Cross-Border Bank Flows and Monetary Policy

Ricardo Correa*

Federal Reserve Board

E-mail: ricardo.correa@frb.gov

Teodora Paligorova

Federal Reserve Board

E-mail: teodora.paligorova@frb.gov

Horacio Sapriza

Federal Reserve Board

E-mail: horacio.sapriza@frb.gov

Andrei Zlate

Federal Reserve Bank of Boston

E-mail: andrei.zlate@bos.frb.org

JEL classification: F34, F36, G01

Keywords: cross-border bank flows, monetary policy, portfolio rebalancing.

---

*We thank Jason Allen, Greg Bauer, Allen Berger, Falk Brauning, Mark Carey, Luis Catao, Stijn Claessens, Sally Davies, Gaston Gelos, Linda Goldberg, John Kandrac, Seung Lee, Andrew Levin, Patrick McGuire, Camelia Minoiu, Josef Schroth, Larissa Schaefer, Rhiannon Sowerbutts, Viktors Stebunovs, Joao Sousa, Garima Vasishta, and Julieta Yung for helpful comments, as well as participants at the Annual Meetings of the 2015 Southern Economic Association, 2016 CEBRA/WEAI, 2016 EMG-ECB Workshop on Global Liquidity and its International Implications, 3rd BIS-CGFS Workshop on research on global financial stability, IMF-Central Bank of Iceland conference on "Capital Flows, Systemic Risk, and Policy Responses," 2016 FIRS, 2017 SED, 2017 European Meeting of the Econometric Society, 2017 FMA Annual Meeting, and seminar participants at the Bank of Canada, IMF, the Federal Reserve Board, and the Bank of Portugal. The authors thank Kelly Posenau for outstanding research assistance. The views stated herein are those of the authors and are not necessarily the views of the Bank of Canada, the Federal Reserve Board, the Federal Reserve Bank of Boston, or the Federal Reserve System.

Cross-Border Bank Flows and Monetary Policy

Abstract

We analyze the impact of monetary policy on bilateral cross-border bank flows using the BIS Locational Banking Statistics between 1995 and 2014. We find that monetary policy in the source countries is an important determinant of cross-border bank flows. In addition, we find evidence in favor of a cross-border portfolio channel that works in parallel with the traditional bank lending channel. As tighter monetary conditions in source countries erode the net worth and collateral values of domestic borrowers, banks reallocate credit toward safer foreign counterparties. The cross-border reallocation of credit is more pronounced for banks from source countries with weaker financial sectors, which are likely to be more risk averse. Lastly, the reallocation is directed toward non-bank borrowers in advanced economies, or those in economies with investment grade sovereign rating. By highlighting the effect of domestic monetary policy on foreign credit, this study enhances our understanding of the monetary policy transmission mechanism through global banks.

JEL classification: F34, F36, G01

Key words: cross-border bank flows, monetary policy, portfolio rebalancing.

1 Introduction

The transmission of monetary policy through banks has received a great deal of attention in the literature, but there is less clarity about the international transmission of monetary policy through global banks. Recent studies have noted the importance of the "global financial cycle", which is partly influenced by monetary policy actions in advanced economies, in determining the volume and cross-country allocation of cross-border credit (Miranda-Agrippino and Rey (2015); Rey (2016); Bruno and Shin (2015a)). However, this analysis abstracts from the importance of domestic monetary policy on banks' domestic activities, which has been shown to be material (Kashyap and Stein (2000); Dell'Ariccia et al. (2017)). In contrast to these studies, we follow a holistic approach to analyze the global allocation of bank credit, domestic and foreign, as domestic monetary policy changes.

Changes in the stance of monetary policy affect bank lending through several channels, of which the bank lending channel and the portfolio channel are the focus of our paper. Under the bank lending channel, monetary tightening is expected to impact credit supply through the banks' cost of funding (Bernanke and Gertler (1995)). Empirically, it has been shown that monetary tightening increases banks' cost of funding and lowers the supply of bank loans (Kashyap et al. (1993)), especially for smaller and domestic banks (Kashyap and Stein (2000); Cetorelli and Goldberg (2012)). At the same time, the portfolio channel predicts that changes in the stance of monetary policy prompt banks to rebalance loan portfolios, with monetary tightening causing reallocations toward relatively safer assets, and conversely for monetary easing. While abstracting from cross-border rebalancing, Den Haan et al. (2007) provides evidence that U.S. monetary tightening is followed by banks reallocating 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, other studies show that monetary loosening decreases risk aversion (Bekaert et al. (2013)) and encourages the origination of riskier loans (Paligorova and Santos (2017), Dell'Ariccia et al. (2017)). Thus, while the bank lending channel predicts changes in the total supply of credit, the portfolio channel predicts changes in the composition of credit in response to monetary

policy actions.

In this framework, our paper examines how domestic monetary policy affects the domestic and cross-border supply of bank credit and the global composition of banks' credit portfolios. Our research questions are, first, how does cross-border bank lending respond to changes in the stance of domestic monetary policy? Second, does cross-border bank lending respond differently than domestic bank lending to monetary policy changes? Third, to the extent that monetary policy prompts global banks to engage in a rebalancing of their credit portfolio, what characteristics drive the reallocation of lending among recipient countries? In answering these questions, our paper benefits from the use of a novel dataset on cross-border banking flows between multiple source and recipient countries, which allows to compare side-by-side the responses of domestic and cross-border bank lending to changes in domestic monetary policy. The dataset also allows to assess the contribution of global and country-specific factors to the volume and composition of cross-border banking flows.

We hypothesize that, first, during episodes of domestic monetary tightening, global banks rebalance their portfolios by increasing their lending to foreign borrowers that become relatively safer, consistent with the portfolio channel described before. Second, in response to domestic monetary tightening, we expect domestic lending to react differently than cross-border lending, as it may be more sensitive to policy rates per the bank lending channel. In contrast, cross-border lending may remain the same or even increase, if the portfolio channel dominates the bank lending channel. Last, we conjecture that portfolio rebalancing will be stronger for weaker banking sectors, as they attempt to insultate themselves from monetary policy changes. Thus, we expect more portfolio rebalancing away from borrowers in countries with weak baking sectors, and more toward borrowers in safer recipient countries. Importantly, portfolio rebalancing should be driven by shifts in the perceived riskiness of domestic and foreign borrowers, rather than by the shift in domestic and foreign investment opportunities or by a currency appreciation caused by the domestic monetary tightening.

Our results are three-fold. First, domestic monetary tightening leads to an increase in cross-border lending. Specifically, a one percentage-point increase in the domestic monetary policy rate leads to about 9% higher cross-border bank flows. Across types of borrowers, the

policy rate increase leads to about 5% higher flows to foreign banks and to 10% higher flows to foreign non-banks.[1] Second, pooling together the data on cross-border and domestic lending to non-bank borrowers, we find that global banks increase cross-border lending by more than domestic lending in response to domestic monetary tightening, as a decrease in domestic credit by smaller institutions may partially outweigh a positive effect on global banks which may be insulated from changes in domestic policy rates (Cetorelli and Goldberg (2012)). Third, we find evidence that portfolio rebalancing is correlated with the cross-sectional riskiness of lenders in source countries and borrowers in destination countries. Although the dataset only provides a coarse decomposition of cross-border lending by loan type, the characteristics of source-recipient country pairs are indicative of the relative riskiness of domestic banks and foreign borrowers. Thus, domestic monetary tightening leads to stronger reallocations of credit away from source countries with weaker financial banking sectors, and also to stronger reallocations toward foreign borrowers in advanced economies or with an investment grade sovereign rating status. Overall, our study provides evidence of the portfolio rebalancing channel in a cross-border context. Notably, our results are also consistent with the standard domestic bank lending channel.

The dyadic (i.e., bilateral) structure of our dataset allows us to overcome a number of challenges that are generally encountered in the empirical literature on international capital flows. Specifically, we use information on bilateral cross-border bank claims from the Locational Banking Statistics by residence (LBS) database compiled by the Bank for International Settlements (BIS). The data on bilateral bank claims allows us to compute cross-border bank flows at a quarterly frequency for the interval between 1995 and 2014, for a matrix of 29 reporting (source) countries and 77 counterparty (recipient) countries.[2]

First, to identify the effect of domestic monetary policy on the supply of cross-border bank flows, one challenge is to control for credit demand in the recipient countries. Otherwise,

[1]The 1ppt increase in the domestic policy rate is associated with 0.37 ppt higher quarterly growth of cross-border bank claims (0.45 ppt for claims on foreign banks and 0.47 ppt for claims on foreign non-banks), relative to an average growth rate of 4.02% for the total cross-border bank claims (8.92% on foreign banks and 4.79% on foreign non-banks).

[2]We use the terms "reporting" and "source" country interchangeably, as countries that report their claims on foreign borrowers are the source countries. Similarly, "counterparties" are "recipient" countries.

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 affecting demand by using counterparty*time fixed effects (with time given by year-quarter). The fixed effects control for unobserved time-variant factors that may affect the demand for credit in recipient countries. This strategy, which is similar in nature to that applied to firms by Khwaja and Mian (2008), relies on the existence of bank flows from multiple source countries lending to each recipient country in each year-quarter.

Second, in many existing studies on international capital flows, the balance of payments data provides capital inflows for each recipient country, but without specifying the source countries. The dyadic nature of the BIS data allows us to break down bank inflows by source countries, and thus to examine the role of country-specific factors such as the stance of monetary policy in source countries, rather than focusing on global factors as the sole drivers of cross-border bank flows.

Third, existing empirical studies focus on either domestic bank lending or cross-border bank flows, but without mixing the two types of lending. Given our research question which focuses on the international rebalancing global banks' portfolios, comparing domestic with cross-border bank lending is necessary. We achieve this goal by combining the dyadic data on cross-border lending with data on bank credit to the domestic private non-bank sector (also from the BIS) and with data on bank credit to the domestic public sector (from national sources).

Our paper is related to an emerging stream of empirical literature that examines the role of global banks in the international transmission of monetary policy. Cetorelli and Goldberg (2012) show that U.S. global banks actively use fund transfers from foreign offices in response to monetary policy shocks in the United States. Brauning and Ivashina (2016) focus on the elevated hedging costs from currency mismatches between global banks funding and investment activities. Due to these hedging costs, global banks react to domestic monetary policy easing by increasing foreign reserves and decreasing lending in foreign markets. In addition, Morais et al. (2015) document an international risk-taking channel of monetary policy, where foreign

monetary policy loosening is associated with increased supply of credit by foreign banks to Mexican firms, although their analysis does not explore cross border flows. Instead, the focus of the paper is on the lending conducted by subsidiaries of foreign banks in Mexico, whose links to the parents and home-country monetary policy may be limited, especially if they are part of a global bank operating a decentralized funding model (for International Settlements (2010)). Finally, Bruno and Shin (2015b) argue that an appreciation of foreign currencies relative to the U.S. dollar makes U.S. dollar funding cheaper and hence increases bank lending to foreign recipient countries. As with other studies that focus on the role of global factors in influencing cross-border bank flows (Cerutti et al. (2017)), data limitations forces them to analyze the importance of these common factors or to focus on cross-sectional differences among borrowing countries. As noted before, our data allow us to understand the domestic and foreign operations of global banks, as well as to isolate those factors that determine the supply or demand for credit.

Finally, we add to the literature on the push and pull determinants of cross-border banking flows. While the existing literature defines push and pull factors along the lines of common and recipient country factors (e.g., Fratzscher (2012)), our dyadic data allow us to include country-specific factors from source countries among the push factors, such as the stance of domestic monetary policy, along with global factors. In addition, besides documenting the role of monetary policy, we also account for typical macroeconomic factors in source and recipient countries, such as GDP growth, inflation, indebtedness, credit growth, and bank equity returns. Nonetheless, our paper is also broadly related to a growing literature on the determinants of international capital flows, but which focuses on total or portfolio flows rather than on cross-border banking flows (Forbes and Warnock (2012), Ahmed and Zlate (2014) and Ghosh et al. (2014)).

The rest of the paper is structured as follows. Section 2 presents the data, and Section 3 the methodology. Sections 4 and 5 describe the main results on the role of monetary policy and portfolio rebalancing. Section 7 concludes.

2 Data Sources and Summary Statistics

2.1 Data sources

The main data source is the confidential LBS database by residence, compiled by the BIS and shared with the central banks of reporting countries. The LBS provide quarterly data on the aggregate cross-border claims and liabilities of banks residing in 45 reporting countries to counterparties in roughly 200 countries (for International Settlements (2013)). The first-difference of cross-border bank claims, which are already adjusted for exchange rate fluctuations across quarters by the BIS, gives the corresponding bank flows. We normalize flows by the lagged outstanding claims, thus obtaining a measure equivalent to the growth of claims. An advantage of the BIS data, compared to the banking flows collected from balance of payments statistics, is the detailed breakdown of the series by reporting and counterparty countries, hence the dyadic structure of the data. The claims and liabilities on counterparty countries are further detailed by currency, instrument (loan and debt securities), and type of counterparty (bank or non-bank).[3]

The LBS dataset includes observations dating back to 1977. However, some countries, especially emerging market economies, started reporting these data only from the early 2000s. This limitation, in addition to the availability of other data used in the empirical tests, reduces our sample to the period between 1995:Q1 and 2014:Q2 for 29 reporting countries and 77 counterparty countries.[4] We also exclude the BIS reporting countries that serve as offshore centers from our sample.[5]

[3]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 (inter-office positions). This instrument category also includes repurchase transactions (repos), financial leases, promissory notes, non-negotiable debt securities (e.g. non-negotiable CDs), subordinated loans (including subordinated non-negotiable 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. *Non-banks* include non-financial sectors (government sector, non-financial corporations, and households) and non-bank 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).

[4]Table A3 presents the list of countries included in the sample and the number of observations per country. France, Germany, Switzerland, and the United Kingdom have the largest number of observations as reporting countries, while the United Kingdom and the United States appear most frequently as counterparty countries.

[5]Offshore centers are typically used by corporations or banks to arrange financial transactions whose funds

The dyadic structure of the LBS data allows us to use various types of fixed effects to control for unobservable variation at the country level (see Section 3). To illustrate the fixed effects estimation method, Figure 1 provides a schematic representation of the dyadic data. In this example, banks from three reporting countries have cross-border exposures to borrowers from five counterparty countries. Thus, the dyadic structure allows to disentangle changes in cross-border bank flows that are driven by supply factors specific to the reporting country from those arising from changes in the demand for credit from the counterparty country. Since multiple lending countries report claims on borrowers from the same counterparty country in one given quarter, the use of counterparty-time fixed effects serves to disentangle the effect of demand conditions from that of supply factors that vary across reporting countries. One additional advantage of the LBS dataset arises from the fact 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.[6]

One drawback of the LBS dataset is that it does not contain the historical claims of domestic banks on borrowers residing in their home country, and hence does not allow computing banks' portfolio shares allotted to the 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 dataset of bank claims on the domestic non-bank sector (See Section 5). These domestic claims include both loans and debt securities, which is consistent with the composition of cross-border claims provided by the LBS. To construct the series of bank claims on the domestic non-bank sector, we use two data sources. First, we use data on bank credit to the private non-financial sector, also provided by the BIS (Dembiermont et al. (2013)). Second, we collect data on domestic banks' claims, loans and securities holdings, vis-a-vis the public sector from national sources, which are consistent with the BIS methodology

are redirected elsewhere for their final use (Avdjiev et al. (2014)). This pass-through nature of offshore centers makes their monetary policy irrelevant to the banking flows originated in these locations.

[6]Note that the currency compositions of cross-border claims are 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.

used to construct the cross-border claims. The resulting series are used to compute the growth in banks' domestic claims on non-banks, which are compatible with the measures described above for the growth of cross-border claims.

We collect data on monetary policy rates, which is our main explanatory variable of interest, from several sources including central banks and databases published by the International Monetary Fund. Some monetary authorities do not target specific rates, in which case we use the reference rate most widely used by market participants to assess the monetary stance of the central bank. For euro area countries, we use the individual countries' policy rates until the introduction of the euro and then the rate for Main Refinancing Operations (minimum bid rate) set by the European Central Bank for the rest of the sample period. For additional controls, we collect country-specific macroeconomic and financial variables—including GDP growth, inflation, debt/GDP, and bank equity returns from multiple sources including Datastream, Haver and Bloomberg, all defined in Appendix 1.

2.2 Summary statistics

Table 1 presents a set of summary statistics for the cross-border bank flows computed as the growth in cross-border claims. We drop reporting-counterparty country pairs where the minimum outstanding claims in a given quarter are less than $5 million or the total outstanding claims are negative. This growth in claims is expressed in percentage points and winsorized at the 2.5 percentile. As shown in the table, the growth in the quarterly cross-border claims vis-a-vis all sectors (Cross-border:All) averages 4.1 percent during our sample period. By type of counterparties, the flows to banks averaged around 9 percent, while the cross-border flows to non-banks averaged 4.8 percent. The flows to banks were not only larger but also more dispersed than the flows to non-bank counterparties, as inferred by their standard deviations. In contrast to cross-border flows, the growth of domestic claims on non-banks was only 2.3 percent and had a lower standard deviation.

Table 1 also reports summary statistics for all variables used in the regressions grouped by both 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 credit growth, bank equity returns, and real GDP growth.

We present a cursory assessment of the relationship between cross-border flows to non-bank counterparties and monetary policy rates in Figure 2. The average cross-border flows were positively correlated with the average monetary policy rate in reporting countries over the sample period. In contrast to the cross-border flows, the growth in domestic claims seems very stable over time and weakly correlated with the monetary policy rates. The chart provides some suggestive evidence that higher monetary policy rates are associated with faster growth in cross-border claims than in domestic claims, which in essence is consistent with the portfolio rebalancing channel.

3 Methodology

This section outlines the empirical tests conducted to test the bank lending and portfolio channels. We describe the main identification strategy to test for the effect of monetary policy on cross-border lending.

3.1 Specification for the role of monetary policy

To estimate the effect of monetary policy in the reporting countries on cross-border flows while controlling for the demand for credit in the counterparty countries, we rely on the following panel regression with a measure of quarterly cross-border flows as the dependent variable:

$$Flows_{ijt}/Outstanding_{ijt-1} = \alpha \text{Policy rate rep}_{it-1} + \beta' Xrep_{it-1} + \gamma_{jt} + \epsilon_{ijt} \quad (1)$$

where i and j indicate the reporting (source) and counterparty (recipient) countries, and t denotes time at the quarterly frequency. We use three different measures of cross-border flows: first, the ratio between the change in total claims ($Flows_{ijt}$) on all sectors in a counterparty country scaled by the lagged outstanding claims of a reporting country in a given quarter ($Outstanding_{ijt-1}$); second, we isolate the growth of claims on bank counterparties; and third,

we focus on the growth of claims on non-bank counterparties. Thus, our analysis is focused not on the dollar amount of cross-border flows, but on the growth of cross-border claims, which is equivalent to the flows normalized by lagged claims.

The main regressor of interest in this specification is the lagged nominal monetary policy rate in the source country *Lag policy rate* rep_{it-1}.[7] First, we use the level of the rate in this specification, as opposed to changes in the rate or estimated shocks, as we want to capture the relative stance of monetary policy across countries at a given point in time (Bernanke and Mihov (1998)). Second, 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 (Herrmann and Mihaljek (2010)). In addition, it is difficult to select the right deflator for the rates that potentially drive cross-border claims. Arguments can be made for using deflators either for the home or the host countries, depending on where the bank profits for the loan would be repatriated or reinvested in the host country, which is not observable. That said, we are aware that the degree of financial tightness associated with nominal rates also depends on the domestic rate of inflation, which motivates the inclusion of the inflation rate as an explanatory variable for reporting countries. Last, because the reporting countries are typically large advanced economies, it is unlikely that credit demand in counterparty countries affects directly monetary policy rates in reporting countries, which alleviates potential concerns arising from reverse causality.

Traditionally, monetary policy affects the supply of bank credit through a number of channels, such as the bank lending channel and portfolio channel. First, the bank lending channel operates through a bank's need to substitute reservable deposits with uninsured liabilities in periods of monetary policy tightening. Thus, this channel affects banks' funding sources and their costs, as contractionary monetary policy boosts the aveage external finance premia paid by banks (Disyatat (2011), Kishan and Opiela (2012)). Second, the balance sheet channel also affects the banks' funding costs, as tighter monetary policy causes banks' net worth to deteriorate through changes in cash flows, net interest margins, and the valuation of assets through

[7] In section 4 we use shadow rates as an alternative measure of the monetary policy stance and LIBOR-OIS as a measure for bank funding costs.

the discount factor (Bernanke and Gertler (1995)). Third, through the risk-taking channel, higher interest rates may result in higher risk premiums because the perception of risk increases, which may be due to a traditional moral hazard or adverse selection mechanism.[8] As the suppliers of wholesale funding perceive bank borrowers as more risky, they charge higher risk premia, which may lead banks to face higher funding costs and consequently lower credit supply.

The empirical literature on the bank lending channel, has found mixed support for its applicability. Kashyap and Stein (2000) find that monetary policy tightening has an effect on lending by smaller banks, while its impact on larger banks is muted. Similarly, Cetorelli and Goldberg (2012) determine that larger global banks are able to absorb changes in domestic monetary policy by using liquidity from their foreign offices, which also weakens the effect of the bank lending channel. This result also applies to banks that belong to financial conglomerates in the United States (Campello (2002)). Thus, although the bank lending channel has solid theoretical underpinnings, its empirical application depends on the structure of the banking sector and the types of banks analyzed.

As discussed in the introduction, the portfolio rebalancing channel predicts that, in response to domestic monetary tightening, banks reallocate their portfolios toward less risky assets, either domestically or abroad, in order to improve their net worth and strengthen their capital base. Because the net worth of domestic borrowers decreases when monetary policy is tightened, banks may reallocate lending to safer foreign borrowers. In a domestic context, Den Haan et al. (2007) find that banks rebalance their portfolios toward relatively safer assets in order to safeguard their capital adequacy ratio in response to monetary tightening. In a similar spirit, we conjecture that a portfolio rebalancing channel is at work internationally, through which banks reallocate lending to relatively safer foreign borrowers (with stronger net worth positions) when domestic monetary policy is tightened.

Based on this background, a positive estimate for α, the main coefficient of interest on the domestic monetary policy rate in source countries, would be consistent with portfolio

[8] Paligorova and Santos (2017) and Jimenez et al. (2014) provide empirical support of the risk-taking channel in the United States and Spain, respectively.

rebalancing, whereby global banks shift their lending to safer foreign borrowers in response to domestic monetary tightening. In contrast, a negative coefficient would signal that monetary tightenings effectively decrease banks' cross-border flows, consistent with the bank lending channel. As noted before, the overall direction of the effect is uncertain, as both channels may operate in different directions, and even within each channel, some banks, or banking sectors, may react differently to monetary policy changes.

For example, bank-specific characteristics likely affect the sensitivity of external funding costs to monetary policy changes. Larger, more liquid, and better capitalized banks may be less affected by monetary tightening through the bank lending channel. These characteristics are associated with stronger balance sheets, a smaller degree of informational asymmetries, and hence less variability in the external finance premium. For the same reason, we expect safer banks to be less engaged in portfolio rebalancing in response to monetary tightening owing to stronger balance sheets and lower funding costs.

Cross-border bank flows are also affected by demand conditions in the recipient country. If monetary policy tightening in the reporting country overlaps with a credit boom abroad, then an increase in cross-border flows may be due to the latter and not the former. To control for time-varying demand factors at the counterparty country level, we make use of the dyadic structure of our data and include counterparty*year-quarter fixed effects (γ_{jt}). The identification of demand factors is driven by the variation in cross-border flows sent by different reporting countries to the same counterparty in a given year-quarter. Therefore, our use of dyadic data achieves a cleaner identification of the impact of supply factors, including monetary policy, on cross-border flows compared with studies using balance-of-payment data.[9]

While the counterparty*year-quarter fixed effects control for demand conditions in the counterparty country, it is also possible that the monetary policy rate in the reporting country depends on domestic macroeconomic conditions that also affect the cross-border flows,

[9] A concern with this identification strategy may be that banks from different reporting countries 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 non-banks are intermediated through the global syndicated loan market. Borrowers on this market are likely to be more homogenous, as they have to satisfy minimum credit quality standards to be able to seek funds from global banks.

such as the outlook for domestic GDP growth. Therefore, omitted variable bias may affect the coefficient on the reporting country's policy rate as a driver of cross-border flows. We counteract this type of bias in two ways. First, we control for a set of macroeconomic variables in reporting countries that may affect the monetary policy rate either directly or indirectly, such as real GDP growth, inflation, and credit growth, which are included in $Xrep_{it-1}$. Second, we use the Eurozone as a special case since the optimal monetary policy rates in some individual Eurozone members may have differed from those set for the euro area as a whole. For example, because the economies of euro-area member states have been unsynchronized, ECB policy actions may have been too loose at times for faster-growing member states such as Ireland, but too tight for slower-growing member states such as Italy.[10]

We also include a set of reporting country controls in $Xrep_{it-1}$ that have been found to affect cross-border credit flows. A higher level of the domestic debt-to-GDP may be indicative of higher sovereign risk and banks' desire to expand lending abroad (Bruno and Shin (2015a)). We use country-level bank equity returns at the quarterly frequency to measure the health of the banking system and its viability to extend credit (Ghosh et al. (2014) and Bruno and Shin (2015a)). We also include the quarterly change in exchange rates between country pairs, as appreciating counterparty currencies may encourage cross-border flows denominated in the reporting country's currency. Appreciating foreign currencies would enhance borrowers' balance sheets and their demand for credit (Kearns and Patel (2016)). We also control for the financial center status of reporting countries, namely, Hong Kong, Luxembourg, United Kingdom, United States, and Singapore. In addition, we consider whether the reporting country is part of the euro area, since these countries may be subject to common credit and business cycles, and hence may have similar credit supply conditions.

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,

[10]The result is found in Lee and Crowley (2009), who conduct counterfactual exercises with a popular Taylor rule-type policy reaction function. Based on these exercises, the authors construct aggregate "stress" measures, which indicate how divergent economic conditions are within the euro area. Following Clarida et al. (1998), policy "stress" refers to the extent to which actual policy deviates from the optimal policy.

that is, Japan, the United Kingdom, and the United States. For these three countries, we construct an indicator variable equal to one for the duration of the quantitative easing program and zero otherwise.

The standard errors are double-clustered at the reporting and counterparty country levels, which is the one of the most conservative clustering setup (Cameron and Miller (2014)). Clustering at the reporting 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 at the counterparty level.

3.2 The portfolio channel

The previous set of specifications allows us to test the relation between cross-border bank flows and monetary policy. However, to analyze the portfolio channel, we explicitly examine banks' decision to adjust their portfolio of domestic and foreign credit, as monetary policy conditions change. To test for banks' portfolio reallocation, we use data on both domestic and cross-border credit to non-bank borrowers in the following specification:

$$Flows\ Differential_{ijt} = \alpha \text{Policy rate rep}_{it-1} + \beta' X rep_{it-1} + \gamma_{jt} + \epsilon_{ijt} \tag{3}$$

$Flows\ Differential_{ijt}$ is the difference between $Flows_{ijt}/Outstanding_{ijt-1}$ and $Flows\ Domestic\ Nonbank\ Credit_{it}/Outstanding_{ijt-1}$. Since we have information on banks' domestic credit to non-banks, we narrow the analysis to cross-border flows to non-banks as well.[11] If banks conduct any portfolio rebalancing across domestic and foreign borrowers, α should be positive, since tighter monetary policy in reporting countries would be associated with faster growth of credit to foreign borrowers compared to domestic counterparties.

In a second set of tests, we also examine whether the relationship between monetary policy and cross-border flows is stronger for banks that are more financially constrained, as discussed before. We expect that riskier reporting banking sectors (such as those with higher

[11] Conceptually, it is also difficult to capture the effect of monetary policy on domestic credit within the banking sector, as on a residency basis, the assets for one set of banks are the liabilities for others. This, closed system, will be quite different to the network of global banking flows.

SRISK/GDP ratios, or banking sectors with lower ratings) will likely be more sensitive to monetary policy developments. As monetary policy tightens, banks that are riskier, should move away from riskier domestic assets and into safer assets abroad. This would allow them to reduce the risk in their overall portfolio as domestic financial conditions become more strained. Developed by Brownless and Engle (2016), SRISK is a suitable measure to capture the riskiness of a banking sector, because it estimates the amount of capital that a financial institution would need to raise in order to function normally under stress. It is worth noting that for the portfolio channel to be applicable, the level of bank riskiness should not be so high that it impedes bank lending activities or that it leads banks to "gamble for resurrection" (Rochet (2008)).

3.3 Specification for robustness to global factors

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 monetary policy in the center country, the United States. Also, Bruno and Shin (2015b) find that U.S. monetary policy is a key driver of cross-border 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 for the robustness of monetary policy in the source country as a driver of cross-border banking flows, we rely on a regression similar to equation (1), but replacing the counterparty*time fixed effects with a separate set of fixed effects for reporting*counterparty pairs and for year*quarter. The latter captures the potential effect of a global factor. Alternatively, we use the VIX instead of year-quarter fixed effects to control for the effect of the global factor on cross-border bank flows, since the VIX is a proxy for the perception of risk and risk appetite in asset markets (Bekaert et al. (2013)).

$$\begin{aligned} Flows_{ijt}/Outstanding_{ijt-1} &= \alpha \text{Policy rate rep}_{it-1} + \theta \text{Policy rate cp}_{jt-1} + \\ &= \beta' Xrep_{it-1} + \mu' Ycp_{jt-1} + \gamma_{ij} + \phi_t + \epsilon_{ijt} \end{aligned} \tag{2}$$

This setup allows us to separately identify "push" factors from reporting countries $Xrep_{it-1}$ and "pull" factors from counterparty countries (Ycp_{jt-1}), while also controlling for a time-

variant global factor.[12] We include the same set of counterparty controls, Ycp_{jt-1}, as for the reporting countries (Ahmed and Zlate (2014), Ahmed et al. (2015)). The year-quarter fixed effect, ϕ_t, controls for the unspecified global factor, while the reporting-counterparty PAIR fixed effect γ_{ij} control for unobserved factors at the pair level that may drive the cross-border flows. With this specification we can assess whether monetary policy in the source country is still a relevant driver when controlling for a global factor. Our conjecture is that, if the global factor were the driver of both banking flows and monetary policy in the source countries, the effect of monetary policy would vanish when the global factor is taken into account. On the contrary, if monetary policy still has a role while accounting for the global factor, the results from our baseline specification should be preserved.

4 Cross-border credit and monetary policy

Table 2 presents estimates for the relationship between monetary policy in reporting countries and cross-border bank flows. These estimations are based on specification (1) presented in the methodology section. In column (1), the dependent variable is the growth of cross-border claims to all sectors of recipient countries (bank, non-bank, and unallocated sectors). The coefficient on *Policy rate rep* shows that a one percentage point increase in the monetary policy rate in a source country is associated with 0.33 percentage point increase in cross-border flows. Given the 4-percent mean of bank flows, this impact is economically significant. In addition, in columns (2) and (3), we split the cross-border flows into those to banking and non-banking foreign borrowers, respectively. We find that a one-percentage point increase in the monetary policy rate in the source country leads to a 0.369 percentage point increase in credit to banks and 0.426 percentage point increase in credit to non-bank counterparties. Overall, it appears that monetary policy affects cross-border flows to banks and non-banks in a similar way. These results are robust to excluding the U.S. and other financial centers from the sample. Further, since we rely on counterparty*year-quarter fixed effects to control for any

[12] Calvo et al. (1996) emphasize the importance of external push factors in explaining capital flows to emerging economies in the 1990s.

change in the demand for credit, these estimates are relevant for the cross-section of reporting countries that have a common counterparty in a given year-quarter.

These findings are inconsistent with the bank lending channel. As noted before, under that channel we would expect a tightening in monetary policy to lead to a decrease in cross-border bank credit. However, banks' international exposures through cross-border lending represent only a fraction, albeit important, of banks' overall balance sheets. The bank lending channel would still be operative if the contraction in domestic credit outweighs the increase in cross-border credit. That assessment is presented in the next section.

Turning back to the results in Table 2, we find that, among the reporting-country controls, higher government debt-to-GDP in the reporting country is associated with lower cross-border flows. In addition, positive changes in a reporting country's nominal exchange rate (i.e., reflecting an appreciation of the counterparty's currency) are associated with more cross-border flows. Also, financial centers lend less abroad compared with other countries, consistent with the view that these countries attract capital rather than send out capital. The euro-area countries also send less cross-border flows, on average, than the rest of the world. Interestingly, the *QE indicator rep* has a positive and statistically significant coefficient for the total cross-border flows, although it is not statistically significant when the flows are detailed by bank and non-bank borrowers.

Next, we present a series of test to determine whether these findings are robust. First, given the new environment faced by banks since the Global Financial Crisis (such as elevated global uncertainty, use of unconventional monetary policy, and new regulatory requirements for banks), we check whether the results reported above are preserved when the pre/post-crisis periods are considered separately. In Table 3, columns (1)-(3) show results for the period before 2007:Q2. The coefficient on the monetary policy rate is positive and statistically significant for all three types of cross-border bank flows. In columns (4)-(6), which cover the period after 2007:Q2, the positive and statistically significant effect is preserved only for the cross-border credit to all sectors in column (4), but not for the flows to banks and non-bank counterparties taken separately. Interestingly, the negative effect of debt/GDP on cross-border flows is present only for the period after 2007:Q2, when sovereign risk increased for several reporting countries.

Also, euro-area countries have had lower cross-border flows than the rest of the sample since 2007:Q2, which is not surprising given their own sovereign debt crisis.

The second set of 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 (Giannetti and Laeven (2012)). In Table 4, we add the lagged LIBOR-OIS spread to the explanatory variables used in Table 2, and repeat the estimation for the full sample (columns 1-3) and the post-2007:Q2 period (columns 4-6). The effect of monetary policy on cross-border flows is still positive, statistically significant, with the exception of columns 2 and 5 which capture cross-border flows to banks. While controlling for the stance of monetary policy, the LIBOR-OIS spread has a negative and statistically significant effect on the cross-border flows to non-banks, suggesting that higher funding costs for banks lead to less lending (columns 3 and 6). The significance of the LIBOR-OIS spread is driven by the crisis and post-GFC period. The results for the pre-GFC period are not significant. The LIBOR-OIS spread appears to capture financing stress in interbank markets (Correa et al. (2015)), but funding cost are driven by monetary policy in normal times.

With monetary policy rates having persisted near the effective lower bound in the post-crisis period, we use a shadow interest rate based on a two-factor model of sovereign yields (Krippner (2013)). This measure allows 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) of Table 4, the relationship between the shadow interest rates in reporting countries and cross-border bank flows remains positive and statistically significant. This finding provides additional evidence that our results on the effect of monetary policy on cross-border bank flows are robust to episodes when unconventional monetary policy is used.

Overall, the relation between the relative stance of monetary policy across countries and cross-border bank flows is positive and significant, even when using alternative monetary policy measures and including proxies to capture banks' funding costs.

5 The portfolio channel

The previous section discussed the effect of monetary policy on cross-border bank flows. In this section we tests for the importance of the portfolio rebalancing channel. Specifically, we examine whether domestic credit is less responsive to monetary policy compared with foreign credit, whether cross-border credit goes to safer destinations as monetary policy changes, and whether the riskiness of banks in reporting country matters for the relation between cross-border credit and monetary policy.

5.1 Do banks substitute domestic for foreign credit?

To analyze the global allocation of banks' credit portfolios, we merge information on cross-border claims with that of domestic claims on non-bank borrowers. With these data, we estimate specification (2), which allows to examine whether the growth of cross-border bank credit is affected differently than that of domestic credit when monetary policy changes in reporting countries. Table 5 presents the main results.

In the specification reported in column (1), we stack data on cross-border bank flows with that on domestic credit for each reporting bank. Thus, for each reporting banking sector we have entries for the claims on foreign residents by country and also for the claims on domestic non-bank borrowers. This setup allows us to control for the domestic demand for credit, as common changes in the claims of all reporting countries to domestic residents, including those of the domestic banking sector, due to credit demand changes will be captured by the counterparty*year-quarter fixed effects.

To capture the differential effect of the monetary policy stance on cross-border and domestic credit, we interact *Lag policy rate rep* with a *Domestic Indicator* that takes the value one for domestic lending (from the domestic banking sector to domestic residents) and zero for cross-border lending. The positive sign on *Lag policy rate rep* suggests that cross-border claims on non-banks increase as monetary policy becomes relatively tighter. However, the negative coefficient on the interaction term between the monetary policy proxy and the domestic indicator suggests that cross-border lending is more sensitive to monetary policy than

domestic credit to non-bank borrowers. This finding shows that while the overall size of banks' balance sheet may change little as monetary policy tightens, there is a rebalancing of the credit portfolio towards foreign borrowers during these episodes.

Interestingly, the negative and significant coefficient on the *DomesticIndicator* shows that cross-border flows are much more volatile than domestic credit. This is consistent with the graphical evidence shown in Figure 2.

We also estimate a more restrictive model in column (2), whereby the dependent variable is defined as the difference in growth rates for foreign and domestic credit. The positive and statistically significant estimate suggests that the differential between cross-border and domestic credit growth increases as monetary policy in the reporting country tightens, which is consistent with the findings using the stacked credit data.

5.2 Cross-border credit and monetary policy in riskier banking sectors

We determined in the previous section that banks rebalance their credit portfolio towards foreign borrowers as monetary policy tightens. If these actions are driven by the need to insulate banks' balance sheets from the risks posed by tighter monetary conditions, we should find a larger sensitivity to monetary policy for banking sectors that are more capital constrained. We proceed to test that hypothesis in this section.

We use Brownless and Engle (2016)'s SRISK measure as a proxy for the health of banking sectors in our tests. It is an estimate of the amount of capital that a financial institution would need to raise in order to function normally in the event of a large financial shock. Banks and banking sectors can reduce their SRISK by decreasing their size, leverage, or risk. To account for the heterogenous size of banking sectors in our sample, we scale the measure by the GDP of reporting countries, and construct an indicator variable $H\ RISK$, which takes one for values higher than the yearly median values and zero otherwise.

In the results shown in column (3) of Table reftab:domestic, we interact $H\ RISK$ with *Lag policy rate rep.*[13] The positive estimate on this interaction term confirms that banking

[13]The number of observations in column (3) drops due to the data availability for SRISK.

sectors with high SRISK rebalance their portfolios toward foreign borrowers in response to monetary tightening.[14] This is consistent with a benign interpretation of banks international activities, whereby global banks use their international to adapt their balance sheet to domestic and foreign changes in economic risk. This will only be true, if banks indeed rebalance their portfolio towards safer countries or borrwers, which is the subject of the next section.

5.3 Is cross-border credit reallocated to safer counterparties?

The portfolio rebalancing channel suggests that cross-border bank flows should be directed toward relatively safer borrowers when monetary policy tightens in the reporting country. To test whether the relationship between cross-border credit and monetary policy depends on counterparty risk, we conduct two tests grouping counterparty countries between those that have an investment grade and those that don't and by comparing cross-border bank flows to advanced and emerging economies.

In the first set of tests, we interact the reporting country's policy rate with an indicator variable labeled *Speculative grade cp*, which takes the value of one if the counterparty country has a speculative grade rating for sovereign risk in a given year-quarter, and zero otherwise. As shown in Table 6, the coefficient on the monetary policy rate is still positive and statistically significant when including this additional interaction term. However, the negative coefficient on the interacted term indicates that cross-border credit flows less to speculative-grade countries as domestic monetary policy tightens. The overall effect of monetary policy on cross border flows to speculative grade countries is captured by the sum of *Lag policy rate rep* and *Lag policy rate rep*×*Speculative grade cp* at the bottom of the table. This sum is not statistically significant in the specification for all cross-border claims, column (1) and for claim on banks, column (2). This result shows that in response to tighter monetary policy at home, cross-border flows increase only to banks in investment-grade counterparties, which is consistent with portfolio rebalancing. Interestingly, cross-border flows increase to non-bank

[14]The impact of SRISK on cross-border flows is likely non-linear suggesting that for the highest SRISK values, banks have to deleverage and cut credit for both domestic and foreign banks. Therefore, portfolio rebalancing likely happens when SRISK is high, but not too high.

borrowers in both investment and speculative-grade counterparty countries (column 3). One potential explanation for this result is that cross-border credit to non-banks typically takes the form of syndicated loans to large multinational corporations, whose credit rating is high and hence less sensitive to local economic conditions.

As an alternative measure of counterparty country risk, we use information on whether a country is classified as an advanced economy or an emerging market. In Table 7 we report the results from the interaction of *EME cp* with each variable in the cross-border flows regression. Our coefficients of interest are *Lag policy rate rep* and *Lag policy rate rep*×*EME cp*. The positive and significant coefficient on the former term and the negative sign on the latter term (except for non-bank borrowers) corroborates the findings from the previous table that cross-border credit is reallocated to safer counterparty countries (i.e., advanced economies) when monetary policy is tightened in the reporting country. Once again, cross-border bank flows increase to non-bank borrowers regardless of their location in an advanced or emerging economy.

Overall, these findings are consistent with the portfolio channel in which cross-border bank credit flows towards safer borrowers when monetary policy in the domestic country tightens.

6 Additional robustness checks

In this section, we conduct additional test to determine whether the relation between monetary policy and cross-border bank claims is robust to different measures and specifications to better capture the role of domestic economic conditions. We also assess the role of global factors and U.S. dollar funding conditions on cross-border bank flows.

6.1 Economic conditions in the reporting countries

Our analysis could be subject to the endogeneity concern that monetary policy and economic activity in the reporting country evolve simultaneously, and hence cross-border flows may be driven by economic conditions rather than monetary policy in reporting countries. For example,

if a monetary tightening leads to a slowdown in economic activity and of credit demand in the reporting countries, banks may be forced to increase cross-border lending to maintain the size of their balance sheet. In this case, our findings would be driven by changes in the demand for credit not captured by our specification rather than active changes in banks' supply of credit.

In an attempt to isolate the effect of monetary policy from that of domestic economic conditions, we use the euro area as an empirical setup in which monetary policy may become misaligned with domestic economic conditions. Namely, we test whether the relationship between cross-border flows and monetary policy differs for the euro-area and non-euro-area reporting countries. Under the assumption that euro-area monetary policy may not co-move strongly with macroeconomic conditions in certain member countries (i.e., monetary policy and economic conditions are relatively less endogenous), the relationship between monetary policy and cross-border claims is expected to be better identified. However, if the estimate on monetary policy is insignificant for the euro-area reporting countries, it is possibly that our main specifications are poorly identified due to endogenous developments in economic conditions and their relationship to monetary policy.

In Table 8 we interact *Euro rep*, an indicator variable equal to one for euro-area countries, with all control variables. Our focus is on the interaction term, *Policy rate rep*Euro rep*. The results for this test are reported in columns (1)-(3). The coefficient on the monetary policy rate is positive and significant across all specifications, and its magnitude is larger for the euro-area than for the non-euro-area countries, as shown by the sum of coefficients at the bottom of the table.

Since monetary policy decisions are more synchronized with French and German economic conditions, we further exclude France and Germany from the sample and show these results in columns (4)-(6). The results are even stronger in this case for the interaction term, showing that monetary policy has and independent effect on bank credit aside from the endogenous component of monetary policy driven by domestic economic conditions.

In a second set of tests, we also examine whether the relationship between monetary policy and cross-border lending varies with economic conditions in the reporting countries. Figure A2.1 shows that the policy rate is similarly distributed across high- and low-GDP

growth regimes, suggesting that the effect of monetary policy can be independent from that of domestic economic conditions. In Table 9, the coefficient on the interaction term between *Policy rate rep* and *HGDP rep* (an indicator variable that takes one if the quarterly GDP growth is higher than the sample median in a given period) is relatively small in magnitude and is not statistically significant for any of the dependent variables, suggesting that the effect of monetary policy is independent from that of the GDP growth in the reporting country.

Lastly, in Table 10, we report results from a similar exercise for periods of currency appreciation and depreciation in the reporting country. The lack of statistical significance on the interaction term between the indicator variable *Appr* (an indicator variable that takes one if the counterparty currency appreciates in a given quarter) and the monetary policy rate confirms that the relationship between monetary policy and cross-border bank flows is independent from domestic exchange rate conditions. This finding is further reinforced by the comparable distributions of monetary policy and currency regimes shown in Figure A2.2.

6.2 Global factors

Omitting global factors from our specification could lead to biases that overstate the effect of monetary policy on cross-border bank flows. We follow two paths to control for this potential bias. First, we use reporting-countrerparty pair fixed effects and year-quarter fixed effects, along with monetary policy rates in the source and recipient countries, instead of countrerparty*year-quarter fixed effects in our specifications. The year-quarter fixed effects should control for any unobserved global factors. Second, using fixed effects for reporting-counterparty pairs and year fixed effects, we include the VIX among the explanatory variables, since this variable has been found to proxy for global liquidity and financial conditions (Miranda-Agrippino and Rey (2015)).

In Table 11, columns (1)-(3), we estimate specification (3) 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 column (1), the coefficient on the policy rate in reporting countries is positive and statistically significant, while the coefficient on the counterparty countries' policy rate is

negative and statistically significant, suggesting that cross-border credit flows to countries with lower monetary policy rates. This finding corroborates the argument that banks avoid lending to risky borrowers at home in favor of borrowers at foreign destinations where collateral values and net worth are higher (i.e., due to lower policy rates). Similar conclusions arise from the results in columns (2) and (3) for cross-border flows to banks and non-banks, respectively.

In terms of other control variables, *Lag credit growth cp* is positive and significant, implying that the demand for credit from the counterparty country attracts capital flows to all sectors. The same holds when the counterparty country has high GDP growth, while a high sovereign debt-to-GDP ratio deters cross-border credit. In the reporting country, high sovereign debt is also a barrier to cross-border credit, likely because the sovereign is relatively strained affecting banks' ability to venture to foreign markets. Finally, during the QE episodes when banks' liquidity is elevated, cross-border flows are higher compared with other periods without QE policies. It is likely that QE policy allows banks to expand their balance sheet and hence their cross-border credit.

In columns (4)-(6) we include the log of VIX, which captures investors' perception of global risk and risk aversion (Bekaert et al. (2013)). While VIX affects cross-border flows negatively, the monetary policy rate in the reporting country still has a positive impact on cross-border bank flows, while the policy rate in the counterparty countries has a negative impact on cross-border flows.[15] Lastly, in columns (7)-(9), monetary policy is measured by the policy rate differential between the reporting and counterparty countries. The negative coefficient on VIX and the positive coefficient on the monetary policy differential are preserved.

These findings show that the impact of domestic monetary policy on cross-border bank flows is important even after controlling for the role of global factors. In this regard, policy makers still have levers to control the international exposures of domestic banks, even if global factors are an important source in the variation of cross-border bank flows.

[15]Instead of year-quarter, we use year fixed effects in order to estimate the impact on VIX that varies at the quarterly frequency.

6.3 U.S. dollar funding

Related to the role of global factors in cross-border banking activities, to the extent that global banks use dollar-denominated liabilities to finance cross-border claims, it may be the case that U.S. monetary policy, rather than the monetary policies of source countries, is the sole driver of cross-border bank flows. To address this concern, in Table 12 we omit the United States as a reporting country from the sample, and add the ratio of banks' dollar-denominated cross-border liabilities over cross-border claims ($USD\ CB\ Liabilities/CB\ Liabilities\ rep$) and its interaction with the U.S. policy rate in our standard speficification.

If cross-border flows are driven solely by U.S. monetary policy rates rather than the source countries' monetary policy rate, we would expect the coefficient estimate on the latter to lose statistical significance. As shown in Table 12, we find that the coefficient of interest is still statistically significant, which suggests that our results is not driven by the U.S. monetary policy stance and global banks' dollar funding.

7 Conclusion

Since cross-border bank flows have expanded rapidly over the past three decades, it has become critical to understand the main drivers of these international transactions, as well as the risks that they may impose for creditors and borrowers. This paper focuses on the role of global banks in the cross-border transmission of monetary policy.

We use information from the BIS Locational banking statistics, as well as a novel dataset with information on banks' claims on the domestic non-bank 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 on the supply of cross-border credit.

Our paper provides three main results. First, a relatively tighter stance of monetary policy in source countries is associated with higher growth of cross-border claims relative to domestic credit. Second, banks appear to rebalance their portfolios toward foreign non-bank borrowers, especially when they reside in source countries with relatively weaker financial

sectors. Third, banks reallocate credit mainly toward foreign borrowers in safer economies, such as advanced economies or economies with investment grade ratings for sovereign debt.

Our results have a number of policy implications. To the extent that an economy relies on foreign credit, policy makers should pay attention to monetary policy developments in source countries. Similarly, for home countries, policy makers should be aware that monetary policy decision may lead to a change in banks global credit portfolios. The riskiness of those portfolios would depend on the monetary stance and the solvency of the domestic banking sector.

References

Ahmed, S., Curcuru, S., Warnock, F., and Zlate, A. (2015). The two components of international capital flows. *Boston Federal Reserve*.

Ahmed, S. and Zlate, A. (2014). Capital flows to emerging market economies: A brave new world? *Journal of International Money and Finance*, 48:221–248.

Avdjiev, S., Chui, M., and Shin, H. (2014). Non-financial corporations from emerging market economies and capital flows. *BIS Quarterly Review, December*.

Bekaert, G., Hoerova, M., and lo Duca, M. (2013). Risk, uncertainty and monetary policy. *Journal of Monetary Economics*, 60:771–788.

Bernanke, B. and Gertler, M. (1995). Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic Perspectives*, 9:27–48.

Bernanke, B. S. and Mihov, I. (1998). Measuring monetary policy. *The Quarterly Journal of Economics*, 113(3):869–902.

Brauning, F. and Ivashina, V. (2016). Monetary policy and global banking. *Mimeo*.

Brownless, C. and Engle, R. (2016). SRISK: A conditonal capital shortfall measure of systemic risk. *Review of Financial Studies*, forthcoming.

Bruno, V. and Shin, H. (2015a). Capital flows and the risk-taking channel of monetary policy. *Journal of Monetary Economics*, 71:119–132.

Bruno, V. and Shin, H. (2015b). Cross-border banking and global liquidity. *Review of Economic Studies*, 82:535–564.

Calvo, G., Leiderman, L., and Reinhart, C. (1996). Capital flows to developing countries in the 1990s: Causes and effects. *Journal of Economic Perspectives*, 10:123–139.

Cameron, A. C. and Miller, D. L. (2014). Robust inference for dyadic data. Unpublished manuscript.

Campello, M. (2002). Internal capital markets in financial conglomerates: Evidence from small bank responses to monetary policy. *The Journal of Finance*, 57(6):2773–2805.

Cerutti, E., Claessens, S., and Ratnovski, L. (2017). Global liquidity and cross-border bank flows. *Economic Policy*, 32(89):81–125.

Cerutti, E., Hale, G., and Minoiu, C. (2015). Financial crises and the composition of cross-border lending. *Journal of International Money and Finance*, 52(Supplement C):60 – 81. Adjustment in the Aftermath of the Global Crisis 2008-09: New Global Order?

Cetorelli, N. and Goldberg, L. (2012). Banking globalization and monetary transmission. *Journal of Finance*, 5:1811–1843.

Clarida, R., Gali, J., and Gertler, M. (1998). Monetary policy rules in practice: Some international evidence. *European Economic Review*, 42:10331067.

Correa, R., Goldberg, L., and Rice, T. (2015). International banking and liquidity risk transmission: Evidence from the united states. *IMF Economic Review*, 63(3):626–643.

Dell'Ariccia, G., Laeven, L., and Suarez, G. A. (2017). Bank leverage and monetary policy's risk-taking channel: Evidence from the united states. *The Journal of Finance*, 72(2):613–654.

Dembiermont, C., Drehmann, M., and Mukakunratana, S. (2013). How much does the private sector really borrow a new database for total credit to the private non-financial sector. *BIS Quarterly Review, March*.

Den Haan, W., Sumner, S., and Yamashiro, G. (2007). Bank loan portfolios and the monetary transmission mechanism. *Journal of Monetary Economics*, pages 904–924.

Disyatat, P. (2011). The bank lending channel revisited. *Journal of Money, Credit and Banking*, 43(4):711–734.

for International Settlements, B. (2010). *Funding patterns and liquidity management of internationally active banks*. Number 39 in CGFS Papers. Bank for International Settlements.

for International Settlements, B. (2013). Guidelines for reporting the BIS international banking statistics. Technical report, Bank for International Settlements.

Forbes, K. and Warnock, F. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of Internaltional Economics*, 88:235–251.

Fratzscher, M. (2012). Capital flows, push versus pull factors and the global financial crisis. *Journal of International Economics*, 88(2):341–356.

Ghosh, A., Quareshi, M., Kim, J., and Zeldueno, J. (2014). Surges. *Journal of International Economics*, 92:266–285.

Giannetti, M. and Laeven, L. (2012). Flight home, flight abroad, and international credit cycles. *The American Economic Review*, 102(3):219–224.

Herrmann, S. and Mihaljek, D. (2010). The determinants of cross-border bank flows to emerging markets: new empirical evidence on the spread of financial crisis. *BIS Working Papers*, 315.

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

Kashyap, A., Stein, J., and Wilcox, D. (1993). Monetary policy and credit conditions: Evidence from the composition of external finance. *American Economic Review*, 83 (1):78–98.

Kashyap, A. K. and Stein, J. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 90:407–428.

Kearns, J. and Patel, N. (2016). Does the financial channel of exchange rates offset the trade channel? *BIS Quarterly Review*.

Khwaja, A. I. and Mian, A. (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, 98 (4):1413–1442.

Kishan, R. and Opiela, T. (2012). Monetary policy, bank lending and the risk-pricing channel. *Journal of Money, Credit and Banking*, 44(4):573–602.

Krippner, L. (2013). Measuring the stance of monetary policy in zero lower bound environments. *Economics Letters*, 118 (1):135138.

Lee, J. and Crowley, P. (2009). Evaluating the stresses from ECB monetary policy euro area. *Bank of Finland Research, Discussion Paper 11*.

Miranda-Agrippino, S. and Rey, H. (2015). World Asset Markets and the Global Financial Cycle. NBER Working Papers 21722, National Bureau of Economic Research, Inc.

Morais, B., Peydro, J.-L., and Ruiz Ortega, C. (2015). The international bank lending channel of monetary policy rates and qe: Credit supply, reach-for-yield, and real effects. International Finance Discussion Papers 1137, Board of Governors of the Federal Reserve System (U.S.).

Paligorova, T. and Santos, J. (2017). Monetary policy and bank risk-taking: Evidence from the corporate loan market. *Journal of Financial Intermediation*, 30:35–49.

Rey, H. (2013). Dilemma not trilemma: The global financial cycle and monetary policy independence. *Proceedings of the Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole*.

Rey, H. (2016). International Channels of Transmission of Monetary Policy and the Mundellian Trilemma. *IMF Economic Review*, 64(1):6–35.

Rochet, J.-C. (2008). *Why Are There So Many Banking Crises?: The Politics and Policy of Bank Regulation*. Princeton University Press.

Figure 1: Structure of BIS Locational Banking Statistics

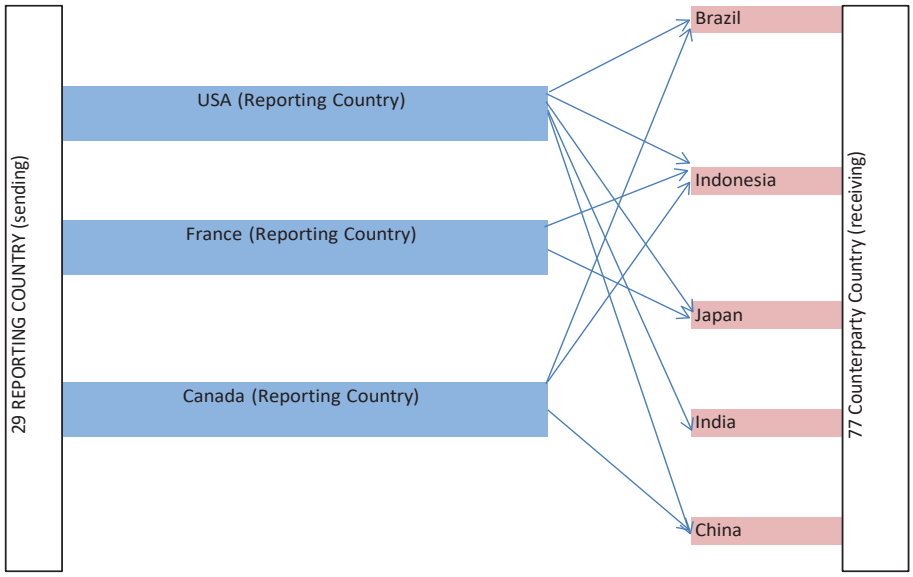
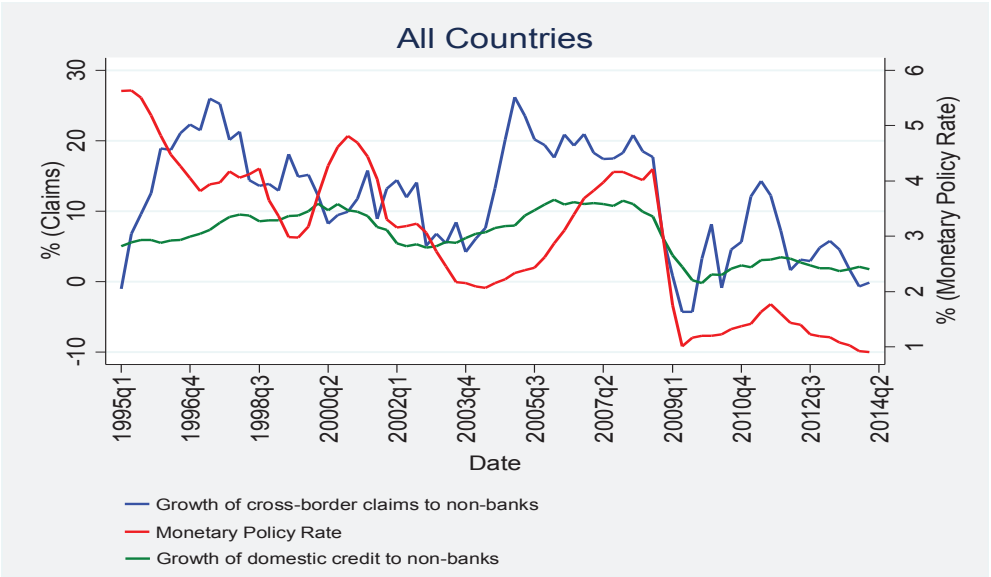


Figure 2: Monetary Policy and Cross-Border Claims



Note: Monetary policy rate is the average rate across reporting countries. Growth of cross-border claims (domestic credit) to non-banks at the quarterly level, defined in Appendix 1.

Table 1: **Sample Characteristics**
This table reports summary statistics for cross-border bank flows, reporting and counterparty countries. All variables are defined in Appendix 1.

	Mean	Median	StDev
		All Sample	
Cross-border flows: All (%)	4.108	0.847	24.365
Cross-border flows: Banks (%)	9.039	0.504	46.983
Cross-border flows: Non-banks (%)	4.844	0.551	27.211
Domestic flows: Non-banks (%)	2.339	1.676	4.966
		Reporting Countries	
Policy rate rep	3.074	2.58	3.211
Credit growth rep	1.914	1.765	4.995
Bank equity returns rep	2.62	3.053	16.742
Real GDP growth rep	0.541	0.584	1.073
Debt/GDP rep	65.9	61.19	39.225
Inflation rep	0.553	0.489	0.821
QE indicator rep	0.047	0.000	0.211
SRISK/GDP rep	0.047	0.031	0.051
Euro rep	0.399	0.000	0.49
Financial Center rep	0.201	0.000	0.401
EME rep	0.100	0.000	0.300
USD CB Liabilities/CB Liabilities rep	0.100	0.000	0.300
		Counterparty Countries	
Policy rate cp	5.905	2.58	3.211
Credit growth cp	2.251	4.000	11.450
Bank equity returns cp	3.524	3.159	19.155
Real GDP growth cp	0.723	0.747	1.381
Debt/GDP cp	56.409	48.88	35.446
Inflation cp	1.171	0.665	4.947
SRISK/GDP cp	0.03	0.007	0.044
Speculative grade	0.21	0.000	0.407
EME cp	0.127	0.000	0.333
VIX	21.017	19.93	8.007
Exchange Rate Growth	0.418	0.000	4.362

Table 2: **Cross-Border Bank Flows and Monetary Policy**
The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Each regression includes counterparty*year-quarter fixed effects. All variables are lagged one quarter. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks
	(1)	(2)	(3)
Lag policy rate rep	0.330***	0.369***	0.426***
	[0.068]	[0.095]	[0.136]
Lag credit growth rep	0.023	0.105	0.064
	[0.050]	[0.078]	[0.053]
Lag bank equity returns rep	-0.006	-0.007	-0.008
	[0.011]	[0.020]	[0.011]
Lag real GDP growth rep	0.160	-0.101	0.107
	[0.100]	[0.210]	[0.174]
Lag Debt/GDP rep	-0.010**	-0.026***	-0.007
	[0.004]	[0.007]	[0.005]
Lag inflation rep	-0.143	0.335	0.160
	[0.269]	[0.496]	[0.417]
Exchange Rate Growth	0.106*	0.178*	0.122**
	[0.057]	[0.095]	[0.053]
Financial Center rep	-1.177*	-3.368***	-1.382
	[0.667]	[1.029]	[0.823]
Euro rep	-0.992**	-1.456	-1.745***
	[0.390]	[0.921]	[0.554]
QE indicator rep	1.332**	1.262	1.317
	[0.484]	[1.140]	[0.912]
EME rep	0.814	1.701	0.818
	[0.658]	[1.256]	[0.987]
Observations	72,249	69,854	70,643
R^2	0.12	0.12	0.11

Table 3: **Cross-Border Bank Flows and Monetary Policy: Before and After the Global Financial Crisis**

The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Each regression includes counterparty*year-quarter fixed effects. All variables are lagged one quarter. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks	All	Banks	Non-Banks
	Before 2007Q2			After 2007Q2		
	(1)	(2)	(3)	(4)	(5)	(6)
Lag policy rate rep	0.289***	0.364***	0.411**	0.353**	0.396	0.410
	[0.074]	[0.127]	[0.172]	[0.136]	[0.243]	[0.249]
Lag credit growth rep	-0.030	-0.027	0.071	0.055	0.181	0.055
	[0.062]	[0.126]	[0.078]	[0.084]	[0.125]	[0.072]
Lag bank equity returns rep	-0.021	-0.023	-0.007	0.004	0.001	-0.010
	[0.022]	[0.039]	[0.016]	[0.012]	[0.028]	[0.018]
Lag real GDP growth rep	0.122	0.163	-0.085	0.173	-0.359	0.281
	[0.174]	[0.469]	[0.166]	[0.184]	[0.314]	[0.273]
Lag Debt/GDP rep	-0.011	-0.022	0.000	-0.009**	-0.023***	-0.012**
	[0.007]	[0.015]	[0.009]	[0.004]	[0.007]	[0.005]
Lag inflation rep	0.501	0.852	0.425	-0.746**	-0.422	-0.146
	[0.318]	[0.776]	[0.445]	[0.362]	[0.612]	[0.558]
Exchange Rate Growth	0.169**	0.257**	0.192*	0.034	0.077	0.049
	[0.071]	[0.116]	[0.094]	[0.114]	[0.176]	[0.094]
Financial Center	-1.126	-4.007***	-1.243	-0.875	-2.204*	-0.982
	[0.699]	[1.040]	[0.872]	[0.838]	[1.207]	[0.950]
Euro	-0.534	-0.639	-1.526**	-1.537***	-2.728***	-1.924***
	[0.407]	[1.100]	[0.620]	[0.531]	[0.957]	[0.646]
QE indicator rep	1.799**	-1.591	1.598*	0.898	0.922	0.702
	[0.664]	[1.672]	[0.824]	[0.665]	[1.428]	[1.248]
EME rep	0.976	1.736	1.120	0.999	1.879	0.855
	[0.797]	[2.184]	[1.218]	[0.786]	[1.494]	[1.245]
Observations	42,071	40,805	41,184	30,178	29,049	29,459
R^2	0.12	0.12	0.12	0.11	0.11	0.10

Table 4: **Alternative Monetary Policy Measures and Banks' Funding Costs**
The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Each regression includes counterparty*year-quarter fixed effects. All variables are lagged one quarter. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks	All	Banks	Non-Banks	All	Banks	Non-Banks
				LIBOR-OIS				Shadow Rates	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lag policy rate rep	0.337**	0.237	0.518**	0.405**	0.347	0.494**			
	[0.143]	[0.248]	[0.193]	[0.166]	[0.305]	[0.236]			
Lag Libor-OIS spread	-0.506	-0.935	-0.753**	-0.428	-0.599	-0.821**			
	[0.443]	[0.702]	[0.349]	[0.388]	[0.563]	[0.312]			
Lag shadow rates rep							0.308***	0.363***	0.418***
							[0.049]	[0.082]	[0.118]
Lag credit growth rep	-0.001	0.052	0.046	-0.008	0.065	0.004	0.023	0.104	0.063
	[0.052]	[0.077]	[0.051]	[0.082]	[0.121]	[0.065]	[0.050]	[0.078]	[0.053]
Lag bank equity returns rep	-0.003	-0.001	-0.019*	0.003	0.000	-0.015	-0.006	-0.007	-0.008
	[0.010]	[0.022]	[0.011]	[0.012]	[0.029]	[0.017]	[0.011]	[0.020]	[0.011]
Lag real GDP growth rep	0.193	-0.067	0.134	0.278	-0.300	0.442	0.167	-0.092	0.118
	[0.124]	[0.224]	[0.196]	[0.171]	[0.324]	[0.294]	[0.100]	[0.210]	[0.176]
Lag Debt/GDP rep	-0.006	-0.024***	-0.005	-0.007	-0.024***	-0.010*	-0.007	-0.023***	-0.004
	[0.005]	[0.007]	[0.006]	[0.005]	[0.008]	[0.006]	[0.005]	[0.007]	[0.006]
Lag inflation rep	0.245	1.091*	0.400	-0.508	-0.146	0.126	-0.124	0.330	0.152
	[0.255]	[0.543]	[0.400]	[0.398]	[0.715]	[0.485]	[0.270]	[0.486]	[0.421]
Exchange Rate Growth	0.155**	0.260**	0.131**	0.098	0.170	0.075	0.106*	0.178*	0.121**
	[0.060]	[0.107]	[0.056]	[0.094]	[0.159]	[0.082]	[0.057]	[0.096]	[0.053]
Financial Center rep	-1.015	-3.176**	-1.314	-0.640	-2.300*	-0.971	-1.062	-3.239***	-1.230
	[0.673]	[1.143]	[0.875]	[0.787]	[1.289]	[0.879]	[0.659]	[1.016]	[0.809]
Euro rep	-0.847*	-1.344	-1.675***	-1.326**	-2.739***	-1.657**	-0.924**	-1.366	-1.638***
	[0.422]	[0.967]	[0.565]	[0.523]	[0.943]	[0.651]	[0.397]	[0.912]	[0.565]
QE indicator rep	1.193**	0.994	1.310	0.743	0.878	0.738	1.849***	1.895	2.044**
	[0.552]	[1.122]	[0.944]	[0.735]	[1.583]	[1.358]	[0.498]	[1.151]	[0.889]
EME rep	0.666	2.385	0.397	0.760	2.638	0.125	0.800	1.610	0.700
	[0.818]	[1.784]	[1.139]	[1.008]	[2.011]	[1.435]	[0.619]	[1.248]	[0.964]
Observations	61,903	59,717	61,297	29,013	27,886	28,687	72,249	69,854	70,643
R^2	0.13	0.13	0.12	0.12	0.12	0.10	0.12	0.12	0.11

Table 5: **Cross-Border Bank Flows and the Portfolio Channel**
The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. *Domestic Indicator* takes one for domestic credit and zero otherwise. *Joint* is the sum of *Lag policy rate rep* and *Lag policy rate rep*×*Domestic Indicator* in column (1) and the sum of the interaction of *H SRISK rep* and monetary policy and the monetary policy base effect. Each regression includes counterparty*year-quarter fixed effects. All variables are one quarter lagged. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	Non-bank	Growth Diff.	Growth Diff.
	(1)	(2)	(3)
Lag policy rate rep	0.475***	0.349***	0.320***
	[0.109]	[0.083]	[0.094]
Lag policy rate rep×*Domestic Indicator*	-0.358***		
	[0.092]		
Domestic Indicator	-2.378***		
	[0.416]		
H SRISK rep			-2.162***
			[0.654]
Lag policy rate rep×*H RISK rep*			0.589**
			[0.269]
Lag bank equity returns rep	-0.006	-0.018*	-0.021*
	[0.011]	[0.010]	[0.011]
Lag real GDP growth rep	0.156	-0.117	-0.186
	[0.170]	[0.191]	[0.215]
Lag Debt/GDP rep	-0.004	0.006	0.007
	[0.005]	[0.006]	[0.005]
Lag inflation rep	0.063	-0.083	-0.163
	[0.098]	[0.103]	[0.114]
Exchange Rate Growth	0.111**	0.181***	0.175**
	[0.051]	[0.055]	[0.070]
Financial Center	-1.245	-0.935	-1.270*
	[0.915]	[0.904]	[0.633]
Euro	-1.827***	-1.490***	-1.611***
	[0.584]	[0.502]	[0.468]
QE indicator rep	0.950	0.769	1.290
	[0.890]	[1.215]	[1.162]
Observations	72,353	67,633	54,357
R^2	0.11	0.11	0.12

Table 6: **Cross-Border Bank Flows to Speculative and Investment Grade Countries** The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. *Speculative grade cp* takes one if the counterparty has non-investment grade rating in a given year-quarter. *Joint Speculative grade cp* is the sum of *Lag policy rate rep* and *Lag policy rate rep*Speculative grade cp*. Each regression includes counterparty*year-quarter fixed effects. All variables are one quarter lagged. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks
Lag policy rate rep	0.404***	0.539***	0.457***
	[0.064]	[0.082]	[0.148]
Lag policy rate rep×*Speculative grade cp*	-0.266**	-0.709**	-0.035
	[0.117]	[0.279]	[0.172]
Lag credit growth rep	0.055	0.107	0.109*
	[0.061]	[0.091]	[0.061]
Lag credit growth rep×*Speculative grade cp*	-0.141	-0.061	-0.182*
	[0.094]	[0.224]	[0.106]
Lag bank equity returns rep	-0.013	-0.020	-0.013
	[0.014]	[0.022]	[0.014]
Lag bank equity returns rep×*Speculative grade cp*	0.028	0.057	0.024
	[0.021]	[0.058]	[0.020]
Lag real GDP growth rep	0.147	0.033	0.017
	[0.114]	[0.266]	[0.177]
Lag real GDP growth rep×*Speculative grade cp*	0.348	-0.307	0.817*
	[0.330]	[0.697]	[0.403]
Lag Debt/GDP rep	-0.010**	-0.024***	-0.006
	[0.005]	[0.008]	[0.007]
Lag Debt/GDP rep×*Speculative grade cp*	0.008	0.002	-0.000
	[0.008]	[0.018]	[0.008]
Lag inflation rep	-0.149	0.443	0.303
	[0.302]	[0.557]	[0.399]
Lag inflation rep×*Speculative grade cp*	0.435	-0.197	-0.348
	[0.369]	[0.971]	[0.237]
Exchange Rate Growth	0.122*	0.219**	0.133
	[0.071]	[0.106]	[0.080]
Exchange Rate Growth×*Speculative grade cp*	-0.120	-0.326*	-0.113
	[0.092]	[0.186]	[0.118]
Financial Center rep	-1.715*	-4.155***	-1.724
	[0.848]	[1.368]	[1.048]
Financial Center rep×*Speculative grade cp*	1.609*	2.371	0.684
	[0.830]	[2.071]	[1.175]
Euro rep	-0.808	-1.168	-1.600**
	[0.490]	[0.928]	[0.691]
Euro rep×*Speculative grade cp*	-0.872	-2.326	-0.632
	[0.618]	[1.746]	[0.804]
QE indicator rep	1.696***	1.786	1.543*
	[0.538]	[1.323]	[0.826]
QE indicator rep×*Speculative grade cp*	-1.811	-3.648	-0.784
	[1.444]	[2.967]	[0.910]
Observations	69,232	67,050	67,646
R^2	0.11	0.11	0.10
Joint Speculative grade cp	0.138	-0.170	0.422***
t-statistic	0.931	-0.560	3.393

Table 7: **Cross-Border Bank Flows to Advanced Economies and Emerging Markets** The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. *EME cp* takes one if the counterparty is classified as a emerging market economy. Joint *EME cp* is the sum of *Lag policy rate rep* and *Lag policy rate rep*×*EME cp*. Each regression includes counterparty*year-quarter fixed effects. All variables are one quarter lagged. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks
Lag policy rate rep	0.448***	0.650***	0.373**
	[0.059]	[0.102]	[0.154]
Lag policy rate rep×*EME cp*	-0.295**	-0.796***	0.231
	[0.116]	[0.247]	[0.241]
Lag credit growth rep	0.045	0.099	0.119
	[0.061]	[0.100]	[0.072]
Lag credit growth rep×*EME cp*	-0.036	0.022	-0.095
	[0.063]	[0.111]	[0.076]
Lag bank equity returns rep	-0.019	-0.016	0.004
	[0.018]	[0.029]	[0.017]
Lag bank equity returns rep×*EME cp*	0.024	0.020	-0.024
	[0.025]	[0.049]	[0.024]
Lag real GDP growth rep	0.048	0.045	-0.194
	[0.178]	[0.374]	[0.243]
Lag real GDP growth rep×*EME cp*	0.329	-0.132	0.687*
	[0.238]	[0.519]	[0.367]
Lag Debt/GDP rep	-0.012*	-0.021*	-0.009
	[0.006]	[0.012]	[0.009]
Lag Debt/GDP rep×*EME cp*	0.006	-0.009	0.006
	[0.008]	[0.018]	[0.010]
Lag inflation rep	-0.370	0.031	0.320
	[0.381]	[0.692]	[0.455]
Lag inflation rep×*EME cp*	0.624	0.979	-0.203
	[0.394]	[0.879]	[0.400]
Exchange Rate Growth	0.116	0.186	0.127
	[0.086]	[0.140]	[0.086]
Exchange Rate Growth×*EME cp*	-0.025	-0.032	-0.013
	[0.089]	[0.157]	[0.091]
Financial Center rep	-2.295**	-5.590***	-1.677
	[0.921]	[1.683]	[1.267]
Financial Center rep×*EME cp*	1.894***	3.912**	0.321
	[0.611]	[1.856]	[1.087]
Euro rep	-1.167**	-2.000	-2.134**
	[0.541]	[1.215]	[0.842]
Euro rep×*EME cp*	0.176	0.722	0.615
	[0.645]	[1.996]	[0.885]
QE indicator rep	0.839	0.392	0.186
	[0.655]	[1.388]	[0.852]
QE indicator rep×*EME cp*	0.383	0.472	1.896
	[0.998]	[1.841]	[1.580]
Observations	72,249	69,854	70,643
R^2	0.12	0.12	0.11
Joint EME cp	0.153	-0.147	0.604
t-statistic	1.076	-0.597	4.009

Table 8: **Cross-Border Bank Flows to Euro-Area Counterparties**
The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Each regression includes counterparty*year-quarter fixed effects. All variables are lagged one quarter. Variable definitions are listed in Appendix 1. *Euro rep* takes one for Eurozone reporting countries and zero otherwise. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks	All Excluding Germany and France	Banks	Non-Banks
	(1)	(2)	(3)	(4)	(5)	(6)
Lag policy rate rep	0.364***	0.456***	0.436***	0.380***	0.478***	0.447***
	[0.058]	[0.108]	[0.136]	[0.062]	[0.116]	[0.141]
Lag policy rate rep×*Euro rep*	0.401*	0.658**	0.237	0.579***	0.833**	0.384
	[0.198]	[0.306]	[0.265]	[0.201]	[0.346]	[0.296]
Lag credit growth rep	0.401*	0.658**	0.237	-0.006	0.045	0.066
	[0.198]	[0.306]	[0.265]	[0.054]	[0.112]	[0.050]
Lag credit growth rep×*Euro rep*	0.401*	0.658**	0.237	-0.015	-0.041	-0.058
	[0.198]	[0.306]	[0.265]	[0.072]	[0.118]	[0.071]
Lag bank equity returns rep	0.401*	0.658**	0.237	-0.007	-0.002	0.001
	[0.198]	[0.306]	[0.265]	[0.017]	[0.039]	[0.019]
Lag bank equity returns rep×*Euro rep*	0.401*	0.658**	0.237	0.003	0.001	-0.011
	[0.198]	[0.306]	[0.265]	[0.015]	[0.048]	[0.023]
Lag real GDP growth rep	0.401*	0.658**	0.237	0.130	-0.241	-0.007
	[0.198]	[0.306]	[0.265]	[0.209]	[0.334]	[0.335]
Lag real GDP growth rep×*Euro rep*	0.401*	0.658**	0.237	-0.032	0.171	0.169
	[0.198]	[0.306]	[0.265]	[0.266]	[0.435]	[0.385]
Lag Debt/GDP rep	0.401*	0.658**	0.237	-0.007	-0.026***	-0.007
	[0.198]	[0.306]	[0.265]	[0.004]	[0.006]	[0.007]
Lag Debt/GDP rep×*Euro rep*	0.401*	0.658**	0.237	-0.021*	-0.018	-0.011
	[0.198]	[0.306]	[0.265]	[0.012]	[0.027]	[0.013]
Lag inflation rep	0.401*	0.658**	0.237	-0.309	0.020	-0.039
	[0.198]	[0.306]	[0.265]	[0.332]	[0.549]	[0.483]
Lag inflation rep×*Euro rep*	0.401*	0.658**	0.237	0.147	0.168	0.080
	[0.198]	[0.306]	[0.265]	[0.617]	[1.107]	[0.692]
Exchange Rate Growth	0.094	0.139	0.116*	0.091	0.126	0.119*
	[0.062]	[0.110]	[0.059]	[0.063]	[0.119]	[0.064]
Exchange Rate Growth×*Euro rep*	0.022	0.135	-0.005	-0.002	0.149	-0.082
	[0.075]	[0.126]	[0.072]	[0.086]	[0.138]	[0.065]
Financial Center rep	-0.984	-3.706***	-1.183	-1.064	-3.877***	-1.307
	[0.784]	[1.184]	[1.010]	[0.831]	[1.278]	[1.066]
Financial Center rep×*Euro rep*	-1.189	1.113	-0.914	-1.691	-0.556	-1.405
	[1.144]	[2.292]	[1.396]	[1.123]	[2.120]	[1.352]
QE indicator rep	0.757*	0.867	0.987	0.820**	0.964	1.126
	[0.408]	[0.701]	[0.991]	[0.380]	[0.808]	[0.931]
QE indicator rep×*Euro rep*	0.000	0.000	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
EME rep	0.342	0.142	0.620	0.446	0.607	0.707
	[0.796]	[1.156]	[1.286]	[0.805]	[1.154]	[1.258]
EME rep×*Euro rep*	2.539*	5.585**	1.383	2.359*	4.629**	1.213
	[1.312]	[2.420]	[1.163]	[1.242]	[2.021]	[1.095]
Euro rep	-0.866	-3.295	-1.852	-0.450	-1.388	-1.313
	[1.393]	[3.013]	[1.642]	[1.352]	[2.688]	[1.497]
Observations	72,249	69,854	70,643	61,694	59,329	60,187
R^2	0.12	0.12	0.11	0.12	0.13	0.12
Coef. Policy Rate Euro cp	0.765	1.114	0.673	0.959	1.310	0.830
t-statistic	3.900	3.401	2.136	5.004	3.508	2.437

Table 9: **Cross-Border Bank Flows in "Good Times" and "Bad Times"**
The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Each regression includes counterparty*year-quarter fixed effects. All variables are lagged one quarter. Variable definitions are listed in Appendix 1. *HGDP rep* takes one if GDP growth is higher than the sample median and zero otherwise. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks
Lag policy rate rep	0.435***	0.391*	0.495**
	[0.102]	[0.212]	[0.183]
Lag policy rate rep×*HGDP rep*	-0.160	-0.051	-0.087
	[0.144]	[0.277]	[0.127]
Lag credit growth rep	0.038	0.091	0.100
	[0.051]	[0.080]	[0.075]
Lag credit growth rep×*HGDP rep*	-0.030	0.023	-0.050
	[0.049]	[0.082]	[0.052]
Lag bank equity returns rep	-0.009	0.002	-0.015
	[0.011]	[0.028]	[0.013]
Lag bank equity returns rep×*HGDP rep*	0.005	-0.012	0.011
	[0.016]	[0.031]	[0.019]
Lag real GDP growth rep	0.250	-0.291	0.468
	[0.199]	[0.421]	[0.310]
Lag real GDP growth rep×*HGDP rep*	-0.035	0.065	-0.161
	[0.306]	[0.516]	[0.481]
Lag Debt/GDP rep	-0.005	-0.022**	-0.011
	[0.005]	[0.008]	[0.008]
Lag Debt/GDP rep×*HGDP rep*	-0.010	-0.008	0.007
	[0.007]	[0.010]	[0.009]
Lag inflation rep	-0.208	0.864	-0.481
	[0.321]	[0.723]	[0.488]
Lag inflation rep×*HGDP rep*	0.023	-0.836	0.983
	[0.469]	[0.926]	[0.672]
Exchange Rate Growth	0.071	0.154	0.043
	[0.058]	[0.116]	[0.063]
Exchange Rate Growth×*HGDP rep*	0.056	0.042	0.133***
	[0.050]	[0.128]	[0.041]
Financial Center rep	-0.619	-2.875*	-1.513*
	[0.850]	[1.630]	[0.785]
Financial Center rep×*HGDP rep*	-1.042	-0.974	0.244
	[0.621]	[1.440]	[0.728]
Euro rep	-0.926**	-1.063	-2.053**
	[0.416]	[1.082]	[0.758]
Euro rep×*HGDP rep*	-0.038	-0.773	0.616
	[0.503]	[1.005]	[0.710]
QE indicator rep	0.779	1.346	0.497
	[0.541]	[1.351]	[0.803]
QE indicator rep×*HGDP rep*	1.301	-0.102	1.706*
	[0.998]	[1.766]	[0.860]
EME rep	0.551	2.518	1.431
	[1.171]	[2.540]	[1.793]
EME rep×*HGDP rep*	0.459	-1.090	-0.857
	[1.438]	[2.866]	[1.621]
H GDP	1.119	2.101	-1.606
	[0.882]	[1.638]	[1.327]
Observations	72,249	69,854	70,643
R^2	0.12	0.12	0.11

Table 10: **Cross-Border Flows during Currency Appreciation and Currency Depreciation Episodes**

The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Each regression includes counterparty*year-quarter fixed effects. All variables are lagged one quarter. Variable definitions are listed in Appendix 1. *Appr* takes one for currency appreciation and zero otherwise. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks
Lag policy rate rep	0.383***	0.481**	0.416**
	[0.113]	[0.203]	[0.152]
Lag policy rate rep×*Appr*	-0.105	-0.242	-0.000
	[0.208]	[0.310]	[0.181]
Lag credit growth rep	0.008	0.057	0.071
	[0.060]	[0.109]	[0.055]
Lag credit growth rep×*Appr*	0.037	0.110	-0.010
	[0.068]	[0.125]	[0.070]
Lag bank equity returns rep	-0.003	-0.006	0.002
	[0.011]	[0.026]	[0.020]
Lag bank equity returns rep×*Appr*	-0.010	-0.005	-0.026
	[0.018]	[0.035]	[0.021]
Lag real GDP growth rep	-0.048	-0.480	-0.054
	[0.196]	[0.390]	[0.229]
Lag real GDP growth rep×*Appr*	0.535*	0.943	0.449
	[0.286]	[0.635]	[0.357]
Lag Debt/GDP rep	-0.011*	-0.035***	-0.009
	[0.005]	[0.012]	[0.006]
Lag Debt/GDP rep×*Appr*	0.003	0.018	0.002
	[0.007]	[0.015]	[0.007]
Lag inflation rep	-0.295	0.454	-0.369
	[0.434]	[0.639]	[0.594]
Lag inflation rep×*Appr*	0.299	-0.283	1.092*
	[0.699]	[1.140]	[0.546]
Exchange Rate Growth	0.116	-0.097	0.224**
	[0.095]	[0.141]	[0.087]
Exchange Rate Growth×*Appr*	-0.059	0.463**	-0.193
	[0.125]	[0.204]	[0.121]
Financial Center rep	-1.330*	-4.205***	-1.594**
	[0.744]	[1.320]	[0.725]
Financial Center rep×*Appr*	0.382	1.932*	0.483
	[0.639]	[1.116]	[0.544]
Euro rep	-0.933**	-1.586	-1.864***
	[0.435]	[1.038]	[0.567]
Euro rep×*Appr*	-0.049	1.028	0.103
	[0.547]	[0.942]	[0.611]
QE indicator rep	2.122**	2.643	2.024**
	[0.821]	[1.637]	[0.978]
QE indicator rep×*Appr*	-1.583	-2.787	-1.460
	[1.214]	[1.788]	[1.140]
EME rep	0.362	0.458	1.125
	[0.724]	[2.271]	[1.269]
EME rep×*Appr*	1.025	2.778	-0.617
	[1.257]	[2.842]	[1.544]
Appr	-0.179	-1.548	-0.882
	[1.009]	[1.760]	[1.150]
Observations	72,249	69,854	70,643
R^2	0.12	0.12	0.11

Table 11: **Cross-Border Bank Flows and the Role of Global Factors**

The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. Columns (1)-(3) include counterparty*reporting country fixed effects and year-quarter fixed effects; columns (4)-(9) include counterparty x reporting country fixed effects and year fixed effects. All variables are one quarter lagged. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty-reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks	All	Banks	Non-Banks	All	Banks	Non-Banks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lag policy rate rep	0.155**	0.182*	0.251*	0.170***	0.211**	0.288**			
	[0.063]	[0.108]	[0.143]	[0.062]	[0.107]	[0.141]			
Lag policy rate cp	-0.096**	-0.247***	-0.052	-0.078**	-0.220***	-0.017			
	[0.038]	[0.074]	[0.045]	[0.037]	[0.073]	[0.044]			
Ln VIX				-3.541***	-3.195***	-5.105***	-3.453***	-3.203***	-4.878***
				[0.686]	[1.194]	[0.749]	[0.680]	[1.185]	[0.757]
Ln policy rate difference							0.114***	0.216***	0.099*
							[0.033]	[0.061]	[0.055]
Lag credit growth rep	0.033	0.106	0.029	0.000	0.012	0.036	-0.001	0.012	0.034
	[0.036]	[0.065]	[0.044]	[0.028]	[0.054]	[0.032]	[0.028]	[0.054]	[0.032]
Lag credit growth cp	0.200***	0.348***	0.090**	0.180***	0.298***	0.084***	0.180***	0.298***	0.083***
	[0.030]	[0.054]	[0.036]	[0.028]	[0.049]	[0.032]	[0.028]	[0.049]	[0.032]
Lag bank equity returns rep	-0.010	-0.006	-0.007	-0.011	-0.010	-0.017*	-0.011	-0.010	-0.017*
	[0.011]	[0.018]	[0.012]	[0.008]	[0.014]	[0.009]	[0.008]	[0.014]	[0.009]
Lag bank equity returns cp	0.012	0.026*	0.003	0.009	0.018	-0.006	0.009	0.018	-0.006
	[0.009]	[0.015]	[0.010]	[0.008]	[0.013]	[0.009]	[0.008]	[0.013]	[0.009]
Lag real GDP growth rep	0.065	-0.128	0.118	0.043	-0.213	0.021	0.037	-0.212	0.005
	[0.147]	[0.257]	[0.163]	[0.131]	[0.227]	[0.155]	[0.131]	[0.227]	[0.153]
Lag real GDP growth cp	0.448***	0.707***	0.222	0.414***	0.601***	0.151	0.407***	0.602***	0.132
	[0.134]	[0.246]	[0.148]	[0.126]	[0.230]	[0.143]	[0.126]	[0.230]	[0.143]
Lag Debt/GDP rep	-0.025***	-0.026**	-0.029***	-0.028***	-0.032**	-0.032***	-0.026***	-0.033***	-0.028***
	[0.007]	[0.012]	[0.009]	[0.007]	[0.013]	[0.009]	[0.007]	[0.012]	[0.009]
Lag Debt/GDP cp	-0.018**	0.018	-0.050***	-0.022***	0.011	-0.052***	0.303*	0.293	0.135
	[0.008]	[0.012]	[0.011]	[0.008]	[0.012]	[0.011]	[0.157]	[0.324]	[0.182]
Lag inflation rep	-0.346	-0.242	0.006	-0.380	-0.224	-0.281	-0.323	-0.229	-0.154
	[0.264]	[0.423]	[0.302]	[0.247]	[0.412]	[0.277]	[0.240]	[0.399]	[0.289]
Lag inflation cp	0.256	0.213	0.242	0.266*	0.297	0.052	0.303*	0.293	0.135
	[0.169]	[0.350]	[0.191]	[0.162]	[0.333]	[0.181]	[0.157]	[0.324]	[0.182]
Euro rep	-0.163	0.317	-1.684*	-0.206	0.171	-1.620*	-0.218	0.172	-1.663*
	[0.622]	[1.091]	[0.876]	[0.624]	[1.090]	[0.874]	[0.624]	[1.091]	[0.877]
QE indicator rep	1.795***	2.575***	2.629***	1.759***	2.478***	2.801***	1.666***	2.486***	2.511***
	[0.555]	[0.905]	[0.693]	[0.553]	[0.904]	[0.685]	[0.544]	[0.886]	[0.660]
Observations	45,386	44,638	44,239	45,386	44,638	44,239	45,386	44,638	44,239
R^2	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Table 12: **Cross-Border Bank Flows and the Role of U.S. dollar funding**
The dependent variables are growth rates of cross-border flows to all sectors (banks and non-banks), banks and non-banks. USD CB Liabilities/CB Liabilities rep is the ratio of cross-border liabilities denominated in US dollars over cross-border liabilities. Each regression includes counterparty*year-quarter fixed effects. All variables are one quarter lagged. Variable definitions are listed in Appendix 1. Standard errors are clustered at the counterparty and reporting country levels. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

	All	Banks	Non-Banks
Lag policy rate rep	0.291***	0.329***	0.415***
	[0.071]	[0.118]	[0.139]
USD CB Liabilities/CB Liabilities rep	3.332**	2.562	2.300
	[1.478]	[3.497]	[1.953]
Lag US policy rate rep $\times$*USD CB Liabilities/CB Liabilities rep*	-0.522	-0.079	-0.778
	[0.365]	[0.562]	[0.470]
Lag credit growth rep	0.044	0.123	0.068
	[0.049]	[0.080]	[0.059]
Lag bank equity returns rep	-0.014	-0.020	-0.009
	[0.011]	[0.019]	[0.012]
Lag real GDP growth rep	0.122	-0.143	0.052
	[0.109]	[0.219]	[0.174]
Lag Debt/GDP rep	-0.013***	-0.030***	-0.010*
	[0.005]	[0.010]	[0.006]
Lag inflation rep	-0.130	0.446	0.119
	[0.270]	[0.509]	[0.415]
Exchange Rate Growth	0.120*	0.225**	0.101*
	[0.064]	[0.092]	[0.057]
Financial Center	-1.881***	-4.185***	-2.096***
	[0.373]	[0.915]	[0.641]
Euro	-0.363	-0.784	-1.576***
	[0.476]	[1.375]	[0.536]
EME rep	1.205***	0.593	0.558
	[0.366]	[1.227]	[0.822]
QE indicator rep	0.895	1.785	0.768
	[0.596]	[1.316]	[0.979]
Observations	68,238	65,851	66,671
R^2	0.12	0.12	0.12

Appendix 1: Definition of Variables

Bank equity returns rep/cp is stock returns of the banking sector. Source: Haver.

Credit growth rep/cp is credit growth of the domestic non-financial sector. Source: Bank of International Settlements.

Cross-border flows to all sectors, banks and non-banks is the ratio of quarterly flows adjusted for exchange rate changes to the previous quarter outstanding amounts, respectively to all sectors, banks and non-banks; winsorized at the 2.5 percentile. Source: Bank of International Settlements.

Debt/GDP rep/cp gross debt to GDP reporting/counterparty countries. It is gross debt as a percentage of nominal GDP for reporting countries. Source, IMF, World Economic Outlook, Haver

EME rep/cp is an indicator variable that takes one if a country is classified as an emerging economy and zero otherwise.

Exchange rate growth is quarter-over-quarter growth rate of nominal exchange rates of the reporting vis-a-vis the counterparty. Source: Bloomberg, Haver, New York Fed, Datastream.

Euro rep/cp is one if a reporting/counterparty country is one and zero otherwise.

Financial center rep is an indicator variable that takes one if the reporting country is a financial center (US, US, Hong Kong, Singapore and Luxembourg) and zero otherwise.

Inflation rep/cp is the quarter-over-quarter inflation for the reporting/counterparty country calculated using consumer price indices. Source: Haver.

Policy rate rep/cp is the monetary policy rate of reporting/counterparty countries. Source: Central banks, international monetary fund, CEIC.

Real GDP growth rep/cp is the real quarter-over-quarter real/chained GDP growth for reporting/counteryparty countries.

SRISK/GDP rep is the ratio of SRISK defined in Brownless and Engle (2016) over GDP.

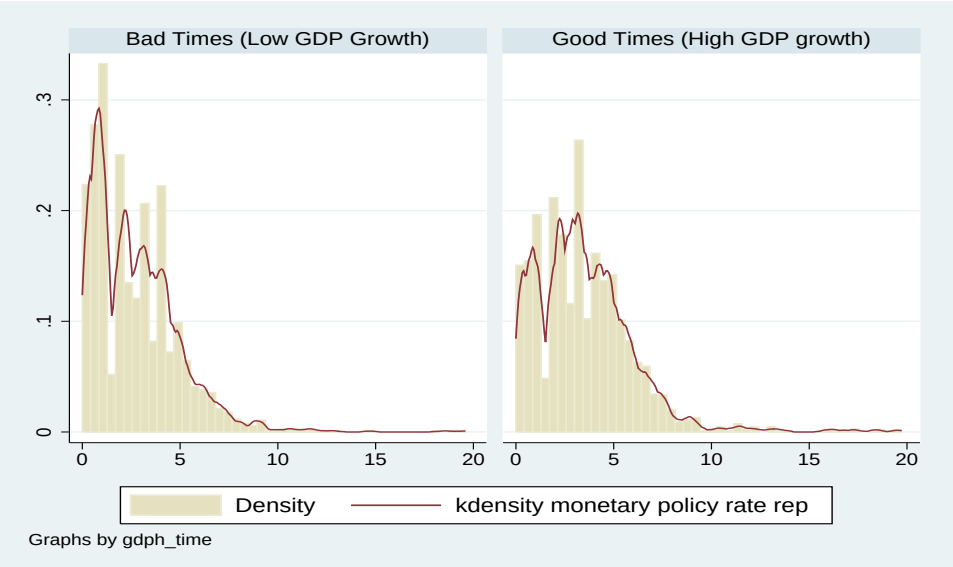
USD CB liabilities/CB liabilities rep is the ratio of cross-border liabilities denominated in US dollars over cross-border liabilities.

QE indicator rep takes one if a counting country has a quantitative easing program.

VIX is a measure of market expectation of stock market volatility over the next 30-day period. It is calculated by the Chicago Board Options Exchange (CBOE), often referred to as the fear index.

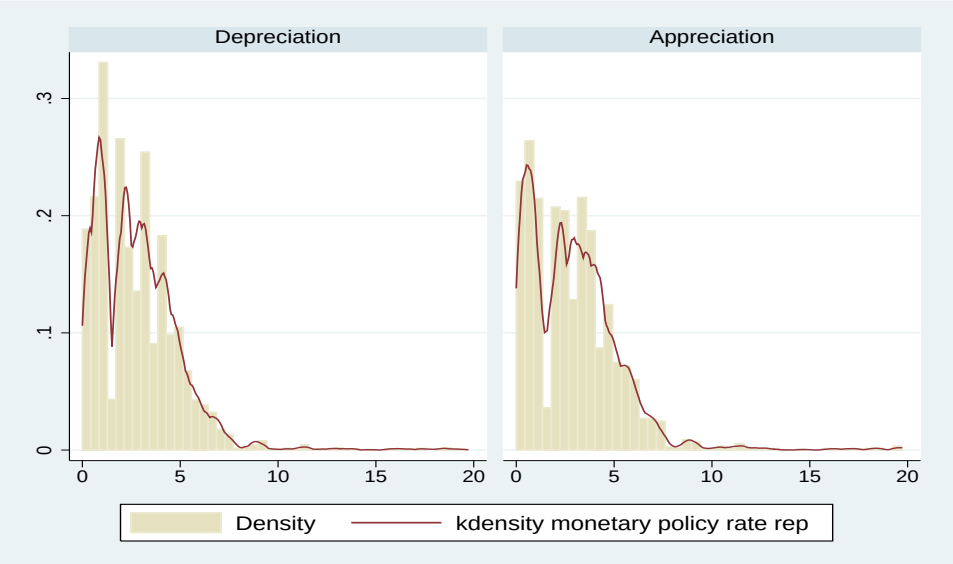
Appendix 2

Figure A2.1: Monetary Policy Rate for Different Economic Conditions



Note: The graphs show the distributions of monetary policy rate in reporting countries for periods of relatively high GDP growth (values are higher than the median) and periods of relatively low GDP growth.

Figure A2.2: Monetary Policy Rate for Currency Appreciation and Depreciation Period



Note: The graph shows the distributions of monetary policy rate in reporting countries for periods of currency appreciation and currency depreciation.

Appendix 3

Table A3: **A List of Reporting and Counterparty Countries**
EME reporting (EME counterparty) takes one if the reporting country is classified as an emerging economy and zero otherwise.

Reporting Country	Observations	EME reporting	Counterparty Country	Observations	EME counterparty
AUSTRALIA	1,467	0	ALGERIA	456	1
AUSTRIA	3,832	0	ARGENTINA	1,014	1
BELGIUM	4,034	0	AUSTRALIA	1,316	0
BRAZIL	819	1	AUSTRIA	1,389	0
CANADA	2,333	0	BELGIUM	1,498	0
DENMARK	2,238	0	BOLIVIA	123	1
FINLAND	1,581	0	BRAZIL	1,276	1
FRANCE	5,228	0	BULGARIA	672	1
GERMANY	5,318	0	CANADA	1,402	0
GREECE	845	1	CHILE	1,171	1
HONG KONG	2,184	1	CHINA	1,376	1
INDIA	1,764	1	COLOMBIA	700	1
INDONESIA	274	1	COTE D'IVOIRE	231	1
IRELAND	2,265	0	CROATIA	473	1
ITALY	3,348	0	CYPRUS	777	1
JAPAN	3,410	0	CZECH REPUBLIC	951	1
KOREA	2,160	0	DENMARK	1,394	0
LUXEMBURG	2,549	0	ESTONIA	122	1
MALAYSIA	866	1	FINLAND	1,270	0
MEXICO	170	1	FRANCE	1,636	0
NETHERLANDS	4,094	0	GERMANY	1,598	0
PORTUGAL	1,479	0	GHANA	346	1
SOUTH AFRICA	373	0	GREECE	1,143	1
SPAIN	3,285	0	GUATEMALA	345	1
SWEDEN	2,227	0	HONG KONG	1,362	1
SWITZERLAND	5,236	0	HUNGARY	936	1
TURKEY	794	1	ICELAND	838	0
UNITED KINGDOM	5,236	0	INDIA	1,074	1
UNITED STATES	3,889	0	INDONESIA	1,308	1
TOTAL	73,298	29	IRELAND	1,505	0
			ISRAEL	1,017	1
			ITALY	1,508	0
			JAMAICA	231	1
			JAPAN	1,561	0
			JORDAN	406	1
			KOREA	1,134	1
			KUWAIT	557	1
			LATVIA	73	1
			LIBYA	169	1
			LITHUANIA	270	1
			LUXEMBOURG	1,487	0
			MALAYSIA	933	1
			MAURITIUS	388	1
			MEXICO	1,219	1
			MOROCCO	892	1
			NETHERLANDS	1,612	0
			NEW ZEALAND	901	0
			NORWAY	1,391	0
			OMAN	500	1
			PAKISTAN	707	1
			PANAMA	1,097	1
			PARAGUAY	341	1
			PERU	918	1
			PHILIPPINES	1,004	1
			POLAND	1,128	1
			PORTUGAL	1,295	0
			QATAR	564	1
			ROMANIA	647	1
			RUSSIA	1,314	1
			SAUDI ARABIA	1,004	1
			SENEGAL	172	1
			SINGAPORE	1,483	1
			SLOVAK REPUBLIC	555	1
			SLOVENIA	582	1
			SOUTH AFRICA	1,195	1
			SPAIN	1,406	0
			SRI LANKA	538	1
			SWEDEN	1,393	0
			SWITZERLAND	1,595	0
			TAIWAN	946	1
			THAILAND	940	1
			TUNISIA	635	1
			TURKEY	1,317	1
			UKRAINE	309	1
			UNITED KINGDOM	1,652	0
			UNITED STATES	1,647	0
			VENEZUELA	963	1
			TOTAL	73,298	77