The bank-lending channel of macroprudential policy: evidence from cross-border bank flows

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Abstract

We study the transmission of foreign macroprudential policy to domestic bank loan issuance in emerging markets via cross-border bank flows. We use the universe of bilateral cross-border bank credit transactions to destination countries matched to macroprudential policy action taken in source countries combined with bank balance sheet data in destination markets to document that a tightening of macroprudential policy in source countries reduces the positive impact of cross-border flows on the credit supply of banks in the destination. We show that the negative spillover effect of foreign macroprudential policy is only operational for capital-based and international-exposure policy tools. We also find evidence that macroprudential regulation performed by destination countries does not change the inward spillovers associated with cross-border flows.

JEL classification: E58, F34, G21, G28

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1 Introduction

How does macroprudential policy set in a country spill over to the rest of the world? A growing literature examines this question focusing on cross-border lending as a transmission channel by looking into the impact of a country's macroprudential conditions on the volume of bank loans it supplies abroad (Aiyar et al., 2014; Avdjiev et al., 2017; Houston et al., 2012; Takáts and Temesvary, 2021), while in a more targeted approach there is work that studies the spillover of macroprudential policy to destination economies through the lending operations of foreign affiliates located there (Buch and Goldberg, 2017; Danisewicz et al., 2017; Franch et al., 2021; Ongena et al., 2013). However, less is known about the linkage between international bank flows and domestic credit supply for the *entire* banking sector of the recipient country when the source country of international flows activates macroprudential regulations, the policy instruments that have the stronger spillover effects, and the role, if any, of macroprudential policy undertaken by the host countries of flows to smooth the effects of foreign bank flow surges. The goal of this paper is to study the workings of the bank-lending channel of macroprudential policy in an international context.[1]

Cross-border bank flows are a particularly useful setting to evaluate the spillover effects of macroprudential policy because of the increasing reliance of recipient-country banks on this source of funding to supply loans in the domestic market (see Aldasoro et al. (2023); Bräuning and Ivashina (2020a) for emerging market recipients), combined with the increased use of macroprudential regulations in the aftermath of the global financial crisis to strengthen financial stability. We consider the following research questions. Does macroprudential policy initiated in the source country of international bank flows change the loan supply of recipient-country banks? If so, does the effect differ across macroprudential policy tools, and can macroprudential policy performed by recipient countries isolate domestic financial stability risks from international banking flow surges? Despite the importance of these questions, to the best of our knowledge, no existing study has comprehensively examined regulatory cross-border externalities and the role of host-country regulation related to the impact of cross-border bank flows on credit supply extended by the universe of banks operating in recipient countries. Our main contribution is to offer new insights into how the macroprudential regime can affect the magnitude of cross-border financial spillovers from an international banking dimension, accounting for possible heterogeneous effects arising from policy tools that target different sectors of the source economy.

We inform our analysis of macroprudential policy spillovers by building on the bank lending channel. According to this channel, when banks gain access to funding sources at a lower cost they respond by

[1]These channels become particularly relevant for recipient countries of cross-border flows that do not have a high concentration of foreign banks, the lending of which is not large enough to affect aggregate local financing conditions. Examples of such emerging market countries included in our sample, where foreign banks account for the minority of banking sector assets in 2017, are Belarus (19.1%), Kazakhstan (24.7%), Russia (12.3%), Turkey (24%), and Ukraine (31.1%).

originating new loans on the asset side of the balance sheet. This response is particularly strong for banks that face higher funding costs due to financial frictions associated with their balance-sheet strength, such as low-capitalized banks. This channel has been documented in the presence of looser domestic monetary policy, known as the domestic bank lending channel of monetary policy (Dell'Ariccia et al., 2017; Jiménez et al., 2014; Kashyap and Stein, 2000), but also in its international dimension where monetary policy loosening abroad translates into increased loan supply in the domestic economy (Bräuning and Ivashina, 2020b; Cetorelli and Goldberg, 2012; Miranda-Agrippino and Rey, 2015; Morais et al., 2019; Temesvary et al., 2018). An expansion of credit supply in the domestic banking system has also been recorded in response to higher foreign capital inflows in the case of Turkey, where the flows represent a positive liquidity shock from abroad (Baskaya et al., 2017; Di Giovanni et al., 2018). Therefore, by increasing the liquidity of the banking system in the recipient country at a lower cost, flows from abroad pass through to local borrowers by raising loan supply in the recipient economy. Accordingly, the bank-lending channel of cross-border flows dictates that a higher inflow of cross-border bank flows to recipient banks increases credit supply to non-bank borrowers (i.e., firms and households) with the effect being stronger for less-capitalized banks.

Invoking this bank-lending channel, we examine how foreign macroprudential policy affects the international credit transmission. There are two opposing views about the macroprudential spillover mechanism focusing on the volume of credit supplied by source countries. On the one hand, as noted by Aiyar et al. (2014), tighter macroprudential regulation by increasing the cost of lending for source-country banks, reduces their credit supply, including cross-border loan supply. For recipient banks, the scaling back in cross-border inflows increases their own cost of funding credit via this source of finance, lowering the overall loan supply to non-bank borrowers. On the other hand, stricter source-country regulation might induce banks to evade costly policies at home by engaging in regulatory arbitrage and increase lending activities abroad (Houston et al., 2012; Ongena et al., 2013). The resulting additional inflows in the recipient country, reduces the cost of funding for domestic banks and increases the quantity of lending extended locally. The ambiguity regarding the sign of the bank-lending channel of macroprudential policy is also reflected by findings in recent empirical studies that examine the impact of specific policy tools. Aiyar et al. (2014) show that an increase in the minimum capital requirements of UK banks reduces their cross-border bank loan supply, while Avdjiev et al. (2017) find that a tightening in local-currency reserve requirements and in the loan-to-value ratio limit increases the growth of lending abroad. Specific to foreign lending through bank affiliates located in destination countries, Buch and Goldberg (2017) based on a meta-analysis of fifteen single-country case studies report that seldom macroprudential policies exhibit statistically significant

inward spillovers in recipient countries.[2]

These implications provide us with the basis upon which we formulate our main hypothesis about how the stance of macroprudential policy in a source country affects the supply of bank loans in destination countries via cross-border flows. Compared to existing studies, our analysis is performed using multiple source and destination countries, the universe of cross-border flows entering emerging market economies, and the universe of banks at destination so that the spillover effect captures the response of the whole host banking sector (and not just of locally-based foreign bank affiliates). In this way, our approach assesses the ensuing impact of macroprudential policy changes in source countries on the bank-lending behavior of banks in destination countries. Moreover, using all the varieties of macroprudential instruments activated by source-country regulators –in the first instance decomposed into those that target loan supply, loan demand, and foreign exchange exposure – we can examine whether the international transmission differs in sign or size by type of policy tool.[3]

In testing the hypothesis, we benefit from the use of a data set that combines bilateral cross-border credit data from 27 source countries to 30 destination countries with loan issuance data for 1,417 banks, and data on national macroprudential policies from 1998 to 2020. We focus on recipient countries where firm financing relies heavily on the banking system. This refers to emerging economies in Central and Eastern Europe and Asia mainly because small and medium enterprises dominate the corporate landscape in this part of the world, where up to 99% of all firms are classified as such companies (Ongena et al., 2013). The absence of a well-developed capital market and with corporate bond financing in its early stages means that banks are by far the primary provider of external funds to businesses. This environment is ideal for identifying the impact of cross-border flows, and the way it changes due to foreign macroprudential policy, on credit granted by banks in recipient countries.

Our identification strategy follows closely the most recent empirical literature that examines the effects of broader capital inflows on the provision of bank credit (Baskaya et al., 2017; Di Giovanni et al., 2018). We identify local bank credit supply effects to changes in cross-border bank inflows from the differential responses of recipient-country banks with different capitalization ratios. Capital-abundant banks may be less willing to change loan granting during periods of increased cross-border inflows due to their greater capacity to obtain financing from their own financiers, implying they are less responsive than capital-constrained banks to changes in cross-border flows. Any changes in the recipient-country loan supply

[2]The analysis in Buch and Goldberg (2017) is based on a multi-study initiative of the International Banking Research Network where fifteen country teams examine the international banking spillovers of regulations, including macroprudential policies, using detailed confidential micro-banking data. The studies focus on a single country each and although they provide a clean identification, the general applicability of the results remains open while the spillover effects limit themselves to the impact on foreign bank affiliates.

[3]This broad classification of policy tools follows Alam et al. (2019) and Chari et al. (2022), but we also examine more disaggregated measures of macroprudential policies including changes in individual instruments.

issuance during episodes of macroprudential policy changes abroad transmitted via cross-border loans, are also identified by the differential response of banks with varying capitalization. This interpretation is possible due to the use of bilateral bank flow data from each source to a destination country, which enables matching macroprudential policy changes in source countries with their own cross-border outflows that permits identifying more accurately the bank-lending channel of foreign macroprudential policy. To sharpen further the identification we take explicit account of macroprudential policy in recipient countries, which may distort the impact of international bank flows on domestic lending perhaps confounding the spillover effects of foreign regulation. The identification of changes in recipient-country bank credit supply attributed to foreign macroprudential policy is also facilitated by the use of multitude fixed effects, such as time-varying lending banking system-specific supply factors, unobserved historical lending relationships between pairs of countries and between source countries and specific banks on the receiving end, and unobserved bank characteristics. Most importantly, the multi-dimensional structure of the data allows us to control for credit demand shocks in the recipient country, thus giving a loan supply interpretation to our estimates.

Our key results are as follows. Consistent with the bank-lending channel of cross-border flows, we find that banks in destination countries increase loan-granting to non-bank borrowers during periods of high cross-border inflows. We find this effect to be heterogeneous across banks, with low-capitalized banks responding more strongly than high-capitalized banks. Specific to our hypothesis, we document that a tighter macroprudential stance in source countries diminishes the impact of cross-border inflows eliciting a decrease in the supply of loans by recipient-country banks. This effect is also more potent for banks with relatively lower capital, but most importantly is operational only for a subset of macroprudential tools, those targeting the international exposure and the capital requirements of banks. These effects are economically significant: a one-standard deviation increase in the growth of cross-border flows increases the lending differential between less- and more-capitalized banks in the destination country by about 16% on average, while a *one-unit* tightening in the macroprudential policy stance in the source country reduces this differential response by 14% for foreign exchange exposure tools and by 3% for capital-based tools.

In an additional set of tests, we consider the extent to which results are driven instead by alternative recipient-country bank-level characteristics (including the foreign ownership of banks), by macroeconomic conditions in source economies, by sub-groups of countries characterized by different levels of development or European Union membership, and by the years of the global financial crisis. In each case, we continue to find supporting evidence for our key results. We also find that recipient-country banks do not change their lending to firms and households when these non-banks receive directly cross-border credit flows from abroad. This implies that the cross-border transmission of flows and its change due to foreign

macroprudential policy occur through a liquidity shock to the recipients' banking systems. Furthermore, we establish that macroprudential policy in recipient countries does not affect the bank-lending channel of cross-border flows, thus providing further credence to the role of foreign macroprudential policy in domestic lending conditions.

Taken together, results corroborate the literature for the importance of cross-border bank inflows for a country's domestic loan supply and underscore the role of banking regulations in the source country of flows in distorting this linkage by changing the cost of the recipient banks' non-core financing. As banks rely on the international credit market to support the expansion of local credit, an increase in the cost of funding from this source following the adoption of stricter regulations abroad support a negative spillover effect of lending in the local economy. In this sense, our paper is consistent with a bank-lending channel of macroprudential policy in an international context.

This study contributes to three strands of the literature. First, we contribute to the literature that studies the transmission of international credit on local loan issuance in emerging economies using *aggregate* inflows entering the destination countries, either in a single country context (Baskaya et al., 2017; Di Giovanni et al., 2018) or a multiple country environment (Aldasoro et al., 2023; Dinger and te Kaat, 2020). We build on these studies and provide complementary evidence by resorting instead to *bilateral* cross-border bank data that in a multi-country analysis enable an improved identification of the causal impact of international bank lending on the local credit supply in emerging economies.

Second, our work contributes to the literature on the international spillovers of macroprudential policy, where part of this literature explores the impact of a source-country's policy on the outflow of cross-border loans (Aiyar et al., 2014; Houston et al., 2012; Takáts and Temesvary, 2021) and another part drills down one more layer and looks into the transmission of *specific* policy changes on the loan supply of the source-country's bank affiliates located in a host country (Buch and Goldberg, 2017; Danisewicz et al., 2017; Franch et al., 2021; Ongena et al., 2013). Matching cross-border flows data between country pairs with macroprudential policy data in the source country of flows allows a clean identification of the degree by which loan supply in host countries is affected by the cross-border transmission of changes in foreign regulation. Importantly, the use of detailed credit data that cover the entire banking sector in recipient countries means that the estimated spillover effect of foreign macroprudential policy is not driven by foreign affiliates, while the use of granular data on macroprudential policies across all those activated allows identifying those policy tools that facilitate the transmission. All these characteristics improve upon current approaches allowing us to make a distinct contribution to the bank lending literature.

At a high level, our paper contributes to the large literature on international spillovers via cross-border flows and the role of financial intermediaries, particularly active in tracing the international bank lending

channel of monetary policy (Bräuning and Ivashina, 2020b; Bruno and Shin, 2015; Cetorelli and Goldberg, 2012; Miranda-Agrippino and Rey, 2015; Temesvary et al., 2018).[4] Unlike these papers that study the role of global banks in the transmission of monetary policy across countries through cross-border bank loan supply, we focus on the cross-border transmission stemming from macroprudential policies. Most directly, our study represents the first attempt to explore in a single framework the response of recipient country banks to changes in cross-border bank inflows and how this response changes due to changes in foreign macroprudential policy. We also allow for the responses to vary with the capitalization of banks from the destination economies, a dimension found in the literature to shape the international bank lending channel.

The paper is structured as follows. Section 2 presents the hypothesis. Section 3 describes the data. Section 4 discusses the estimation framework. Section 5 presents the results of the analysis, and Section 6 concludes.

2 Hypothesis

This paper falls within the international bank lending literature, in the context of which we explore the impact of cross-border flows to destination-country bank lending and develop our main hypothesis assessing the international transmission of foreign country macroprudential policy via cross-border flows.

The hypothesis relies on the presence of a bank-lending channel of cross-border flows, according to which cross-border loans flowing into destination country banks increase those banks' loan granting to non-banks, especially by constrained banks with low capital-to-assets ratios. Figure 1 helps visualise this channel. It illustrates that a bank located in a foreign country j can extend loans domestically and across the border. Cross-border assets, in turn, involve claims on foreign resident non-banks (i.e., firms and households) and claims on foreign resident banks. The cross-border loans received by banks in country i represent a positive liquidity shock to the banking system, which can be used to supply loans to banks and non-banks in the country. The channel involves how banks in the destination country respond in terms of credit supply to non-bank borrowers when faced with increased international banking inflows and states that destination country banks with lower capitalization will respond more strongly to this liquidity shock. The identification of this channel follows the broad literature on the bank-lending channel of monetary policy by estimating the differential response of banks with low vs. high capitalization ratios to an increase in cross-border flows in the domestic economy, also using the dyadic structure of the cross-border lending

[4]The literature has also documented the international bank-lending channel of monetary policy along a currency dimension. According to this, in response to monetary policy changes at home, commercial banks located abroad change the composition of credit supply between domestic and foreign currencies (Bräuning and Ivashina, 2020a; Neanidis and Savva, 2021; Ongena et al., 2021; Takáts and Temesvary, 2020; Temesvary et al., 2018).

data that allows saturating the model with several fixed effects, including recipient country×time fixed effects to capture time-varying credit demand in the recipient country (Temesvary et al., 2018).[5]

Assuming we identify a bank-lending channel of cross-border flows, our hypothesis is as follows:

Hypothesis. There exists a bank-lending channel of foreign macroprudential policy via cross-border flows:

1. a macroprudential policy tightening in the source country of cross-border flows *reduces* the destination country banks' loan granting to non-banks, especially by constrained banks with low capital-to-assets ratios.

2. a macroprudential policy tightening in the source country of cross-border flows *increases* the destination country banks' loan granting to non-banks, especially by constrained banks with low capital-to-assets ratios.

Figure 1 shows how a change in macroprudential policy abroad, indicated by H, can spill over from the source country via cross-border flows to the destination country's individual bank loan supply to the non-bank sector, thus generating an inward transmission. The underlying idea is that tougher regulation in the source country to build up local bank resilience affects bank credit supply not only in the domestic market, but also across the border. To the extent that a tightening in macroprudential policy changes the cost of cross-border lending, it affects the cost of funding from this source for recipient banks causing them to change credit supply to non-banks. Stricter source-country regulations may induce global banks to scale-back cross-border lending activities, lowering loan granting by recipient-country banks to non-banks (H1). Alternatively, regulatory arbitrage by global banks may increase their international flows, increasing the volume of credit extended by local banks at destination (H2). In each scenario, the response is expected to be more potent for less capitalized banks.

The identification of the bank-lending channel of foreign macroprudential policy through cross-border flows relies on the use of source country×time fixed effects (see Correa et al., 2022) and the interaction between macroprudential policies and cross-border flows, which isolate supply-driven changes in cross-border lending attributed to macroprudential policy in source countries. Further, the differential response of recipient-country banks to this channel is captured by their varying bank-capitalization ratios.

[5]It is necessary to include fixed effects that separate the factors driving credit supply from those driving credit demand. Otherwise, supply-driven changes in cross-border lending in source countries may be confounded with changes driven by credit demand in the recipient countries, to which recipient-country banks respond equally by granting more loans. In effect, we apply the Khwaja and Mian (2008) identification method, which relies on firm borrowing from different banks, whereas in our case identification relies on destination-country borrowing from different source lending systems.

3 Data

The basis of our analysis is a multi-country dataset on cross-border bank flows, macroprudential policy, and recipient country bank loan supply. The cross-border bank flows directed to the 30 destination countries come from 27 source countries, including 10 euro area countries. The banks in recipient economies represent the universe of institutions, totalling 1,417 banks. Table A3 lists the set of source and destination countries. The constructed dataset is at the annual frequency for the period 1998-2020. We assemble the data from three main sources: bilateral country bank flows from the BIS, bank-level data from S&P Capital and BankScope, and country-level macroprudential policy from iMaPP. We discuss each dataset below.

3.1 Cross-border banking data

Data on cross-border bank claims are from the Locational Banking Statistics (LBS), collected by the BIS. The key organizational criteria of the LBS data are the country of residence of the source banks and their destination country with the recording of all positions on a gross basis, detailed by instrument (loans and security holdings) and destination sector (bank and non-bank). As such, they include intra-group positions between entities that are part of the same banking group (such as subsidiaries) and inter-office positions with their non-resident branches but exclude inter-office positions with the bank's resident branches. LBS is, therefore, consistent with the balance of payments and international investment position statistics. LBS reporting banks comprise all foreign banks located in a reporting country and domestic banks with substantial international business covering all cross-border banking activity across 48 source countries and 200 destination countries. The reported claims capture around 95% of the estimated cross-border claims of all banks worldwide (for details, see https://www.bis.org/statistics/lbs_globalcoverage.pdf). In our sample, recipient countries receive 100% of their total cross-border inflows from the 27 source countries included in the analysis, thus capturing the universe of flows entering the destination.

The dyadic structure of the data represent an advantage for our research objectives because it allows disentangling changes in cross-border bank flows driven by supply factors specific to the source countries from those arising from changes in credit demand from destination countries. In this way, we can use fixed effects to control for factors affecting the demand for credit in the destination country, thus isolating supply-side factors that vary across source countries.[6] But, we can also use fixed effects to account for historical lending relationships between country pairs and source country-destination bank pairs, perhaps due to proximity or other time-invariant ties.

[6] Another advantage of the LBS data is that cross-border claims, denominated initially in multiple currencies, are expressed in U.S. dollars and adjusted for exchange rate changes, allowing to compute cross-border flows that abstract from exchange rate fluctuations over time.

Our measure of cross-border lending activity is the growth rate of cross-border claims. We first calculate the bank flows from source to destination countries with the first-difference of cross-border bank claims, already adjusted for exchange rate fluctuations and breaks-in-series. Then, we normalize the flows by the lagged outstanding claims, thus obtaining a measure equivalent to the growth of claims.[7]

Although the LBS data set includes observations for most of our source countries dating back to 1977, data on our destination countries only started being reported in the late 1990s. This limitation, alongside the data availability for lending by banks in the destination countries, constraints our sample to the period between 1998-2020. The panel is unbalanced since not all reporting source countries have outstanding claims in all destination countries. Overall, we cover cross-border flow data for 730 country pairs where, out of all the destination countries, 97% have claims from more than 20 source countries. In the sample, most global banking activity concentrates on a few origin and destination countries. For instance, reporting banks in Austria have been the largest external source of funding, followed by Germany and the UK, with top destinations in Russia, Turkey, and Poland. This bilateral concentration of flows can raise a challenge when using growth rates in any empirical analysis, as high growth rates on small claims can influence the estimates. To overcome this issue, we winsorize the growth rates of cross-border claims at the bottom and top 2.5 percent of observations, as is common in the literature (Avdjiev et al., 2020; Avdjiev and Takáts, 2019; Chari et al., 2022; Takáts and Temesvary, 2021).[8]

Table A1 presents a set of summary statistics for cross-border bank flows and all other variables used in our empirical analysis. The main measure of flows we consider is the annual growth rate of total claims on all instruments (i.e., loans and security holdings) vis-à-vis all counterparty sectors (i.e., banks and non-banks), which averages 27.92% during our sample period. The figure is not too dissimilar if we consider only the growth rate of loans (28.74%) or the growth rate of claims to non-banks (29.98%).[9]

3.2 Bank-level data

For every bank in each destination country, we observe annual balance sheet information, including net loans granted to non-banks and banks, total assets, equity, and profitability. The primary source of bank-

[7] In our analysis, we transform the quarterly cross-border bank flow data to annual to match them to the balance sheet data of banks in recipient countries which are only available at the annual level. In robustness tests, we also experiment with a different measure of cross-border flows normalized by the recipient country's GDP.

[8] Our results are robust to alternative winsorization levels, such as at the 1st and 99th percentiles, and the 5th and 95th percentiles.

[9] An alternative to the LBS dataset is the BIS Consolidated Banking Statistics (CBS), which aggregates claims by the banks' *nationality* rather than their location and excludes cross-border intragroup positions. Our preference for the LBS data is due to (i) the suitability to address our research questions, as they allow us to establish a more direct link between the source countries' macroprudential policy and the banks' resultant cross-border portfolio adjustments, which are likely to include changes in intragroup positions, and (ii) the CBS failing to adjust the series for exchange rate fluctuations and breaks. Nevertheless, we also use the CBS data to test our hypotheses in the robustness analysis. Table A1 reports that the average growth rate of cross-border flows based on this dataset is slightly higher than that of the LBS, at 32.22%.

level data is S&P Capital IQ which we complement with BankScope data to expand coverage.[10] The main dependent variable is the first-difference of net loans granted to non-bank customers by a bank normalized by the stock of lagged net loans, thus yielding a measure of annual loan growth that mirrors the measure of cross-border flow growth.

We use the information on the balance sheets to extract bank characteristics, including the capitalization ratio, defined as the share of a bank's equity to total assets. As explained earlier, we use this variable to determine the heterogeneous effects of bank lending behavior in response to cross-border bank inflows and changes in foreign macroprudential policy. We also include as control variables two other bank characteristics that can capture time-variation in the banks' loan supply: *Size*, measuring a bank's prominence in the destination country banking sector as a share of the bank's total assets in all banks' assets in a given country in a given year, and *Profit*, defined as a ratio of operating profit over total assets. We also test whether differences in bank *Size* and *Profit* drive bank heterogeneity rather than bank capitalization.

The bank-level dataset covers 1,417 banks active for at least one year between 1998-2020 in destination countries, generating several thousand observations. We report the summary statistics in Table A1, where all bank-level variables are winsorized at the 2.5 percentile to exclude outliers. During the sample period, banks in emerging economies in Central and Eastern Europe and Asia increased lending to non-bank borrowers by an average of 15.87%. The respective growth in claims to fellow banks was substantially larger, at 43.80%, and more dispersed, as indicated by their standard deviation. There is also considerable variation in the capital-to-assets ratio: while the average bank capital ratio is 16.96%, high-capitalized banks (at the 99th percentile of the distribution) hold on average 67.78% of equity as a share of total assets and low-capitalized banks (at the 1st percentile) hold just 3.61%.[11] In contrast, both *Size* and *Profit* exhibit smaller average values and lower variability.

3.3 Macroprudential policy

We construct a country's macroprudential policy using the updated data of the IMF's Integrated Macroprudential Policy (iMaPP) database, introduced initially by Alam et al. (2019). The iMaPP offers the most comprehensive cross-country, time-series data on a broad set of macroprudential regulations. It provides monthly dummy-type indicators of tightening and loosening actions for 17 macroprudential policy instruments in 161 countries from 1990 to 2020.

The policy action indices take the value of 1 for tightening actions, -1 for loosening, and zero for

[10]By using BankScope we expand the sample of banks and years covered for some entities, overall increasing our final sample by about 5% compared to the S&P Capital IQ sample alone.

[11]For a few banks the capitalization ratio even takes negative values. These observations represent less than one percent of the bank-level observations and removing these observations does not alter our main findings.

no change. The granularity of the database allows us to disentangle the possibly heterogeneous effect of macroprudential policy by targeted sector exposure. For instance, we can track changes in policies targeting the supply of credit, policies targeting the demand for credit, and policies targeting international exposures. Table A1 provides details on the precise policy instruments included in each set of targeted policies. One drawback of this data is that the dummies capture policy changes rather than the magnitude or intensity of the actions. Yet, given the significant heterogeneity in the use of policies across source and destination countries, the dummy-type variables summarize information from different banking regulators in a single measure allowing us to extract their impact on local bank loan supply via cross-border flows.

To proxy for the tightness or looseness of an instrument, we construct a macroprudential policy *stance* measure defined as the sum of all changes in that policy instrument recorded annually since 1990 and up to the year of observation. Following this approach, in line with Bergant et al. (2020), Forbes (2021), and Chari et al. (2022), we construct a cumulative measure of each country's macroprudential policy stance for each year in our sample period, where a higher value indicates a tighter stance.

When accounting for all macroprudential policy instruments, the resulting stance ranges from -10 to 46 across the country sample, with a mean of 3.12 and 5.90 for source and destination countries, respectively. A closer look at the instruments shows that regulators used more measures targeting credit supply than those targeting credit demand and foreign exposure (Table A1).[12] Figure 2 plots the mean of the overall macroprudential policy stance and by target sector for source countries, panel (a), and destination countries, panel (b). It shows that source countries used macroprudential policy less actively than recipient countries before 2008. This fact reflects the greater tendency of advanced economies to loosen more during recessions rather than hesitating to tighten during stable times (Chari et al., 2022). In comparison, emerging economies used macroprudential policies more frequently, especially foreign exchange-related policies, consistent with their higher exposure to external shocks and volatile capital flows (Cerutti et al., 2017). However, the gap between the two country groups began to close towards the end of the sample. Overall, the early 2000s saw only a slight net tightening, so countries had a very loose macroprudential stance on the eve of the 2008 global financial crisis. Regulators began to tighten macroprudential policy more frequently after 2010, reaching its peak value in 2019 before the pandemic. The sharp decline afterward captures the quick easing in response to COVID-19.

Given the wealth of macroprudential policy instruments described above, our baseline analysis focuses on the broad measure of macroprudential stance and its three components by target sector. Across sectors,

[12]There is also variation within each country group. For instance, South Korea, Hong Kong, and Mexico had the tightest stance on average among source countries. In contrast, euro-area countries and the Philippines had the loosest stance throughout the period. Amongst destination countries, Bulgaria, Russia, Turkey, and Romania had the most stringent policies, while Ukraine, Montenegro, and Slovenia had the loosest stance.

given the emphasis of regulators on changing mainly supply-side instruments, we pay special attention to policies targeting separately for capital-based, credit-based, and general policies within this sector. Nevertheless, we also perform analysis at the finest granularity of instruments to unveil the impact of specific policy tools.

3.4 Additional macroeconomic controls

We collect data on monetary policy rates in each source country from central banks or databases published by the International Monetary Fund. The objective is to examine if the results testing for the spillover effects of macroprudential policy survive controlling for the international bank lending channel of source-country monetary policy as identified in the literature (see Correa et al., 2022). For those source countries currently members of the euro area, we use the individual country policy rates until the euro introduction and the euro area's interbank rates for the rest of the sample period.[13] For additional source-country controls, used in the robustness analysis, we collect real GDP growth, inflation, changes in the exchange rate, and the Chinn-Ito index of financial openness. Table A1 defines the variables and reports the summary statistics. Given that the sample of source countries includes predominantly advanced economies, the mean values for these macroeconomic variables are on the low side.

4 Empirical framework

We use two equations to test our hypothesis. The first equation estimates the impact of bilateral cross-border inflows on the credit volume of local banks; this examines the presence of the bank-lending channel of cross-border flows. The second equation adds an interaction term with source-country macroprudential policy to assess how the impact changes due to foreign regulatory activity; this tests the bank-lending channel of foreign macroprudential policy. Critical for identification, both equations include further interactions of the main variables with bank capitalization ratios.

To analyze the bank-lending channel of cross-border flows, we examine the decision of the average destination-country bank to change the volume of granted loans as a function of the bank flows received from abroad. Evaluating whether this effect varies with the capitalization of banks in destination countries allows identifying this channel according to which banks with lower capitalization react more to inward

[13] Given our sample period covers in full the years for which source-country central banks used unconventional monetary policies during which policy rates entered the zero lower bound, in separate regressions, we use shadow policy rates for the euro area, Japan, the UK, and the US based on Krippner (2016) and Wu and Xia (2016). Short-term shadow rates can capture expansionary monetary policy actions more accurately by not being subject to the zero lower bound.

flows than banks with higher capitalization. We estimate the following specification:

$$\Delta L_{bit} = \alpha_b + \alpha_{it} + \alpha_{jt} + \alpha_{ji} + \alpha_{jb} + \beta_1 \Delta F_{jit} + \beta_2 BKR_{bit-1} + \beta_3 (\Delta F_{jit} \times BKR_{bit-1}) + \epsilon_{bit} \quad (1)$$

The dependent variable, ΔL_{bit}, represents the growth of loans granted by bank b in destination country i during year t. The main regressors of interest are the growth of bank claims from a source country j to a destination country i during year t, ΔF_{jit}, and its interaction with the predetermined destination-country bank capitalization ratio, BKR_{bit-1}.[14] The specification also includes a range of fixed effects. These are recipient country bank fixed effects, α_b, to control for unobserved bank characteristics; destination country-time fixed effects, α_{it}, to fully account for recipient-country time-varying characteristics and demand for credit; source country-time fixed effects, α_{jt}, to capture all lending banking system-specific supply factors that vary over time; a fixed effect for each source country and destination country pair, α_{ji}, to control for unobserved historical lending relationships between pairs of countries; and a fixed effect between each source country and recipient country bank, α_{jb}, to capture any potential bias stemming from historical lending relationships between a sending country and a recipient bank.[15]

Given that the dependent variable varies at the bank-recipient country-year level, the inclusion of all time-invariant and time-varying fixed effects in equation (1) allows us to interpret the coefficient β_1 as the effect of cross-border bank flows on the loan issuance of the average destination country bank. When cross-border flows represent flows to the recipient country's bank sector, a positive β_1 would indicate that banks in the destination country provide more loans when having more access to credit from abroad.[16] Our identification relies on the coefficient β_3 of the interaction between cross-border inflows and the predetermined bank characteristic which estimates the differential credit supply effect of cross-border inflows with respect to bank capitalization. A negative value implies a reduced impact of cross-border flows on local lending for *more* capitalized banks.[17] Therefore, with the inclusion of the fixed effect factors we disentangle the bank credit supply-related variations in loan outcomes, thus testing for the bank-lending channel of cross-border flows.

[14]Using lagged values of the bank capitalization ratio ensures that these ratios, at most, reflect past strategic choices of banks unrelated to liquidity shocks arising from cross-border flows.

[15]Using destination country-year fixed effects ensures that all recipient-country macroeconomic variables in levels are fully absorbed; hence, such variables are unnecessary in the regression. This also applies to source-country macroeconomic variables due to the use of source country-year fixed effects.

[16]The analysis also explores the case where cross-border flows represent flows to the recipient country's *non-bank* sector. In this case, β_1 may change sign and turn negative, implying that host-country banks contract their lending when foreign country banks issue direct loans to the local non-bank sector. In this situation, cross-border loans and local bank loans act as substitutes.

[17]The identification strategy relies on the *differential* response of high-capitalized vs. low-capitalized destination country banks to inward cross-border flows. Even if inward spillovers simultaneously impact the liquidity of all banks, the cross-bank differences in the transmission strength should not be affected.

Equation (1) draws from the work of Baskaya et al. (2017) and Di Giovanni et al. (2018) who examine the impact of broader capital inflows in Turkey on the credit supply of local banks by using credit-registry data. Unlike these studies that use aggregate capital flows entering a single country, we use bilateral bank flows from multiple source to destination countries. An advantage from using bilateral flow data in our specification is that they improve the identification of the bank lending channel. Specifically, the inclusion in equation (1) of recipient country-year fixed effects, α_{it}, is a way of asking whether banks in the same recipient country in the same year borrowing from multiple source countries experience an increase in lending due to an increase in the *supply* of cross-border flows. This term is therefore the direct analogue of the firm-specific fixed effects methodology pioneered by Khwaja and Mian (2008) to absorb changes in demand conditions. Since the comparison is the variation in cross-border flows across different source countries j for the same destination country i in a given year t, all demand shocks in country i at time t are absorbed by this term. This allows a clean identification of the impact of cross-border flows from multiple source countries on recipient-country bank lending.[18] A further advantage from using bilateral bank flow data is that it enables matching macroprudential policy changes in source countries to cross-border outflows from those countries, thereby providing a direct link between source-country regulatory changes and destination-country credit supply. This matching is crucial in identifying the bank-lending channel of foreign macroprudential policy, discussed next.

To examine our main hypothesis on whether the impact of cross-border flows on recipient-country bank loan supply changes due to macroprudential policy actions in source countries, we estimate the following specification:

$$\begin{aligned}\Delta L_{bit} = {} & \alpha_b + \alpha_{it} + \alpha_{jt} + \alpha_{ji} + \alpha_{jb} + \beta_1 \Delta F_{jit} + \beta_2 BKR_{bit-1} + \beta_3 (\Delta F_{jit} \times BKR_{bit-1}) \\ & + \gamma_1 (MPP_{jt} \times \Delta F_{jit}) + \gamma_2 (MPP_{jt} \times BKR_{bit-1}) + \gamma_3 (MPP_{jt} \times \Delta F_{jit} \times BKR_{bit-1}) + \epsilon_{bit}\end{aligned} \tag{2}$$

Compared to equation (1), equation (2) adds the macroprudential policy stance in a source country j, MPP_{jt}, as an interaction term with the three variables of interest: ΔF_{jit}, BKR_{bit-1}, and $\Delta F_{jit} \times BKR_{bit-1}$.[19] The additional interaction terms allow foreign macroprudential policy to shape the bank lending channel of cross-border flows by affecting the relation between inward cross-border flows and recipient country bank credit supply. In this specification, the coefficient γ_1 isolates the impact of international bank flows on the destination country's average bank loan supply due to changes in the source country's macroprudential

[18] In some regressions, we also load the specification with source country×destination country×time fixed effects, α_{jit}, that allows for a narrower identification of the bank lending channel by absorbing the level effects associated with changes in cross-border flows, i.e., coefficient β_1.

[19] The specification does not include on its own the source-country macroprudential policy stance, MPP_{jt}, because it is absorbed by the source country-year fixed effects, α_{jt}.

policy stance, while identification comes from the coefficient γ_3 that captures the strength of this effect along the bank capitalization ratio of the destination country banks. In some regressions we also include a set of (lagged) bank-level variables, *Size* and *Profit*, or restrict the sample to foreign vs. domestically-owned banks, all described in the extant literature to affect the supply of loans.[20]

As discussed in the Introduction, a tighter macroprudential policy in the source country, when the financial system is judged to be overheating, will encourage domestic banks to cut back on domestic credit supply. But this policy might also prompt banks to change the volume of cross-border lending operations. If source-country banks reduce credit supplied abroad, recipient-country banks facing a negative liquidity shock that increases the cost of funding via this source reduce the local supply of loans. A negative γ_1 would be consistent with this negative spillover effect of tighter source-country macroprudential policy, with a positive γ_3 indicating that more capitalized banks respond *less* strongly to this effect than less capitalized banks in destination countries. On the contrary, if source-country banks facing tighter regulation at home rebalance their portfolio from domestic to cross-border lending to compensate for the lower ability to engage in risk taking in their home-country market, banks in the recipient country can rely more on this lower-cost source of funding and use it to extend more loans to their own customers. This positive inward spillover effect would correspond to a positive estimate for γ_1 and a negative estimate for γ_3. The wide variety of macroprudential instruments in our dataset across the spectrum of supply-side, demand-side, and foreign exposure target sectors provides us with an empirical setup where we can extract the sign and magnitude of the spillover by type of policy tool.[21]

Finally, the standard errors in all estimations are clustered at the bank level, although we also experiment with double-clustering at the source and destination country levels without this decision affecting findings. The following section presents the results based on estimating equations (1) and (2).

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[20]The inclusion of recipient country-year fixed effects, α_{it}, in the specification serves an additional role here since it is not unlikely that a looser macroprudential policy in source countries may coexist with a credit boom in destination countries. Controlling for time-varying credit demand in recipient countries, we isolate the impact of cross-border flows arising from changing source-country macroprudential policy.

[21]The fixed effects and the new interaction terms in equation (2) are necessary to ensure that we estimate the impact of foreign macroprudential policy on domestic credit granting through cross-border flows, avoiding potential confounding factors such as other drivers of international lending between country pairs (for instance, see Correa et al. (2022) for the role of foreign monetary policy). Alternatively, we could have performed a two-stage analysis, where in the first stage cross-border flows would be a function of the macroprudential policy stance (and other macroeconomic conditions) in the source country. In the second stage, loans granted by banks in the recipient country would be a function of the estimated component of cross-border flows explained by changes in the source-country macroprudential policy stance. However, this specification would suffer from omitted variables bias as it would fail to control in the first stage for *all* time-varying characteristics in the source country that may affect international credit supply. Our reduced-form specification overcomes this concern and controls for all unobserved time-varying source-country specific supply factors with the fixed effects α_{jt}, thereby offering a clean identification approach the coefficient estimates of which have a straightforward interpretation.

5 Results

The presentation of results begins with the estimates of equation (1) and then builds in the estimates of equation (2) testing the main hypothesis. Table 1 illustrates this transition starting from relatively simple models and gradually developing more sophisticated estimates. We then present results that zoom in on different dimensions of the data. Specifically, we analyse more granular measures of macroprudential policy by targeted sector (credit demand, credit supply, and foreign exposure) and different types of cross-border flows. We also "horserace" our baseline model against alternative channels through which cross-border flows may impact domestic lending and explore the heterogeneity of response across different country groups. Further, we examine the persistence of the spillover effect and perform sensitivity tests using alternative ways of measuring cross-border flows. Finally, we consider whether the domestic macroprudential environment matters for the inward transmission of foreign regulation. All these additional results appear in Tables 2 through 10.

5.1 Baseline results

Table 1 presents our first set of results. Columns 1 through 3 estimate equation (1), including successively an increasingly exhaustive set of fixed effects to control for time-varying credit demand and supply factors, and historical ties between countries and between source-countries and destination-country banks. Columns 4 and 5 estimate equation (2) by integrating the spillover effect arising from the source-country macroprudential policy stance. Column 5 includes the most extensive set of fixed effects. Although it offers the narrowest identification model, it precludes examining the level effects of cross-border flows and of their interaction with source-country macroprudential policy, as the fixed effects now absorb these. For this reason, the analysis uses the specification in column 4 as its baseline model. This model includes all relevant double and triple interaction terms for international flows, macroprudential policy, and bank capitalization.

We find strong evidence in support of a bank-lending channel of cross-border flows: the coefficient on cross-border flows is positive and statistically significant, suggesting that banks in destination countries grant on average more loans to non-bank borrowers when cross-border flows are higher. Importantly, the coefficient on the interaction between cross-border flows and the recipient bank's equity-to-asset ratio is negative and significant throughout. Therefore, the supply of loans by more capital-constrained banks is affected by changes in bilateral cross-border flows significantly *more* than loans granted by their capital-abundant counterparts. This finding supports the local credit supply effect of a positive liquidity shock from abroad that is heterogeneous along a bank-capital dimension.

The results also offer strong evidence in favor of a bank-lending channel of foreign macroprudential policy via cross-border flows: the negative and statistically significant coefficient estimate for the interaction term between cross-border flows and macroprudential policy in the source country means that macroprudential tightening in a source bank lending system significantly diminishes the positive impact of international bank flows on the loans supplied by recipient country banks. This effect is due to the higher cost of funding associated with cross-border inflows faced by destination-country banks as a means of finance, resulting in lower loan supply in the destination economy. However, the positive and statistically significant coefficient estimate of the triple interaction term reveals that the increased cost of international inflows as source of funding does not lead all recipient banks to reduce loan supply by the same amount. Banks respond heterogeneously, with less-capitalized banks reducing their lending to non-banks significantly *more* than high-capitalized banks. This result suggests a causal role for source-country macroprudential policy in the international transmission of flows and the way it feeds into the loan supply of host countries in line with a negative spillover effect presented in Hypothesis 1.

Column 5, representing the most demanding specification, continues to offer support to these findings since the relevant interaction coefficient estimates remain significant and materially unchanged. This combined evidence underscores the importance of cross-border flows for the lending capacity of recipient banks (Aldasoro et al., 2023; Baskaya et al., 2017; Di Giovanni et al., 2018) and adds to previous studies on the effectiveness of macroprudential tools in containing *domestic* credit growth (Altavilla et al., 2020; Araujo et al., 2020; Forbes, 2021) by showing that macroprudential regulation also has consequences across borders for those countries tightly connected via the lending behavior of global banks. Going beyond the current literature, which focuses on the impact of source-country regulation on recipient-country bank loan supply through locally-based affiliates (Danisewicz et al., 2017; Franch et al., 2021; Ongena et al., 2013), results support a broader impact of foreign macroprudential policy on loan supply by reducing the ability of the *entire* banking system in the recipient country to extend loans.

The bank-lending channels of cross-border flows and foreign macroprudential policy are not only statistically significant, but also economically relevant. The bottom panel in Table 1 presents the economic significance of the estimated coefficients associated with these two effects. For our benchmark regression in column 4, the coefficient of 0.005 for cross-border flows implies that a one-standard deviation increase in the growth of flows increases lending by destination-country banks to non-bank borrowers by an average of 0.65 percentage points. Translating this effect into a semi-elasticity, i.e., as a percent based on the sample mean value of domestic loans growth, it corresponds to 4.14% (this effect is obtained as 0.005*1.3089/0.1587). To characterize the magnitude of the bilateral flows effect at various levels of capitalization ratios, we use percentile ranks for the destination-country banks. Doing so reveals that following a

one-standard deviation increase in the growth of cross-border flows, low-capitalized banks (at the 1st percentile of the bank capital ratio, which is 3.61%) increase lending by 2.47 percentage points *more* than high-capitalized banks (at the 99th percentile of the bank capital ratio, which is 67.78%; -0.0294*1.3089*(0.0361-0.6778)), or a semi-elasticity of 15.58%.

The corresponding values for the bank-lending channel of foreign macroprudential policy appear in the table under H. They show that in response to a one-unit tightening in the macroprudential policy stance in the source country, lending by banks in destination countries decreases by an average of 0.29% due to the higher cost of funding associated with cross-border inflows (this is obtained as -0.0004*1.3089/0.1587). Across recipient banks, this effect varies with a unitary tightening in macroprudential policy abroad causing a 1.1% (calculated as 0.0021*1.3089*(0.0361-0.6778)/0.1587) greater drop in lending by low-capitalized banks than high-capitalized ones. At first glance, these effects might come across as relatively small, diminishing on average only about 7% (i.e., -0.29%/4.14%) of the impact of cross-border flows on domestic bank lending. However, it is important to note that they correspond to a *one-unit* tightening in macroprudential policy abroad within a year. More incidents of tightening per year would further reduce the impact of international flows.[22]

Overall, Table 1 confirms that higher cross-border inflows increase bank lending by recipient-country banks and supports H1 since tighter macroprudential policy in the source country reduces the magnitude of the transmission channel. The strength of the findings critically depends on the capitalization ratio of recipient banks with capital-constrained banks responding significantly more than capital-abundant banks.

5.2 More granular measures of macroprudential stance and cross-border flows

The findings of the previous section are based on the baseline model of equation (2) that regresses destination-country bank loans issued to non-bank borrowers on cross-border claims in *all* instruments (loans and security holdings) and on macroprudential stance *aggregated* across different policy categories (supply-side, demand-side, and foreign exchange exposure). While these aggregate variables can help capture the *overall* effects of interest, they may mask differences in the channels through which the spillover operates. For instance, it might be that demand-based macroprudential tools, such as a limit on the loan-to-value ratio, prompt affected banks to increase lending abroad as a result of regulatory arbitrage, reducing in destination-country banks the cost of funding from international flows and raising their own loan sup-

[22]One might be concerned with the timing of the effect of macroprudential policy on flows, which we assume in the regression to be contemporaneous at time t. However, it is possible that the regulation's impact may take more than a year to fully influence cross-border flows. For this reason, we test an alternative model where macroprudential policy activated abroad enters with a time lag. This exercise does not change the message of our main findings and even strengthens their magnitude further. Despite this, in our remaining analysis, we opt for the more conservative approach and proceed by entering both policy and flows at time t, while in a robustness test below we jointly include contemporaneous and lagged values to assess any separate effects.

ply. To examine this transmission channel, we next zoom in on different dimensions of the data that can help us answer key questions for policymakers: Does the bank-lending channel of cross-border *loans* operate the same as for international claims? Does the bank-lending channel of macroprudential policy *differ* in direction or strength when foreign authorities activate different types of macroprudential tools? Do banks change their lending to non-banks and fellow banks alike when cross-border flows go instead to the *non-banking* sector of the destination economy? We address these questions in Tables 2 through 4.

Table 2 tackles the first two questions by distinguishing cross-border flows and macroprudential policy by type. Odd-numbered columns present results based on the comprehensive definition of international flows, while even-numbered columns focus on the loans subset. Each pair of claims and loans is then reported across the three macroprudential policy-targeted sectors: supply side, demand side, and foreign exposure. For every pair of flows, by macroprudential policy type, the coefficient estimates attached to flows are almost identical in both statistical significance and size. This is also shown by the similar values of the semi-elasticities for each pair at the bottom of the table. These results imply that cross-border flows, either in loans or total claims, support an active international bank-lending channel. Nevertheless, because the use of cross-border loans reduces the observations in our sample by about 17%, we retain total claims as our measure of cross-border flows in the remaining analysis.

Moving to testing possible differences across types of macroprudential policies enacted by source countries of international flows relevant to our hypothesis, Table 2 shows that all the double term coefficients interacting the macroprudential stance with cross-border flows and the triple term coefficients with bank capitalization maintain their signs as in the benchmark model continuing to support the presence of negative spillover effects. However, the magnitude of the coefficient estimates varies with policy instruments targeting foreign exchange exposure displaying significantly stronger effects than all other instruments, while the strong statistical significance is not preserved throughout as demand-side policy tools are only significant at the 10% level. In fact, in a further regression that uses all three types of macroprudential tools jointly in a single model, not reported in the table, we find that the weak effect of demand-side policies turns statistically insignificant. This finding is consistent with Buch and Goldberg (2017), who report that when global banks face tighter loan-to-value ratio limits at home they do not experience any statistically significant international spillovers via their affiliates located abroad. A likely explanation for the lack of spillovers associated with demand-side policies is the unchanged demand for overall credit in the source country because banks affected by the regulation might change the composition of their credit supply by substituting away from mortgage lending at home toward lending into other domestic sectors. Overall, these findings suggest that the choice of policy tool can affect the extent of spillovers to destination-country banks' lending decisions, with strong negative spillovers arising from instruments targeting supply-side

and foreign exchange exposure.[23]

To better grasp differences in the effects of those macroprudential policies that exhibit statistically significant effects, in Table 3 we report results based on more granular measures for supply side and international exposure policy tools. First, following Alam et al. (2019), we divide the supply-side tools into those directly constraining bank-loan supply (supply-credit), those targeting the build-up of capital (supply-capital), and more general measures (supply-general).[24] Second, for those sub-groups of instruments found to have significant effects, we examine the impact of adjusting *specific* macroprudential tools.[25] Columns 1-3 indicate weak statistical significance for the coefficients testing our hypothesis for the supply-general and supply-credit tools, which turn statistically insignificant when included simultaneously in an unreported regression along with supply-capital measures. The impact of capital-based tools, on the other hand, is significant at the 1% level suggesting that a unitary tightening in supply-capital instruments in source countries reduces the impact of cross-border flows on average destination-country bank loan supply by about 19% (i.e., –0.87%/4.64%). This value is almost three times larger than the mitigating effect identified in Table 1 when all instruments were added up together (i.e., –0.29%/4.14% or -7%). A further disaggregation of supply-capital measures into its five individual components, shown in columns 4 through 8, indicates that the most influential policy tools are leverage limits, conservation buffers, and measures applied to larger banks, the tightening of which can fully offset the impact of inward flows to destination countries. Among the policy tools targeting foreign exchange exposure, reported in columns 9 through 11, a similar outcome applies solely to stricter foreign currency loan restrictions.[26]

These findings align with previous studies that examine spillover effects and are consistent with the idea that when regulators tighten *supply-capital* tools, the higher cost of raising capital induces banks to cut back on the supply of loans, both domestically and abroad, especially if capital constraints become more binding (Aiyar et al., 2014).[27] Further, the absence of negative spillover effects arising from *supply-*

[23]Specific to foreign exchange exposure, a closer inspection of the data reveals that only a handful of source countries in our sample have activated such policies: Austria, Brazil, Korea, and the Philippines. All four have been granting cross-border loans in reserve currencies, the last three over 95% of their respective international loans. Austria is the only country in this subset that is a reserve-currency issuer that nevertheless extends cross-border loans also in other reserve currencies at about 25% of its international loans.

[24]*Credit measures* include loan-loss provisions, limits on credit growth, loan restrictions, and limits on the loan-to-deposit ratio. *Capital measures* include capital requirements (except capital requirements on foreign currency loans), countercyclical buffers, conservation buffers, leverage limits, and measures for the systemically important financial institutions. *General measures* include reserve and liquidity requirements.

[25]We construct the macroprudential policy stance for each subgroup and individual instrument following the same procedure as for the aggregate measure, i.e., the sum of cumulative changes since 1990 for each policy-action dummy-type indicator.

[26]In column 9, the lack of a coefficient estimate for the triple interaction term is due to the zero variability in this policy tool since it is tightened only once by Brazil, making it collinear with the interaction term between the policy stance and cross-border flows.

[27]Ordoñez (2018) shows this in a model where tighter risk-weighted capital requirements cause banks to restrict investment, such as loan assets, by imposing a higher "skin in the game." Relevant to our setup, the effect applies equally to both domestic and foreign assets due to a horizontal application of the macroprudential tool to both domestic and cross-border loans.

general measures is supported by Buch and Goldberg (2017) and Danisewicz et al. (2017) in their analysis of the lending patterns of multinational banks' foreign affiliates despite the rationale that higher reserve requirements in foreign banks' home countries directly reduce the lending provision of affiliates by raising the cost of parent bank funding because of the need to hold a larger share of funding as reserves. Similarly, the tightening of *supply-credit* tools, by being applied to specific bank products in the source country, may lack the power to affect cross-border credit and instead cause small compositional shifts in bank lending within the source country (Danisewicz et al., 2017; Ongena et al., 2013). As for stricter measures targeting foreign exchange exposure, Ahnert et al. (2021) model theoretically and document empirically their negative effect on cross-border lending in foreign currency. Our study contributes to these results by looking at the loan supply response of banks in the recipient country by focusing on *all* recipient-country banks, and not just on a subset of foreign affiliates, for the universe of macroprudential policies by type of exposure.

Next, we take advantage of the cross-border flows data that are available by *sector* of destination country, between banks and non-banks (see Figure 1), to examine whether the loan supply of destination-country banks granted to non-banks changes when the latter receive loans directly from abroad. Access to funding from abroad by non-bank borrowers may likely prompt local banks to reduce loan provisions giving rise to a loan substitution effect. The first half of Table 4 reports the estimates across the aggregated macroprudential stance and for each policy sub-group. The coefficient estimates, being statistically insignificant throughout for all variables of interest, reveal that when non-bank borrowers in destination countries receive loans directly from abroad, local banks do not change their loan-granting behavior, not even when source-country banks face a tighter macroprudential stance. One possible reason is that bank-to-non-bank lending typically has a longer maturity, and hence it is harder for destination-country banks to cut back when foreign lenders increase non-bank credit (see Aiyar et al., 2014). The flip side of this is that bank-to-bank lending, by being of much shorter maturity, is more easily adjusted when households and firms have access to more loans from abroad. This is tested in columns 5-8, where we find support for this pattern even if statistically significant only at the 10% level. Recipient-country banks reduce inter-bank lending by an average of 3.5% in response to more cross-border inflows to the non-bank sector, with less-capitalized banks experiencing a more potent effect of about -13%. The statistically insignificant coefficient estimates associated with the interactions of macroprudential policy further reveal the absence of policy spillovers from abroad in this case.

Overall, after reviewing different sectoral dimensions of our dataset, the results continue to support Hypothesis 1, especially for policies targeting capital-based tools and international exposure. The results also suggest that the negative spillovers of foreign regulation operate through lending to non-banks by

destination-country banks, rather than through direct international lending to households and firms or bank-to-bank lending.

5.3 Other bank characteristics, macroeconomic conditions, and country sub-samples

In this section, we revert to the aggregated measure of macroprudential stance and examine whether destination-country banks' loan supply decisions are sensitive to changes, first, in other bank characteristics, second, in source-country macroeconomic conditions, and, third, in sub-samples of source and destination countries.

Table 5 presents results that examine our baseline model in equation (2) either for subsets of banks or by "horseracing" against alternative channels through which cross-border flows may affect the lending decisions of recipient-country banks to non-bank borrowers. Columns 1 through 4 use other bank characteristics and columns 5 through 10 use the macroeconomic environment in the source countries. The preceding analysis includes banks in the recipient countries that are both affiliates of multinational banks and domestically-owned banks. But it is likely that the link among cross-border bank flows, source-country macroprudential policy and loan supply in the recipient is different between the two types of banks, especially given the presence of internal capital markets within multinational banks that allow fund transfers across affiliates (de Haas and van Lelyveld, 2014; Jeon et al., 2013). To examine this likelihood, we classify banks as foreign vs. domestic by using the Orbis database which provides information on historical ownership (see Table A1 for summary statistics). We consider a bank as foreign-owned if the global ultimate owner is registered in a country other than the bank's location and is a majority shareholder, i.e., holds at least 50% of the banks shares. This approach allows us to identify the ownership of 487 banks (34% of our bank sample), out of which 294 banks are classified as foreign. The remaining set of banks in our sample cannot be classified as either domestic or foreign.[28]

Restricting the sample to foreign banks in column 1 and domestic banks in column 2 reveals that cross-border flows increase the loan supply of domestically-owned banks in the recipient with no effect on the lending of foreign banks. Results also show that the negative spillover of foreign macroprudential policy only materializes for the loan supply of domestic banks, suggesting that it is local banks that are subjected to the bank-lending channel of macroprudential policy compared to foreign-owned affiliates that avoid such exposure due to the internal reallocation of funds across borders. The estimated coefficients in column 2 are twice as large as the corresponding estimates for the entire sample, implying a stronger

[28]The limited number of banks classified based on ownership is an outcome of the short number of matches between the datasets in Orbis and S&P Capital IQ, which customarily uses the Legal Entity Identifier as the common identifier between the two databases. Despite the small number of banks classified by ownership in our sample, the share of foreign-owned banks of 60% is consistent with figures in emerging Europe (Denderski and Paczos, 2021).

economic importance of the channel for domestic banks.[29]

Moving beyond bank ownership, so far we have focused on bank equity to total bank assets as the bank balance-sheet characteristic that may affect changes in banks' lending decisions following changes in cross-border inflows and foreign macroprudential policy. In columns 3 and 4, we also consider bank size and bank profitability by adding all relevant double and triple interaction terms with these variables in the baseline model. We observe that, although both these variables directly reduce bank loan supply, the interaction terms with cross-border flows and with flows and macroprudential stance are not statistically significant, suggesting that following changes in cross-border inflows and macroprudential policy abroad there is no effect in the supply of loans identifiable from the adjustment of banks of different size or profitability. We also observe that the estimated coefficients on the interaction terms that include the bank capital ratio continue to be statistically significant and economically equivalent to the benchmark findings.

It is not unlikely that the bank-lending channels of cross-border flows and foreign macroprudential policy we identify are responsive, or even due, to changes in macroeconomic conditions in the source country of flows. In other words, it is possible that our results are an outcome of economic activity in the source country and of its endogeneity with macroprudential policy since these two evolve simultaneously. To isolate the effect of macroprudential policy from that of domestic economic conditions, in our main model we include source country-time fixed effects to control for any time-varying conditions to which the source countries' bank flows usually respond. In a further attempt to control for the impact arising from domestic economic activity, we horserace interactions of cross-border flows and flows $\times$ bank capitalization with various source-country macroeconomic variables. These include monetary policy indicators (actual and shadow rates), GDP growth, inflation, the nominal effective exchange rate, and capital controls. If our results are driven mostly by macroeconomic conditions, we expect their inclusion to render insignificant the impact of macroprudential policy.

Columns 5 through 8 show the economic relevance of monetary policy, GDP growth and inflation in source countries in the transmission of credit flows for the banks' loan supply decisions in destination countries across their capitalization ratio. Higher monetary policy rates, GDP growth, and inflation in source countries all boost credit granting by recipient-country banks due to a higher inflow of loans from abroad that decreases the cost of using this source of funding, more so for lowly capitalized banks. Including these macroeconomic variable interactions in the regression turns statistically insignificant the estimated coefficients associated with the bank-lending channel of cross-border flows implying that credit flows from source countries are mainly driven by the macroeconomic environment there. The finding re-

[29] In an unreported regression, we have also estimated the model for those banks that could not be classified as foreign or domestic and results are identical to the benchmark model.

lated to monetary policy corresponds to results in Correa et al. (2022), where source-country banks when faced with tighter monetary policy at home shift their loan composition away from domestic loans and toward cross-border loans. Correa et al. (2022) also support the result that periods of economic expansion in source countries prompt domestic banks to grant more loans abroad. Columns 9 and 10 suggest that changes in the exchange rate or in capital controls set by source countries do not affect the transmission of credit flows across economies and the resulting lending by banks in destination countries.[30] All these considerations do not alter our findings regarding the loan supply effects arising from changes in source-country macroprudential policy which continue to be negative, statistically significant, and heterogeneous across recipient bank capitalization in line with Hypothesis 1.

Next, we study different groups of source and destination countries to assess whether our results are driven by specific country constellations. Source countries with lower income, or outside of the European Union (EU), or with low growth rates of cross-border lending may exhibit a preference for low-risk safer destinations, affecting the general findings we observe. Given that a subset of the host countries in our sample are EU members, insofar as risk-adjusted returns to banks' cross-border loans differ across EU and non-EU countries, an episode of source-country macroprudential policy tightening may influence cross-border lending to EU vs. non-EU countries differently. In Table 6, we report results from several specifications in which we interact dummy variables for developing and high-credit flows source economies, and for EU and non-EU source and destination countries with flows, macroprudential stance, and bank capitalization in all their combinations.[31] We also explore whether the global financial crisis has affected the strength of the transmission channels we study.

Columns 1 through 7 reveal that regardless of the country clustering we consider, the average effects across all source and destination countries we obtained in our baseline model continue to hold both in terms of statistical and economic significance so that results support Hypothesis 1. In addition, the interaction terms with the country sub-groups that capture the differential impact of those sub-groups of countries from the average effects are overall not statistically significant. This means that developing source countries do not impact the loan supply of destination-country banks via cross-border flows and macroprudential policy any differently than advanced source economies. Similarly, the top 5 high-credit

[30] Despite the expectation that positive changes in a source country's nominal exchange rate (reflecting depreciation for the source country's currency relative to its trading partners) are associated with more cross-border bank flows, a plausible reason for the absence of an effect in our case is that the definition of flows from the LBS already incorporates valuation effects due to exchange rate changes.

[31] Advanced economies dominate our sample of 27 source countries, yet we also cover data from six developing economies: Brazil, Chile, Korea, Mexico, Philippines, and South Africa. Top 5 source countries with high credit flows based on values are Austria, Germany, UK, Netherlands, and France, while based on growth rates are Hong Kong, Chile, Mexico, Australia, and Taiwan. Source EU member countries, all since the start of our sample period except the UK that left in 2020, include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, and Sweden. Destination EU member countries, which joined the union at different dates during our sample period thus making the dummy variables time-variant, are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

sending source countries, measured either by the average *value* of cross-border claims in column 6 or the average *growth* rate in claims in column 7, do not affect the lending behavior of recipient banks differently from all other source economies.

The only indication of heterogeneity is when distinguishing between EU and non-EU countries, specifically when credit flows from non-EU source to EU destination countries related to the impact of source-country macroprudential regulation. In column 4 the positive coefficient for the dummy variable interaction with flows and macroprudential policy indicates that banks in EU recipient countries differentially *increase* loan supply when they receive cross-border credit from non-EU source countries during episodes of tighter macroprudential policy at source, with the effect being more potent for low-capitalized banks. This result goes against our findings for the average source country and implies that non-EU source-country banks view EU recipient countries as a safer destination for their loans, a finding that is in line with Correa et al. (2022) who show that source countries when faced with a riskier environment at home–in the form of tighter monetary policy that erodes the net worth and collateral of domestic borrowers–reallocate cross-border flows predominantly toward foreign borrowers in safer destination countries.

Lastly, column 8 tests whether our estimates are affected by the financial crisis that swept up the global economy in 2008-2009. Excluding these two years from the sample period does not materially affect our benchmark findings, giving further support to Hypothesis 1.[32] Taken together, the results in Tables 5 and 6 suggest that bank-level characteristics, source-country macroeconomic factors, or country sub-samples do not confound our baseline findings.

5.4 Persistence of spillovers and different measures of cross-border flows

As an additional series of robustness tests we check how the effects of credit flows from abroad and their impact due to macroprudential policy on recipient-country banks' loan supply (i) evolve over time, (ii) are sensitive to a different dataset for tracking cross-border flows, and (iii) depend on scaling cross-border flows by GDP.

In the base case, we looked at the contemporaneous effects of inward spillovers on bank lending within a year. This time convention is typical in the literature that assesses the impact of macroprudential regulation, which often uses quarterly data and focuses on a four-quarter window (Ahnert et al., 2021; Aiyar et al., 2014; Takáts and Temesvary, 2021). However, the effect of inward spillovers could grow or fade over

[32] In unreported regressions we performed additional robustness tests by excluding from the source-country sample one country at a time to ensure results are not driven by countries with frequent adjustments in the macroprudential policy stance. This exercise does not have any bearing in our findings. We have also explored whether the loan supply of recipient banks responds to the intensive or extensive margin of credit flows from abroad. Unveiling the impact of both margins, however, is not feasible because for every country pair-year in our sample there are only positive observations of cross-border claims. Effectively, this means that our results reflect an intensive margin of cross-border credit.

different time windows. To better understand the dynamics, we allow for cross-border effects and the impact of macroprudential stance to affect the dependent variable for an additional year, a period corresponding cumulatively to eight quarters. For consistency, the bank-to-capital ratio continues to enter with a predetermined value.

Table 7 presents the results based on the timing of inflows. Column 1 uses only one-period lagged effects of flows and aggregated macroprudential regulation. It finds that they persist even after a year, impacting the recipient-country banks' loan supply in line with Hypothesis 1. Adding a contemporaneous value in column 2 reveals the independent effect of both current and lagged inward transmission on bank loan granting since all relevant estimated coefficients are statistically significant. The semi-elasticities at the bottom of the table show that the magnitude of the effect fades somewhat over time. Repeating the analysis in columns 3 through 5 for our three broad types of macroprudential policy instruments (i.e., targeting supply, demand, and international exposure) does not change the outcome but shows, once again, that the stronger effects come from international exposure and supply-side tools.

Our measure of cross-border bank flows variable used to tease out the bank-lending channel attached to our hypothesis relies on changes in bank claims from the LBS normalized by the lagged outstanding claims to get a measure of the growth of claims. In Table 8, first, and despite the drawbacks mentioned in Section 3, we employ the CBS dataset to measure the growth of cross-border claims, and, second, we normalize the LBS-based changes in claims by the recipient country GDP. We also normalize the dependent variable by GDP for consistency in the latter case. Both changes intend to test the sensitivity of our findings to the measure of cross-border flows. Columns 1 through 4 measure international flows of source-country banks based on their nationality, rather than location. This exercise gains relevance in our study because some institution-specific regulations may apply to the entire banking group, along with its branches and subsidiaries abroad. As a result, the cross-border transmission due to macroprudential policies may be more sizeable in this case. In each column, the signs and statistical significance of the estimated coefficients align with those that used locational statistics data. The economic impact of the channels is also very robust and somewhat greater in magnitude, whereby in column 1 a unitary tightening in macroprudential policy in source countries mitigates 11% of the impact of cross-border flows on domestic bank lending.[33] The second half of Table 8 shows that using the GDP of the destination country as the numeraire by which we calculate the magnitude of cross-border flows has no consequential effects on our findings. This includes the result that the bank-lending channel of foreign macroprudential policy carries over for supply-side and

[33]It is important to note that the source country coverage of the CBS differs from that of the LBS dataset. This means that the results reported for CBS-based data include as new source countries India, Norway, Portugal, Singapore, and Turkey, while they exclude the Philippines and South Africa. The results are also robust to restricting the sample to cover only those source countries with available data in both databases.

foreign currency instruments, but not for demand-side tools.

Overall, these findings continue to conform to the bank-lending channel of cross-border flows and its diminished effect due to tighter macroprudential policy abroad.

5.5 A role for recipient country macroprudential policy?

The previous sections provided strong evidence in favor of a bank-lending channel of cross-border flows and its diminished impact due to foreign macroprudential policy (Hypothesis 1). Now, we turn to test whether the effect we so far attributed to foreign macroprudential policy is not in fact due to changes in regulation in the recipient country. Put differently, the exclusion of host-country macroprudential policy from the analysis might give rise to an omitted variables bias since domestic regulation might also mitigate inward spillovers via cross-border loans. The high positive correlation of 0.44 between the source- and destination-country aggregated macroprudential stance is a further good reason to incorporate the latter into our analysis.

To test for this event, Table 9, column 1 presents results when we replace foreign macroprudential policy with the domestic stance in all its interactions with credit flows and bank capitalization. Although we continue to find that recipient banks grant more loans when receiving more cross-border flows varying along their capitalization ratio, this channel is not affected by the recipient-country macroprudential stance. All the relevant interaction terms are statistically insignificant, suggesting that domestic macroprudential policy does not affect local credit-giving via cross-border flows or operate as a proxy for foreign policy. Thus, the effect captured in Hypothesis 1 truly reflects a response to the macroprudential policy stance in the source country. To further emphasize this point, columns 2 through 5 modify our setup to include simultaneously the macroprudential stance of both the source and destination countries by target sector of policy. We find that key results are robust to this modification, while the interaction terms based on host-country regulation are statistically insignificant, suggesting that the main findings are solely driven by changes in the policy stance of the country where flows originate from. Overall, findings continue to support Hypothesis 1 for supply-side and foreign exchange exposure policy actions.

One concern with adding the recipient-country policy stance in the regression model is that macroprudential policy is likely to be endogenous to the country's own macroeconomic and credit developments. Specifically, policymakers are more likely to tighten policy tools when the dependent variable (i.e., credit growth) starts to rise to shelter against domestic financial stability risks. This development would bias the estimates that involve the host economy macroprudential policy's impact toward zero, making them even insignificant. To tackle this challenge, we apply a policy-shocks estimation approach to derive the exogenous component of the destination-country macroprudential stance. Following recent work (see Ah-

nert et al., 2021; Chari et al., 2022; Forbes, 2021), we estimate a first-stage regression of the host-country macroprudential policy stance on a range of variables that could affect the implementation of local macroprudential regulations. The residuals from this regression are then used as an exogenous macroprudential policy shock proxying for the macroprudential policy stance.

Appendix Table A2 provides more information on the first-stage control variables, including summary statistics. It encompasses a list of eleven variables capturing the risks and vulnerabilities for financial stability that could cause host-country policymakers to adjust macroprudential regulations.[34] The variables are divided into four groups, reflecting variables that proxy "Crisis" covering the number of countries in sovereign, currency, and banking crises, and whether a country has experienced a crisis in the last 12 months; "Credit" including aggregate cross-border flows and private credit growth; "Growth" such as real exchange rate appreciation, GDP growth forecast, inflation, and real GDP growth; and "Other macro/institutional characteristics" in the form of capital controls. Table 10 presents the results of the first-stage regressions, where all control variables enter with a time lag. The regression also includes destination-country fixed effects to control for any country-specific, time-invariant factors that may affect a country's macroprudential stance. Standard errors are bootstrapped and clustered at the destination country level.

In general, many of the instruments are statistically significant suggesting that a tighter macroprudential stance correlates with fewer crises in terms of the incidence and the number of countries experiencing crises, slower domestic credit growth, weaker exchange rate appreciation, and lower inflation. Some instruments are not individually significant, reflecting the challenge of predicting the precise timing of policy adjustments, especially when using lower frequency annual data to capture changes in financial variables that could affect decisions about the macroprudential stance. But, most importantly, the joint explanatory power of the control variables is high, reflected by the values of the R-squared and F-statistic, the latter exhibiting values well above 100 for the aggregate and supply-side policy tools.

Next, we re-estimate our modified specification using the residuals from the first-stage regressions as more exogenous measures of the macroprudential stance in the destination country. Returning to Table 9, columns 6 through 9 report the results for these second-stage estimates. The orthogonal measures of the recipient-country macroprudential stance are not statistically significant in any of its interactions with credit flows and bank capitalization. In contrast, the results continue to support the key conclusions from the main analysis about Hypothesis 1. Jointly, these findings support that a macroprudential policy

[34]Originally, following the work of Chari et al. (2022), we collected data for eighteen variables and estimated the first-stage regression with this full set of controls. However, due to data gaps, half of the destination countries were excluded from the sample. To improve upon this dimension, we narrowed down the set of explanatory variables by sequentially excluding those with the fewest observations, none of which met conventional levels of statistical significance (defined as a 10% threshold). This process continued until we reached a set of controls that included most destination countries, yielding a final set of eleven explanatory variables for the first-stage regression.

tightening in the country where flows originate from attenuates the spillover effect of flows, while tightening regulation in the destination country does not play any role in transmitting the effect. Overall, the takeaway message from this section is that the lack of an offsetting role for destination-country macroprudential policy against inward spillovers suggests that regulators in recipient countries must rely fully on their source-country counterparts for them to control the transmission of flows.

6 Concluding remarks

Over the last two decades cross-border bank flows have expanded rapidly due to an increasing interconnection of the international banking system. In the same period, and following the global financial crisis, national supervisory authorities have activated macroprudential policies to reduce the build-up of risks and increase the resilience of the banking sector. However, the domestic nature of these policies generates regulatory gaps between home and host countries faced by global banks. These cross-country differences in banking regulation may give rise to unintended consequences of policies in the form of cross-border spillovers. In line with these observations, our paper examines whether macroprudential policy activated by source countries affects local credit supply in recipient countries through a cross-border bank flows channel.

Using information on bilateral cross-border lending flows across source banking systems and target countries of borrowers, data on source countries' macroprudential stance and bank-level loan data in recipient countries, our paper shows that cross-border bank flows increase loan issuance by local banks in recipient countries with capital-constrained banks responding more strongly to granting loans than their unconstrained counterparts. Specific to our main hypothesis, we show that a tighter macroprudential policy in source countries limits the international bank credit channel with, once again, more potent effects for capital-constrained recipient banks. We also show that the negative spillover effect of foreign macroprudential policy is only operational for a subset of policy instruments, namely capital-based and international exposure tools. Our findings carry important implications for the international dimension of macroprudential policies. Regulators in destination countries should be paying attention to macroprudential developments in source countries because foreign policy can increase the local supply of credit when additional credit may not be desirable. This implies that destination country policymakers may find it beneficial to target the funding of domestic banks from abroad and impose barriers on cross-border inflows whenever deemed necessary.

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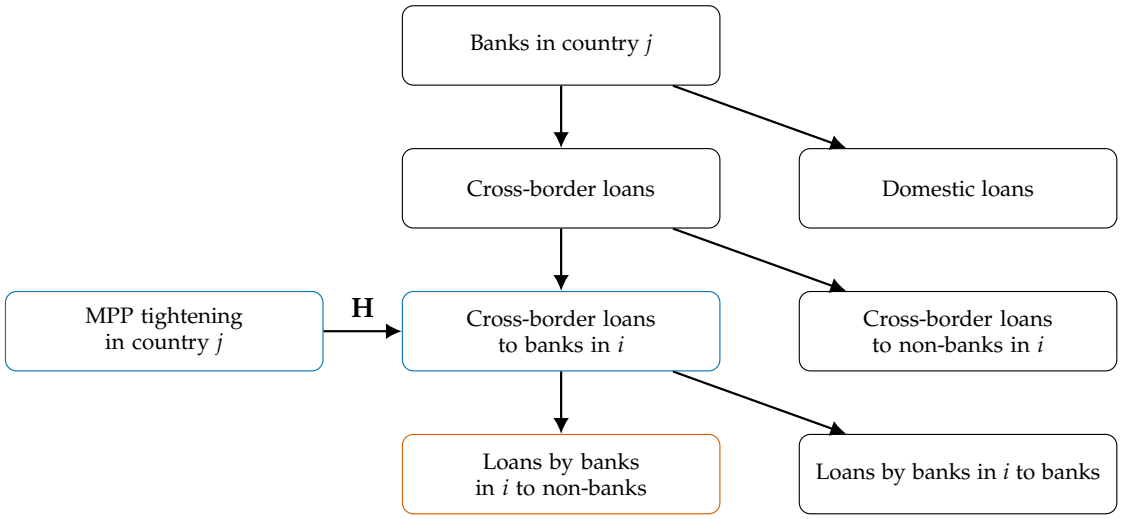
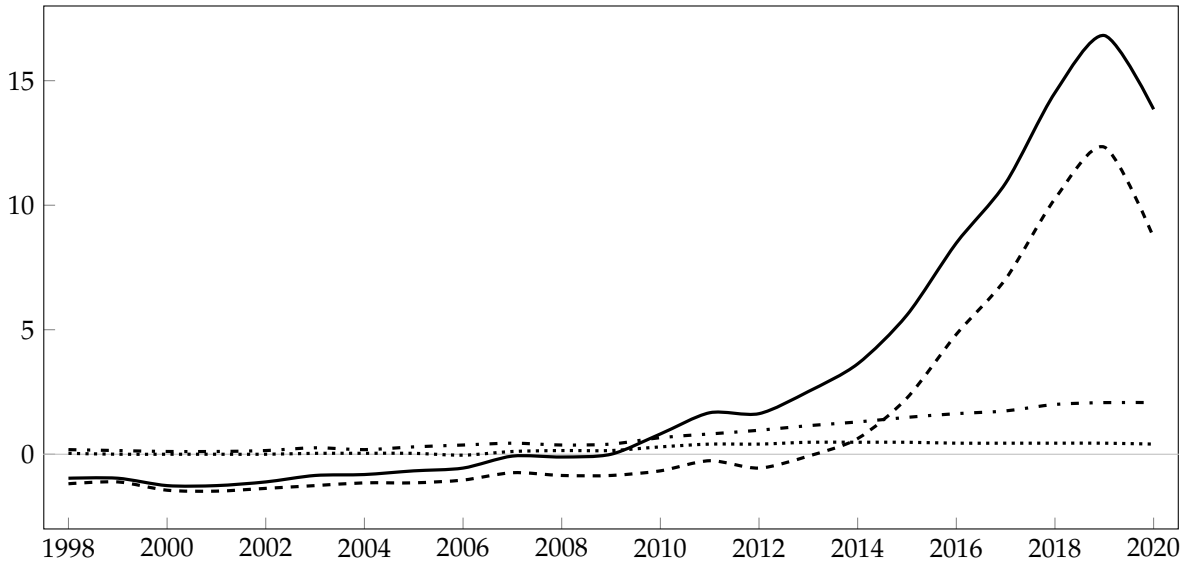
Figure 1: Hypothesis



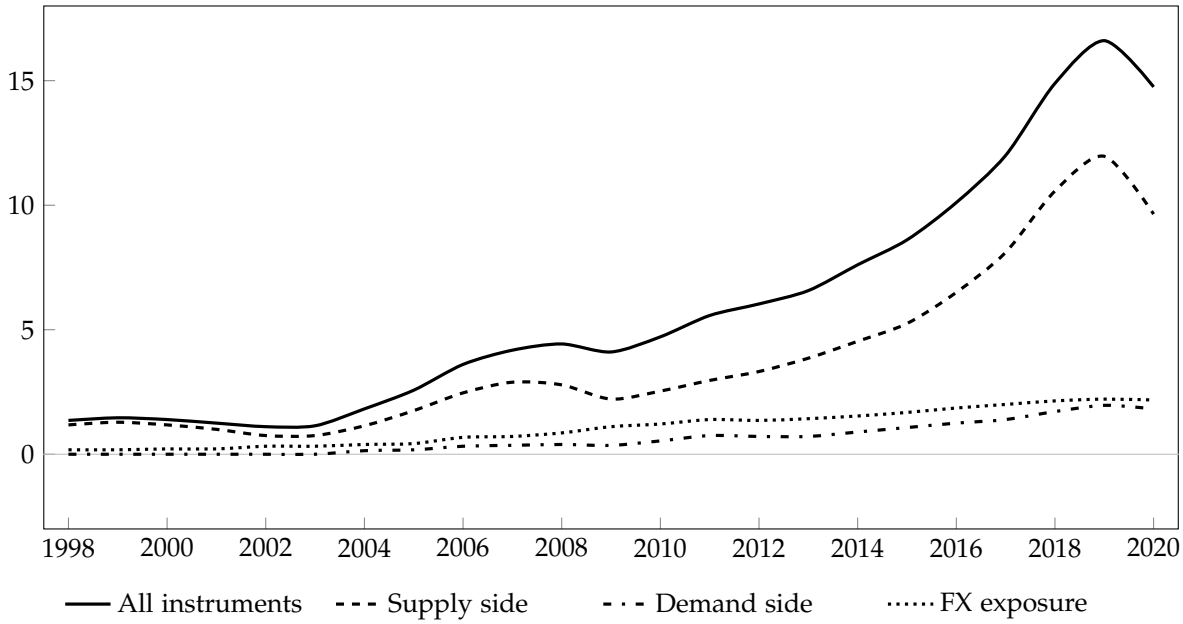
Note: The figure depicts the international transmission of cross-border flows from source countries to destination-country bank credit and, separately, the influence of source-country macroprudential policies (**H**). Boxes highlighted in blue depict the variables of which the effect we estimate on the variable included in the box highlighted in red.

Figure 2: Macroprudential policy stance

(a) Source countries



(b) Destination countries



Note: The figure shows the macroprudential policy stance, measured as the sum of cumulative changes in the respective policy instruments recorded annually since 1990 and up to the year of observation. *Panel (a)* shows the yearly mean value across all source countries in our sample, while *Panel (b)* shows the respective value for the destination countries. See Table A3 for a list of the countries covered. *Supply side* includes changes in capital requirements (except capital requirements on foreign currency loans), countercyclical buffers, conservation buffers, leverage limits, measures for the systemically important financial institutions, loan loss provisions, limits on credit growth, loan restrictions, limits on the loan-to-deposit ratio, reserve requirements, and liquidity requirements. *Demand side* includes changes in loan-to-value ratio and debt-service-to-income ratios. *FX exposure* includes changes in limits on foreign currency lending or rules or recommendations on foreign currency loans, limits on net or gross open foreign exchange positions, limits on foreign exchange exposures and funding, and currency mismatch regulations, and capital requirements on foreign currency loans. *All instruments* records changes in all measures targeting *supply side*, *demand side*, and *FX exposure*. *Source:* Constructed using the updated data of the IMF's Integrated Macroprudential Policy (iMaPP) database, introduced initially by Alam et al. (2019).

Table 1: Baseline estimation results

Dep.variable: Δ *net loans to non-banks*	(1)	(2)	(3)	(4)	(5)
Flows_{jit}	0.0028*	0.0028*	0.0031*	0.0050***	
	(0.0015)	(0.0015)	(0.0016)	(0.0017)	
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit}$				−0.0004**	
				(0.0001)	
BKR_{bit-1}	0.8504***	0.8505***	0.8658***	0.8441***	0.8440***
	(0.0909)	(0.0911)	(0.0923)	(0.0987)	(0.1005)
MPP $\text{Stance}_{jt} \times \text{BKR}_{bit-1}$				0.0052	0.0053
				(0.0053)	(0.0055)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$	−0.0159*	−0.0161*	−0.0178*	−0.0294***	−0.0325***
	(0.0084)	(0.0086)	(0.0094)	(0.0102)	(0.0115)
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$				0.0021**	0.0023**
				(0.0008)	(0.0009)
Adjusted R^2	0.43	0.43	0.37	0.37	0.35
N	242,568	242,568	240,282	240,282	240,221
Bank FE	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	No	Yes	Yes	Yes	Yes
Source country×Bank FE	No	No	Yes	Yes	Yes
Destination×Source×Time FE	No	No	No	No	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):					
	2.30%	2.33%	2.57%	4.14%	
H:				−0.29%	
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):					
	8.50%	8.59%	9.43%	15.58%	17.23%
H:				−1.11%	−1.23%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 2: By group of MPP instrument and type of flow

MPP instrument:	Supply side		Demand side		FX exposure	
Type of cross-border flow:	All claims	Loans	All claims	Loans	All claims	Loans
Dep.variable: Δ net loans to non-banks	(1)	(2)	(3)	(4)	(5)	(6)
Flows_{jit}	0.0048***	0.0045**	0.0042**	0.0042**	0.0036**	0.0037**
	(0.0017)	(0.0018)	(0.0016)	(0.0018)	(0.0016)	(0.0017)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit}$	−0.0005**	−0.0006**	−0.0010*	−0.0011*	−0.0050**	−0.0043**
	(0.0002)	(0.0002)	(0.0006)	(0.0006)	(0.0020)	(0.0019)
BKR_{bit-1}	0.8545***	0.8519***	0.8592***	0.8576***	0.8567***	0.8555***
	(0.0961)	(0.0989)	(0.0937)	(0.0956)	(0.0929)	(0.0950)
$\text{MPP Stance}_{jt} \times \text{BKR}_{bit-1}$	0.0060	0.0064	0.0057	0.0066	0.0315*	0.0317**
	(0.0072)	(0.0072)	(0.0074)	(0.0075)	(0.0161)	(0.0161)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$	−0.0280***	−0.0264**	−0.0238**	−0.0242**	−0.0207**	−0.0216**
	(0.0101)	(0.0108)	(0.0093)	(0.0102)	(0.0092)	(0.0102)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$	0.0031**	0.0033**	0.0058*	0.0061*	0.0263**	0.0218**
	(0.0012)	(0.0014)	(0.0032)	(0.0037)	(0.0107)	(0.0099)
Adjusted R^2	0.37	0.37	0.37	0.37	0.37	0.37
N	240,282	205,592	240,282	205,592	240,282	205,592
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):						
	3.95%	3.76%	3.44%	3.55%	3.00%	3.14%
H:	−0.44%	−0.47%	−0.81%	−0.90%	−4.16%	−3.57%
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):						
	14.82%	14.26%	12.60%	13.05%	10.95%	11.65%
H:	−1.63%	−1.79%	−3.05%	−3.31%	−13.91%	−11.77%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. Columns (1) through (6) indicate the group of macroprudential policy instrument and type of cross-border flow used in the regression. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 3: By MPP instrument: credit supply and FX exposure

MPP instrument:	Supply side								FX exposure		
	General	Credit	Capital								
	All	All	All	CCyB	Capital	LVR	CCoB	SIFI	Cap. FX	LFX	LFC
Dep.variable: Δ net loans to non-banks	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Flows_{jit}	0.0029*	0.0048***	0.0056***	0.0031*	0.0050**	0.0036**	0.0052***	0.0051***	0.0031*	0.0031*	0.0038**
	(0.0016)	(0.0018)	(0.0019)	(0.0017)	(0.0022)	(0.0016)	(0.0018)	(0.0017)	(0.0016)	(0.0016)	(0.0016)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit}$	−0.0008*	−0.0015*	−0.0011***	−0.0003	−0.0015	−0.0062*	−0.0039**	−0.0045***	0.6014	0.0007	−0.0055**
	(0.0005)	(0.0008)	(0.0004)	(0.0012)	(0.0009)	(0.0034)	(0.0016)	(0.0015)	(0.4962)	(0.0059)	(0.0024)
BKR_{bit-1}	0.8703***	0.8506***	0.8402***	0.8644***	0.8391***	0.8594***	0.8516***	0.8525***	0.8656***	0.8669***	0.8581***
	(0.0915)	(0.0962)	(0.1010)	(0.0927)	(0.0971)	(0.0934)	(0.0977)	(0.0969)	(0.0923)	(0.0922)	(0.0928)
$\text{MPP Stance}_{jt} \times \text{BKR}_{bit-1}$	0.0046	0.0186	0.0128	0.0221	0.0324	0.0502	0.0277	0.0300	0.5280	0.1171**	0.0254*
	(0.0124)	(0.0189)	(0.0133)	(0.0405)	(0.0229)	(0.0478)	(0.0344)	(0.0365)	(0.8757)	(0.0536)	(0.0142)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$	−0.0166*	−0.0278***	−0.0333***	−0.0180*	−0.0301**	−0.0210**	−0.0306***	−0.0291***	−0.0178*	−0.0174*	−0.0214**
	(0.0093)	(0.0103)	(0.0113)	(0.0096)	(0.0128)	(0.0091)	(0.0105)	(0.0100)	(0.0094)	(0.0093)	(0.0090)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$	0.0046*	0.0090*	0.0063***	0.0024	0.0092*	0.0367*	0.0232**	0.0257***		−0.0069	0.0293**
	(0.0026)	(0.0048)	(0.0024)	(0.0069)	(0.0053)	(0.0198)	(0.0096)	(0.0087)		(0.0325)	(0.0127)
Adjusted R^2	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
N	240,282	240,282	240,282	240,282	240,282	240,282	240,282	240,282	240,282	240,282	240,282
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):											
	2.29%	3.92%	4.64%	2.59%	4.14%	3.00%	4.32%	4.18%	2.58%	2.52%	3.11%
H:	−0.67%	−1.27%	−0.87%	0.00%	0.00%	−5.08%	−3.24%	−3.70%	0.00%	0.00%	−4.53%
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):											
	8.77%	14.73%	17.60%	9.50%	15.94%	11.11%	16.20%	15.39%	9.44%	9.24%	11.33%
H:	−2.44%	−4.74%	−3.33%	0.00%	−4.89%	−19.42%	−12.26%	−13.61%	0.00%	0.00%	−15.49%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. Columns (1) through (11) indicate the sub-group of or the specific macroprudential policy instrument used in the regression. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 4: Cross-border flows to non-banks and domestic loans to banks

Dep.variable:	Growth of net loans to non-banks				Growth of net loans to banks			
MPP instrument:	All instruments	Supply side	Demand side	FX exposure	All instruments	Supply side	Demand side	FX exposure
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flows_{jit}	0.0019	0.0020	0.0016	0.0023	-0.0121^{*}	-0.0114^{*}	-0.0122^{*}	-0.0115^{**}
	(0.0015)	(0.0015)	(0.0014)	(0.0014)	(0.0067)	(0.0066)	(0.0063)	(0.0056)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit}$	-0.0001	-0.0001	0.0002	-0.0029	0.0004	0.0004	0.0018	0.0062
	(0.0001)	(0.0002)	(0.0005)	(0.0016)	(0.0004)	(0.0006)	(0.0016)	(0.0052)
BKR_{bit-1}	0.8322^{***}	0.8450^{***}	0.8487^{***}	0.8522^{***}	1.6957^{***}	1.6607^{***}	1.6219^{***}	1.5794^{***}
	(0.1017)	(0.0991)	(0.0952)	(0.0951)	(0.3522)	(0.3441)	(0.3311)	(0.3300)
$\text{MPP Stance}_{jt} \times \text{BKR}_{bit-1}$	0.0061	0.0067	0.0103	0.0300	-0.0158	-0.0190	-0.0282	-0.0025
	(0.0053)	(0.0072)	(0.0074)	(0.0163)	(0.0142)	(0.0191)	(0.0187)	(0.0217)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$	-0.0109	-0.0112	-0.0090	-0.0128	0.0709^{*}	0.0665^{*}	0.0697^{*}	0.0665^{*}
	(0.0088)	(0.0087)	(0.0084)	(0.0082)	(0.0411)	(0.0402)	(0.0371)	(0.0339)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$	0.0004	0.0007	-0.0009	0.0157	-0.0023	-0.0025	-0.0108	-0.0333
	(0.0008)	(0.0012)	(0.0027)	(0.0087)	(0.0025)	(0.0036)	(0.0099)	(0.0288)
Adjusted R^2	0.36	0.36	0.36	0.36	0.02	0.02	0.02	0.02
N	213,476	213,476	213,476	213,476	148,537	148,537	148,537	148,537
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):								
	0.00%	0.00%	0.00%	0.00%	-3.47%	-3.28%	-3.51%	-3.32%
H:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):								
	0.00%	0.00%	0.00%	0.00%	-13.09%	-12.28%	-12.87%	-12.27%
H:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable in columns (1) through (4) is the annual growth of net loans granted to customers by bank b located in country i, while in columns (5) through (8) is the annual growth of net loans granted to banks by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. In all columns cross-border flows are to the destination country non-bank sector. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 5: Other bank characteristics and source country macroeconomic conditions

Bank/Macro Characteristic:	Foreign bank	Domestic bank	Bank size	Bank profit	Monetary policy	Shadow rate	GDP growth	Inflation	Exchange rate	Capital controls
Dep.variable: Δ *net loans to non-banks*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Flows_{jit}	−0.0045	0.0122*	0.0042**	0.0036**	0.0019	0.0045***	0.0024	0.0021	0.0050***	0.0056*
	(0.0041)	(0.0071)	(0.0020)	(0.0018)	(0.0022)	(0.0017)	(0.0020)	(0.0023)	(0.0018)	(0.0031)
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit}$	0.0001	−0.0011**	−0.0003*	−0.0003**	−0.0003**	−0.0004**	−0.0003**	−0.0003**	−0.0004**	−0.0002
	(0.0003)	(0.0005)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
BKR_{bit-1}	1.4662***	0.9260*	0.9591***	0.9844***	0.8488***	0.8478***	0.8455***	0.8444***	0.8442***	0.8437***
	(0.2732)	(0.5121)	(0.1280)	(0.1272)	(0.0985)	(0.1017)	(0.0987)	(0.0987)	(0.0988)	(0.1034)
MPP $\text{Stance}_{jt} \times \text{BKR}_{bit-1}$	0.0012	0.0261*	0.0028	−0.0001	0.0050	0.0041	0.0052	0.0052	0.0052	0.0036
	(0.0140)	(0.0151)	(0.0058)	(0.0059)	(0.0052)	(0.0052)	(0.0053)	(0.0053)	(0.0053)	(0.0055)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$	0.0316	−0.0762*	−0.0226**	−0.0193*	−0.0111	−0.0260***	−0.0137	−0.0136	−0.0294***	−0.0305*
	(0.0292)	(0.0439)	(0.0110)	(0.0110)	(0.0126)	(0.0097)	(0.0121)	(0.0133)	(0.0102)	(0.0168)
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$	−0.0008	0.0067**	0.0018**	0.0018**	0.0017**	0.0021**	0.0020**	0.0019**	0.0021**	0.0014*
	(0.0022)	(0.0029)	(0.0009)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Size_{bit-1}			−2.8308***	−2.4546***						
			(0.3693)	(0.3766)						
$\text{Profitability}_{bit-1}$			−0.8772***	−1.0526***						
			(0.2971)	(0.3178)						
MPP $\text{Stance}_{jt} \times \text{Bank Characteristic}_{bit-1}$			0.0421***	0.0238						
			(0.0077)	(0.0170)						
$\text{Flows}_{jit} \times \text{Bank Characteristic}_{bit-1}$			−0.0149	−0.0435						
			(0.0148)	(0.0490)						
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit} \times \text{Bank Characteristic}_{bit-1}$			−0.0004	0.0004						
			(0.0008)	(0.0037)						
$\text{Flows}_{jit} \times \text{Macro Characteristic}_{jt}$					0.0013*	0.0007*	0.0011**	0.0015*	0.0001	−0.0006
					(0.0008)	(0.0004)	(0.0005)	(0.0008)	(0.0003)	(0.0014)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1} \times \text{Macro Characteristic}_{jt}$					−0.0074*	−0.0042*	−0.0064*	−0.0076*	−0.0007	0.0027
					(0.0044)	(0.0022)	(0.0033)	(0.0045)	(0.0016)	(0.0079)
Adjusted R^2	0.49	0.42	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.37
N	44,166	19,987	188,413	188,413	227,622	218,654	240,282	240,282	240,282	200,136
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):										
	0.00%	8.55%	4.73%	4.06%	0.00%	3.50%	0.00%	0.00%	4.13%	4.28%
H:	0.00%	−0.76%	−0.30%	−0.34%	−0.24%	−0.28%	−0.28%	−0.27%	−0.29%	−0.17%
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):										
	0.00%	34.26%	16.19%	13.80%	0.00%	13.09%	0.00%	0.00%	15.54%	14.98%
H:	0.00%	−3.03%	−1.31%	−1.32%	−0.90%	−1.04%	−1.07%	−1.01%	−1.12%	−0.68%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. Columns (1) include 294 foreign banks while column (2) includes 193 domestic banks. Columns (3) through (10) include 1417 banks from 30 emerging market countries. Columns (3) through (10) indicate the additional interactions used in the regression. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 6: Developing source countries, EU membership, and GFC

Period:	1998-2020							excl. 2008-2009
Source country:	EMDE	EU	EU	non-EU	non-EU	Top 5	Top 5	All
Destination country:	All	EU	non-EU	EU	non-EU	All	All	All
Dep.variable: Δ net loans to non-banks	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flows_{jit}	0.0044**	0.0061***	0.0037*	0.0054***	0.0044**	0.0045***	0.0048**	0.0050***
	(0.0019)	(0.0019)	(0.0020)	(0.0019)	(0.0021)	(0.0017)	(0.0019)	(0.0019)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit}$	−0.0003*	−0.0004***	−0.0003*	−0.0005**	−0.0003*	−0.0003**	−0.0006***	−0.0004**
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
BKR_{bit-1}	0.8435***	0.8443***	0.8444***	0.8442***	0.8441***	0.8450***	0.8440***	0.8083***
	(0.0988)	(0.0987)	(0.0988)	(0.0987)	(0.0987)	(0.0988)	(0.0987)	(0.1004)
$\text{MPP Stance}_{jt} \times \text{BKR}_{bit-1}$	0.0052	0.0052	0.0052	0.0052	0.0052	0.0052	0.0052	0.0090*
	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0054)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$	−0.0261**	−0.0339***	−0.0241*	−0.0307***	−0.0263**	−0.0265***	−0.0277**	−0.0295***
	(0.0115)	(0.0108)	(0.0130)	(0.0108)	(0.0125)	(0.0098)	(0.0108)	(0.0109)
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$	0.0016*	0.0022***	0.0017*	0.0026***	0.0017*	0.0018**	0.0032***	0.0022**
	(0.0008)	(0.0008)	(0.0009)	(0.0010)	(0.0010)	(0.0008)	(0.0012)	(0.0008)
$\text{Flows}_{jit} \times \mathbb{1}$	0.0047	−0.0070	0.0029	−0.0024	0.0027	0.0024	0.0009	
	(0.0052)	(0.0044)	(0.0035)	(0.0037)	(0.0039)	(0.0052)	(0.0038)	
$\text{Flows}_{jit} \times \text{BKR}_{bit-1} \times \mathbb{1}$	−0.0215	0.0410	−0.0109	0.0079	−0.0117	−0.0096	−0.0070	
	(0.0278)	(0.0333)	(0.0199)	(0.0284)	(0.0214)	(0.0282)	(0.0225)	
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit} \times \mathbb{1}$	−0.0004	−0.0001	−0.0004	0.0005**	−0.0002	−0.0013	0.0004	
	(0.0003)	(0.0007)	(0.0004)	(0.0002)	(0.0003)	(0.0009)	(0.0003)	
$\text{MPP Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1} \times \mathbb{1}$	0.0020	0.0021	0.0017	−0.0031**	0.0009	0.0066	−0.0021	
	(0.0019)	(0.0051)	(0.0020)	(0.0015)	(0.0015)	(0.0046)	(0.0016)	
Adjusted R^2	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
N	240,282	240,282	240,282	240,282	240,282	240,282	240,282	221,446
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):								
	3.61%	4.99%	3.07%	4.49%	3.60%	3.71%	3.95%	4.16%
H:	−0.21%	−0.32%	−0.22%	−0.38%	−0.23%	−0.25%	−0.47%	−0.30%
H: $\mathbb{1} = 1$	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%	0.00%	
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):								
	13.80%	17.94%	12.78%	16.27%	13.91%	14.05%	14.68%	15.65%
H:	−0.85%	−1.18%	−0.89%	−1.36%	−0.91%	−0.95%	−1.72%	−1.15%
H: $\mathbb{1} = 1$	0.00%	0.00%	0.00%	1.64%	0.00%	0.00%	0.00%	

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. Columns (1) through (7) indicate the country samples for source and destination countries used in the regression, while column (8) excludes the years of the GFC. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 7: Timing of MPP stance

MPP instrument:	All instruments		Supply side	Demand side	FX exposure
Dep.variable: Δ net loans to non-banks	(1)	(2)	(3)	(4)	(5)
Flows_{jit}		0.0073***	0.0070***	0.0058***	0.0052***
		(0.0020)	(0.0020)	(0.0019)	(0.0018)
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit}$		−0.0005***	−0.0007***	−0.0013**	−0.0062***
		(0.0002)	(0.0002)	(0.0006)	(0.0022)
BKR_{bit-1}		0.2707*	0.2950**	0.3162**	0.3477***
		(0.1383)	(0.1340)	(0.1267)	(0.1256)
MPP $\text{Stance}_{jt} \times \text{BKR}_{bit-1}$		0.0140*	0.0177*	0.0203**	−0.0067
		(0.0072)	(0.0102)	(0.0087)	(0.0197)
$\text{Flows}_{jit} \times \text{BKR}_{bit-1}$		−0.0461***	−0.0439***	−0.0351***	−0.0311***
		(0.0121)	(0.0120)	(0.0109)	(0.0107)
MPP $\text{Stance}_{jt} \times \text{Flows}_{jit} \times \text{BKR}_{bit-1}$		0.0030***	0.0043***	0.0077**	0.0343***
		(0.0009)	(0.0014)	(0.0036)	(0.0118)
Flows_{jit-1}	0.0047***	0.0055***	0.0053***	0.0044***	0.0046***
	(0.0017)	(0.0018)	(0.0018)	(0.0016)	(0.0016)
MPP $\text{Stance}_{jt-1} \times \text{Flows}_{jit-1}$	−0.0002*	−0.0003**	−0.0004**	−0.0001	−0.0037**
	(0.0001)	(0.0001)	(0.0002)	(0.0005)	(0.0016)
BKR_{bit-2}	0.7103***	0.5614***	0.5517***	0.5454***	0.5183***
	(0.0837)	(0.1130)	(0.1104)	(0.1067)	(0.1062)
MPP $\text{Stance}_{jt-1} \times \text{BKR}_{bit-2}$	0.0032	−0.0064	−0.0091	−0.0100	0.0434**
	(0.0051)	(0.0065)	(0.0095)	(0.0079)	(0.0179)
$\text{Flows}_{jit-1} \times \text{BKR}_{bit-2}$	−0.0269***	−0.0325***	−0.0314***	−0.0255***	−0.0271***
	(0.0099)	(0.0107)	(0.0107)	(0.0095)	(0.0094)
MPP $\text{Stance}_{jt-1} \times \text{Flows}_{jit-1} \times \text{BKR}_{bit-2}$	0.0012*	0.0017**	0.0025**	0.0004	0.0195**
	(0.0007)	(0.0008)	(0.0012)	(0.0027)	(0.0086)
Adjusted R^2	0.36	0.36	0.36	0.36	0.36
N	213,955	206,575	206,575	206,575	206,575
Bank FE	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):					
@ t:		6.73%	6.41%	5.35%	4.75%
@ $t-1$:	4.33%	5.03%	4.88%	4.00%	4.27%
H @ t:		−0.44%	−0.63%	−1.15%	−5.74%
H @ $t-1$:	−0.20%	−0.26%	−0.38%	0.00%	−3.39%
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):					
@ t:		27.18%	25.87%	20.68%	18.33%
@ $t-1$:	16.03%	19.18%	18.51%	15.04%	15.98%
H @ t:		−1.77%	−2.55%	−4.54%	−20.20%
H @ $t-1$:	−0.74%	−1.01%	−1.45%	0.00%	−11.49%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. Column (1) replaces macroprudential policy stance in time t with time *t-1*, while columns (2) through (5) use both time t and *t-1* macroprudential policy stance. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 8: CBS cross-border flows and scaling by GDP

Dep.variable:	Growth of net loans to non-banks				Change in net loans to non-banks as % of GDP_i			
Flows variable:	Growth rate of $claims_{ji}$ (CBS)				Change in $claims_{ji}$ as % of GDP_i (LBS)			
MPP instrument:	All instruments	Supply side	Demand side	FX exposure	All instruments	Supply side	Demand side	FX exposure
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Flows_{jit}$	0.0045**	0.0035**	0.0040**	0.0040**	0.0798***	0.0752***	0.0772***	0.0820***
	(0.0018)	(0.0016)	(0.0016)	(0.0016)	(0.0075)	(0.0071)	(0.0073)	(0.0078)
MPP $Stance_{jt} \times Flows_{jit}$	−0.0005***	−0.0005**	−0.0021**	−0.0036**	−0.0034***	−0.0041***	−0.0007	−0.0115***
	(0.0002)	(0.0002)	(0.0009)	(0.0015)	(0.0006)	(0.0007)	(0.0018)	(0.0019)
BKR_{bit-1}	0.8532***	0.8627***	0.8639***	0.8609***	−0.0017***	−0.0015***	−0.0014***	−0.0013***
	(0.0978)	(0.0957)	(0.0930)	(0.0929)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
MPP $Stance_{jt} \times BKR_{bit-1}$	0.0063	0.0067	0.0146	0.0337**	0.0001***	0.0001***	0.0002***	0.0005***
	(0.0060)	(0.0076)	(0.0136)	(0.0150)	(0.0000)	(0.0000)	(0.0000)	(0.0001)
$Flows_{jit} \times BKR_{bit-1}$	−0.0265**	−0.0206**	−0.0231**	−0.0236**	−0.5215***	−0.4888***	−0.5012***	−0.5376***
	(0.0105)	(0.0096)	(0.0094)	(0.0095)	(0.0504)	(0.0470)	(0.0480)	(0.0533)
MPP $Stance_{jt} \times Flows_{jit} \times BKR_{bit-1}$	0.0029***	0.0027**	0.0125**	0.0200**	0.0235***	0.0276***	0.0038	0.0808***
	(0.0010)	(0.0013)	(0.0052)	(0.0080)	(0.0038)	(0.0051)	(0.0116)	(0.0132)
Adjusted R^2	0.38	0.38	0.38	0.38	0.43	0.43	0.43	0.43
N	222,031	222,031	222,031	222,031	262,452	262,452	262,452	262,452
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination×Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country×Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth in columns 1-4 and as a percent based on the sample mean value of change in net loans to GDP in column 5-8) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):								
	3.73%	2.89%	3.31%	3.32%	1.75%	1.65%	1.70%	1.80%
H:	−0.42%	−0.40%	−1.78%	−3.03%	−0.08%	−0.09%	0.00%	−0.25%
Semi-elasticity (as a percent based on the sample mean value of net loans growth in columns 1-4 and as a percent based on the sample mean value of change in net loans to GDP in column 5-8) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):								
	14.21%	11.05%	12.42%	12.66%	7.36%	6.90%	7.07%	7.59%
H:	−1.55%	−1.46%	−6.70%	−10.71%	−0.33%	−0.40%	0.00%	−1.14%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank b located in country i. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. Columns (1) through (4) measure cross-border flows based on the BIS-CBS dataset, while columns (5) through (8) scale the change in net loans to non-banks and the change in cross-border claims with the destination-country GDP. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 9: MPP stance in destination country: exogenous vs. endogenous shocks

MPP_i stance:	Exogenous					Endogenous			
MPP instrument:	All instruments		Supply side	Demand side	FX exposure	All instruments	Supply side	Demand side	FX exposure
multicolumn1l*Dep.variable:* Δ *net loans to non-banks*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Flows_{jit}$	0.0044*	0.0053**	0.0048**	0.0049***	0.0047**	0.0051***	0.0047***	0.0045***	0.0036**
	(0.0023)	(0.0023)	(0.0021)	(0.0018)	(0.0021)	(0.0018)	(0.0018)	(0.0017)	(0.0016)
MPP $Stance_{jt} \times Flows_{jit}$		−0.0003**	−0.0006***	−0.0008	−0.0056***	−0.0005***	−0.0007***	−0.0012**	−0.0074***
		(0.0001)	(0.0002)	(0.0006)	(0.0021)	(0.0001)	(0.0002)	(0.0006)	(0.0022)
BKR_{bit-1}	0.7871***	0.7888***	0.8033***	0.8539***	0.7795***	0.7889***	0.7850***	0.8215***	0.7919***
	(0.1154)	(0.1153)	(0.1095)	(0.0954)	(0.1186)	(0.1057)	(0.1039)	(0.0992)	(0.1034)
MPP $Stance_{jt} \times BKR_{bit-1}$		0.0007	0.0005	0.0063	0.0246	−0.0005	−0.0016	0.0076	0.0224
		(0.0045)	(0.0066)	(0.0074)	(0.0152)	(0.0046)	(0.0065)	(0.0076)	(0.0164)
$Flows_{jit} \times BKR_{bit-1}$	−0.0259*	−0.0311**	−0.0282**	−0.0273***	−0.0291**	−0.0297***	−0.0277***	−0.0261***	−0.0213**
	(0.0136)	(0.0138)	(0.0125)	(0.0100)	(0.0132)	(0.0105)	(0.0105)	(0.0100)	(0.0098)
MPP $Stance_{jt} \times Flows_{jit} \times BKR_{bit-1}$		0.0020**	0.0032***	0.0045	0.0283***	0.0029***	0.0043***	0.0074**	0.0381***
		(0.0008)	(0.0012)	(0.0034)	(0.0108)	(0.0008)	(0.0013)	(0.0035)	(0.0110)
MPP $Stance_{it} \times Flows_{jit}$	−0.0002	−0.0001	−0.0000	−0.0013*	−0.0008	0.0001	0.0001	0.0000	−0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0008)	(0.0008)	(0.0002)	(0.0002)	(0.0008)	(0.0008)
MPP $Stance_{it} \times BKR_{bit-1}$	0.0068	0.0064	0.0064	0.0026	0.0382	0.0097	0.0100	−0.0065	0.0435
	(0.0057)	(0.0061)	(0.0065)	(0.0311)	(0.0325)	(0.0066)	(0.0068)	(0.0335)	(0.0344)
MPP $Stance_{it} \times Flows_{jit} \times BKR_{bit-1}$	0.0012	0.0004	0.0003	0.0081	0.0053	−0.0004	−0.0003	−0.0008	0.0020
	(0.0010)	(0.0009)	(0.0010)	(0.0055)	(0.0047)	(0.0011)	(0.0011)	(0.0055)	(0.0048)
Adjusted R^2	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36
N	236,759	236,759	236,759	236,759	236,759	221,949	221,949	221,949	221,949
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country × Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country × Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination × Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source country × Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the growth rate of loans granted by destination country banks to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):									
	3.63%	4.35%	3.95%	4.03%	3.89%	4.19%	3.91%	3.76%	3.00%
H:		−0.28%	−0.46%	0.00%	−4.58%	−0.41%	−0.61%	−1.03%	−6.15%
Semi-elasticity (as a percent based on the sample mean value of net loans growth) of the differential response of capital-constrained banks (at the 1st ptile) vs. capital-abundant banks (at the 99th ptile) in the destination country to a one standard deviation increase in cross-border flows growth, and its response to a one-unit tightening in the macroprudential policy stance in the source country (H):									
	13.69%	16.40%	14.87%	14.40%	15.34%	15.79%	14.77%	13.87%	11.34%
H:		−1.07%	−1.70%	0.00%	−14.93%	−1.55%	−2.30%	−3.92%	−20.30%

Notes: The table reports estimates from ordinary least squares regressions, including several types of fixed effects (FE) indicated in each column, for the period 1998 to 2020. The dependent variable is the annual growth of net loans granted to customers by bank *b* located in country *i*. All bank control variables are lagged one period. Table A1 contains the definition of all variables and the summary statistics for each included variable, while Table A3 includes all source and destination countries of cross-border bank flows. All columns include 1417 banks from 30 emerging market countries. The endogenous MPP stance in the destination country *i* is estimated using the policy shocks approach based on results in Table 10. Coefficients are listed in the first row, robust standard errors clustered at the bank level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. "–" indicates that the set of characteristics or fixed effects are comprised in the wider included set of fixed effects. Time FE include an effect for every year. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 10: First stage of MPP stance shocks

MPP instrument:	All instruments	Supply side	Demand side	FX exposure
Dep.variable: destination country MPP stance	(1)	(2)	(3)	(4)
Crisis in last 12 months$_{it-1}$	-1.801^{*}	-1.917^{*}	-0.023	-0.133
	(1.070)	(1.159)	(0.159)	(0.166)
Sovereign crisis count$_{it-1}$	-0.722^{***}	-0.429^{***}	-0.100^{***}	-0.117^{***}
	(0.115)	(0.083)	(0.024)	(0.031)
Currency crisis count$_{it-1}$	0.707^{***}	0.504^{***}	0.104^{***}	0.087^{***}
	(0.108)	(0.119)	(0.036)	(0.027)
Banking crisis count$_{it-1}$	-0.535^{***}	-0.370^{***}	-0.080^{**}	-0.072^{***}
	(0.102)	(0.090)	(0.036)	(0.023)
Flows$_{it-1}$	-0.639	-0.588	-0.079	-0.140
	(0.550)	(0.364)	(0.090)	(0.086)
Private credit growth$_{it-1}$	-5.270^{***}	-2.567	-1.302^{**}	-1.048^{**}
	(2.026)	(1.963)	(0.526)	(0.524)
REER growth$_{it-1}$	-8.463^{*}	-7.395^{*}	-0.455	-0.275
	(4.417)	(4.213)	(0.776)	(0.604)
GDP growth forecast$_{it-1}$	-22.624	-20.580	-0.969	-1.143
	(24.414)	(25.302)	(2.328)	(5.023)
Inflation$_{it-1}$	-13.491^{***}	-9.263^{***}	-1.759	-1.850^{**}
	(4.621)	(3.379)	(1.368)	(0.847)
Real GDP growth$_{it-1}$	7.668	6.348	2.375	-2.122
	(8.754)	(7.194)	(2.047)	(1.371)
Capital controls$_{it-1}$	4.587	2.969	1.633^{**}	0.420
	(2.980)	(1.963)	(0.740)	(0.634)
Within R^2	0.36	0.27	0.20	0.31
Countries	26	26	26	26
F-statistic	202.00	113.00	37.90	71.50
Destination country FE	Yes	Yes	Yes	Yes

Notes: The table reports estimates from ordinary least squares regressions, including country fixed effects (FE), for the period 1998 to 2020. The dependent variable is the MPP stance of the destination country *i*. All control variables are lagged one period. Table A2 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, bootstrapped standard errors clustered at destination country level are reported in the row below in parentheses, and the corresponding significance levels are placed adjacently. Constant term is not reported. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table A1: Descriptions and summary statistics of variables

Variable	Definition	Source	Mean	sd	1st pct	99th pct
Cross-border banking flows						
Growth rate of total claims	Annual flows of total cross-border claims of reporting country *j* on all instruments and all counterparty sectors of country *i* adjusted for exchange rate fluctuations and breaks-in-series and normalized by the lagged outstanding total claims of reporting country *j* on all instruments and all counterparty sectors of country *i*. To neutralize the impact of outliers this variable is winsorized at 2.5%.	BIS - LBS	27.92	130.89	−85.01	770.77
Growth rate of total loan and deposit claims	Annual flows of total cross-border claims of reporting country *j* on loans and deposits in all counterparty sectors of country *i* adjusted for exchange rate fluctuations and breaks-in-series and normalized by the lagged outstanding claims of reporting country *j* on loans and deposits in all counterparty sectors of country *i*. To neutralize the impact of outliers this variable is winsorized at 2.5%.	BIS - LBS	28.74	131.58	−85.65	738.65
Growth rate of total claims to non-banking sector	Annual flows of total cross-border claims of reporting country *j* on all instruments in non-banking sector of country *i* adjusted for exchange rate fluctuations and breaks-in-series and normalized by the lagged outstanding total claims of reporting country *j* on all instruments in non-banking sector of country *i*. To neutralize the impact of outliers this variable is winsorized at 2.5%.	BIS - LBS	29.98	134.60	−83.27	806.98
Growth rate of claims (CBS)	Growth rate of the annual stock of total claims of domestic banks with nationality *j* on all instruments from all remaining maturities and all counterparty sectors of country *i* booked in all currencies and reported on an immediate countrerparty basis. To neutralize the impact of outliers this variable is winsorized at 2.5%.	BIS - CBS	32.22	138.97	−83.48	800.00
Change in claims as % of GDP	Annual flows of total cross-border claims of reporting country *j* on all instruments and all counterparty sectors of country *i* adjusted for exchange rate fluctuations and breaks-in-series and normalized by GDP in current prices of country *i*. To neutralize the impact of outliers this variable is winsorized at 2.5%.	BIS-LBS and IMF WEO	0.03	0.29	−0.74	0.94
Bank-level data						
Growth of net loans to non-banks	Annual growth rate of net loans granted by bank *b* located in country *i* to non-banks. To neutralize the impact of outliers this variable is winsorized at 2.5%.	S&P Capital IQ and BankScope	15.87	46.05	−51.93	191.83
Growth of net loans to banks	Annual growth rate of net loans granted by bank *b* located in country *i* to other banks. To neutralize the impact of outliers this variable is winsorized at 5%.	S&P Capital IQ	43.80	146.50	−90.35	517.03
Change in net loans to non-banks as % of GDP	Annual change in net loans granted by bank *b* located in country *i* to non-banks normalized by GDP in current prices of country *i*. To neutralize the impact of outliers this variable is winsorized at 2.5%.	S&P Capital IQ, BankScope, and IMF WEO	0.09	0.39	−0.78	1.81
Capitalization	Total equity divided by total assets. To neutralize the impact of outliers this variable is winsorized at 2.5%.	S&P Capital IQ and BankScope	16.96	12.96	3.61	67.78
Foreign ownership	Dummy equal to one if the bank is foreign owned, zero if domestic.	Orbis	0.69	0.46	0	1
Size	Total assets of bank *b* located in country *i* divided by the sum of total assets in all banks in country *i*. To neutralize the impact of outliers this variable is winsorized at 2.5%.	S&P Capital IQ and BankScope	2.80	5.20	0.00	25.36
Profitability	Net income before tax divided by total assets times. To neutralize the impact of outliers this variable is winsorized at 2.5%.	S&P Capital IQ and BankScope	1.10	2.55	−7.39	7.68

Notes: The sample includes 1417 banks from 30 emerging market countries, representing the destination countries of cross-border bank flows during the period 1998-2020. Summary statistics are based on the average values of the variables over the sample period.

Descriptions and summary statistics of variables (cont.)

Variable	Definition	Source	Mean	sd	1st pct	99th pct
Macroprudential policy stance						
MPP all instruments	Sum of cummulated changes in the sum since 1990 of all the policy-action dummy-type indicators from MPP supply side, demand side, and international exposure plus 2 additional indicators: i) tax measures for macroprudential purposes and ii) other macroprudential measures not captured in the previous categories (e.g., stress testing, restrictions on profit distribution, and structural measures).	iMaPP	3.12	8.33	-7	36
MPP supply side	Sum of cummulated changes in the sum since 1990 of the 11 dummy-type indicators that target credit supply: i) capital requirements (except capital requirements on foreign currency loans), ii) countercyclical buffers, iii) conservation buffers, iv) leverage limits, v) measures for the systemically important financial institutions, vi) loan loss provisions, vii) limits on credit growth, viii) loan restrictions, ix) limits on the loan-to-deposit ratio, x) reserve requirements and xi) liquidity requirements.	iMaPP	1.34	5.93	-6	24
MPP demand side	Sum of cummulated changes in the sum since 1990 of the 2 dummy-type indicators that target credit demand: i) loan-to-value ratio and ii) debt-service-to-income ratios	iMaPP	0.82	2.26	-1	11
MPP international exposure	Sum of cummulated changes in the sum since 1990 of the 3 dummy-type indicators that target international exposure: i) limits on foreign currency lending or rules or recommendations on foreign currency loans, ii) limits on net or gross open foreign exchange positions, limits on foreign exchange exposures and funding, and currency mismatch regulations, and iii) capital requirements on foreign currency loans.	iMaPP	0.23	0.85	0	5
Other macroeconomic variables						
Monetary policy	End-of-period central bank policy rate of country *j*.	IMF MFS, BIS, FRED, and Central Banks	3.24	4.05	−0.69	19.00
Shadow rate	Replace the central bank policy rate with the end-of-period shadow rate if country *j* is the US, UK, euro area, or Japan.	Krippner (2016)	2.31	4.90	−6.65	19.00
GDP growth	Annual growth rate of GDP at constant prices of country *j*.	IMF WEO	2.12	3.17	−8.17	9.03
Inflation	End-of-period consumer prices inflation in country *j*.	IMF WEO	2.21	2.14	−2.00	10.07
Exchange rate	Annual growth rate on the nominal effective exchange rate of country *j* (calculated against 170 trading partners).	Bruegel Broad Datasets	0.11	5.62	−19.19	14.78
Capital controls	Chinn-Ito Index of financial openness of country *j*.	Chinn and Ito (2008)	1.73	1.09	−1.23	2.32

Notes: The sample includes 1417 banks from 30 emerging market countries, representing the destination countries of cross-border bank flows during the period 1998-2020. Summary statistics are based on the average values of the variables over the sample period.

Table A2: Variables for first-stage of MPP stance

Variable	Definition	Source	Mean	sd	1st pct	99th pct
Crisis variables						
Crisis in last 12 months	Dummy equal to one if the country experienced a banking, currency, or sovereign debt crisis in the year.	Laeven and Valencia (2020); Nguyen et al. (2022)	0.21	0.41	0	1
Sovereign crisis count	Count of countries in sample in a sovereign debt crisis in a given year.	Laeven and Valencia (2020); Nguyen et al. (2022)	4.09	3.93	1	13
Currency crisis count	Count of countries in sample in a currency crisis in a given year.	Laeven and Valencia (2020); Nguyen et al. (2022)	1.73	2.60	0	10
Banking crisis count	Count of countries in sample in a banking crisis in a given year.	Laeven and Valencia (2020); Nguyen et al. (2022)	2.36	2.29	0	7
Credit variables						
Flows	Growth rate of total claims of all reporting countries *j* on all instruments and all counterparty sectors of country *i*. To neutralize the impact of outliers, this variable is winsorized at 2.5%.	BIS - LBS	17.93	49.75	-39.58	216.28
Private credit growth	Growth rate of private credit by deposit money banks and other financial institutions as a share of GDP. To neutralize the impact of outliers, this variable is winsorized at 2.5%.	WB Global Financial Development Database	6.68	14.98	-20.17	45.40
Growth variables						
REER growth	Year-on-year real exchange rate appreciation against 170 trading partners (CPI-based, %).	Bruegel Broad Datasets	0.54	8.39	-27.04	19.57
GDP growth forecast	5 quarter ahead forecast annual real GDP growth rate, October WEO.	IMF World Economic Outlook	4.30	2.81	-2.18	15.28
Inflation	Year-on-year average CPI inflation.	IMF World Economic Outlook	8.33	16.59	-1.32	70.00
Real GDP growth	Annual real GDP growth.	IMF World Economic Outlook	4.05	4.94	-12.15	17.10
Other macro and institutional characteristics						
Capital controls	Chinn-Ito index of financial openness normalized to range between zero and one.	Chinn and Ito (2008)	0.54	0.34	0	1

Notes: The sample includes 30 emerging market countries representing the destination countries of cross-border bank flows from 1998-2020. Summary statistics are based on the average values of the variables over the sample period.

Table A3: Country coverage

Destination country (*i*)	Source country (*j*)
Albania	Australia
Armenia	Austria
Azerbaijan	Belgium
Belarus	Brazil
Bosnia and Herzegovina	Canada
Bulgaria	Chile
Croatia	Chinese Taipei
Czechia	Denmark
Estonia	Finland
Georgia	France
Hungary	Germany
Kazakhstan	Greece
Kyrgyztan	Hong Kong SAR
Latvia	Ireland
Lithuania	Italy
Moldova	Japan
Mongolia	Korea
Montenegro	Luxembourg
North Macedonia	Mexico
Poland	Netherlands
Romania	Philippines
Russia	South Africa
Serbia	Spain
Slovakia	Sweden
Slovenia	Switzerland
Tajikistan	United Kingdom
Turkey	United States
Turmenistan	
Ukraine	
Uzbekistan	

Notes: The table lists the source countries and destination countries of cross-border bank flows included in the dataset described in Section 3.