarse split between advanced (investment-grade) and emerging (speculative-grade) countries provides a broad assessment of the ex ante risk choices faced by banks during
In Table 5, panel A, we interact the domestic monetary policy rate and all the other explanatory variables with a time-varying indicator variable Speculative grade cp, which takes the value of one if the destination country has a speculative-grade rating in a given year-quarter and zero otherwise. The coefficient for the monetary policy rate is still positive and statistically significant. However, the negative coefficient for the interaction term indicates that banks prefer to increase cross-border credit to investment-grade rather than speculative-grade destination countries during episodes of tighter monetary policy at home. The overall effect of monetary policy on cross-border flows to speculative-grade countries is captured by the sum of the coefficients for Lagpolicyrater ep and Lagpolicyrater ep × Speculative grade cp, which is reported at the bottom of panel A, see row Joint speculative grade cp and the associated t-statistic. This sum is not statistically significant for the total flows (column 1), nor for the flows to bank borrowers (column 2). The result shows that in response to relatively tighter monetary policy at home, cross-border flows to bank borrowers increase only for investment-grade destination countries, which is consistent with portfolio rebalancing. However, in the case of cross-border flows to nonbank borrowers, lenders do not seem to differentiate across investment and speculative-grade destination countries (column 3). One potential explanation for this result is that cross-border credit to nonbanks typically takes the form of syndicated loans to large multinational corporations, whose credit ratings are high and hence less sensitive to local economic conditions.

As an alternative measure of counterparty risk in destination countries, we use information on whether a country is classified as advanced or emerging market economy. Table 5, panel B, reports the results for specification (4) in which the indicator variable EME cp is interacted with each explanatory variable in the cross-border bank flows regression. Our coefficients of interest are Lagpolicyrater ep and Lagpolicyrater ep × EME cp. The positive and significant coefficient for the monetary policy measure and the negative sign on the interaction term with the EME indicator variable (except for nonbank borrowers) corroborate the previous findings that cross-border credit is reallocated their lending decisions. Some advanced economies may contain some (ex post) risky borrowers, but in the overall choice set of banks, those borrowers may be potentially safer than those in the home country of the lender.

28 These results are similar if we use median bank ratings from Moody’s Investor Services instead of sovereign ratings as our proxy for risk (unreported).

29 In unreported results, we find that most of the reallocation of credit is toward countries with A- ratings and above, while the coefficient for exposures to BBB countries and below is negative, but not statistically significantly.
to bank borrowers in safer destination countries when monetary policy in the source country is relatively tighter (see the sum of the coefficients for row JointEMEcp and the associated t-statistic). In line with the previous results, cross-border bank flows to nonbank borrowers increase regardless of their location in an advanced or emerging economy.

In these specifications, we also control for the macroeconomic conditions that likely affect domestic monetary policy in source countries. The coefficients for domestic GDP and credit growth are positive and statistically significant in several estimations (not reported). The change in exchange rate is also positive and statistically significant, suggesting that the counterparty’s currency appreciation is associated with increased cross-border flows. However, while controlling for macroeconomic conditions and exchange rates, the relationship between the source countries’ domestic monetary policy and cross-border flows is preserved and depends on counterparty risk characteristics.

Overall, these findings are consistent with the bank risk-taking channel hypothesis, in which cross-border bank credit flows toward safer borrowers when monetary policy in the domestic country is relatively tighter.

5. Robustness Checks

In this section, we provide a battery of robustness tests to determine whether our main results are robust to alternative measures of the monetary policy stance and banks’ cost of funding; to controlling for domestic economic conditions to which monetary policy usually responds; to considering different time periods separately; and to controlling for the role of global factors that may drive cross-border banking flows.

5.1 Banks’ cost of funding

The first set of robustness tests focuses on the role of banks’ funding costs and alternative measures of monetary policy on cross-border credit. We use the LIBOR-OIS spread as a proxy for banks’ cost of funding in the specification reported in Tables 2 and 4. Table 6 presents the robustness results. After controlling for the LIBOR-OIS spread in the reporting countries, the effect of monetary policy on the differential between cross-border and domestic credit flows is still positive and statistically significant (column 1). The same holds for the cross-border flows to nonbank borrowers (column 4). In both cases, the LIBOR-OIS spread has a negative and statistically significant effect on the flows or the flows differential to nonbank borrowers, suggesting that
higher funding costs for banks in source countries lead to less cross-border rebalancing and cross-border flows. The result is consistent with Giannetti and Laeven (2012), who use the LIBOR-OIS spread as a proxy for bank funding costs to study how funding conditions in the global banks’ countries of origin affect the relative amount of domestic and foreign syndicated loans originated by these banks. While the role of funding costs is consistent with the existing literature, we provide evidence for a cross-border risk-taking channel.

[Insert Table 6 here]

5.2 Macroeconomic conditions in source countries

One concern is that our results could be affected by the endogeneity of monetary policy and economic activity in the reporting country, as they evolve simultaneously. Cross-border bank flows may be driven by domestic economic conditions rather than monetary policy in source countries, that is, cross-border credit could expand during economic booms regardless of monetary policy. In our main results, we address this concern to some extent by controlling for domestic real GDP growth, credit growth, and inflation in addition to several indicator variables that should capture any differences in average economic conditions across countries.

In a further attempt to isolate the effect of monetary policy from that of domestic economic conditions, we use the euro area as an empirical setup for our next robustness test. The ECB conducts its monetary policy to be consistent with overall euro area conditions (Maddaloni and Peydró, 2011). However, macroeconomic and financial conditions are likely to vary across individual countries within the euro area. We exploit this divergence between overall euro area conditions and individual country conditions to assess whether our monetary policy proxy is relevant for banks’ global portfolio positions. In principle, if our results were driven mostly by macroeconomic conditions, we would expect the coefficient for the monetary policy proxy to be insignificant for euro area countries.

In Table 7, we interact Euroarea, an indicator variable equal to one for euro area countries, with the main regressors and the same set of control variables as in Tables 2 and 4. Our focus is on the interaction term, Lagpolicyrate × Euroarea. Column 1 shows the results for the growth differential between cross-border and domestic claims to nonbanks, and columns 3–5 show the results for cross-border flows to all sectors, to banks, and to nonbanks. In each case, the coefficient for the monetary policy rate is positive and statistically significant; for the growth differential, the magnitude is statistically significantly larger for the euro area than for non-euro-area source countries, as shown by the
sum of coefficients at the bottom of the table, which strengthens our main result (the \( t \)-statistics are reported below the sum).

[Insert Table 7 here]

Since monetary policy decisions in the euro area could be more synchronized with domestic economic conditions in France and Germany than in other euro area countries, we conduct a stricter experiment by excluding France and Germany from the sample of source countries. The results presented in column 2 for the growth differential of cross-border and domestic claims, and in columns 6–8 for cross-border flows, show that the estimates on the interaction term \((\text{Lag policy rate rep} \times \text{Euroarea rep})\) are even larger than those for the full set of euro area countries, which strengthens our main results about the link between monetary policy and cross-border flows. The relation that we find between monetary policy and banks' portfolio allocations appears to be, to some extent, independent from the endogenous component of monetary policy related to economic conditions.

In a second robustness test, we examine whether the relation between monetary policy and cross-border bank lending varies with economic conditions, as captured by relatively prolonged periods of high- and low-GDP growth in source countries. Figure IA.1 in the Internet Appendix shows that the policy rate is similarly distributed across high- and low-GDP growth regimes in source countries, suggesting that the effect of monetary policy may be independent from that of domestic economic conditions in our sample. In Table IA.4 in the Internet Appendix, we formally test whether the role of domestic monetary policy varies across high- and low-GDP growth regimes in source countries, using a specification similar to that in equation (4), except that the regressors are interacted with \( \text{High GDP growth rep} \), that is, an indicator variable that equals one if the quarterly GDP growth in a reporting country is higher than the sample median in a given period. The coefficient for the interaction term is relatively small in magnitude and not statistically significant, suggesting that the effect of monetary policy does not depend on the GDP growth regime in source countries.

Similarly, we check whether the relation between monetary policy and cross-border flows varies across episodes of bilateral currency appreciation and depreciation in source relative to destination countries. With this test, we address potential concerns that the cross-border bank flows may be driven by exchange rate movements rather than domestic monetary policy (Kearns and Patel, 2016). In Table IA.5 in the Internet Appendix, the lack of statistical significance on the interaction term between the domestic monetary policy rate and \( \text{Appreciation} \), that is, an indicator variable that equals one if the destination currency appreciates relative to the source in a given quarter, suggests that the link between monetary policy and cross-border bank flows does not
depend on exchange rate developments. Figure IA.2 in the Internet Appendix reinforces this finding. The figure shows that the distribution of monetary policy rates is similar during bilateral appreciation and depreciation episodes.

Overall, using three different robustness tests, we find that the effect of monetary policy on cross-border bank flows documented in our main results is not driven by domestic economic conditions in source countries.

5.3 Results for the pre- and post-GFC periods and results using shadow rates

Given the new environment faced by banks since the GFC, characterized by elevated global uncertainty, unconventional monetary policy, and new regulatory requirements, we test whether the results from Table 4 are preserved when the pre- and post-GFC periods are considered separately. In Table 8, the coefficient for the monetary policy rate is positive and statistically significant for all three types of cross-border bank flows during the pre-GFC period (shown in columns 1–3), but not during the post-GFC period (in columns 4–6). However, with monetary policy rates having persisted near the effective lower bound in the postcrisis period, we also use as an alternative measure of monetary policy, a shadow interest rate based on a two-factor model of sovereign yields (Krippner, 2013). This measure allows us to capture the stance of monetary policy at the effective lower bound for the euro area, Japan, the United Kingdom, and the United States. As shown in columns 7–9, the positive effect on cross-border credit is preserved, although it is statistically significant only for flows to nonbank counterparties. Besides the low rate environment persistent in the postcrisis period, the relatively shorter sample also decreases the power of our tests, weakening the estimated relation between the variables of interest. The weaker evidence for the post-GFC period, a period with more unconventional monetary policies, is consistent with the case studies covered in the IBRN initiative on monetary policy transmission (Argimon et al., 2019; Auer et al., 2019; Lindner et al., 2019).

Interestingly, the negative effect of the government debt-to-GDP ratio on cross-border flows is present only for the post-GFC period, when sovereign risk increased for several reporting countries. Also, euro area countries had lower cross-border bank flows in the post-GFC period than in the rest of the sample, which is not surprising given the impact of the euro area sovereign debt crisis and its effects on banks in the region.

Overall, the relation between the relative stance of monetary policy across countries and cross-border bank flows is positive and significant, especially in the pre-GFC period. Although weaker, it still manifests
itself when using alternative measures of the monetary policy stance for the post-GFC period.

5.4 Global and country-specific factors

As noted previously, Miranda-Agrippino and Rey (2015) and Rey (2013) argue that cross-border flows are largely driven by a global factor, which in turn can be related to the stance of U.S. monetary policy. Bruno and Shin (2015b) also find that U.S. monetary policy, the dollar exchange rate, and global risk aversion are key drivers of cross-border bank flows, as local banks borrow in U.S. dollars from global banks, which in turn can access wholesale U.S. dollar financing in financial centers. To test whether the role of monetary policy in individual source countries is robust to a global factor as a simultaneous driver of cross-border banking flows, we use the following specification:

\[ \text{Cross-border credit flows}_{ijt} = \alpha \text{Policy rate}_{rep} - 1 + \theta \text{Policy rate}_{cp} - 1 + \beta' X_{rep} - 1 + \mu' Y_{cp} - 1 + \gamma_{ij} + \phi_t + \epsilon_{ijt}, \]

in which the dependent variable measures cross-border banking flows to all sectors, to banks, and to nonbanks. This setup allows to separately identify the roles of “push” factors from multiple source countries, \( X_{rep} - 1 \), from that of “pull” factors from destination countries, \( Y_{cp} - 1 \), and also from a time-varying global factor.\(^{30}\) To this end, we include the same set of controls for destination countries and for source countries. In addition, we use the reporting-counterparty country pair fixed effects \( \gamma_{ij} \) to control for unobserved factors at the country pair level, which replace the counterparty \( \times \) year-quarter fixed effects used in our earlier specifications. To control for the unobserved global factor, we use the year-quarter fixed effects \( \phi_t \); alternatively, we include the \( \ln VIX \) among the explanatory variables, since it has been used by several studies as a proxy for global liquidity and financial conditions (Bekaert et al., 2013; Miranda-Agrippino and Rey, 2015).\(^{31}\)

Thus, specification (5) allows us to nest our results within those proposed in the global factors studies. We conjecture that if the global factor were the driver of both banking flows and monetary policy in the source countries, the effect of monetary policy in individual source countries would vanish when the global factor is taken into account. On the contrary, if monetary policy in source countries remains an

\(^{30}\) Calvo et al. (1996) emphasize the importance of external push factors in explaining capital flows to emerging economies in the 1990s.

\(^{31}\) Instead of year-quarter fixed effects, we use year fixed effects with \( \ln VIX \) as an additional control.
important driver while accounting for the global factor, the finding would reinforce our main results. This would explain the patterns in Figure 1, where the composition of the sources of cross-border bank credit appear to vary over time only with a loose relation to the overall amount of cross-border banking flows.

In Table 9, columns 1–3, we estimate specification (5) with reporting-counterparty and year-quarter fixed effects. Taking into account time-invariant effects within the reporting-counterparty country pairs, the additional year-quarter fixed effects control for the quarterly global factor. In columns 1 and 2, the coefficient for the policy rate in reporting countries is positive and statistically significant, while the policy rate coefficient for the counterparty countries is negative and statistically significant, suggesting that banks reallocate cross-border credit away from source countries with relatively tighter monetary policy toward destination countries with relatively easier monetary policy. Columns 4 to 6 show similar results with \( \ln VIX \) having a negative overall impact on cross-border flows. In columns 7–9, the monetary policy differential of the destination and source country pair enters with a positive coefficient, which is consistent with the results in columns 1 to 3. Among the other control variables, the lagged GDP growth in the destination country appears as an important pull factor in driving the cross-border banking flows. The lagged domestic credit growth from both source and destination countries affect cross-border flows positively. A high level of the domestic sovereign debt to GDP ratio in destination countries appears to deter cross-border credit flows to nonbank borrowers. Finally, cross-border flows are higher during QE episodes in source countries, as QE allows banks to expand their balance sheets and hence their cross-border credit.

These results suggest that the impact of domestic monetary policy in individual source and destination countries on cross-border bank flows remains important even after controlling for the role of global factors.\(^{32}\)

These estimates also allow us to assess quantitatively the relative importance of global factors, such as the VIX, compared to local factors, such as the domestic monetary policies of source or destination countries. One key question is to what extent the local factors can mitigate the effect of global factors, that is, what is the strength of the substitution effect. Specifically, using the results in column 4 of Table 9, we find that a one-standard-deviation higher \( \ln VIX \) implies 1.7-percentage-point slower growth of cross-border claims between country pairs. Relative

\(^{32}\) Ahmed and Zlate (2014) also show that global factors, such as U.S. monetary policy, do not deter or detract from the importance of country-specific determinants of cross-border portfolio flows, such as the monetary policy in recipient countries.
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to the average growth of claims, the higher $\ln VIX$ lowers the country pair bank flows by about 40%.

However, the local factors may be able to partly offset the negative effect of global factors on bank flows. For example, source countries that are more resilient to global financial stress could maintain a tighter monetary policy. As a result, a one-standard-deviation higher monetary policy rate in source countries implies a faster growth of cross-border claims by about 0.5 percentage points. Thus, the tighter monetary policy in source countries may offset up to one-third of the decline in bank flows associated with the higher VIX.

As another mitigating factor, destination countries may be able to ease monetary policy—thus strengthening the balance sheets of their domestic borrowers—when global factors dampen bank inflows. Our results suggest that a one-standard-deviation lower monetary policy rate in destination countries coincides with a 0.71-percentage-point faster growth in claims on that destination country. This effect offsets an additional two-fifths of the decline in bank flows caused by the higher VIX.

One important caveat to this analysis is that the local factors may be endogenous to the global ones, which would constrain the ability of local factors to lean against the global factors. Thus, to the extent that source countries are forced to ease monetary policy in response to global financial stress, or to the extent that recipient countries are constrained from easing because of concerns about exchange rate depreciation (Ahmed and Zlate, 2014), the local factors would be less able to offset the global factor. This constraint may be less binding if the global factor represents U.S. monetary policy tightening, in which case the source countries’ monetary policy could be aligned with the global factor. However, the local factors may be less able to offset a spike in global risk aversion, when source and destination countries alike may be forced to ease monetary policy.

Finally, we obtain similar results when we use the change in the broad dollar index as a global factor instead of the VIX in specification (5). Table IA.6 in the Internet Appendix shows the results. While episodes of broad dollar appreciation coincide with reduced cross-border flows like in Bruno and Shin (2015a), the coefficients for the monetary policy

33 The 1.7-percentage-point magnitude is obtained as $0.35 \times (-4.95) = -1.71$ percentage points. Relative to the average growth of claims of 3.97%, the value implies the flows are lower by 43%.

34 Based on Table 1 and the results in Table 9, column 4, the values are obtained as $0.198 \times 2.46 = 0.49$ percentage point, which is roughly one-third of the slowdown in credit growth caused by the spike in $\ln VIX$, that is, -1.71 percentage points of the average growth in claims.

35 The value is obtained as $-0.096 \times 7.439 = 0.71$ percentage point, which is 42% of the -1.71 percentage points slowdown in the average growth of claims caused by VIX.
stance in individual source and destination countries are consistent with a cross-border risk-taking channel. Our main results also hold when we distinguish by the currency denomination of cross-border flows and control for the monetary policy of each currency area as a global factor, like in Takats and Temesvary (2020).\textsuperscript{36}

6. Conclusion

The rapid expansion of cross-border bank flows over the past three decades have made it critical to understand the main drivers of these international transactions. Our paper focuses on the role of the monetary policy stance from multiple source countries as a driver of banks’ global credit portfolio allocation. In particular, our study provides evidence in favor of a cross-border risk-taking channel, which complements the growing evidence of a bank lending channel in the international context.

We use information from the BIS LBS, as well as a novel data set with information on banks’ claims on the domestic nonbank sector. The dyadic structure of these data allows us to control for factors affecting the demand for cross-border bank flows, which helps to identify the effect of domestic monetary policy in multiple individual source countries on the supply of cross-border credit.

Our paper provides three main results. First, a relatively tighter monetary policy in source countries is associated with cross-border bank portfolio rebalancing toward relatively safer foreign borrowers, whereby cross-border credit grows faster than domestic credit. Second, the extent of cross-border rebalancing depends on bank capitalization in source economies: rebalancing is more prevalent for banks from source countries with lower-capitalized banking sectors, which provides empirical support to a franchise value rather than a risk-shifting effect. Third, banks reallocate credit mainly toward foreign borrowers in safer economies, such as advanced economies or economies with investment-grade ratings.

Our results have a number of policy implications for source and destination countries. Based on our results, policymakers from source countries should be aware that domestic monetary policy decisions may lead to a change in banks’ cross-border credit portfolios. This has implications for the conduct of monetary policy and for financial stability. As monetary policy in the country becomes tighter, banks may have an incentive to diversify to foreign jurisdictions. This may reinforce the effect of the change in the monetary policy stance on domestic credit availability. From a financial stability perspective, bank supervisors may have to monitor the adjustment of banks portfolios toward foreign economies.

\textsuperscript{36} Tables IA.7 and IA.8 of the Internet Appendix report the results.
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exposures. However, based on our results, we would expect banks to focus on relatively “safer” counterparties.

From the receiving countries’ perspective, to the extent that an economy relies on foreign credit, policy makers should pay attention to the monetary policy developments of source countries beyond the traditional global factors. As the relative monetary stance of some countries becomes tighter, their banks may supply credit to other jurisdictions, potentially increasing the availability of credit in those countries.

Our paper also leaves a number of open research questions, such as whether recipient countries can effectively impose barriers on cross-border flows when additional credit may not be desirable, and whether unconventional monetary policy and negative rates lead to cross-border portfolio reallocations away or toward the source country implementing such policies. The latter question is becoming more salient, as recent studies have shown the increasing importance of cross-border market financing, as opposed to cross-border bank financing, in the post-GFC period (Avdjiev et al., 2020; Bruno and Shin, 2017).

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The figure reports quarterly data between 1995:Q1 and 2014:Q1 for countries that report cross-border bank claims to the Bank for International Settlements for the entire sample period. The bars represent the quarterly exchange rate and break-adjusted cross-border flows for reporting countries aggregated into four regions: the United States, the euro area, other advanced economies, and emerging markets. The euro area comprises Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, and Spain. Other advanced economies include Canada, Denmark, Japan, Norway, Sweden, Switzerland, and the United Kingdom. Lastly, the emerging markets group is made up of Hong Kong and Singapore. The black line represents the effective federal funds rate.
### Table 1

#### Summary statistics

|                                | Mean  | SD    | 25th  | 50th  | 75th  |
|--------------------------------|-------|-------|-------|-------|-------|
| **All sample countries**       |       |       |       |       |       |
| Credit flows, domestic and cross-border (%) | 4.539 | 26.306 | -6.605 | 0.653 | 9.998 |
| Cross-border credit flows: All sectors (%) | 3.971 | 24.034 | -7.587 | 0.837 | 11.089 |
| Cross-border credit flows: Banks (%) | 8.877 | 46.754 | -12.616 | 0.495 | 16.955 |
| Cross-border credit flows: Nonbanks (%) | 4.675 | 26.757 | -6.872 | 0.545 | 10.378 |
| Domestic credit flows to nonbanks (%) | 1.800 | 3.395 | 0.324 | 1.504 | 2.841 |
| Credit growth diff., cross-border vs. domestic (pp) | 3.068 | 26.089 | -8.047 | -0.222 | 8.673 |
| **Reporting countries (rep)**  |       |       |       |       |       |
| Bank equity returns rep (% yoy) | 2.523 | 17.283 | -5.335 | 3.016 | 11.082 |
| Capital/assets rep (%)         | 6.095 | 2.441 | 4.386 | 5.767 | 7.434 |
| Credit growth rep (% yoy)      | 7.814 | 12.802 | -0.66 | 6.635 | 15.186 |
| Debt/GDP rep (%)               | 69.246 | 39.931 | 46.52 | 63.32 | 82.65 |
| EME rep                        | 0.063 | 0.243 | 0     | 0     | 0     |
| Euro area rep                  | 0.447 | 0.497 | 0     | 0     | 1     |
| High Housing rep               | 0.613 | 0.487 | 0     | 1     | 1     |
| High SRISK rep                 | 0.592 | 0.491 | 0     | 1     | 1     |
| Housing/GDP rep                | 0.448 | 0.246 | 0.244 | 0.413 | 0.627 |
| Financial center rep           | 0.19  | 0.392 | 0     | 0     | 0     |
| Inflation rep (% yoy)          | 0.523 | 0.613 | 0.198 | 0.481 | 0.801 |
| Low capital rep                | 0.388 | 0.487 | 0     | 1     | 1     |
| QER indicator rep              | 0.057 | 0.233 | 0     | 0     | 0     |
| Policy rate rep (%)            | 2.796 | 2.46  | 1     | 2.5   | 4     |
| Shadow policy rate rep (%)     | 2.321 | 3.023 | 0.440 | 1.451 | 3.920 |
| Real GDP growth rep (% yoy)    | 0.522 | 1.023 | 0.089 | 0.569 | 1.012 |
| SRISK/GDP rep                  | 0.051 | 0.052 | 0.008 | 0.037 | 0.08  |
| **Counterparty countries (cp)**|       |       |       |       |       |
| Bank equity returns cp (% yoy) | 3.522 | 19.204 | -5.426 | 3.173 | 12.232 |
| Credit growth cp (% yoy)       | 9.89  | 14.838 | 0.594 | 8.389 | 18.303 |
| Debt/GDP cp (%)                | 56.244 | 35.659 | 33.88 | 48.18 | 72.32 |
| EME cp                         | 0.558 | 0.497 | 0     | 1     | 1     |
| Inflation cp (% yoy)           | 1.099 | 4.747 | 0.244 | 0.659 | 1.248 |
| Policy rate cp (%)             | 5.207 | 7.439 | 1.83  | 3.69  | 6.03  |
| Real GDP growth cp (% yoy)     | 0.72  | 1.388 | 0.118 | 0.752 | 1.391 |
| Speculative-grade cp           | 0.208 | 0.406 | 0     | 0     | 0     |
| **Other variables**            |       |       |       |       |       |
| Exchange rate pct. change (% yoy) | 1.154 | 9.237 | -3.351 | 0     | 5.228 |
| LIBOR-OIS spread rep           | 0.169 | 0.343 | 0.600 | 0.080 | 0.250 |
| ln(VIX)                        | 3.027 | 3.455 | 2.761 | 3.065 | 3.354 |
| Policy rate differential (pp)  | -2.443 | 7.657 | -3.75 | -0.75 | 0.25  |
| U.S. policy rate (%)           | 2.799 | 2.279 | 0.19  | 2.12  | 5.25  |

This table reports summary statistics for the main dependent variables, as well as for the explanatory variables in reporting (source) and counterparty (destination) countries. The sample period is from 1995:Q1 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables.
### Table 2: Portfolio reallocation between domestic and cross-border credit

|                                | Full sample | Pre-GFC (until 2007:Q2) | Post-GFC (2009:Q3 onward) |
|--------------------------------|-------------|-------------------------|----------------------------|
|                                | (1)         | (2)                     | (3)                        |
| Credit flows, domestic and     |             |                         |                            |
| cross-border                   |             |                         |                            |
| Credit growth diff., domestic  |             |                         |                            |
| vs. cross-border               |             |                         |                            |
| Credit flows, domestic and     |             |                         |                            |
| cross-border                   |             |                         |                            |
| Credit growth diff., domestic  |             |                         |                            |
| vs. cross-border               |             |                         |                            |
| Lag policy rate rep            | 0.527***    | 0.440***                | 0.548**                    |
|                                | [0.128]     | [0.113]                 | [0.199]                    |
| Lag policy rate × Domestic     | -0.398***   | -0.471**                | -0.372                     |
|                                | [0.097]     | [0.181]                 | [0.254]                    |
| Domestic                       | -2.266**    | -3.269***               | -1.264*                    |
|                                | [0.431]     | [0.631]                 | [0.679]                    |
| Lag bank equity returns rep    | -0.011      | -0.020**                | -0.007                     |
|                                | [0.010]     | [0.009]                 | [0.015]                    |
| Lag real GDP growth rep        | 0.479**     | 0.307                   | -0.143                     |
|                                | [0.184]     | [0.220]                 | [0.267]                    |
| Lag debt/GDP rep               | -0.003      | 0.005                   | 0.019**                    |
|                                | [0.005]     | [0.006]                 | [0.007]                    |
| Lag inflation rep              | 0.046       | -0.079                  | 0.221                      |
|                                | [0.121]     | [0.120]                 | [0.136]                    |
| Exchange rate pct. change      | 0.020       | 0.043                   | 0.011                      |
|                                | [0.023]     | [0.029]                 | [0.039]                    |
| Financial center rep           | -1.386      | -1.172                  | -1.573*                    |
|                                | [0.906]     | [0.979]                 | [0.771]                    |
| Euro area rep                  | -1.660***   | -1.378***               | -1.581**                   |
|                                | [0.541]     | [0.464]                 | [0.612]                    |
| QE indicator rep               | 1.215       | 1.060                   | 1.241                      |
|                                | [0.874]     | [1.174]                 | [0.776]                    |
| EME rep                        | -0.983      | -0.895                  | 0.133                      |
|                                | [0.988]     | [0.979]                 | [1.326]                    |

The dependent variable in columns 1, 3, and 5 combines the domestic and cross-border credit flows to nonbank borrowers. The dependent variable in columns 2, 4, and 6 is the credit growth differential between cross-border and domestic nonbank borrowers. Domestic is an indicator variable that equals one for domestic credit and zero for cross-border credit. The sample period in columns 1 and 2 is from 1995:Q1 to 2014:Q2, from 1995:Q1 to 2007:Q2 in columns 3 and 4, and from 2009:Q3 to 2014:Q2 in columns 5 and 6. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p <.1; **p <.05; ***p <.01.
The dependent variable is the credit growth differential between cross-border and domestic nonbank borrowers. *HighSRISK rep* is an indicator variable that takes the value of one for values higher than the median value in a given year, and zero otherwise. *Low capital rep* is an indicator variable that takes the value of one for values lower than the median Tier 1 capital ratio in a given year, and zero otherwise. *High housing rep* is an indicator variable that takes the value of one for values higher than the median share of housing credit in GDP in a given year, and zero otherwise. The sample period is from 1995:Q1 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p < .1; **p < .05; ***p < .01.

## Table 3
Cross-border portfolio reallocation and bank capital in source countries

| Credit growth differential, cross-border vs. domestic | (1)       | (2)       | (3)       |
|------------------------------------------------------|-----------|-----------|-----------|
| Lag policy rate rep                                  | 0.414***  | 0.465***  | 0.359**   |
|                                                      | [0.100]   | [0.112]   | [0.130]   |
| High SRISK rep                                       | -2.365*** |           |           |
|                                                      | [0.694]   |           |           |
| Lag policy rate × High SRISK rep                     | 0.556**   |           |           |
|                                                      | [0.252]   |           |           |
| Low capital rep                                      | -1.118**  |           |           |
|                                                      | [0.432]   |           |           |
| Lag policy rate × Low capital rep                    | 0.415**   |           |           |
|                                                      | [0.169]   |           |           |
| High Housing rep                                     | -0.949*   |           |           |
|                                                      | [0.549]   |           |           |
| Lag policy rate × High housing rep                   | 0.314*    |           |           |
|                                                      | [0.175]   |           |           |
| Lag bank equity returns rep                          | -0.024**  | -0.025**  | -0.014**  |
|                                                      | [0.011]   | [0.009]   | [0.006]   |
| Lag real GDP growth rep                              | 0.264     | 0.311     | 0.171     |
|                                                      | [0.241]   | [0.228]   | [0.163]   |
| Lag debt/GDP rep                                     | 0.008     | 0.010*    | 0.005     |
|                                                      | [0.005]   | [0.006]   | [0.006]   |
| Lag inflation rep                                    | -0.138    | -0.108    | -0.106    |
|                                                      | [0.117]   | [0.116]   | [0.074]   |
| Exchange rate pct. change                           | 0.043     | 0.064*    | 0.013     |
|                                                      | [0.034]   | [0.032]   | [0.025]   |
| Financial center rep                                | -1.517**  | -1.313*   | -0.929    |
|                                                      | [0.579]   | [0.741]   | [0.808]   |
| Euro area rep                                        | -1.687*** | -1.600*** | -1.357*** |
|                                                      | [0.419]   | [0.432]   | [0.464]   |
| QE indicator rep                                     | 1.388     | 1.332     | 1.479     |
|                                                      | [0.917]   | [1.292]   | [0.952]   |
| EME rep                                              | -1.395*   | -1.154    | 0.609     |
|                                                      | [0.819]   | [0.917]   | [1.269]   |

Counterparty × Year-quarter FE: Yes Yes Yes

Observations: 53,644 61,378 51,098

R²: .10 .13 .13

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### Table 4
Cross-border credit flows and monetary policy in source countries

|                                | Cross-border credit flows to |           |           |           |
|--------------------------------|-----------------------------|-----------|-----------|-----------|
|                                | All sectors | Banks       | Nonbanks  |           |
| Lag policy rate rep            | 0.312***   | 0.252**     | 0.463***  |           |
|                                | [0.083]     | [0.093]     | [0.132]   |           |
| Lag credit growth rep          | 0.058*     | 0.086*      | 0.060*    |           |
|                                | [0.029]     | [0.050]     | [0.031]   |           |
| Lag bank equity returns rep    | -0.005      | -0.000      | -0.013    |           |
|                                | [0.011]     | [0.021]     | [0.010]   |           |
| Lag real GDP growth rep        | 0.262**    | 0.175       | 0.399**   |           |
|                                | [0.111]     | [0.249]     | [0.170]   |           |
| Lag debt/GDP rep               | -0.006     | -0.023***   | -0.004    |           |
|                                | [0.004]     | [0.008]     | [0.006]   |           |
| Lag inflation rep              | -0.028     | 0.802       | 0.051     |           |
|                                | [0.305]     | [0.603]     | [0.205]   |           |
| Exchange rate pct. change      | -0.012     | 0.015       | -0.013    |           |
|                                | [0.026]     | [0.046]     | [0.031]   |           |
| Financial center rep           | -1.301*    | -3.602***   | -1.530*   |           |
|                                | [0.677]     | [0.989]     | [0.818]   |           |
| Euro area rep                  | -1.093**   | -1.705*     | -1.695*** |           |
|                                | [0.397]     | [0.980]     | [0.538]   |           |
| QE indicator rep               | 1.542***   | 1.299       | 1.609*    |           |
|                                | [0.460]     | [1.076]     | [0.915]   |           |
| EME rep                        | 0.221      | 1.479       | 0.278     |           |
|                                | [0.992]     | [1.655]     | [1.154]   |           |

| Counterparty × Year-quarter FE | Yes | Yes | Yes |
|--------------------------------|-----|-----|-----|
| Observations                   | 68,403 | 66,170 | 67,018 |
| $R^2$                          | 12 | 12 | 11 |

The dependent variable is the cross-border credit flows to borrowers in all sectors, to banks, or to nonbanks. The sample period is from 1995:Q1 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *$p < .1$; **$p < .05$; ***$p < .01$. 

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Table 5
Cross-border credit flows and counterparty risk in destination countries

| Cross-border credit flows to All sectors | Banks | Nonbanks |
|-----------------------------------------|-------|---------|
|                                         | (1)   | (2)     | (3)     |

### A. Speculative-grade counterparties

| Lag policy rate rep | 0.352*** | 0.413*** | 0.354** |
|---------------------|----------|----------|---------|
|                     | [0.072]  | [0.065]  | [0.160] |
| Lag policy rate rep × Spec.-grade cp | -0.277** | -0.545** | 0.049   |
|                     | [0.133]  | [0.243]  | [0.203] |
| Joint speculative grade cp | 0.0751   | -0.132   | 0.403   |
| t-statistic         | 0.477    | -0.487   | 2.782   |
| Controls rep        | Yes      | Yes      | Yes     |
| Controls rep × Spec.-grade cp | Yes      | Yes      | Yes     |
| Counterparty × Year-quarter FE | Yes      | Yes      | Yes     |
| Observations        | 68,403   | 66,170   | 67,018  |
| R²                   | .11      | .11      | .10     |

### B. Emerging market counterparties

| Lag policy rate rep | 0.375*** | 0.492*** | 0.275* |
|---------------------|----------|----------|--------|
|                     | [0.072]  | [0.063]  | [0.160]|
| Lag policy rate rep × EME cp | -0.257* | -0.682** | 0.258  |
|                     | [0.129]  | [0.281]  | [0.255]|
| Joint EME cp        | 0.118    | -0.190   | 0.533  |
| t-statistic         | 0.690    | -0.731   | 2.840  |
| Controls rep        | Yes      | Yes      | Yes    |
| Controls rep × EME cp | Yes      | Yes      | Yes    |
| Counterparty × Year-quarter FE | Yes      | Yes      | Yes    |
| Observations        | 68,403   | 66,170   | 67,018 |
| R²                   | .12      | .12      | .11    |

The dependent variable is the cross-border credit flows to borrowers in all sectors, banks, and nonbanks. The indicator variables Speculative-grade cp and EME cp equal one if the counterparty country has a non-investment-grade rating and EME status, respectively, in a given year-quarter. The sum of the coefficients for Lagpolicyrate rep and Lagpolicyrate rep × Speculative-grade cp is reported as Joint speculative grade cp with the corresponding t-statistic. The sum of coefficients for Lagpolicyrate rep and Lagpolicyrate rep × EME cp is reported as Joint EME cp. The sample period is from 1995:Q1 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p < .1; **p < .05; ***p < .01.
## Table 6
Cross-border credit flows and banks’ cost of funding

| Credit growth diff., cross-border vs. domestic | Cross-border credit flows to All sectors | Banks | Nonbanks |
|-----------------------------------------------|----------------------------------------|-------|---------|
| Lag policy rate rep                           | 0.402**                                | 0.275** | 0.145 | 0.340* |
|                                              | [0.192]                                | [0.125] | [0.229] | [0.168] |
| Lag LIBOR-OIS rep                             | -0.968*                                | -0.495 | -0.986 | -0.724* |
|                                              | [0.532]                                | [0.416] | [0.736] | [0.369] |
| Lag credit growth rep                         | 0.046                                  | 0.062 | 0.060 |
|                                              | [0.029]                                | [0.052] | [0.036] |
| Lag bank equity returns rep                   | -0.027**                               | -0.803 | 0.003 | -0.025** |
|                                              | [0.010]                                | [0.023] | [0.010] |
| Lag real GDP growth rep                       | 0.381                                  | 0.374** | 0.172 | 0.462** |
|                                              | [0.274]                                | [0.126] | [0.234] | [0.194] |
| Lag debt/GDP rep                              | 0.009                                  | -0.004 | -0.021** | -0.005 |
|                                              | [0.008]                                | [0.005] | [0.009] | [0.007] |
| Lag inflation rep                             | 0.005                                  | 0.104 | 0.975 | 0.534 |
|                                              | [0.104]                                | [0.272] | [0.640] | [0.455] |
| Exchange rate                                 | 0.037                                  | -0.000 | 0.038 | -0.038 |
|                                              | [0.035]                                | [0.028] | [0.047] | [0.040] |
| Financial center                              | -0.977                                 | -1.026 | -1.154** | -1.420* |
|                                              | [0.948]                                | [0.635] | [1.048] | [0.813] |
| Euro area rep                                 | -1.221**                               | -0.832* | -1.365 | -1.600*** |
|                                              | [0.572]                                | [0.424] | [1.028] | [0.564] |
| QE indicator rep                              | 0.973                                  | 1.378** | 1.077 | 1.696 |
|                                              | [1.242]                                | [0.494] | [1.019] | [1.009] |
| EME rep                                       | -0.618                                 | 0.296 | 2.670 | 0.966 |
|                                              | [2.196]                                | [0.962] | [2.543] | [1.555] |

| Counterparty × Year-quarter FE | Yes | Yes | Yes | Yes |
|-------------------------------|-----|-----|-----|-----|
| Observations                 | 58,123 | 59,720 | 57,660 | 56,786 |
| $R^2$                         | .12 | .13 | .13 | .13 |

The dependent variable in column 1 is the credit growth differential between cross-border and domestic nonbank borrowers. The dependent variable in columns 2 to 4 is the cross-border credit flows to borrowers in all sectors, to banks, or to nonbanks. The sample period is from 1995:Q1 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p < .1; **p < .05; ***p < .01.
Table 7: Cross-border credit flows and monetary policy in euro area source countries

|                  | Full sample | Excl. FR, GE | Full sample | Excl. FR, GE |
|------------------|-------------|--------------|-------------|--------------|
|                  | Credit gr. diff., cross-border vs. domestic | Credit gr. diff., cross-border vs. domestic | Cross-border credit flows to all sectors | Cross-border credit flows to nonbanks |
| Lag policy rate rep | 0.382*** [0.113] | 0.411*** [0.114] | 0.257*** [0.069] | 0.308*** [0.074] |
|                  | Lag policy rate rep × Euro area rep | 0.719*** [0.280] | 0.290 [0.186] | 0.451 [0.202] |
|                  | Joint Euro area rep | 0.719 [0.303] | 0.594 [0.281] | 0.369 [0.364] |
|                  | t-statistic | 2.572 | 2.805 | 2.297 |
| Controls rep | Yes | Yes | Yes | Yes |
| Controls rep × Euro area rep | Yes | Yes | Yes | Yes |
| Counterparty × Year-quarter FE | Yes | Yes | Yes | Yes |
| Observations | 65,202 | 55,129 | 68,403 | 56,067 |
| R² | .11 | .12 | .12 | .13 | .12

The dependent variable in columns 1 and 2 is the credit growth differential between cross-border and domestic nonbank borrowers. The dependent variable in columns 3 to 8 is the cross-border credit flows to borrowers in all sectors, to banks, or to nonbanks. Euro area rep takes the value of one for Euro area reporting countries and zero otherwise. Joint Euro area rep is the sum of coefficients for Lag policy rate rep and Lag policy rate rep × Euro area rep. The sample period is from 1995:Q1 to 2014:Q2. The sample in columns 1 and 3–5 includes all reporting and counterparty countries listed in Table A1 in the appendix. The sample in columns 2 and 6–8 excludes Germany and France as reporting countries. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p < .1; **p < .05; ***p < .01.
Table 8: Cross-border credit flows in the pre- and post-GFC periods

|                      | Pre-GFC (until 2007:Q2) | Post-GFC (2009:Q3 onward) | Post-GFC (2009:Q3 onward) |
|----------------------|-------------------------|---------------------------|---------------------------|
|                      | All sectors             | Cross-border credit flows to | All sectors             | Cross-border credit flows to | All sectors             | Cross-border credit flows to |
|                      | Banks                   | Nonbanks                  | Banks                   | Nonbanks                  | Banks                   | Nonbanks                  |
|                      | (1)                     | (2)                       | (3)                     | (4)                       | (5)                     | (6)                       | (7)                       | (8)                       | (9)                       |
| Lag policy rate rep  | 0.304 ***               | 0.272 *                   | 0.542 **                | 0.160                     | -0.099                   | 0.441                     | 0.198                     | 0.093                     | 0.403 *                   |
|                      | [0.103]                 | [0.149]                   | [0.198]                 | [0.184]                   | [0.218]                  | [0.324]                  | [0.174]                   | [0.292]                   | [0.234]                   |
| Lag shadow policy rate rep | 0.198                 | 0.093                     | 0.403 *                | 0.071 **                  | 0.031                   | 0.039                     | 0.006                     | 0.009                     | 0.010                     |
|                       | [0.127]                 | [0.292]                   | [0.234]                 | [0.030]                   | [0.074]                  | [0.041]                  | [0.006]                   | [0.009]                   | [0.010]                   |
| Lag credit growth rep| 0.044                   | 0.106                     | 0.041                   | 0.070 **                  | 0.034                   | 0.032                     | 0.071 **                  | 0.031                   | 0.039                     |
|                      | [0.042]                 | [0.070]                   | [0.055]                 | [0.031]                   | [0.078]                  | [0.043]                  | [0.030]                   | [0.074]                  | [0.041]                   |
| Lag bank equity returns rep | -0.013              | 0.001                     | -0.008                  | -0.006                    | -0.011                  | -0.021                    | -0.005                    | -0.010                   | -0.020                    |
|                      | [0.020]                 | [0.039]                   | [0.016]                 | [0.015]                   | [0.041]                  | [0.022]                  | [0.015]                   | [0.032]                  | [0.022]                   |
| Lag real GDP growth rep | 0.029                | 0.273                     | -0.032                  | 0.635 **                  | 0.042                   | 1.112 **                  | 0.634 **                  | 0.066                   | 1.118 ***                  |
|                      | [0.191]                 | [0.417]                   | [0.225]                 | [0.247]                   | [0.410]                  | [0.270]                  | [0.243]                   | [0.401]                  | [0.266]                   |
| Lag debt/GDP rep      | -0.008                  | -0.017                    | 0.003                   | -0.004                    | -0.024 **                | -0.004                    | -0.000                    | -0.021 **                | 0.002                     |
|                      | [0.008]                 | [0.016]                   | [0.010]                 | [0.004]                   | [0.008]                  | [0.007]                  | [0.006]                   | [0.009]                  | [0.010]                   |
| Lag inflation rep     | 0.928 **               | 1.462                     | 0.847                   | -0.668                    | -0.179                  | 0.117                     | -0.670                    | -0.301                   | 0.099                     |
|                      | [0.420]                 | [1.013]                   | [0.620]                 | [0.509]                   | [0.801]                  | [0.608]                  | [0.518]                   | [0.797]                  | [0.604]                   |
| Exchange rate pct. change | -0.018              | -0.025                    | -0.006                  | 0.000                     | 0.064                   | -0.021                    | 0.003                    | 0.067                   | -0.021                    |
|                      | [0.038]                 | [0.066]                   | [0.056]                 | [0.028]                   | [0.072]                  | [0.044]                  | [0.026]                   | [0.070]                  | [0.042]                   |
| Financial center rep  | -1.332 **              | -4.423 ***                | -1.759 **               | -0.216                    | -1.888                  | 0.204                     | -0.012                    | -1.555                   | 0.488                     |
|                      | [0.714]                 | [1.019]                   | [0.836]                 | [0.659]                   | [1.210]                  | [0.969]                  | [0.758]                   | [1.359]                  | [1.017]                   |
| Euro area rep         | -0.812 **              | -1.384                    | -1.744 ***              | -1.465 **                 | -2.794 **               | -2.143 **                | -1.328 **                 | -2.650 ***               | -1.831 ***                |
|                      | [0.444]                 | [1.179]                   | [0.600]                 | [0.529]                   | [0.807]                  | [0.641]                  | [0.536]                   | [0.832]                  | [0.590]                   |
| QE indicator rep      | 2.066 ***              | -1.425                    | 1.670 **                | 0.832                     | 0.884                   | -0.465                   | 1.153                    | 1.023                   | 0.306                     |
|                      | [0.586]                 | [1.496]                   | [0.799]                 | [1.211]                   | [2.317]                  | [1.693]                  | [1.167]                   | [2.089]                  | [1.443]                   |
| EME rep               | 0.365                  | 0.817                     | -0.268                  | 1.644                     | 4.962 ***               | -0.078                   | 1.376                    | 4.132 **                 | -0.162                    |
|                      | [0.878]                 | [2.127]                   | [1.437]                 | [1.099]                   | [1.172]                  | [1.578]                  | [1.031]                   | [1.606]                  | [1.492]                   |

The dependent variable consists of the cross-border credit flows to borrowers in all sectors, to banks, or to nonbanks. The sample period in columns 1–3 is from 1995:Q1 to 2007:Q2, and in columns 4–9 from 2009:Q3 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in the appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p < .1; **p < .05; ***p < .01.
Table 9: Cross-border credit flows and global factors

|                      | Cross-border credit Flows to All sectors | Cross-border credit Flows to Banks | Cross-border credit Flows to Nonbanks |
|----------------------|------------------------------------------|-----------------------------------|-------------------------------------|
|                      | (1)                                      | (2)                               | (3)                                 |
| Lag policy rate rep  | 0.210**                                 | 0.274*                            | 0.170                               |
|                      | [0.086]                                  | [0.144]                            | [0.139]                             |
| Lag policy rate cp  | -0.094**                                | -0.231***                         | -0.059                              |
|                      | [0.040]                                  | [0.078]                            | [0.046]                             |
| ln(VIX)              | -4.964***                               | -4.991***                         | -5.783***                           |
| Lag policy rate diff | 0.116***                                | 0.246***                          | 0.159***                            |
| Lag credit growth rep| 0.076***                                | 0.094***                          | 0.064***                            |
|                      | [0.015]                                  | [0.026]                            | [0.017]                             |
| Lag bank equity returns rep | -0.099                              | -0.003                             | -0.012                              |
|                      | [0.010]                                  | [0.014]                            | [0.013]                             |
| Lag bank equity returns cp | 0.016                               | 0.004                             | 0.016**                             |
|                      | [0.009]                                  | [0.016]                            | [0.009]                             |
| Lag real GDP growth rep | 0.242                               | 0.270                             | 0.444***                            |
|                      | [0.151]                                  | [0.297]                            | [0.171]                             |
| Lag real GDP growth cp | 0.266**                              | 0.355                             | 0.290**                             |
|                      | [0.127]                                  | [0.228]                            | [0.141]                             |
| Lag debt/GDP rep     | -0.017**                                | -0.014                            | -0.022**                            |
|                      | [0.007]                                  | [0.013]                            | [0.009]                             |
| Lag debt/GDP cp      | -0.009                                  | 0.029**                           | -0.040**                            |
|                      | [0.008]                                  | [0.013]                            | [0.011]                             |
| Lag inflation rep    | -0.012                                  | 0.568                             | -0.149                              |
|                      | [0.310]                                  | [0.533]                            | [0.328]                             |
| Lag inflation cp     | 0.276                                  | 0.143                             | 0.297                               |
|                      | [0.174]                                  | [0.366]                            | [0.192]                             |
| Exchange rate pct. change | -0.016                             | 0.015                             | 0.001                               |
|                      | [0.015]                                  | [0.025]                            | [0.017]                             |
| Euro area rep        | -0.118                                  | 0.752                             | -2.391**                            |
|                      | [0.760]                                  | [1.324]                            | [1.035]                             |
| QE indicator rep     | 1.977**                                 | 2.839**                           | 2.649**                             |
|                      | [0.550]                                  | [0.925]                            | [0.673]                             |
| Counterparty x Reporting FE | Yes                                  | Yes                                 | Yes                                 |
| Year-quarter FE      | Yes                                     | Yes                                 | Yes                                 |
| Year FE              | Yes                                     | Yes                                 | Yes                                 |
| Observations        | 42,664                                  | 41,973                             | 41,688                              |

The dependent variable consists of the cross-border credit flows to borrowers in all sectors, to banks, or to nonbanks. The sample period is from 1995:Q1 to 2014:Q2. The sample includes all reporting and counterparty countries listed in Table A1 in appendix. The appendix defines all variables. Standard errors are clustered at the counterparty and reporting country levels. *p < .1; **p < .05; ***p < .01.
# Appendix

Table A1
List of reporting and counterparty countries

## A. Reporting/source countries

| Reporting country | Obs. | EME status | Reporting country | Obs. | EME status |
|-------------------|------|------------|-------------------|------|------------|
| Australia         | 1,324| 0          | Japan             | 4,015| 0          |
| Austria           | 3,616| 0          | Korea             | 1,920| 0          |
| Belgium           | 3,818| 0          | Luxembourg        | 2,322| 0          |
| Brazil            | 741  | 1          | Malaysia          | 722  | 1          |
| Canada            | 2,205| 0          | Mexico            | 3,056| 0          |
| Denmark           | 2,022| 0          | Netherlands, The  | 3,394| 0          |
| Finland           | 1,390| 0          | Portugal          | 1,370| 0          |
| France            | 4,952| 0          | South Africa      | 224  | 1          |
| Germany           | 5,006| 0          | Spain             | 3,056| 0          |
| Greece            | 749  | 0          | Sweden            | 2,105| 0          |
| Hong Kong         | 2,016| 0          | Switzerland       | 4,964| 0          |
| India             | 1,620| 1          | Turkey            | 670  | 1          |
| Indonesia         | 189  | 1          | United Kingdom    | 4,964| 0          |
| Ireland           | 2,129| 0          | United States     | 3,683| 0          |
| Italy             | 3,059| 0          | Total             | 68,403| 7 of 29 |

EME status equals one if the country is an emerging market economy according to the IMF’s WEO classification and zero otherwise. For each economy, the table reflects its status at the end of the sample period. The following economies switched from emerging to mature status during the period:
- Bahrain
- Cambodia
- Czech Republic
- Hungary
- Lithuania
- Malta
- Mexico
- Mongolia
- Poland
- South Africa
- Thailand
- Turkey
- Ukraine

## B. Counterparty/destination countries

| Counterparty country | Obs. | EME status | Counterparty country | Obs. | EME status |
|----------------------|------|------------|----------------------|------|------------|
| Algeria              | 431  | 1          | Lithuania            | 254  | 1          |
| Argentina            | 955  | 1          | Luxembourg           | 1,391| 0          |
| Australia            | 1,224| 0          | Malaysia             | 875  | 1          |
| Austria              | 1,259| 0          | Mauritius            | 354  | 1          |
| Belgium              | 1,393| 0          | Mexico               | 1,149| 1          |
| Bolivia              | 82   | 1          | Morocco              | 841  | 1          |
| Brazil               | 1,198| 1          | Netherlands, The     | 1,511| 0          |
| Bulgaria             | 619  | 1          | New Zealand          | 845  | 0          |
| Canada               | 1,303| 0          | Norway               | 1,297| 0          |
| Chile                | 1,100| 1          | Oman                 | 483  | 1          |
| China                | 1,278| 1          | Pakistan             | 660  | 1          |
| Colombia             | 660  | 1          | Panama               | 1,026| 0          |
| Cote d’Ivoire        | 219  | 1          | Paraguay             | 316  | 1          |
| Croatia              | 424  | 1          | Peru                 | 870  | 1          |
| Cyprus               | 713  | 0          | Philippines          | 945  | 1          |
| Czech Republic       | 895  | 0          | Poland               | 1,060| 1          |
| Denmark              | 1,305| 0          | Portugal             | 1,212| 0          |
| Estonia              | 78   | 0          | Qatar                | 537  | 1          |
| Finland              | 1,194| 0          | Romania              | 596  | 1          |
| France               | 1,519| 0          | Russia               | 1,224| 1          |
| Germany              | 1,484| 0          | Saudi Arabia         | 938  | 1          |
| Ghana                | 307  | 1          | Senegal              | 158  | 1          |
| Greece               | 1,070| 0          | Singapore            | 1,384| 1          |
| Guatemala            | 324  | 1          | Slovak Republic      | 524  | 0          |
| Hong Kong            | 1,273| 0          | Slovenia             | 546  | 0          |
| Hungary              | 882  | 1          | South Africa         | 1,115| 1          |
| Iceland              | 793  | 0          | Spain                | 1,318| 0          |
| India                | 1,003| 1          | Sri Lanka            | 512  | 1          |
| Indonesia            | 1,225| 1          | Sweden               | 1,301| 0          |
| Ireland              | 1,403| 0          | Switzerland          | 1,479| 0          |
| Israel               | 958  | 1          | Taiwan               | 881  | 1          |
| Italy                | 1,408| 0          | Thailand             | 882  | 1          |
| Jamaica              | 219  | 1          | Tunisia              | 591  | 1          |
| Japan                | 1,435| 0          | Turkey               | 1,228| 1          |
| Jordan               | 397  | 1          | Ukraine              | 287  | 1          |
| Korea                | 1,063| 0          | United Kingdom       | 1,538| 0          |
| Kuwait               | 534  | 1          | United States        | 1,533| 0          |
| Libya                | 157  | 1          | Venezuela            | 908  | 1          |
| Total                | 68,403| 46 of 76  |                      |      |            |

EME status equals one if the country is an emerging market economy according to the IMF’s WEO classification and zero otherwise. For each economy, the table reflects its status at the end of the sample period. The following economies switched from emerging
A Variable Definitions

A.1 Dependent variables

Credit flows, domestic and cross-border is the domestic and cross-border credit flows from reporting (source) countries to nonbank borrowers located either domestically or in various counterparty (destination) countries. It is obtained by stacking two other variables, Cross-border credit flows and Domestic credit flows to nonbanks. The variable only covers nonbank borrowers because of the constraint imposed by domestic credit. Source: Bank of International Settlements.

Credit growth differential, cross-border versus domestic is the difference between the growth of cross-border and domestic claims on nonbank borrowers. It is obtained as the difference between Cross-border credit flows and Domestic credit flows to nonbanks. The variable only covers nonbank borrowers because of the constraint imposed by the domestic credit variable. Source: Bank of International Settlements.

Cross-border credit flows to all sectors, banks, and nonbanks is constructed as the quarterly change in cross-border claims adjusted for exchange rate changes and normalized by the previous quarter’s outstanding claims. The variable is constructed separately for foreign borrowers from all sectors, for banks, and for nonbank borrowers, respectively. It is equivalent to the quarterly growth rate of the corresponding claims or to the quarterly credit flows. Source: Bank of International Settlements.

Domestic credit flows to nonbanks is the quarterly change in banks’ domestic claims on the nonbank sector normalized by the previous quarter’s outstanding claims. The variable covers domestic credit both to the private nonfinancial sector and to the public sector (e.g., central government). It is equivalent to the quarterly cross-border credit flows to nonbanks. Sources: Bank of International Settlements and national sources (central banks, statistical agencies, etc.).

A.2 Explanatory variables

Bank equity returns rep/cp is the four-quarter percent change in the bank stock price indexes in reporting and counterparty countries. Sources: Bloomberg and Haver Analytics.

Credit growth rep/cp is the year-over-year growth rate of banks’ domestic claims on the nonbank sector. The variable covers domestic credit to the private nonfinancial sector and to the public sector. Sources: Bank of International Settlements and national sources.

Debt/GDP rep/cp is the ratio of gross government debt to the GDP of reporting/counterparty countries. Source: IMF, World Economic Outlook, Haver Analytics.

EME rep/cp is an indicator variable that equals one if a country is classified as an emerging economy and zero otherwise. Source: IMF’s World Economic Outlook.

Exchange rate pct. change is the four-quarter percent change in the bilateral nominal exchange rate of reporting/source countries vis-à-vis counterparty/destination countries. Positive values show
currency appreciation for the counterparty/destination country relative to the reporting/source country. Sources: Bloomberg, Haver, Federal Reserve Bank of New York, and Datastream.

Euro area rep/cp is an indicator variable that equals one for periods and reporting/counterparty countries belong to the euro area and zero otherwise. Source: https://europa.eu/european-union/about-eu/euro/which-countries-use-euro_en

Financial center rep is an indicator variable that equals one if the reporting country is a financial center (United States, United Kingdom, Hong Kong, Singapore, and Luxembourg) and zero otherwise. Source: https://assets.publishing.service.gov.uk/media/5b18efca40f0b654cb3dd78c/Mapping_financial_centres.pdf

High housing rep is an indicator variable that takes the value of one for years and reporting countries in which the ratio of housing credit (mortgage) to GDP (Housing/GDP rep) is higher than the sample median and zero otherwise. Source: Cerutti et al. (2017), available at http://www.eugeniocerutti.com/Datasets/.

High SRISK rep is an indicator variable that takes the value of one for years and reporting countries in which the SRISK/GDP ratio is higher than the sample median and zero otherwise. Source: Brownless and Engle (2017).

Inflation rep/cp is computed for reporting and counterparty countries based on consumer price indices. Source: Haver Analytics.

LIBOR-OIS spread rep is the average difference within a quarter between the 3-month LIBOR in each reporting country’s currency and the Overnight Index Swap (OIS) on the corresponding policy rate. When the OIS is not available, the difference uses the policy rate instead of the OIS. Sources: Correa et al. (2015) and IBRN.

Low capital rep is an indicator variable that takes the value of one for years and reporting countries in which banks on aggregate have capital and reserves (or equity capital) to assets ratios lower than the sample median and zero otherwise. Source: Lee et al. (2020).

Policy rate rep/cp is the monetary policy rate of reporting/counterparty countries. Sources: Central banks, International Monetary Fund, and CEIC.

Policy rate differential is the difference between the policy rate of reporting and counterparty countries expressed in percentage points; constructed from the same sources as the individual policy rates.

Real GDP growth rep/cp is the year-over-year growth rate of the real/chained GDP for reporting/counterparty countries. Source: Haver Analytics.

Shadow policy rate rep is the shadow short rate estimate for the effective lower bound period in the United States, the euro area, Japan, and the United Kingdom, based on Krippner (2013). We use the policy rate for all other countries with missing shadow rates.

SRISK/GDP rep is the ratio of SRISK, as defined in Brownless and Engle (2017), over the GDP of each reporting country. SRISK is the expected capital shortfall of a financial entity conditional on a prolonged market decline. SRISK is a function of bank size, its degree of leverage, and its expected equity loss conditional on the market decline. SRISK is used to construct rankings of
systemically risky institutions: Firms with the highest SRISK are the largest contributors to the undercapitalization of the financial system in times of distress. The sum of SRISK across all firms is used as a measure of overall systemic risk in the entire financial system. It can be interpreted as the total amount of capital that the government would have to provide to bail out the financial system in case of a crisis. \textit{Source}: Brownless and Engle (2017).

\textit{Speculative-grade cp} is an indicator variable that takes the value of one for years and reporting countries with a speculative-grade sovereign credit rating. \textit{Source}: S&P Global Market Intelligence.

\textit{QE indicator rep} is an indicator variable that equals one for quarters and reporting countries in which a quantitative easing program is in place. \textit{Source}: Central banks’ websites.

\textit{VIX} is a measure of the market expectation of stock market volatility over the following 30-day period. It reflects the market participants’ perceived risk and risk aversion. \textit{Source}: Chicago Board Options Exchange (CBOE).