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by

John Beirne[1] and Christian Friedrich[2]

[1]International Policy Analysis Division
European Central Bank
Frankfurt am Main, 60311, Germany
and
Centre for Empirical Finance
Brunel University, London, UB8 3PH, United Kingdom
John.Beirne@ecb.int

[2]International Economic Analysis Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
Corresponding author: cfriedrich@bankofcanada.ca

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Abstract

This paper assesses the effectiveness and associated externalities that arise when macroprudential policies (MPPs) are used to manage international capital flows. Using a sample of up to 139 countries, we examine the impact of eight different MPP measures on cross-border bank flows over the period 1999-2009. Our panel analysis takes into account the structure of the banking system as well as the presence of potential *cross-country* and *cross-asset class* spillover effects. Our results indicate that the structure of the domestic banking system matters for the effectiveness of MPPs. We specifically find that a high share of non-resident bank loans in the MPP-implementing country reduces the domestic effectiveness of most MPPs, while a high return on assets in the domestic banking system has the opposite effect. Our results on the spillover analysis indicate that both types of spillover can occur. First, we find that a high return on assets in the banking system of countries other than the MPP-implementing one leads to a reduction, and a greater degree of trade integration leads to an increase in spillovers across countries. However, the economic significance of the results suggests that only a limited number of countries will tend to experience substantial geographical spillover effects. Second, we also find some evidence of spillover effects across asset classes within countries.

JEL classification: F3, F5, G01, G11
Bank classification: International topics; Financial markets; Balance of payments and components

Résumé

Nous évaluons l'efficacité des politiques macroprudentielles dans la gestion des flux de capitaux internationaux et les externalités découlant de leur mise en œuvre. À l'aide d'un échantillon comptant jusqu'à 139 pays, nous étudions les effets de huit mesures de politique macroprudentielle sur les flux bancaires transfrontaliers au cours de la période allant de 1999 à 2009. Notre analyse longitudinale examine la structure du système bancaire et la présence de possibles effets de débordement *entre pays* et *entre catégories d'actifs*. Nos résultats indiquent que la structure du système bancaire national a une incidence sur l'efficacité des politiques macroprudentielles. Plus précisément, nous constatons qu'une proportion élevée de prêts accordés par des banques non résidentes dans un pays qui adopte des politiques macroprudentielles réduit l'efficacité à l'échelle intérieure de la plupart de celles-ci, alors qu'un haut rendement des actifs dans le système bancaire national a une incidence contraire. Par ailleurs, notre analyse donne à penser que les deux types d'effets de débordement peuvent se produire. Premièrement, nous observons qu'un haut rendement des actifs dans le système bancaire de pays autres que celui qui applique des politiques macroprudentielles entraîne une diminution de ces effets, alors qu'un niveau élevé d'intégration commerciale au sein du même groupe de pays provoque une hausse dans tout le groupe. Cependant, le fait que les résultats soient économiquement significatifs tend à indiquer que généralement seul un nombre limité de

pays subit des effets de débordement géographiques. Deuxièmement, certains résultats laissent entrevoir des retombées touchant diverses catégories d'actifs à l'intérieur de pays.

Classification JEL : F3, F5, G01, G11
Classification de la Banque : Questions internationales; Marchés financiers; Balance des paiements et composantes

1 Introduction

The recent global financial crisis has demonstrated the important role played by systemic risk in raising financial stability concerns. Since then, macroprudential policies (MPPs) have been placed prominently on the research agendas of major central banks and international policy institutions.[1] Lately, the policy discussion has extended to also assessing the use of MPPs in managing large capital inflows, especially to emerging markets (e.g., IMF, 2011c). It is worth noting that while capital flows can have undoubtedly positive effects on emerging-market economies by promoting investment and growth, there is also ample evidence to suggest that foreign capital inflows have contributed to fuel credit booms, to provoke over-indebtedness, and to facilitate the emergence of currency and maturity mismatches. In order to mitigate the negative effects associated with excessive capital inflows, countries mainly relied on capital controls in the past. However, tackling excessive inflows of foreign capital with MPPs instead comes with the advantage that MPPs pertain to all participants of a financial system – unlike capital controls, which only apply to non-residents. In addition, policy-makers might not only be interested in the impact of MPPs on capital flows in order to actively influence capital flows. There is also an increasing need to better understand potential externalities along the international dimension arising from MPPs that are primarily targeted to reduce domestic risks.

In light of the growing debate on the effectiveness of MPPs in emerging markets, the International Monetary Fund (IMF) has started a large policy-oriented research program[2] on the use and implementation of capital controls and MPPs in recent years.[3] It includes defining and categorizing MPPs (IMF, 2011a), identifying indicators to measure systemic risk (IMF, 2011b), examining the institutional frameworks for MPPs (Nier et al., 2011), and assessing their effectiveness (Lim et al., 2011). Lately, the IMF has also placed multilateral aspects of capital flow measures on the agenda (IMF, 2011d) and urges national policy-makers to pay more attention to the multilateral effects of MPPs, such as evasion effects and spillovers to other countries.

Previous academic research on MPP effectiveness typically assesses the effect of various MPPs on selected components of the financial system and finds that MPPs have generally been effective in reducing systemic risk (e.g., Lim et al., 2011; Habermeier et al., 2011; Qureshi et al., 2012). However, the MPP literature lacks convincing evidence of their impact on foreign capital flows so far. In this paper, we argue that properly accounting for the structure and the quality of the domestic financial system – the intermediation point for capital from abroad and also the target of the MPPs – is a key factor for overturning this observation. A second gap in the literature relates to the dearth of studies on externalities associated with MPP implementations, as the majority of the literature focuses primarily on benefits associated with these measures.

We try to close this second gap by explicitly including measures of international spillover effects, which may arise after the introduction of an MPP, in our empirical specifications. Our empirical analysis relies on a panel data approach that examines the impact of eight different MPP indices on international bank flows in a sample of up to 139 countries over the period

[1] The notion of macroprudential policies (MPPs) includes all financial sector policies that are targeted to manage the systemic risks embedded in the financial system. Furthermore, policies discussed in this paper can largely be attributed to the following four categories: restrictions on the use of foreign currency, the implementation of credit ceilings, limitations to maturity mismatches and the introduction of capital requirements. Section 3.2 gives a more detailed definition of MPPs.

[2] This program has evolved around the question of how to manage large-scale capital inflows in emerging markets after the crisis and the problem of a missing international framework on how to deal with capital account restrictions (e.g., see IMF, 2010 and IMF, 2011c). For the IMF's view on capital controls, see also Ostry et al. (2010).

[3] A similar intention is observed in other policy institutions as well; see, for example, BIS (2010).

1999-2009. Hence, we derive our results from a world sample containing advanced countries, emerging markets and other developing countries. We answer our research question by interacting standard MPP indices taken from the literature (Qureshi et al., 2012; Lim et al., 2011) as well as our international spillover index derived from these measures with a set of financial and macroeconomic variables that are most likely able to influence the effectiveness of MPPs. We finally provide a comprehensive discussion regarding whether MPPs have been successful in reducing foreign capital flows to the implementing country and whether they may have created spillovers to other countries.

Among the financial variables, we find that a high share of non-resident bank loans in the economy reduces the domestic effectiveness of most MPPs, while a high return on assets in the domestic banking system has the opposite effect. For the macroeconomic variables, it turns out that MPPs targeted at credit growth, maturity mismatches and capital requirements are more effective when the country experiences a high real growth rate. When focusing on international spillovers, we find that a high return on assets in countries other than the MPP-implementing one leads to a reduction in spillovers from foreign MPP implementations, and a high degree of trade integration in the same set of countries is positively related to spillovers. Also the level of loans from non-resident banks plays a role, especially for domestically oriented MPPs: while the effects for credit and maturity-related policies differ across the definitions of our international spillover index, the implementation of capital-related MPPs leads to consistently more spillovers in an environment with a high share of non-resident bank loans. Based on these coefficient estimates, we examine the total marginal effects of all MPPs, domestically and internationally, along the distribution of our financial and macroeconomic variables. Although the majority of these combinations show no significant impact on international bank flows, we do find a notable number of combinations in which MPPs reduce bank flows to the implementing country. More importantly, several of these incidents are accompanied by spillover effects – both positive and negative – *across* countries. Finally, when replacing the bank flow variable with an alternative type of capital flow, we find spillover effects across asset classes *within* the implementing country.

The remainder of the paper is organized as follows. Section 2 provides a summary of the literature. Section 3 presents the organizing framework for our empirical analysis, the construction of the MPP indices used in this paper and their development over time. Section 4 describes the methodology and the data to be used in the empirical analysis. Section 5 presents the empirical results, Section 6 assesses their robustness and Section 7 concludes.

2 Literature

A number of papers on the effectiveness of capital controls and macroprudential policies have emerged in recent years, both of a theoretical and an empirical nature. In this section, we provide an overview of the most relevant papers relative to our own contribution. From an effectiveness perspective, we show that most of the theoretical work done in this field indicates that MPPs can be welfare-enhancing. This literature assumes the existence of a state-dependent, aggregate, external financing shock. Often, financial frictions are also introduced that induce agents, such as banks, firms or households to take on too much systemic risk. Hence, agents become underinsured against the external financing shock. Financial frictions, for example, can take on the form of limited commitment in financial contracts (Lorenzoni, 2008), limited access of banks to productive capital in times of crisis (Federico, 2011) or collateral constraints (Korinek, 2010). Financial frictions usually materialize through a downward pressure on asset

prices when the economy is hit by a negative financing shock.

Lorenzoni (2008) introduces a theoretical framework and applies it to credit booms and overborrowing. His analysis suggests that reserve requirements may limit the need to sell assets in times of crisis and thus can be welfare improving. Federico (2011) builds on the same framework and introduces banks that finance long- and short-term investments by borrowing locally and externally. To overcome inefficiencies resulting from the above-mentioned externality, he suggests using liability-side instruments, such as unremunerated reserve requirements, and asset-side instruments, such as taxes on short-term assets, at the same time. Korinek (2010) focuses on high capital flow volatility and argues that taxing risky inflows, such as foreign currency debt, with unremunerated reserve requirements can be welfare improving. In the same vein, Jeanne and Korinek (2010) show in a calibrated model that a Pigouvian tax on borrowing may induce borrowers to internalize externalities and increase welfare. Other theoretical papers are based on a Dynamic Stochastic General Equilibrium (DSGE) framework. For example, Bianchi (2011) examines several MPP measures, such as taxes on debt, tightening of margins, and capital and liquidity requirements, that are designed to increase the effective costs of borrowing and thus can increase welfare. He finds that implementing a constrained-efficient allocation requires an increase in the effective costs of borrowing by about five percent on average. This number turns out to be even higher for greater levels of debt and an increasing probability of a future financial crisis.[4]

The empirical literature examining MPP effectiveness largely finds a significant effect on systemic risk measures, but only a weak impact on capital flows. Magud et al. (2011) provide an extensive meta-study on the empirical literature of capital controls. The authors identify four key problems in the literature: *(i)* no unified theoretical framework to analyze macroeconomic consequences of capital controls; *(ii)* a substantial heterogeneity across countries and types of controls implemented; *(iii)* no clear definition of when capital controls are successful; and *(iv)* a strong reliance on a few country cases. To solve these issues, the authors try to standardize the results of 30 empirical studies by constructing two indices that assign weights to the results of various papers. The authors conclude that capital controls can make monetary policy more independent, influence the composition of flows and, to a lesser extent, reduce exchange rate pressures. However, no significant impact is found on the level of net capital flows. A study that goes beyond assessing the effectiveness of capital controls only for the introducing country is Forbes et al. (2011).[5] The authors examine the introduction of a tax on foreign debt investments in Brazil from 2006 to 2011. Using bond and equity fund data, the approach differentiates between effects on the funds' portfolio allocation to Brazil and spillover effects on the portfolio allocation to other countries. It is found that spillover effects are heterogeneous across countries: countries that are perceived as likely to implement capital controls in the near future receive lower portfolio weights, while countries that are located in the same region, that are of similar weight in the benchmark index, and that benefit from growth in China, are likely to receive higher portfolio weights.

More recently, a number of studies have emerged that focus jointly on the effectiveness of capital controls and MPPs. The first set of papers is Habermeier et al. (2011) and Baba and Kokenyne (2011). Both papers attempt to find empirical evidence on the effectiveness of

[4]Also Unsal (2011) confirms the theoretical conclusion that MPPs can be welfare-improving by introducing latter ones in an Open Economy DSGE model. Beningno et al. (2010a, 2010b) arrive at different conclusions.

[5]Lambert et al. (2011) examine the same event and also find spillovers to other countries in the region, especially to Mexico.

capital controls and MPPs during the past decade. The authors refer to both policies jointly as *capital flow measures*. Habermeier et al. (2011) summarize the empirical literature by stating that capital controls have only a small effect on the volume of flows and the resulting currency appreciation but can change the composition of flows. The authors also note that there has not been much in-depth study of the effectiveness of MPPs to date. They supplement their literature survey with a four-country (Brazil, Columbia, Korea and Thailand) Generalized Method of Moments (GMM) analysis that shows very limited success for capital controls in reducing capital inflows. Baba and Kokenyne (2011) examine the same set of countries in a Vector Autoregression (VAR) framework. The authors find capital controls have a positive impact in maintaining an interest differential to conduct independent monetary policy. However, Baba and Kokenyne (2011) also find that capital controls have nearly no effect on the level of capital flows and the currency appreciation.

The most closely related studies to this paper are Lim et al. (2011) and Qureshi et al. (2012). Lim et al. (2011) examine the effectiveness of 10 different MPPs using three different methodological approaches: a case study, a before-after analysis and a panel regression. The panel-regression approach, where MPPs are represented by dummy variables taking on the value of 1 when they are present, is divided into cyclical and cross-sectional risks. Starting with the effect of MPPs on cyclical systemic risks, such as the presence of credit booms, the authors find that a number of MPP instruments can indeed reduce the procyclicality of credit. Successful instruments include caps on the loan-to-value ratio and the debt-to-income ratio as well as limits on credit growth, reserve requirements and dynamic provisioning. The only outcome variable in the analysis that is related to capital flows and currency mismatches is associated with cross-sectional risks and comprises the ratio of foreign liabilities to foreign assets. Lim et al. (2011) find that only MPPs that limit net open positions in foreign currency have a mitigating effect on the ratio mentioned above. All other MPPs turn out to be ineffective in this setup.[6] Qureshi et al. (2012) construct three indices for *capital controls*, *foreign exchange-related MPPs* and *other MPPs*. These indices are used in a panel regression with 51 emerging-market countries over the period 1995-2008. The findings indicate that capital controls and foreign exchange-related MPPs are associated with a lower ratio of lending in foreign currency to total domestic bank credit and a lower proportion of portfolio debt in total external liabilities.[7] In addition, measures of the *other MPPs* category seem to reduce the intensity of aggregate credit booms. However, the effect of MPPs on capital flows, measured as the percentage of total flows that are debt flows, is mostly insignificant.

In our empirical analysis, we rely on the MPP measures from both Lim et al. (2011) and Qureshi et al. (2012). Their construction and interpretation is discussed in Section 3.2. Concluding the literature review, it can be stated that the effect of capital controls on the level of capital flows, their composition as well as their effect on exchange rate pressure/the interest rate differential have been extensively researched. Most prominently, no effect of capital controls on

[6] In addition, Forbes et al. (2013) examine the effectiveness of capital controls and MPPs using a self-constructed database on weekly changes in capital-flow-management policies over the period from 2009 to 2011. Their findings also indicate that MPPs can reduce financial fragility but are not successful in affecting capital inflows.

[7] Another strand of literature deals more explicitly with policy responses to lending in foreign currencies. Zettelmeyer et al. (2010) focus on currency mismatches in Eastern Europe. The authors deliver a survey of the empirical literature on the dollarization of corporate and household liabilities, and provide evidence themselves on the causes of foreign currency lending in Eastern Europe. Finally, they conclude that using (macroprudential) regulation to reduce foreign currency mismatches is useful in relatively advanced countries, where a small market size or the proximity to the Euro area make it difficult to develop local currency bond markets.

the volume of capital flows has been found. Regarding MPPs, first assessments of the effectiveness of different macroprudential measures in reducing systemic risk indicators, such as credit growth or currency and maturity mismatches, have been carried out and a positive impact has been identified. The literature has also examined the effect of MPPs on capital flows. However, in nearly all studies, this effect turns out to be insignificant and no compelling explanation for this finding is offered. In addition, the literature has also neglected the examination of related externalities following the introduction of MPPs – especially along the international dimension. We tackle both issues in this paper.

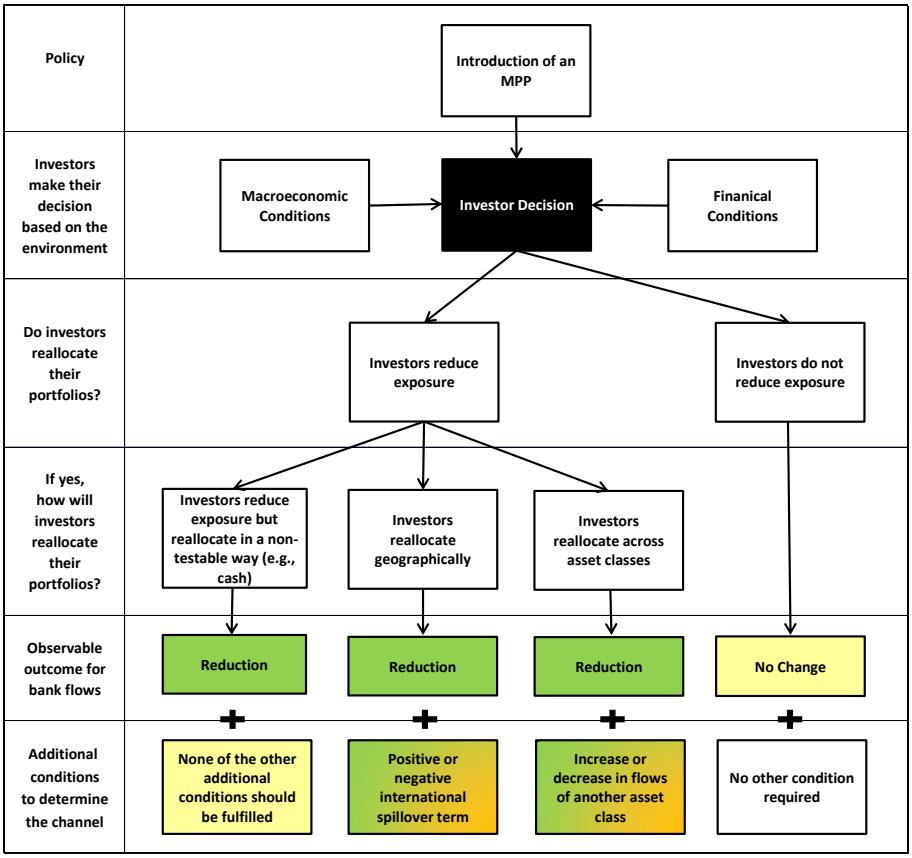
3 Macroprudential Policies and Capital Flows

3.1 A Multilateral Framework for the Empirical Analysis

This subsection motivates the empirical analysis in Section 5 by highlighting potential channels through which MPPs can affect international capital flows. We specifically focus on the response of bank flows since we expect to observe the strongest effect here. While we directly observe the implementation of MPPs by a country as well as their eventual effect on capital flows in the data, uncovering the underlying channels and assessing their relevance requires more work. Based on Figure 1, this subsection provides an overview of potential channels derived from the decision problem of an international investor. The empirical analysis in Section 5 assesses the relative importance of those channels.

Following the introduction of an MPP, investors make their decision on whether or not to reallocate their portfolios. This decision is most likely affected by current financial and macroeconomic conditions (which we incorporate into our empirical analysis as control and interaction variables). Subsequently, in a scenario where investors remain with their portfolios and exposure to the country-asset-class pair is not reduced, we would observe no effect on bank flows at all. However, when investors decide to reduce their exposure to a country-asset-class pair, it is expected that bank flows to the implementing country should decrease. At least three different channels are consistent with this outcome. First, investors could simply reduce their exposure to the asset class without the outcome being observable to us (e.g., holding the money in cash). Although, in such a case, we would not observe the alternative investment, owing to a lack of data, for example, we could still exclude the occurrence of geographical spillover effects or a reallocation of capital to another observed asset class in the same country. Second, investors could remain with the same asset class but reallocate their funds geographically. In this case, we would observe that bank flows toward the MPP-implementing country decrease and an international spillover effect occurs. However, the direction of such an effect is difficult to determine. Where investors associate the introduction of the MPP with a signaling effect and expect other countries to follow suit, spillovers to the neighbor country/the region would imply a reduction in their capital inflows as well. Alternatively, investors could expect the neighbor country/region to be a safe haven and increase their exposure to it. This would result in an increase in capital flows to the countries nearby. Finally, the third option for investors would be to continue investing in the same country but reallocate their capital across observed asset classes. Again, the direction of the effect can go either way. Should investors expect other asset classes to be affected by the MPP as well, we would see a synchronized response of various types of capital flows. However, should investors expect the MPP to be targeted exclusively toward bank flows, our prior would be that bank flows decrease and other types of capital flows rise.

Figure 1: The Domestic and International Effects of Macroprudential Policies



Having pointed out potential channels through which MPPs could affect capital flows in general and bank flows specifically, the goal of the empirical analysis in the remainder of the paper is to specify the conditions under which each of these channels becomes relevant.

3.2 Construction of Macroprudential Policy Measures

To examine the impact of MPPs on capital flows empirically, the abstract notion of an MPP has to be made measurable. This is a complex task, since the line between MPPs and capital controls is very narrow. Moreover, the separation between macro- and microprudential policies is not always clear-cut. In this paper, we define MPPs and the two related concepts based on our reading of the literature as follows.[8]

- **Macroprudential Policy:** A policy that is targeted at all participants of the banking/financial system in order to reduce endogenous systemic risk (often only temporary)
- **Microprudential Policy:** A policy that is targeted at an individual financial institution in order to reduce exogenous risks (usually more permanent in nature)
- **Capital Control:** A policy that is applied by the residence principle and targeted to all non-residents of a country

[8]The first two definitions are adapted from Borio (2003).

For our empirical analysis, we replicate MPP indices from the existing literature based on two different sources, namely, Qureshi et al. (2012) and Lim et al. (2011). Table 1 and the following paragraphs provide a more detailed outline of the definitions and the construction of both indices.

The first source of MPPs is Qureshi et al. (2012), who use MPP measures based on averages of dummy variables created from the IMF's AREAER database. The IMF's AREAER database comprises data on restrictions to the financial account of a country and is available for most countries in the world. While the overall database has been exploited extensively to compute *de jure* measures of financial openness, and therefore a concept closely related to the definition of capital controls in the past (e.g., Chinn-Ito, 2008), the main contribution of Qureshi et al. (2012) is to select only those categories that fall into the range of specific MPP definitions. However, in some cases, the separation is not straightforward. Overall, the authors construct two distinct types of MPPs, where each of the two types is subdivided into a basic and a more advanced version of the index. The first two measures are *fincont1* and *fincont2*, which we name *Q_fincont1* and *Q_fincont2*, respectively. Both measures represent capital controls specifically directed to the financial sector and therefore serve as a hybrid construct between capital controls and MPPs. Measure *Q_fincont1* comprises restrictions on "borrowing abroad" and a "differential treatment of deposit accounts held by non-residents." Measure *Q_fincont2* contains the same elements and also captures restrictions on the "maintenance of accounts abroad." The other two MPP measures are *fxreg1* and *fxreg2*, which we term *Q_fxreg1* and *Q_fxreg2*, respectively. Both MPP measures are related to the use of foreign currency. *Q_fxreg1* comprises constraints on "lending locally in foreign exchange" and a "differential treatment of deposit accounts in foreign exchange." *Q_fxreg2* contains the same elements and also takes into account restrictions to "purchase of locally issued securities denominated in foreign exchange" and limits to "open foreign exchange positions." We replicate all four resulting measures from Qureshi et al. (2012) for our empirical analysis and expand the sample to all countries available from the AREAER database (instead of focusing only on emerging markets).

The second source is Lim et al. (2011), who describe a large set of MPP occurrences in their appendix. Based on this anecdotal evidence, we compute four aggregated dummy variables that take on the value of 1 when a policy in their respective category is implemented: *(i)* Restrictions on the use of foreign currency (henceforth, referred to as *L_fxres*), comprising Caps on Foreign Currency Lending and Limits on Net Open Currency Positions/Currency Mismatches. *(ii)* Lending-related policies that are targeted to reduce individual credit risk (henceforth, *L_credres*), such as Ceilings on Credit or Credit Growth, caps on the Loan-to-Value Ratio (LTV), and caps on the Debt-to-Income Ratio (DTI); however, excluding all foreign exchange restrictions. *(iii)* Capital buffer-related policies that are targeted at banks (henceforth, *L_capreq*) and comprise all policies in the form of Countercyclical Capital Requirements, Time-varying/Dynamic Provisioning and Restrictions on Profit Distribution. *(iv)* Finally, liquidity-related policies (henceforth, *L_matres*) that include Limits on Maturity Mismatches and all Reserve Requirements that are not part of one of the previous groupings. There is less concern that the Lim et al. (2011) measures are closely related to capital controls. That said, some of the associated MPPs share certain characteristics with the definition of microprudential policies instead, for example, capital requirements.

There is one central difference between both sources. Because of the nature of their construction, all Qureshi et al. (2012) measures encompass the entire period in which an MPP is in place. This is highly systematic and delivers a large number of observations for which we can

Table 1: Elements of the Macroprudential Policy Indices

Qureshi et al. (2012)	**Elements**
Capital Controls to the Financial Sector (Q_fincont)	
Capital Controls to the Financial Sector I (Q_fincont1)	- Borrowing abroad (XII.A.1.) - Differential treatment of deposit accounts held by non-residents (XII.A.7.)
Capital Controls to the Financial Sector II (Q_fincont2)	- Elements of Q_fincont1 - Plus: Maintenance of accounts abroad (XII.A.2.)
FX-related Prudential Regulations (Q_fxreg)	
Regulations for Foreign Exchange Transactions (Q_fxreg1)	- Lending locally in foreign exchange (XII.A.4.) - Differential treatment of deposit accounts in foreign exchange (XII.A.6.)
Regulations for Foreign Exchange Transactions (Q_fxreg2)	- Elements of Q_fxreg1 - Plus: Purchase of locally issued securities denominated in foreign exchange (XII.A.5.) - Plus: Open foreign exchange position limits (XII.A.9.)

Lim et al. (2011)	**Elements**
Foreign Exchange Restrictions (L_fxres)	
Restrictions on the use of foreign currency	- Caps on Foreign Currency Lending - Limits on Net Open Currency Positions/ Currency Mismatches
Credit Restrictions (L_credres)	
Lending-related policies that are targeted to reduce individual credit risk; excluding all foreign exchange restrictions	- Ceilings on Credit or Credit Growth - Caps on the Loan-to-Value Ratio (LTV) - Caps on the Debt-to-Income Ratio (DTI)
Maturity Mismatch Restrictions (L_matres)	
Liquidity-related policies	- Limits on Maturity Mismatches - Reserve Requirements that are not part of previous groupings
Capital Requirements (L_capreq)	
Capital-buffer-related policies that are targeted at banks	- Countercyclical Capital Requirements - Time-varying/Dynamic Provisioning - Restrictions on Profit Distribution

Note: The Roman numbers in brackets behind the Qureshi et al. (2012) measures indicate the section of the IMF's AREAER database from which the corresponding information was taken.

be confident about the actual state of the MPP. The measures pertaining to Lim et al. (2011), however, are based on anecdotal evidence and therefore only indicate the introduction date of an MPP. This has two important implications: First, we are not able to distinguish between zero values and missing observations for these measures. And second, because of the limited number of reported occurrences, the overall number of MPP introductions for the Lim et al. (2011) measures is relatively low. Given the lack of a better index to measure MPPs targeted at domestic risks, however, we nonetheless use the latter set of measures alongside those of Qureshi et al. (2012).

3.3 Dynamics of Macroprudential Policy Measures over the Sample Period

This subsection displays the number of policy incidents reported by each of the two sets of MPP measures and illustrates their behavior over time. Table 2 summarizes the MPP incidents for each of the eight measures over the entire sample period. The first column shows the label, the second column the number of observations and the remaining columns show the index values in each case as well as the frequency of their occurrences.

Table 2: Frequency of Macroprudential Policy Incidents in the Sample

Source and Name	**Total Obs.**	**Strength of Policy (1 - strongest)**						
Qureshi et al. (2012)		**0**	**1/4**	**1/3**	**1/2**	**2/3**	**3/4**	**1**
Q_fincont1	1,644	830			597			217
Q_fincont2	1,631	729		366		375		161
Q_fxreg1	1,773	619			609			545
Q_fxreg2	1,227	330	249		273		257	118
Lim et al. (2011)		**0**						**1**
L_fxres	2,002	1976						26
L_credres	2,002	1984						18
L_matres	2,002	1991						11
L_capreq	2,002	1972						30

Note: The indices from Qureshi et al. (2012) capture the entire period during which a macroprudential policy is in place. The indices from Lim et al. (2011) indicate only the implementation date of a policy. Hence, the number of observations in the Lim et al. (2011) case is much lower.

The Qureshi et al. (2012) measures are averages over a varying number of dummy variables depending on the index type. The Lim et al. (2011) measures are actual dummy variables and therefore take on only the values zero and one. As discussed in the previous subsection, Table 2 shows that the number of MPP incidents for the Lim et al. (2011) measures is very small relative to the overall number of observations. In addition to Table 2, we also plot the development of all eight MPP measures as averages across countries over time. Figure 2 depicts the four measures taken from Qureshi et al. (2012) and Figure 3 presents the four measures based on Lim et al. (2011). When examining the two figures, we observe similar dynamics across different types of MPPs. Nearly all eight series have their peaks between 2006 and 2008, indicating that the

recent financial crisis contributed to an increased use of MPPs. MPPs were also used extensively during the early 2000s.

Figure 2: Macroprudential Policy Indices after Qureshi et al. (2012) over Time

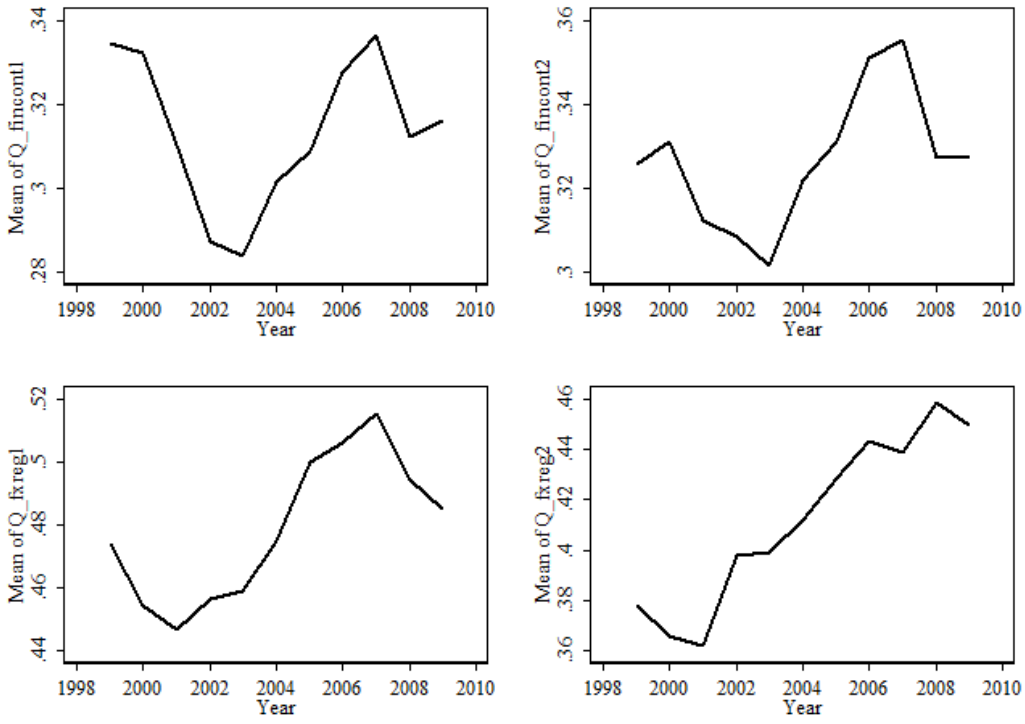
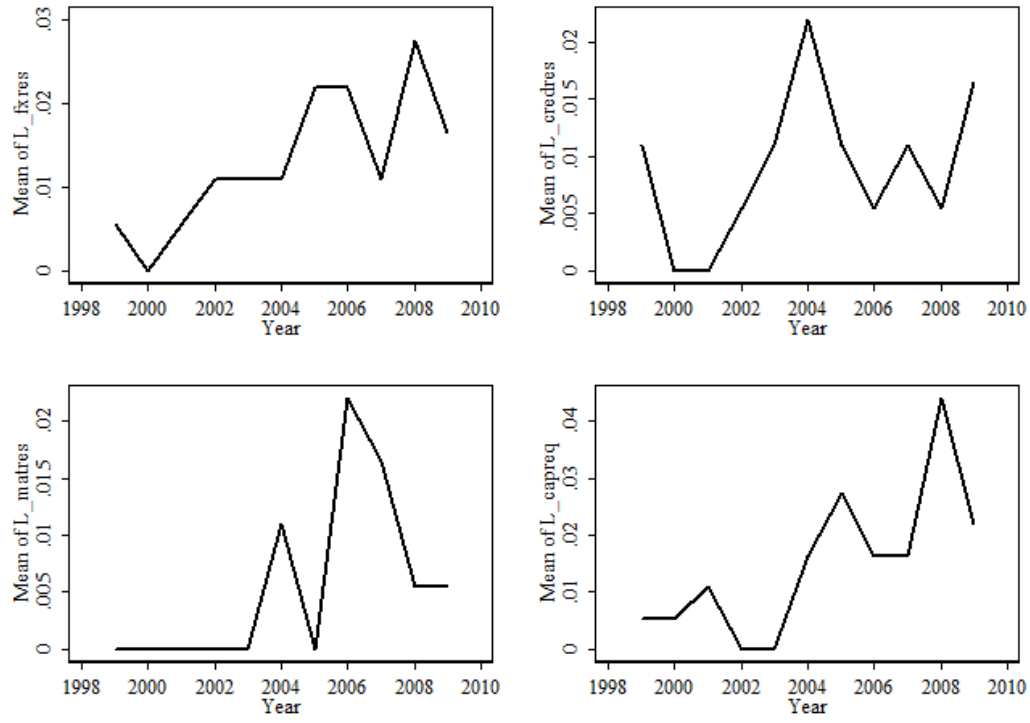


Figure 3: Macroprudential Policy Indices after Lim et al. (2011) over Time



4 Methodology

4.1 Empirical Specification

This subsection presents the empirical framework that is used to assess the relative importance of different channels through which MPPs can affect international bank flows. The framework is characterized by the interaction of the MPP indices introduced in Section 3.2 with a set of standard macroeconomic and financial control variables. Further, and in addition to their domestic effects, we specifically take the international dimension of an MPP into account. Following Forbes et al. (2011), we include a term in the empirical specification that captures international spillover effects. In our case, this term is represented by a GDP-weighted index of MPPs in immediate neighbor countries or in the associated world region. Hence, we can determine which specific macroeconomic and financial conditions have to be fulfilled for a certain capital flow pattern to emerge at the domestic or at the international level following the introduction of an MPP. Throughout the empirical analysis, we rely on a panel data approach with country and time fixed effects to uncover this relationship. Our baseline specification takes the following form:

$$\begin{aligned} k_{i,t} = \alpha_i + \alpha_t + \beta X_{i,t-1} + \gamma MPP_{i,t} + \delta MPPINT_{i,t} \\ + \lambda MPP_{i,t} \times X_{i,t-1} + \mu MPPINT_{i,t} \times X_{i,t-1} + \epsilon_{i,t} \end{aligned} \tag{1}$$

where $k_{i,t}$ measures *bank flows to country i in % of its GDP at time t*. The core variables of our specification are the domestic and the international MPP indices. In Equation (1), the domestic dimension is captured by $MPP_{i,t}$, which corresponds to our set of country-specific MPP indices that was introduced in Section 3.2. The international dimension is captured by $MPPINT_{i,t}$, which is the GDP-weighted average of MPPs from neighbor countries or world regions, which will be formally introduced in the next subsection. In all our empirical specifications, we will include both the domestic MPP index and one of the two international MPP indices at the same time. However, owing to multicollinearity concerns, we limit the number of distinct MPP types from which the domestic and the international indices are derived to one per specification. Moving on in the description of Equation (1), $X_{i,t}$ represents a vector of financial and macroeconomic control variables that also determine the level of bank flows. In order to minimize endogeneity concerns, we let all control variables enter the specification with a one-year lag.

The key terms of interest for the determination of channels through which an MPP can affect bank flows are the interaction term of our domestic MPP index with the control variables, $MPP_{i,t} \times X_{i,t-1}$, represented by coefficient λ, as well as the interaction term of our international MPP index with the control variables $MPPINT_{i,t} \times X_{i,t-1}$, represented by coefficient μ. Finally, α_i and α_t are country and time fixed effects and $\epsilon_{i,t}$ is the error term. The standard errors in all specifications are clustered by country.

To evaluate the effectiveness of our domestic and international MPP indices, we calculate both their total marginal effects with respect to our bank flow measure on the left-hand-side. Hence, differentiating Equation (1) with respect to $MPP_{i,t}$ and $MPPINT_{i,t}$ yields:

$$\frac{\partial k_{i,t}}{\partial MPP_{i,t}} = \gamma + \lambda X_{i,t-1} \tag{2}$$

$$\frac{\partial k_{i,t}}{\partial MPPINT_{i,t}} = \delta + \mu X_{i,t-1} \tag{3}$$

Figure 1 helps us to form our prior for the two marginal effects in Equation (2) and Equation (3). If investors reduced their exposure to the country implementing the MPP, the total marginal effect of the domestic MPP, i.e., Equation (2), should be negative and significant. This corresponds to channels one, two and three in Figure 1. If we expect the MPP to be ineffective, however, we should instead observe an insignificant total marginal effect, which would correspond to channel four in Figure 1. The interpretation for the international dimension is similar. In the scenario where we expect negative geographical spillovers (i.e., an increase in bank flows to the country in question after, say, a neighbor country has introduced an MPP), we would expect to observe a positive and significant total marginal effect for the spillover term. Where investors expect the MPP to have a signaling effect for neighbor countries or regions, we would observe positive spillovers of the policy and thus a negative and significant total marginal effect for the spillover term. Finally, we can assess the pattern for capital reallocations among asset classes within a country. In such a case, we would observe a reduction in bank flows – indicated by a negative and significant total marginal effect for the domestic term. And, depending on the strength of the signaling effect, we would expect either a negative or a positive effect for the same coefficient in a specification with an alternative asset class variable on the left-hand-side.

4.2 Data

This subsection describes the variables used in the empirical analysis in addition to the MPP measures introduced in Section 3.2. For a detailed description of data sources and summary statistics of all sample variables, see also Tables 7 and 8 in the Appendix. In all specifications, the data frequency is annual.

4.2.1 Capital Flows

Capital flows represent the left-hand-side variable in our empirical analysis. We primarily focus on bank flows, since we would expect the impact of an MPP introduction to be strongest here. Our bank flow measure corresponds to the liability side of the category *Other Investment*, subcategory *Banks*, in the financial account of the Balance of Payments framework. In order to normalize the measure by country size, we scale the original U.S.-dollar (USD) figure by domestic GDP. We refer to this variable as *bank flows in % of GDP* or simply *bank flows* in the remainder of the paper. In order to examine spillovers across capital classes, we compute a similar measure of non-bank-related capital flows using the subcategory *Other* instead of the subcategory *Banks* in the Balance of Payments category *Other Investment*. Finally, for robustness reasons, we also use the USD-denominated bank-flow variable to construct a measure of *Gross Portfolio Shares*, which corresponds to the share of bank flows to country i in bank flows to all sample countries.[9] In order to minimize the impact of outliers on our results (e.g., due to a different behavior of capital flows in financial centers) the capital flow variables are winsorized at the 1% level.

4.2.2 Domestic Macroprudential Policy Indices

We include the MPP indices in the regression as presented in Section 3.2. As outlined above, the untreated MPP indices capture the domestic MPP dimension in our empirical analysis.

[9]The measure of overall bank flows is computed using the absolute value of bank flows to all sample countries.

Altogether, we have eight different MPP indices at hand: four originating from the Qureshi et al. (2012) paper and four based on the appendix of the Lim et al. (2011) paper. It should be noted, however, that the latter four indices represent a much smaller proportion of MPP incidents since they are *(i)* based on anecdotal evidence and *(ii)* indicate only the introduction year of the policy. In each of our empirical specifications, we will display all eight MPP indices. In order to minimize multicollinearity concerns, we include the indices on a one-by-one basis.

4.2.3 International Macroprudential Policy Indices

In order to capture the international dimension of an MPP, and the (potentially) associated spillover effects, we construct two different versions of international MPP indices for each of our eight domestic MPP indices. First, we compute for each country a GDP-weighted average MPP index across the domestic MPP indices of all immediate neighbor countries. Based on the *CEPII gravity data set*, we determine each country's set of neighbor countries and weight the value of their respective domestic MPP indices by their share of GDP among all neighbor countries. Hence, we obtain a different index value for each country-MPP(-year) pair. Second, we analogously compute a GDP-weighted average MPP index based on the MPP stance of a country's world region. This can be justified by the fact that MPP implementations in large countries might have an effect that goes beyond their immediate neighbor countries. The world region version of the index is computed as the GDP-weighted average of the domestic MPP indices in all countries of a world region, where GDP weights are given by the GDP shares of countries in each region. Altogether, we define 10 different world regions.[10] Throughout the entire empirical analysis, we will include only one international MPP index at a time.

4.2.4 Control Variables

We use six different control variables of which three are associated with the macroeconomic environment and three with the financial system and, more specifically, the banking system of a country. As shown in the previous subsection, all six control variables are interacted with both the domestic and the international MPP indices at the same time.

The macroeconomic variables comprise the *real GDP growth rate*, the *inflation rate* and a measure for *trade integration*. The real GDP growth rate is used to capture the host country's cyclical conditions on the real side, while the inflation rate is used to capture their equivalent on the nominal side. Although a measure of the short-term interest rate would be preferable in this context, we use the inflation rate, since it is available in a harmonized way for all the sample countries. Finally, trade integration is measured as the sum of exports and imports in % of GDP. It is added to capture a positive long-term trend that could be responsible for an increase in capital flows to the host country.

The financial variables are targeted to capture the following dimensions of the host country's banking system. First, the *outstanding amount of loans from non-resident banks* serves as an openness indicator of the domestic banking system. The higher this amount, the more difficult it could prove to implement an MPP effectively, since domestic agents in the MPP-implementing country could legally circumvent such policies. The second measure is the *return on assets of the banking sector* and is supposed to capture the degree of profitability of the banking system. Finally, the variable *private credit by deposit money banks* serves as a measure for the size of

[10]The regions comprise "Western Europe," "Eastern Europe," "Commonwealth of Independent States," "Latin America," "Middle East," "Emerging Asia," "Other Asia," "Africa," "Oceania," and the residual category "Other Advanced" containing the United States, Canada, Australia, New Zealand, Japan and Israel.

the banking system. As with the capital flow variables, we winsorize all control variables at the 1% level in order to minimize the impact of outliers. Finally, we include the control variables with a one-year lag in all specifications to reduce endogeneity concerns.

The list of control variables presented so far contains only *pull* factors that affect bank flows from the perspective of the host country. However, because of the inclusion of time fixed effects in the empirical specification, there is no need to include additional *push* factors, such as global liquidity conditions or risk appetite, which might affect bank flows from a global perspective as well. The same holds for the exclusion of time-invariant, country-specific variables and the presence of country-fixed effects in the empirical specification.

5 Results

5.1 Baseline Specification

5.1.1 Neighboring Country Index Version

First, Equation (1) is estimated for all eight MPP types using bank flows in % of GDP as the left-hand-side variable and the neighboring country version of our international MPP index. Table 3 presents the corresponding results and can be interpreted as follows.

Each column corresponds to a different MPP measure. The first four columns refer to the Qureshi et al. (2012) MPP measures (*Q_fincont1*, *Q_fincont2*, *Q_fxreg1* and *Q_fxreg2*) and the last four columns to the Lim et al. (2011) measures (*L_fxres*, *L_credres*, *L_matres* and *L_capreq*). Since the former MPP definition contains a comprehensive set of start and end dates for the MPPs, which are not available in all cases, the number of observations in these specifications ranges from 858 to 1176. Since the latter four MPP measures are defined using only information on MPP introductions, there is no separation between zero values and missing values, and thus the number of observations amounts to 1291 in all four specifications. The number of countries varies somewhat across specifications and ranges from 117 to 139. Finally, the corresponding R-squared measures take on values between 12 and 26%. Aside from the constant, the coefficients in Table 3 can be divided into four different groups: *(i)* the level terms of the domestic MPP index (MPP) as well as the international MPP index (MPPINT), *(ii)* the level terms of the control variables, *(iii)* the interaction terms of the domestic MPP indices with the control variables, as well as *(iv)* the interaction terms of MPPINT with the control variables.

Starting with the examination of coefficients in the first group (i.e., γ and δ in Equation (1)), it turns out that there is no significant effect of MPPs on bank flows when all control variables are equal to zero – neither through the domestic channel (i.e., MPP) nor through the international spillover channel (i.e., MPPINT). However, it should be noted that the case where all control variables are equal to zero is only hypothetical and not very likely to occur in the real world.

Turning next to the coefficients on the level terms of the control variables (i.e., β in Equation (1)), we find that if the level of MPPs and their international spillover effects equal zero, the financial variables have the following impact: a higher level of non-resident bank loans has a negative effect on bank flows, a higher return on assets in the banking system has a positive effect on bank flows, and bank flows seem to be independent of the level of private credit in the banking system. These results are consistent across all eight MPP specifications. Moving on to the level terms of the macro variables, we find that if the MPP indices and their international correspondences equal zero, the real GDP growth rate has a positive effect on bank flows in

three cases, a higher inflation rate has a positive effect in two cases, and bank flows are entirely independent of the degree of trade integration (again, provided that both MPP and MPPINT take on a value of zero). Although there is some variation in the size of the coefficients and the significance levels (especially for the macro variables) across the eight MPP specifications, it is reassuring to see that the level terms of the control variables behave in a largely similar way and their coefficients carry the expected signs. However, an exception might be the positive coefficient of the inflation rate. This observation in turn can be explained by a high correlation between the inflation rate and standard measures of short-term interest rates, which are not consistently available for the entire sample but highly correlated whenever they can be obtained.

We now examine the coefficients of the interactions of the control variables with the domestic MPP indices (i.e., λ in Equation (1)) – the first one of the two key sections in Table 3. Here, the coefficients on the interaction terms indicate how the domestic MPP effect on bank flows changes depending on the modifying control variable. The strongest modification of the domestic MPP effect seems to arise when the level of loans from non-resident banks changes. For all four Qureshi et al. (2012)-based indices (*Q_fincont1*, *Q_fincont2*, *Q_fxreg1* and *Q_fxreg2*), an increase in loans from non-resident banks significantly reduces *ceteris paribus* the effectiveness of domestic MPPs on bank flows.[11] A straightforward interpretation would suggest that agents in the MPP-implementing country might take out loans from non-resident banks directly and circumvent the MPP rules that are most likely applied at the bank level.

Interestingly, the impact of non-resident bank loans on the effectiveness of MPPs is of the opposite sign for the first two Lim et al. (2011) measures (i.e., *L_fxres* and *L_credres*) and insignificant for the second two measures (i.e., *L_matres* and *L_capreq*). In this context, several factors should be discussed that are highly relevant for the interpretation of the other coefficients. As previously mentioned, the MPP measures based on Lim et al. (2011) show only a very limited number of MPP incidents, since there is no information on the length of the period for which these policies are in place. This has two implications. First, it is not possible to separate missing values from zero values and thus there might be more noise in the way MPPs are measured. Second, provided that the four Lim et al. (2011) measures are informative, the effect of a newly introduced MPP on bank flows might be different than the effect of an MPP that is in place for an extended period. Considering the possibility of overshooting, for example, the introduction of an MPP might be followed by an immediate reduction of bank flows and a balancing counter effect in the long term. Hence, in the present case, bank flows might decrease initially (even in an environment with a large number of non-resident bank loans) but overcompensate for the reduction over time. And third, while the MPPs from Qureshi et al. (2012) target capital flows at least to some extent (especially since *Q_fincont1* and *Q_fincont2* are a hybrid construct between classical MPPs and capitial controls, and *Q_fxreg1* as well as *Q_fxreg2* relate to foreign currency use), the Lim et al. (2011) measures are predominantly designed to influence domestic developments, such as excessive credit growth (*L_credres*), maturity mismatches (*L_matres*) and the undercapitalization of banks (*L_capreq*); the exception here is the MPPs targeted to currency mismatches (*L_fxres*). In terms of the loans from the non-resident banks case, a domestic MPP targeted to reduce credit growth could be more successful in reducing bank flows when the source of such credit growth stems from loans provided by non-resident banks, for example.

[11] It should be noted, however, that in this case and in all cases in this subsection, the total marginal effect of an MPP on bank flows can only be assessed using an F-test for the MPP level term and *all* associated interaction terms, evaluated at certain levels of the control variable distribution. Hence, the fact that a higher level of loans from non-resident banks increases bank flows to a country *ceteris paribus* does not imply that the total marginal effect of an MPP is positive. We will examine this issue more specifically in Section 5.2.

Table 3: Baseline Specification – Neighboring Country Version

Bank Flows	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2	L_fxres	L_credres	L_matres	L_capreq
MPP	3.586	-6.373	0.113	-1.480	-1.833	0.118	4.420	-4.240
	(0.40)	(0.22)	(0.98)	(0.86)	(0.32)	(0.94)	(0.59)	(0.63)
MPPINT	-3.002	-5.653	-4.798	-8.979	-2.841	-7.679	11.980	3.353
	(0.57)	(0.25)	(0.31)	(0.21)	(0.48)	(0.42)	(0.43)	(0.33)
(1) NR Loans	-0.089**	-0.105**	-0.108***	-0.162***	-0.046	-0.046	-0.048	-0.046
	(0.04)	(0.03)	(0.00)	(0.00)	(0.20)	(0.20)	(0.17)	(0.19)
(2) ROA	1.158*	1.410**	2.928***	3.423***	0.661**	0.623**	0.679**	0.600*
	(0.08)	(0.03)	(0.00)	(0.00)	(0.04)	(0.04)	(0.03)	(0.06)
(3) Private Credit	0.019	0.030	0.006	0.037	-0.015	-0.014	-0.010	-0.015
	(0.71)	(0.58)	(0.91)	(0.47)	(0.77)	(0.79)	(0.85)	(0.78)
(4) Real Growth	0.439*	0.472*	0.518*	0.238	0.153	0.150	0.133	0.151
	(0.08)	(0.07)	(0.05)	(0.45)	(0.17)	(0.15)	(0.19)	(0.14)
(5) Inflation	0.089**	0.100**	0.127	0.206	0.034	0.033	0.030	0.034
	(0.02)	(0.01)	(0.15)	(0.12)	(0.21)	(0.21)	(0.22)	(0.19)
(6) Trade Integr.	-0.027	-0.077	-0.079	-0.093	-0.016	-0.015	-0.014	-0.015
	(0.70)	(0.18)	(0.17)	(0.27)	(0.73)	(0.73)	(0.75)	(0.74)
(1) x MPP	0.164***	0.191***	0.167**	0.212**	-0.146*	-0.055*	-0.078	-0.028
	(0.01)	(0.01)	(0.02)	(0.04)	(0.10)	(0.06)	(0.14)	(0.82)
(2) x MPP	-0.169	-0.614	-1.429***	-1.903**	-3.302***	0.998	-0.147	4.094*
	(0.79)	(0.42)	(0.01)	(0.05)	(0.00)	(0.16)	(0.94)	(0.09)
(3) x MPP	-0.143**	-0.040	0.047	0.081	0.013	0.010	-0.013	0.036
	(0.04)	(0.51)	(0.39)	(0.34)	(0.68)	(0.63)	(0.83)	(0.26)
(4) x MPP	-0.323	-0.350	-0.343	0.135	1.128**	-0.880**	-1.249***	-1.245***
	(0.25)	(0.20)	(0.17)	(0.68)	(0.04)	(0.01)	(0.00)	(0.01)
(5) x MPP	-0.057	-0.070	-0.060	-0.082	-0.035	0.119	0.286	0.451
	(0.34)	(0.41)	(0.23)	(0.64)	(0.57)	(0.17)	(0.18)	(0.34)
(6) x MPP	-0.006	0.096	0.008	-0.005	0.049*	0.035	0.026	0.027
	(0.89)	(0.14)	(0.87)	(0.93)	(0.06)	(0.21)	(0.10)	(0.44)
(1) x MPPINT	-0.066	-0.112	-0.052	-0.063	-0.034***	-0.057*	0.101*	0.092***
	(0.36)	(0.13)	(0.19)	(0.35)	(0.00)	(0.07)	(0.08)	(0.00)
(2) x MPPINT	-1.733*	-2.115*	-2.506**	-3.276**	-0.861*	-0.063	-2.272	0.489
	(0.09)	(0.06)	(0.02)	(0.01)	(0.08)	(0.97)	(0.16)	(0.48)
(3) x MPPINT	-0.001	0.008	0.026	0.077	0.009	0.376	-0.161**	-0.038
	(0.99)	(0.91)	(0.70)	(0.19)	(0.88)	(0.18)	(0.01)	(0.48)
(4) x MPPINT	-0.501	-0.492	-0.331	-0.451	0.121	1.368	0.626	-0.288
	(0.16)	(0.20)	(0.27)	(0.24)	(0.74)	(0.35)	(0.44)	(0.38)
(5) x MPPINT	-0.035	-0.060	-0.074	-0.154*	-0.012	0.003	-2.376*	0.079
	(0.70)	(0.44)	(0.40)	(0.08)	(0.89)	(0.97)	(0.07)	(0.70)
(6) x MPPINT	0.101	0.143**	0.114***	0.180**	0.036	-0.088	-0.021	-0.039
	(0.15)	(0.02)	(0.01)	(0.02)	(0.21)	(0.54)	(0.90)	(0.24)
Constant	0.979	5.193	3.512	11.445	4.636	4.521	4.317	4.450
	(0.91)	(0.52)	(0.67)	(0.27)	(0.43)	(0.45)	(0.46)	(0.45)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1176	1175	1226	858	1291	1291	1291	1291
R-squared	0.16	0.19	0.21	0.26	0.12	0.12	0.13	0.13
Countries	134	134	134	117	139	139	139	139

Note: Left-hand-side variable: Bank Flows = *Bank Flows in % of GDP*; Right-hand-side variables: MPP = *Domestic Macroprudential Policy Index (see column header)*, MPPINT = *International Macroprudential Policy Index (here: Neighboring Country Version)*, NR Loans = *Loans from Non-resident Banks (t-1)*, ROA = *Return on Assets in the Banking System (t-1)*, Private Credit = *Private Credit in % of GDP (t-1)*, Real Growth = *Real Growth Rate (t-1)*, Inflation = *Inflation Rate (t-1)*, Trade Integr. = *Trade Integration in % of GDP (t-1)*. Standard errors are clustered by country. P-values are in parentheses: *** = p <0.01, ** = p <0.05, * = p <0.1.

Turning to the second financial variable, the return on assets held by domestic banks, and therefore a measure of the profitability of the banking system, we observe four significant interaction term coefficients. Remarkably, the first three of these coefficients refer exclusively to foreign exchange/currency-related MPPs (*Q_fxreg1*, *Q_fxreg2* and *L_fxres*) and carry the same negative sign. This implies that MPPs targeted to reduce currency mismatches are more successful when the return on assets in the domestic banking system is high. Following up on the discussion in the previous paragraph, we see in this case that both the introduction as well as the maintenance of foreign exchange/currency-related MPPs has an identical effect. A potential interpretation for the strongly positive dependence of this group of MPPs on the profitability of the banking system could be caused by a lower sensitivity of domestic banks to foreign currency transactions, when domestic capital supply is sufficiently high (e.g., via retained earnings). An alternative explanation might be that an already profitable banking system could be less dependent on the presence of speculative currency positions in order to generate earnings in the first place. In both cases, the introduction of a foreign exchange/currency-related MPP would be relatively effective as the substitution costs for banks (for a substitution between foreign funds and retained earnings in the first case and between foreign investments and domestic investments in the second case) are relatively low. Additionally, it should be noted that MPPs targeted to increase capital requirements in the banking sector show the opposite pattern and increase bank flows upon their introduction when a high-return environment is considered. However, there is no obvious interpretation for this observation.

Focusing then on the role of private credit in % of GDP in influencing the effectiveness of MPPs on bank flows, it turns out that there is no significant effect in seven out of eight cases. The only exception of an MPP being more effective in larger financial systems is the case where a policy for capital controls to the financial sector is considered (however, the evidence here is not very robust, since it holds for only one of the first two specifications, *Q_fincont1*).

Having discussed the impact of all financial variables on the effectiveness of MPPs in detail, we can now move on to the coefficients on the interaction of MPPs and the macroeconomic variables. It turns out that the domestic effects of the Qureshi et al. (2012) MPPs are basically independent of the macroeconomic environment and only some of the Lim et al. (2011) MPPs show significant coefficients on the corresponding interaction terms.

The most prominent case is the positive dependence of the more domestically oriented MPPs, namely credit growth ceilings (*L_credres*), maturity mismatch restrictions (*L_matres*) and capital requirements (*L_capreq*) on the real growth rate of a country. While the individual channels may differ, it is intuitive that domestic policies – therefore including MPPs targeted at primarily domestic developments as well – can be implemented more successfully in an environment where the domestic economy is growing. The second but less prominent exception is the observation that foreign exchange/currency-related MPPs (*L_fxres*) are less effective in an environment with high trade integration. While the argument seems plausible, only one out of three currency-related MPP measures shows a significant effect here.

The second key section of Table 3 presents the coefficients on the interaction terms for the control variables and the international MPP index (i.e., μ in Equation (1)). The results are as follows. The most pronounced pattern of significant coefficients arises for the interaction terms of the international MPP indices and the return-on-assets variable. Here, all of the first five specifications (i.e., *Q_fincont1*, *Q_fincont2*, *Q_fxreg1*, *Q_fxreg2* and *L_fxres*) exhibit a negative and significant coefficient on the interaction term. Hence, a higher return on bank assets or a

more profitable domestic banking system reduce *ceteris paribus* the occurrence of MPP spillovers from immediate neighbor countries. A potential reason for this finding could be that a more profitable banking system is less dependent on foreign inflows. Thus, a surge in capital inflow from an MPP-implementing neighboring country might affect the country in question much less. Interestingly, all five specifications have in common that they represent MPP measures that are primarily targeted to capital- and currency-related issues and less so to domestic ones.

The specification with the next most significant coefficients is the one on loans of non-resident banks. Here, significant coefficients are present for all four Lim et al. (2011) MPPs. Their signs however are different. While a high share of loans from non-resident banks has a dampening effect on banking flow spillovers from foreign exchange- (*L_fxres*) and credit-related (*L_credres*) MPPs, the opposite holds for banking flow spillovers from maturity- (*L_matres*) and capital-related (*L_capreq*) MPPs. Here, a country with a high share of loans from non-resident banks experiences higher bank inflows when a neighbor country implements one of the last two measures.

Finally, the third notable result comes from the macro side and indicates in three cases that a higher degree of trade integration leads to an increase in bank flows following the introduction of foreign exchange/currency-related (*L_fxres*) MPPs as well as the financial sector-related *Q_fincont1* MPP (however, marginally not significant in one of the two cases).

In addition, we observe significant idiosyncratic effects for three international MPP index-control variable pairs; namely, that maturity-related MPPs (*L_matres*) create *ceteris paribus* fewer spillovers in an environment of high private credit or under high inflation, as well as that a high-inflation environment reduces spillover effects from exchange rate/currency-related MPPs (*Q_fxreg2*). And, finally, the real growth rate of a country does not seem to have any influence on the spillover results.

5.1.2 World Regions Index Version

After having discussed the international MPP index in the neighboring country version in detail, we can now turn to the results for the world region version of our index. These results are depicted in Table 4. By and large, the key results are very similar – especially for the impact of domestic MPPs. Unsurprisingly, the most significant differences emerge regarding the occurrence of international spillover effects.

While in the neighboring country index case, none of the MPP/MPPINT indices' level terms is significant, we now observe a negative and significant level term for spillovers from foreign exchange- and maturity-related MPPs. This implies that both MPPs, when implemented elsewhere in the same world region, do have a bank-flow-reducing effect on other countries independent of the interaction term. Most likely, the reason behind this observation is a signaling effect through which investors might expect other countries in the region to follow the implementing country's example. This interpretation can be reconciled with the insignificant findings from the neighbor country case as follows: although a neighboring country should be part of the world region as well, the world region index might benefit large countries that exhibit a higher GDP share and thus their MPPs have a stronger (and generally similar) impact in the world region version of the index – and also on countries that do not share a common border with them.

Focusing on the coefficients of the interaction terms between the international MPP index and the control variables, we observe the same pattern for the return on assets interactions as well as for the trade integration interactions. The biggest difference, however, stems from the interactions with the share of non-resident bank loans. Instead of the previously found negative

Table 4: Baseline Specification – World Regions

Bank Flows	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2	L_fxres	L_credres	L_matres	L_capreq
MPP	3.154	-7.518	-0.113	-1.349	-1.860	0.498	12.405	-6.049
	(0.43)	(0.13)	(0.98)	(0.87)	(0.26)	(0.73)	(0.11)	(0.52)
MPPINT	-16.497	-10.650	-13.070	-7.182	-15.023***	-23.142	-103.698***	-10.176
	(0.34)	(0.29)	(0.12)	(0.49)	(0.01)	(0.40)	(0.00)	(0.34)
(1) NR Loans	-0.076*	-0.103**	-0.106***	-0.155***	-0.055	-0.043	-0.046	-0.048
	(0.08)	(0.03)	(0.01)	(0.00)	(0.11)	(0.17)	(0.20)	(0.16)
(2) ROA	1.652	2.040**	3.586***	4.811***	0.597*	0.399*	0.630**	0.464*
	(0.14)	(0.05)	(0.01)	(0.00)	(0.05)	(0.10)	(0.04)	(0.10)
(3) Private Credit	0.015	0.024	0.016	0.031	-0.015	-0.044	-0.013	-0.033
	(0.79)	(0.67)	(0.76)	(0.58)	(0.77)	(0.35)	(0.80)	(0.53)
(4) Real Growth	0.484	0.665*	0.287	0.076	0.156	0.142	0.150	0.186
	(0.17)	(0.07)	(0.38)	(0.85)	(0.18)	(0.15)	(0.12)	(0.10)
(5) Inflation	0.086	0.125	0.134	0.266*	0.034	0.033	0.034	0.039
	(0.33)	(0.12)	(0.18)	(0.08)	(0.17)	(0.19)	(0.15)	(0.15)
(6) Trade Integr.	-0.095	-0.122*	-0.139**	-0.110	-0.021	-0.019	-0.025	-0.026
	(0.16)	(0.06)	(0.05)	(0.29)	(0.62)	(0.68)	(0.50)	(0.50)
(1) x MPP	0.182***	0.188***	0.171**	0.215**	-0.137*	-0.048*	-0.123**	-0.032
	(0.01)	(0.01)	(0.02)	(0.04)	(0.08)	(0.06)	(0.01)	(0.80)
(2) x MPP	-0.113	-0.374	-1.004**	-0.381	-3.080***	1.154	-3.258	4.635*
	(0.82)	(0.56)	(0.02)	(0.51)	(0.01)	(0.10)	(0.12)	(0.08)
(3) x MPP	-0.149*	-0.028	0.066	0.142	0.018	0.022	-0.059	0.053
	(0.05)	(0.65)	(0.27)	(0.16)	(0.54)	(0.27)	(0.48)	(0.13)
(4) x MPP	-0.113	-0.031	-0.268	-0.191	1.139**	-0.795**	-1.140***	-1.167**
	(0.65)	(0.91)	(0.30)	(0.53)	(0.05)	(0.02)	(0.00)	(0.01)
(5) x MPP	-0.001	0.026	-0.039	-0.029	-0.051	0.113	0.069	0.553
	(0.98)	(0.75)	(0.36)	(0.66)	(0.37)	(0.15)	(0.88)	(0.26)
(6) x MPP	-0.012	0.086	-0.021	-0.042	0.045*	0.018	0.038**	0.020
	(0.80)	(0.16)	(0.64)	(0.58)	(0.07)	(0.45)	(0.02)	(0.61)
(1) x MPPINT	-0.140*	-0.029	-0.010	-0.074***	0.041***	0.286***	-0.033	0.042***
	(0.06)	(0.18)	(0.48)	(0.00)	(0.00)	(0.00)	(0.61)	(0.00)
(2) x MPPINT	-2.858	-3.279*	-3.624**	-5.796***	0.280	22.003**	19.492	3.386
	(0.20)	(0.09)	(0.03)	(0.00)	(0.82)	(0.02)	(0.27)	(0.27)
(3) x MPPINT	-0.051	-0.082	-0.076	-0.147	0.202*	0.745***	0.622	0.199
	(0.73)	(0.46)	(0.42)	(0.21)	(0.09)	(0.01)	(0.15)	(0.27)
(4) x MPPINT	-0.791	-1.123*	-0.014	0.113	0.198	-1.329	0.392	-0.359
	(0.20)	(0.07)	(0.98)	(0.84)	(0.61)	(0.73)	(0.92)	(0.59)
(5) x MPPINT	-0.057	-0.108	-0.105	-0.246	0.055	1.767	1.735	0.045
	(0.81)	(0.48)	(0.42)	(0.19)	(0.87)	(0.11)	(0.41)	(0.75)
(6) x MPPINT	0.253	0.200**	0.230***	0.182	0.089**	-0.398**	0.243	0.041
	(0.12)	(0.04)	(0.00)	(0.11)	(0.05)	(0.04)	(0.15)	(0.77)
Constant	8.422	10.171	9.196	14.177	4.688	3.693	5.612	5.357
	(0.39)	(0.24)	(0.34)	(0.21)	(0.41)	(0.54)	(0.33)	(0.35)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1176	1175	1226	910	1291	1291	1291	1291
R-squared	0.18	0.20	0.22	0.27	0.15	0.17	0.14	0.15
Countries	134	134	134	118	139	139	139	139

Note: Left-hand-side variable: Bank Flows = *Bank Flows in % of GDP*; Right-hand-side variables: MPP = *Domestic Macroprudential Policy Index (see column header)*, MPPINT = *International Macroprudential Policy Index (here: World Region Version)*, NR Loans = *Loans from Non-resident Banks (t-1)*, ROA = *Return on Assets in the Banking System (t-1)*, Private Credit = *Private Credit in % of GDP (t-1)*, Real Growth = *Real Growth Rate (t-1)*, Inflation = *Inflation Rate (t-1)*, Trade Integr. = *Trade Integration in % of GDP (t-1)*. Standard errors are clustered by country. P-values are in parentheses: *** = p <0.01, ** = p <0.05, * = p <0.1.

coefficients on the foreign exchange- and the credit growth-related MPPs as well as the positive coefficient found for maturity- and capital-related MPPs, we observe that two of the Qureshi et al. (2012) measures have now become significant. One of the financial sector MPPs as well as one of the foreign exchange/currency-related MPPs carry a significantly negative sign now, indicating a spillover-reducing influence when the share of loans from non-resident banks is high. In addition, the previously negative and significant coefficients on the interaction terms of foreign exchange- and credit-related MPPs (after Lim et al. (2011)) have turned positive as well. Finally, positive and significant coefficients on capital-related MPPs remain the same across both specifications.

A last notable difference in this setup is the emergence of two significant coefficients on interaction terms between foreign exchange- and credit growth-related MPPs with the private credit variable. In both cases, where levels of private credit are high, there are more bank flow spillovers to the non-implementing countries in the region.

5.2 Reconciling the Empirical Findings with the Investor Framework

5.2.1 Determining the Economic Significance of the Results

The previous section has shown how key financial and macroeconomic characteristics influence the effectiveness of MPPs at the domestic as well as at the international level. While the results of the previous section hold in general, it would be of additional interest to see for what share of countries they are relevant. In the following paragraphs, we therefore try to assess the economic significance of the empirical results obtained in the last subsection and subsequently relate them to the investor framework introduced in Figure 1. As previously mentioned, the individual coefficient estimates in Table 3 and Table 4 deliver only a partial picture of the effect of MPPs on bank flows – be it for the implementing country or its neighbors. In order to identify the overall impact of both MPP and MPPINT on our dependent variable, we need to evaluate the corresponding total marginal effects, depicted in Equation (2) and Equation (3), at given levels of the control variable distribution. We can then assess the significance level of the resulting linear combination with an F-test.

Since the size of the marginal effects depends linearly on the value of the control variable, we face a trade-off between finding significant total marginal effects (in either direction) and selecting control variable values that are relevant for a sufficiently large share of our sample countries. We solve this trade-off by allowing our control variables to take on either a *high* or a *low* value. These two values correspond to the 25^{th} and the 75^{th} percentile of the sample distribution of each control variable. Since there are six different control variables in each of the two total marginal effects, this yields 64 ($= 2^6$) different combinations for MPP and MPPINT. For each combination, we use an F-test to determine the level of significance of the corresponding total marginal effect. We then summarize all results according to the following three outcomes of interest: an overall reduction in bank flows (*Reduction in Flows*), an overall increase in bank flows (*Increase in Flows*) or no significant impact on bank flows (*No Effect*). To be included in the first two categories, the F-test has to show a p-value of less than 10%. Hence, the third category contains all residual cases. Table 5 shows the corresponding outcomes of this exercise for both of our international MPP index definitions (*top panel*: neighboring country version; *bottom panel*: world regions version).

Starting with the neighboring country version of our international MPP index in the top panel, we observe the following distribution for the first MPP (*Q_fincont1*): 23.4% of the combinations yield a significant reduction in flows, 67.2% of the combinations yield no effect on flows

and in 9.4% of the cases, we observe an increase. Although this is a purely hypothetical exercise and the control variables might be correlated with each other (e.g., a country that benefits from a high real growth rate might be subject to inflationary pressures at the same time), we do find a number of combinations in which this MPP type is effective for a sizable number of countries. Interestingly, the share of international spillovers that is created by the policy is relatively small. The modified version of the same policy, *Q_fincont2*, largely confirms this pattern; however, it shows a somewhat smaller effectiveness but a stronger international spillover effect in favor of the policy.

The two exchange rate/currency-based policies from Qureshi et al. (2012), *Q_fxreg1* and *Q_fxreg2*, do not show much evidence of being effective for a majority of countries – their domestic effects are insignificant in basically all of the cases. However, both policies create a notable amount of international spillovers in favor as well as against the intended direction of the policy.

Turning to the Lim et al. (2011) measures, all four seem to exhibit cases in which the MPP can become effective for a number of countries. Since they have a more domestic orientation, it is also not surprising that three out of the four measures (namely *L_fxres*, *L_credres* and *L_capreq*) do not create international spillovers as well. The only exception is *L_matres*, which creates international spillovers in favor of the policy in about one-third of the combinations.

In the next step, we can examine the results under the world regions version of our international MPP index in the lower panel of Table 5. Regarding the domestic policy impacts, we obtain nearly identical results for *Q_fincont1* and *Q_fxreg2*, and very similar results for *Q_fincont2* and *Q_fxreg1*, with the first policy being somewhat more and the second one somewhat less significant here. Also the domestic dimensions of the four Lim et al. (2011) measures match the previous results very closely. Compared to the neighbor country version of the spillover index, however, we do observe more cases in which spillovers occur in favor of the policies, and the effect is more pronounced than before in six out of eight cases. In addition, we observe that three out of the four Lim et al. (2011) policies might cause an increase in bank flows to other countries of the region in up to one-third of the combinations (the exception being *L_matres* again).

A potential explanation for the increased occurrence of spillovers in favor of a policy under the world regions version of the MPP index might be that the GDP weights place a strong emphasis on the MPP values of the largest country in a region. Thus, if such a country is implementing a policy, investors might expect nearby countries to follow.

Summarizing the results so far, we have seen that the state and the structure of the domestic banking system is an important determinant of the effectiveness of MPPs. Somewhat less important, but still influential, are the macroeconomic conditions of the host country and, here especially, the degree of trade integration.

The key results shown in Table 3 are that a high share of non-resident bank loans in the economy reduces the domestic effectiveness of most MPPs, while a high return on assets in the banking system has the opposite effect. On the macro side, we find that MPPs targeted at credit growth, maturity mismatches and capital requirements are more effective when the country experiences real growth. For the international spillover terms, we see that a high return on assets leads to a reduction of spillovers from foreign MPP implementations and a high degree of trade integration increases spillovers. Also the level of loans from non-resident banks plays a role, especially for the domestically oriented MPPs from Lim et al. (2011). While the effects for credit and maturity-related policies differ across the definitions of our international spillover

Table 5: Impact of Different Macroprudential Policies

Policies:	**Q_fincont1**	**Q_fincont2**	**Q_fxreg1**	**Q_fxreg2**	**L_fxres**	**L_credres**	**L_matres**	**L_capreq**
Domestic Effect								
Reduction in Flows	23.4	12.5	1.6	0	12.5	9.4	6.3	9.4
No Effect	67.2	79.7	90.6	82.8	56.3	57.8	71.9	67.2
Increase in Flows	9.4	7.8	7.8	17.2	31.3	32.8	21.9	23.4
International Spillover Effect (Neighboring Country)								
Reduction in Flows	6.3	18.8	12.5	6.3	1.6	0	35.9	3.1
No Effect	93.8	78.1	76.6	65.6	98.4	100	64.1	95.3
Increase in Flows	0	3.1	10.9	28.1	0	0	0	1.6

Policies:	**Q_fincont1**	**Q_fincont2**	**Q_fxreg1**	**Q_fxreg2**	**L_fxres**	**L_credres**	**L_matres**	**L_capreq**
Domestic Effect								
Reduction in Flows	25.0	0	6.3	1.6	10.9	7.8	1.6	10.9
No Effect	68.8	90.6	89.1	73.4	48.4	59.4	70.3	70.3
Increase in Flows	6.3	9.4	4.7	25	40.6	32.8	28.1	18.8
International Spillover Effect (World Regions)								
Reduction in Flows	29.7	48.4	31.3	35.9	9.4	7.8	28.1	0
No Effect	70.3	51.6	62.5	64.1	65.6	59.4	71.9	89.1
Increase in Flows	0	0	6.3	0	25	32.8	0	10.9

Note: To assess the likely economic significance of all macroprudential policies, we compute the marginal effects for the domestic and the international component. We use the estimated coefficients from the two baseline specifications (top: neighboring country; bottom: world regions). The marginal effects are evaluated at the 25^{th} and the 75^{th} percentile of the sample distribution for all control variables (i.e., NR Loans, ROA, Private Credit, Real Growth, Inflation, Trade Integration) allowing the remaining variables to take on both values as well. This yields 64 ($= 2^6$) different combinations. The tables above present the share of resulting marginal effects that are significantly greater or smaller than zero and pass an F-test for significance at the 10% level. The "no effect" category indicates the residual cases.

indices, the implementation of capital-related MPPs create consistently more spillovers in an environment with a high share of non-resident bank loans.

When subsequently examining the total marginal effects for the domestic MPP dimension and its international counterpart, we find that for the majority of hypothetical control-variable combinations, there is no significant effect on bank flows. However, especially for *Q_fincont1* as well as for the four Lim et al. (2011) measures, we observe a sizable amount of combinations that indicate a significant reduction in bank flows. We also show that there is a possibility for international spillovers following the implementation of a policy. For the neighbor country version of the index, such spillovers are relatively moderate but increase when the world regions version is used. In most of the cases, the spillovers are positive, in that they reinforce the policy in other countries as well. However, especially under the world regions version of the international MPP index, we show that there is a significant amount of control-variable combinations that lead to negative spillovers – especially for the domestic-oriented Lim et al. (2011) MPPs.

In the next step, we align these results with our framework in Figure 1. The substantial share of insignificant MPP effects in the hypothetical control-variable exercise indicates that a certain share of investors will not adjust their portfolios. A first reason for this finding might be that either the intermediary or another third party bears the costs of the policy introduction in the first place. A second reason might be that the costs arising from the MPP implementation are simply not substantial enough and thus do not require investors to adjust their behavior. However, since we also saw a number of control-variable combinations leading to a significant reduction in bank flows, the question that arises now is how will investors reallocate their portfolios. Evidence from the international spillover term specifications indicates that it is very likely that investors reallocate at least parts of their portfolios across countries. One question that so far remains unanswered, however, is whether we might also observe domestic spillovers – especially toward other asset classes. We will answer these questions in the next subsection.

5.2.2 Assessing (Non-geographical) Spillovers across Observed Asset Classes

In order to assess capital spillovers to other observed asset classes within the MPP-implementing country, we have to replace our current left-hand-side variable, bank flows, with another form of capital flows that is available to us. As already described in Section 4.2, we select the subcategory *Other* from the financial account category *Other Investments*. As with bank flows, we focus only on the liability side of this measure and normalize it by domestic GDP. We then re-estimate our baseline specification using the alternative capital flow variable. The corresponding results of this exercise are depicted in Table 6. Three important findings emerge. First, as capital flows from the *Other Flows* category are not necessarily intermediated through the banking system, fewer of the banking system-related control variables turn out to be significant. Second, there are far fewer significant terms in the interactions with the international MPP indices, indicating that we do not observe a combination of cross-country *and* cross-asset class spillovers. And third, most importantly, in three out of the eight cases (i.e., for *Q_fincont1*, *Q_fincont2* and *L_credres*), we observe a positive and significant coefficient on the level term, indicating that spillovers across asset classes following an introduction of the above-mentioned MPPs are indeed present. Altogether, these findings not only suggest that part of the investors reallocate their funds geographically, but also indicate that a reallocation of funds across asset classes takes place. Phrased in terms of Figure 1, we have therefore gathered ample evidence that the introduction of an MPP can affect international capital flows through channels two, three and four as well.

Table 6: Examining Asset Class Spillovers – Other Flows

Other Flows	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2	L_fxres	L_credres	L_matres	L_capreq
MPP	2.585**	1.940*	1.138	3.503	-0.325	3.446***	0.728	-0.984
	(0.04)	(0.06)	(0.28)	(0.13)	(0.77)	(0.00)	(0.59)	(0.35)
MPPINT	-0.903	-1.302	-1.728	0.060	2.559	-9.440***	-0.728	-0.587
	(0.48)	(0.37)	(0.20)	(0.98)	(0.20)	(0.00)	(0.58)	(0.65)
(1) NR Loans	-0.007	-0.005	-0.003	-0.001	-0.006*	-0.007*	-0.007*	-0.006*
	(0.22)	(0.36)	(0.57)	(0.88)	(0.06)	(0.06)	(0.06)	(0.07)
(2) ROA	-0.064	-0.028	-0.004	0.078	0.057	0.052	0.052	0.045
	(0.61)	(0.84)	(0.98)	(0.68)	(0.42)	(0.43)	(0.45)	(0.50)
(3) Private Credit	0.011	0.009	0.003	0.012	0.009	0.008	0.008	0.008
	(0.42)	(0.51)	(0.80)	(0.37)	(0.45)	(0.49)	(0.48)	(0.48)
(4) Real Growth	0.095	0.107	0.060	0.086	0.035	0.031	0.032	0.037
	(0.14)	(0.12)	(0.49)	(0.37)	(0.35)	(0.40)	(0.39)	(0.32)
(5) Inflation	-0.006	0.004	-0.004	-0.120**	-0.005	-0.004	-0.005	-0.005
	(0.60)	(0.77)	(0.88)	(0.01)	(0.22)	(0.32)	(0.19)	(0.19)
(6) Trade Integr.	0.017	0.015	0.011	0.025*	-0.001	-0.002	-0.001	-0.000
	(0.11)	(0.17)	(0.33)	(0.08)	(0.90)	(0.84)	(0.89)	(0.99)
(1) x MPP	-0.003	-0.006	-0.005	-0.011	0.047	-0.007	-0.031***	0.008
	(0.78)	(0.48)	(0.53)	(0.59)	(0.61)	(0.54)	(0.00)	(0.27)
(2) x MPP	-0.100	-0.286	-0.024	-0.218	0.240	0.172	-0.963***	0.281
	(0.65)	(0.28)	(0.88)	(0.50)	(0.75)	(0.77)	(0.01)	(0.38)
(3) x MPP	-0.023	-0.015	0.020	0.047**	-0.006	-0.038***	-0.047***	-0.014*
	(0.34)	(0.50)	(0.20)	(0.03)	(0.85)	(0.00)	(0.00)	(0.06)
(4) x MPP	-0.025	-0.069	-0.012	-0.015	-0.025	-0.165	-0.119	-0.016
	(0.74)	(0.45)	(0.89)	(0.91)	(0.94)	(0.51)	(0.23)	(0.85)
(5) x MPP	0.023	0.011	0.014	0.193**	0.064	-0.068	0.525***	0.215*
	(0.29)	(0.50)	(0.44)	(0.01)	(0.21)	(0.27)	(0.00)	(0.09)
(6) x MPP	-0.017	-0.012	-0.024*	-0.042**	0.001	0.001	0.044***	0.010*
	(0.24)	(0.32)	(0.05)	(0.03)	(0.95)	(0.91)	(0.00)	(0.07)
(1) x MPPINT	0.010	0.005	-0.010	-0.004	-0.004	-0.014	0.011	-0.002
	(0.26)	(0.69)	(0.19)	(0.77)	(0.32)	(0.11)	(0.14)	(0.85)
(2) x MPPINT	0.421	0.372	0.148	0.120	-0.538***	0.674	0.600**	0.060
	(0.11)	(0.21)	(0.51)	(0.65)	(0.00)	(0.54)	(0.03)	(0.83)
(3) x MPPINT	0.004	0.005	0.018	0.014	0.013	0.063	0.017	-0.000
	(0.82)	(0.75)	(0.26)	(0.42)	(0.44)	(0.29)	(0.51)	(0.99)
(4) x MPPINT	-0.073	-0.048	-0.025	-0.064	0.067	0.951*	-0.077	-0.184
	(0.52)	(0.67)	(0.78)	(0.57)	(0.67)	(0.06)	(0.75)	(0.20)
(5) x MPPINT	-0.021	-0.028	-0.015	0.029	-0.107***	0.022	0.223	0.146
	(0.58)	(0.42)	(0.64)	(0.20)	(0.00)	(0.70)	(0.24)	(0.21)
(6) x MPPINT	0.001	0.004	0.014	0.006	-0.016*	0.006	-0.025	0.009
	(0.95)	(0.79)	(0.24)	(0.75)	(0.10)	(0.82)	(0.30)	(0.32)
Constant	-0.255	-1.266	-0.589	-1.623	1.073	1.269	1.152	1.038
	(0.82)	(0.33)	(0.71)	(0.36)	(0.20)	(0.14)	(0.18)	(0.22)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1227	1225	1284	886	1353	1353	1353	1353
R-squared	0.09	0.09	0.09	0.13	0.08	0.09	0.08	0.08
Countries	137	137	138	121	143	143	143	143

Note: Left-hand-side variable: Bank Flows = *Other Flows in % of GDP*; Right-hand-side variables: MPP = *Domestic Macroprudential Policy Index (see column header)*, MPPINT = *International Macroprudential Policy Index (here: World Region Version)*, NR Loans = *Loans from Non-resident Banks (t-1)*, ROA = *Return on Assets in the Banking System (t-1)*, Private Credit = *Private Credit in % of GDP (t-1)*, Real Growth = *Real Growth Rate (t-1)*, Inflation = *Inflation Rate (t-1)*, Trade Integr. = *Trade Integration in % of GDP (t-1)*. Standard errors are clustered by country. P-values are in parentheses: *** = p <0.01, ** = p <0.05, * = p <0.1.

6 Discussing Endogeneity and Robustness of the Results

In this section, we carry out a number of robustness checks and sensitivity assessments of our empirical results. Specifically, we examine how endogeneity of the MPP measures might affect our results, whether our results are robust to an alternative definition of our left-hand-side variable and whether a simple dummy variable version of the Qureshi et al. (2012) indices delivers a similar outcome.

We start with the discussion of endogeneity. Using capital flow data at the country level has the advantage that a large number of countries can be included in the empirical analysis. However, such an approach places restrictions on the degree to which we can establish causality between the implementation of an MPP and the reaction of capital flows. Unsurprisingly, a country is more likely to introduce an MPP when capital inflows are already high or are expected to increase in the near future, making the MPP to some extent endogenous. However, one decisive factor works in favor of our empirical analysis. The presence of a feedback effect from capital inflows to MPPs should be positive, resulting in a positive bias in the MPP coefficient (i.e., the effect is closer to zero) and therefore an underestimation of the effectiveness of MPPs. We observe some signs that the described effect might be present when looking at Table 5, for example. The possibility of an exclusively positive reaction of bank flows to an MPP introduction is not well-supported by economic theory. However, it could indeed emerge when coefficients are biased upward for endogeneity reasons. Therefore, our results should primarily be interpreted as a lower bound for the associated MPP effects.

A second endogeneity concern might refer to our financial and macroeconomic control variables. A surge in capital inflows, for example, might increase the credit-to-GDP ratio or the inflation rate. We therefore lag all financial and macroeconomic variables in the analysis by one year in order to account for this effect.

Nevertheless, we do not lag the MPP measures in our baseline specifications but let them enter contemporaneously, since the major effect should occur relatively soon after their introduction. We present the baseline specification with all MPP measures lagged by one year in Table 9 in the Appendix. The key results are very similar to the case of a contemporaneous MPP inclusion; however, some of the effects are weaker. An example of such a case is the dependence of the domestic effectiveness of an MPP on the return on assets of the domestic banking system. Instead of the three significantly negative and one positive coefficients in the baseline specification, we observe only one negative and two positive coefficients that are statistically significant. Interestingly, the real growth rate seems to now have a stronger influence in determining spillovers compared with the baseline specification.

In the remainder of this section, we carry out two additional robustness checks. The first one is targeted at an alternative definition of our left-hand-side variable. Instead of using our current definition, bank flows in % of GDP, we compute the share of bank flows to country i in gross bank flows to all our sample countries. On the one hand, this approach more closely resembles the definition of a portfolio share. On the other hand, the effectiveness of MPPs becomes more dependent on global capital flow dynamics that might not be captured appropriately by the time fixed effects in Equation (1). Table 10 in the Appendix shows the corresponding results. We again observe positive and significant coefficients for the interaction terms of domestic MPPs with non-resident bank loans and negative coefficients on five out of eight interaction terms between domestic MPPs and the returns-on-assets variable (of which three are statistically significant). The remaining three MPPs show positive and significant coefficients on the

interaction term. A key difference from the previous results is the increased importance of the ratio of private credit to GDP, which yields positive and significant interaction terms. We also observe an increased importance of the real growth rate, which is now a key determinant of MPP effectiveness in six out of eight cases. Turning to the spillover section of the table, we observe again a largely similar picture to that in the baseline case. Both the asset-return variable (by reducing spillovers) as well as the trade-integration variable (by increasing spillovers) show up significantly in a number of specifications.

The second robustness check deals with an alternative definition of the Qureshi et al. (2012) MPP measures, which were expected to be more informative, given their systematic derivation. Instead of letting MPP variables enter with their discrete values, we define them as dummy variables taking on the value of 1 whenever their current value is unequal to zero and keeping the zero otherwise. The corresponding results are depicted in Table 11 in the Appendix. We again observe positive and significant coefficients on the interaction terms of the domestic MPP indices and the non-resident bank loans variable. This time, the effect is so strong that it consistently shows up across all eight MPP specifications. The interaction terms with the return-on-assets variable, however, seem to be less important in this setup. Instead, when moving on to the interpretation of our international MPP indices, we see that the asset-returns variable plays a significant role as well. In seven out of eight specifications, a higher level of asset returns has a reducing impact of international MPP spillovers. Finally, as in the previous cases, the trade-integration variable is an important determinant of cross-country spillovers.

7 Conclusion

This paper has examined the effectiveness and externalities of macroprudential policies (MPPs) in affecting capital flows, specifically cross-border bank flows. Besides using MPPs as a tool to reduce excessive capital inflows, policy-makers might also be interested in knowing whether MPPs targeted at domestic objectives have an unexpected side effect on international capital flows. We have contributed to the literature in two ways. First, by assessing the conditions of the banking system that are required for MPPs to be effective, and second, by accounting for the presence of potential spillover effects – across both countries and asset classes – in our empirical analysis. We achieve this by replicating two sets of MPP indices from the literature and interacting them with a set of banking system variables (in addition to standard macroeconomic variables). We also create two versions of a GDP-weighted international spillover index for each MPP measure, which we include in the specification analogously. Our empirical analysis then relies on a panel-data approach and examines the impact of eight different MPP types on bank flows in a sample of up to 139 countries over the period 1999-2009.

Our results indicate that the structure of the domestic banking system matters for the effectiveness of MPPs. We specifically find that a high share of non-resident bank loans in the MPP-implementing country reduces the domestic effectiveness of most MPPs, while a high return on assets in the domestic banking system has the opposite effect. On the macro side, MPPs that are targeted at excessive credit growth, maturity mismatches and capital requirements are more effective when the country experiences real growth. Our results also indicate that both types of spillovers can occur. First, we find that a high return on assets in countries other than the MPP-implementing one leads to a reduction of spillovers from foreign MPP implementations and that trade integration is positively related with spillover effects. Also the level of loans from

non-resident banks plays a role, especially for domestically oriented MPPs. While the effects for credit and maturity-related policies differ across the definitions of our measure of international spillovers, the implementation of capital-related MPPs creates consistently more spillovers in an environment with a high share of non-resident bank loans. Based on these coefficient estimates, we examine the total marginal effects of MPPs, domestically and internationally, along the distribution of our financial and macroeconomic variables. Although the majority of such combinations show no significant effect on bank flows, we do find a number of combinations in which MPPs reduce flows and create spillovers – both positive and negative – to other countries. Second, when replacing the bank flow variable with an alternative type of capital flows, we also find spillovers across asset classes within countries. Overall, our empirical results are an important contribution to the policy debate on the importance of devising a macroprudential framework at the multilateral level.

Going forward, future research could extend the empirical analysis in two broad directions. First, one could examine more directly the decision problems of international investors as well as the associated channels. It would especially be interesting to see why and how certain characteristics of the banking system (e.g., foreign exposure, profit conditions and size) lead to the observed outcomes for capital flows. Hence, an approach examining the channels at the micro-level would be a good addition. And second, more effort should be dedicated to developing high-frequency measures of MPPs over an extended period. This in turn would allow the use of at least quarterly or potentially even monthly data in the empirical analysis and thus enable researchers to get a clearer picture of the behavior of capital flows immediately after the introduction of an MPP.

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[12]The order of the authors presented here corresponds to the NBER Working Paper Version.

9 Appendix

Table 7: Sources of Key Variables

Variable	Unit	Source	Original Name/Source
Main Variables			
Other Investm. – Banks – Liabilities	USD	IFS	IFS.A.111.7.78.BUD.Z.F.$$$
Gross Dom. Product, Curr. Prices	USD	WEO Database	WEO.A.111.NGDPD
Gross Dom. Product, Const. Prices	LCU	WEO Database	WEO.A.111.NGDP_R
Consumer Price Index	LCU	WEO Database	WEO.A.111.PCPI
Exp. of Goods & Serv., Curr. Prices	LCU	WEO Database	WEO.A.111.NX
Imp. of Goods & Serv., Curr. Prices	LCU	WEO Database	WEO.A.111.NM
Loans from Non-Res. Banks	% of GDP	Beck et al. (2000)	nrbloans
Average Return on Assets	%	Beck et al. (2000)	roa
Private Credit by Dep. Mon. Banks	% of GDP	Beck et al. (2000)	pcrdbgdp
Macroprudential Policy Indices			
Q_fincont1	Index	Qureshi et al. (2012)	Fincont1
Q_fincont2	Index	Qureshi et al. (2012)	Fincont2
Q_fxreg1	Index	Qureshi et al. (2012)	FXreg1
Q_fxreg2	Index	Qureshi et al. (2012)	FXreg2
L_fxres	Index	Lim et al. (2011)	Constructed from Appendix
L_credres	Index	Lim et al. (2011)	Constructed from Appendix
L_matres	Index	Lim et al. (2011)	Constructed from Appendix
L_capreq	Index	Lim et al. (2011)	Constructed from Appendix

Table 8: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Control Variables (all winsorized at the 1% level)					
Bank Flows in % of GDP	1543	2.6	10.2	-25.74	59.07
Loans from Non-Res. Banks	1933	56.25	227.3	0.05	1942.09
Return on Assets	1783	1.52	1.64	-4.67	7.28
Private Credit in % of GDP	1770	42.94	40.5	1.54	174.76
Real Growth Rate	1981	4.14	4.37	-12.7	18.17
Inflation Rate	1976	7.89	22.04	-3.47	550
Trade Integra. in % of GDP	1914	89.6	46.9	14.51	314.09
Macroprudential Policy Indices – Domestic Dimension					
Q_fincont1	1644	0.31	0.35	0	1
Q_fincont2	1631	0.33	0.35	0	1
Q_fxreg1	1773	0.48	0.4	0	1
Q_fxreg2	1227	0.42	0.33	0	1
L_fxres	2002	0.01	0.11	0	1
L_credres	2002	0.01	0.09	0	1
L_matres	2002	0.01	0.07	0	1
L_capreq	2002	0.01	0.12	0	1
Macroprud. Pol. Indices – Int'l Dimension I (Neighboring Country)					
Q_fincont1	2002	0.27	0.29	0	1
Q_fincont2	2002	0.3	0.3	0	1
Q_fxreg1	2002	0.44	0.39	0	1
Q_fxreg2	1902	0.39	0.37	0	1
L_fxres	2002	0.02	0.12	0	1
L_credres	2002	0.01	0.07	0	0.9
L_matres	2002	0.01	0.06	0	0.98
L_capreq	2002	0.03	0.13	0	1
Macroprud. Pol. Indices – Int'l Dimension II (World Regions)					
Q_fincont1	1637	0.35	0.22	0	0.93
Q_fincont2	1624	0.39	0.24	0	0.82
Q_fxreg1	1766	0.58	0.29	0	0.99
Q_fxreg2	1226	0.52	0.33	0	0.97
L_fxres	1989	0.03	0.1	0	0.83
L_credres	1989	0.01	0.02	0	0.27
L_matres	1989	0.01	0.03	0	0.54
L_capreq	1989	0.03	0.08	0	0.49

Table 9: Robustness – Lagged Macroprudential Policies

Bank Flows	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2	L_fxres	L_credres	L_matres	L_capreq
MPP	3.373	-1.899	5.040	-3.895	2.255	-6.118	-24.341**	-7.143*
	(0.45)	(0.61)	(0.18)	(0.59)	(0.19)	(0.36)	(0.03)	(0.06)
MPPINT	-2.615	-5.994	-3.808	-5.974	2.122	2.154	10.251	-5.642*
	(0.65)	(0.32)	(0.47)	(0.56)	(0.69)	(0.82)	(0.25)	(0.06)
(1) NR Loans	-0.068	-0.084*	-0.111***	-0.126**	-0.046	-0.044	-0.047	-0.048
	(0.13)	(0.06)	(0.00)	(0.02)	(0.20)	(0.21)	(0.18)	(0.18)
(2) ROA	1.310*	1.601**	3.132***	3.211***	0.634**	0.629**	0.624**	0.561*
	(0.06)	(0.03)	(0.00)	(0.00)	(0.04)	(0.04)	(0.05)	(0.08)
(3) Private Credit	-0.006	0.007	-0.001	0.019	-0.010	-0.014	-0.013	-0.016
	(0.93)	(0.91)	(0.99)	(0.77)	(0.85)	(0.79)	(0.80)	(0.77)
(4) Real Growth	0.575**	0.673**	0.605*	0.654	0.128	0.157	0.141	0.146
	(0.05)	(0.04)	(0.06)	(0.15)	(0.21)	(0.14)	(0.17)	(0.16)
(5) Inflation	0.125***	0.127***	0.095	0.224	0.034	0.030	0.033	0.031
	(0.01)	(0.01)	(0.39)	(0.26)	(0.19)	(0.23)	(0.19)	(0.21)
(6) Trade Integr.	-0.051	-0.093	-0.072	-0.110	-0.015	-0.013	-0.016	-0.014
	(0.51)	(0.18)	(0.30)	(0.29)	(0.74)	(0.77)	(0.71)	(0.75)
(1) x MPP	0.108	0.141*	0.212***	0.048	-0.041	-0.089	-0.209***	-0.036*
	(0.10)	(0.06)	(0.00)	(0.64)	(0.59)	(0.13)	(0.01)	(0.07)
(2) x MPP	0.177	-0.359	-1.266**	-0.973	1.403	0.874	6.786***	4.878***
	(0.84)	(0.64)	(0.04)	(0.50)	(0.32)	(0.18)	(0.00)	(0.00)
(3) x MPP	-0.054	-0.027	-0.002	0.050	0.017	0.067	0.241**	0.066**
	(0.44)	(0.59)	(0.96)	(0.50)	(0.66)	(0.12)	(0.02)	(0.03)
(4) x MPP	-0.334	-0.402	-0.386	-0.153	-0.954	-0.536	0.203	-0.365
	(0.28)	(0.21)	(0.18)	(0.76)	(0.16)	(0.13)	(0.60)	(0.17)
(5) x MPP	-0.124*	-0.131	-0.043	-0.053	0.126	0.705	0.506	0.266
	(0.08)	(0.12)	(0.41)	(0.83)	(0.40)	(0.13)	(0.60)	(0.38)
(6) x MPP	-0.020	0.046	-0.028	0.066	-0.005	0.010	0.020	-0.039*
	(0.61)	(0.29)	(0.58)	(0.14)	(0.88)	(0.73)	(0.50)	(0.09)
(1) x MPPINT	-0.106	-0.100	-0.085**	-0.043	-0.032*	-0.005	0.081*	0.051*
	(0.31)	(0.35)	(0.01)	(0.62)	(0.10)	(0.85)	(0.07)	(0.05)
(2) x MPPINT	-2.500**	-2.669**	-3.173***	-3.991**	-0.590	-1.795	0.072	1.046
	(0.04)	(0.04)	(0.00)	(0.01)	(0.52)	(0.14)	(0.96)	(0.16)
(3) x MPPINT	0.022	0.030	0.026	0.068	0.005	-0.286	-0.097	0.054
	(0.76)	(0.66)	(0.66)	(0.22)	(0.95)	(0.23)	(0.32)	(0.41)
(4) x MPPINT	-1.042**	-0.999**	-0.453	-0.952*	0.659*	-1.622	0.468	-0.713
	(0.02)	(0.04)	(0.18)	(0.07)	(0.10)	(0.34)	(0.58)	(0.13)
(5) x MPPINT	-0.004	-0.022	-0.055	-0.156	-0.072	-0.144	-0.952	0.806**
	(0.96)	(0.80)	(0.64)	(0.32)	(0.64)	(0.58)	(0.33)	(0.02)
(6) x MPPINT	0.144*	0.198**	0.125**	0.142	-0.027	0.164	-0.116	-0.009
	(0.09)	(0.03)	(0.03)	(0.15)	(0.32)	(0.22)	(0.42)	(0.80)
Constant	5.911	8.790	5.110	8.815	1.403	4.478	4.702	1.416
	(0.47)	(0.25)	(0.51)	(0.55)	(0.82)	(0.45)	(0.43)	(0.82)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1080	1079	1129	768	1291	1291	1291	1291
R-squared	0.15	0.17	0.22	0.24	0.12	0.12	0.12	0.13
Countries	133	133	134	114	139	139	139	139

Note: Left-hand-side variable: Bank Flows = *Bank Flows in % of GDP*; Right-hand-side variables: MPP = *Domestic Macroprudential Policy Index (see column header, t-1)*, MPPINT = *International Macroprudential Policy Index (here: Neighboring Country Version, t-1)*, NR Loans = *Loans from Non-resident Banks (t-1)*, ROA = *Return on Assets in the Banking System (t-1)*, Private Credit = *Private Credit in % of GDP (t-1)*, Real Growth = *Real Growth Rate (t-1)*, Inflation = *Inflation Rate (t-1)*, Trade Integr. = *Trade Integration in % of GDP (t-1)*. Standard errors are clustered by country. P-values are in parentheses: *** = p <0.01, ** = p <0.05, * = p <0.1.

Table 10: Robustness – Bank Flow Shares

Bank Shares	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2	L_fxres	L_credres	L_matres	L_capreq
MPP	0.507	-0.534	-0.125	-0.123	-0.006	0.303	-2.453***	-1.029
	(0.25)	(0.36)	(0.78)	(0.89)	(0.98)	(0.51)	(0.00)	(0.33)
MPPINT	-0.781	-1.181**	-0.479	-1.176	-0.331	-9.875	-0.766	-0.342
	(0.14)	(0.02)	(0.33)	(0.30)	(0.50)	(0.13)	(0.30)	(0.47)
(1) NR Loans	-0.009*	-0.010	-0.011*	-0.018**	-0.005	-0.005	-0.006	-0.005
	(0.07)	(0.11)	(0.06)	(0.05)	(0.13)	(0.13)	(0.12)	(0.13)
(2) ROA	0.149**	0.168***	0.340***	0.393***	0.084***	0.082***	0.083***	0.072***
	(0.02)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)
(3) Private Credit	-0.002	-0.002	-0.006	-0.002	-0.006	-0.006	-0.006	-0.007
	(0.71)	(0.77)	(0.37)	(0.82)	(0.32)	(0.33)	(0.33)	(0.27)
(4) Real Growth	0.068**	0.072**	0.068**	0.064	0.021*	0.022*	0.023*	0.025*
	(0.02)	(0.02)	(0.03)	(0.17)	(0.09)	(0.06)	(0.07)	(0.06)
(5) Inflation	0.010**	0.010**	0.015	0.013	0.003	0.002	0.002	0.003
	(0.04)	(0.02)	(0.15)	(0.55)	(0.33)	(0.44)	(0.35)	(0.30)
(6) Trade Integr.	-0.004	-0.009	-0.009	-0.010	-0.001	-0.001	-0.001	-0.001
	(0.63)	(0.24)	(0.28)	(0.44)	(0.81)	(0.81)	(0.81)	(0.79)
(1) x MPP	0.016**	0.017*	0.014**	0.025	-0.038***	-0.002	-0.007	-0.017
	(0.03)	(0.05)	(0.04)	(0.15)	(0.00)	(0.56)	(0.11)	(0.23)
(2) x MPP	-0.061	-0.076	-0.150**	-0.352**	-0.377**	0.483**	0.788***	0.761***
	(0.35)	(0.30)	(0.01)	(0.04)	(0.03)	(0.02)	(0.00)	(0.01)
(3) x MPP	-0.009	0.001	0.010	0.024*	0.016***	0.012**	0.040***	0.020***
	(0.20)	(0.86)	(0.19)	(0.07)	(0.00)	(0.05)	(0.00)	(0.00)
(4) x MPP	-0.049*	-0.048*	-0.045*	-0.017	0.212**	-0.240***	-0.021	-0.121**
	(0.07)	(0.07)	(0.08)	(0.72)	(0.03)	(0.00)	(0.28)	(0.03)
(5) x MPP	-0.007	-0.007	-0.009	0.001	-0.010	0.012	0.010	0.026
	(0.29)	(0.45)	(0.17)	(0.96)	(0.25)	(0.59)	(0.76)	(0.66)
(6) x MPP	-0.002	0.009	0.003	-0.003	-0.004	-0.003	-0.004*	-0.000
	(0.66)	(0.25)	(0.61)	(0.76)	(0.34)	(0.55)	(0.09)	(0.96)
(1) x MPPINT	-0.010	-0.012	-0.005	-0.005	-0.001	-0.009	0.000	0.002
	(0.20)	(0.11)	(0.18)	(0.64)	(0.79)	(0.24)	(0.97)	(0.45)
(2) x MPPINT	-0.164**	-0.211**	-0.273***	-0.194	-0.041	-1.234	-0.009	0.213*
	(0.05)	(0.02)	(0.00)	(0.12)	(0.55)	(0.22)	(0.93)	(0.07)
(3) x MPPINT	0.014*	0.015**	0.017**	0.029**	-0.004	-0.024	0.023***	0.011
	(0.05)	(0.02)	(0.03)	(0.02)	(0.80)	(0.71)	(0.01)	(0.32)
(4) x MPPINT	-0.067**	-0.076**	-0.034	-0.051	0.072	0.699	-0.042	-0.014
	(0.04)	(0.03)	(0.17)	(0.19)	(0.19)	(0.27)	(0.68)	(0.85)
(5) x MPPINT	-0.005	-0.006	-0.009	-0.012	0.004	0.075	0.043	0.055
	(0.66)	(0.47)	(0.45)	(0.31)	(0.66)	(0.14)	(0.31)	(0.14)
(6) x MPPINT	0.016*	0.021**	0.011*	0.018	0.003	0.073	-0.001	-0.005
	(0.06)	(0.02)	(0.09)	(0.12)	(0.42)	(0.26)	(0.95)	(0.19)
Constant	0.150	0.662	0.416	1.713	0.356	0.433	0.398	0.364
	(0.82)	(0.28)	(0.56)	(0.16)	(0.38)	(0.22)	(0.32)	(0.37)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1176	1175	1226	858	1291	1291	1291	1291
R-squared	0.09	0.10	0.11	0.16	0.07	0.09	0.07	0.08
Countries	134	134	134	117	139	139	139	139

Note: Left-hand-side variable: Bank Shares = *Bank Flows in % of Gross Flows to all Sample Countries*; Right-hand-side variables: MPP = *Domestic Macroprudential Policy Index (see column header)*, MPPINT = *International Macroprudential Policy Index (here: World Region Version)*, NR Loans = *Loans from Non-resident Banks (t-1)*, ROA = *Return on Assets in the Banking System (t-1)*, Private Credit = *Private Credit in % of GDP (t-1)*, Real Growth = *Real Growth Rate (t-1)*, Inflation = *Inflation Rate (t-1)*, Trade Integr. = *Trade Integration in % of GDP (t-1)*. Standard errors are clustered by country. P-values are in parentheses: *** = p <0.01, ** = p <0.05, * = p <0.1.

Table 11: Robustness – Dummy Indices for all Macroprudential Policies

	Neighboring Country				World Region			
Bank Flows	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2	Q_fincont1	Q_fincont2	Q_fxreg1	Q_fxreg2
MPP	2.783	-4.984*	-0.717	-9.765	2.613	-5.998**	-0.680	-7.384
	(0.42)	(0.08)	(0.79)	(0.22)	(0.40)	(0.05)	(0.79)	(0.19)
MPPINT	-0.802	-0.594	-3.744	-3.900	-3.211	-2.349	-9.190	-5.333
	(0.82)	(0.85)	(0.43)	(0.56)	(0.70)	(0.73)	(0.42)	(0.64)
(1) NR Loans	-0.097**	-0.103**	-0.142***	-0.176***	-0.081*	-0.096**	-0.136***	-0.165***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.07)	(0.04)	(0.00)	(0.00)
(2) ROA	1.162*	1.685**	3.204***	4.486***	1.787	2.827**	4.598***	5.611***
	(0.09)	(0.02)	(0.00)	(0.00)	(0.13)	(0.02)	(0.00)	(0.00)
(3) Private Credit	0.021	0.025	0.019	0.048	0.026	0.012	0.016	0.057
	(0.68)	(0.67)	(0.72)	(0.41)	(0.64)	(0.85)	(0.77)	(0.46)
(4) Real Growth	0.385	0.426	0.451*	-0.099	0.491	0.812*	0.532	0.058
	(0.17)	(0.16)	(0.08)	(0.80)	(0.19)	(0.06)	(0.20)	(0.93)
(5) Inflation	0.108**	0.127***	0.141	0.181	0.137	0.259**	0.228	0.336
	(0.02)	(0.01)	(0.24)	(0.55)	(0.13)	(0.04)	(0.15)	(0.21)
(6) Trade Integr.	-0.017	-0.068	-0.094	-0.123	-0.073	-0.111*	-0.137	-0.167*
	(0.81)	(0.16)	(0.19)	(0.17)	(0.29)	(0.08)	(0.20)	(0.10)
(1) x MPP	0.103***	0.117**	0.166***	0.100*	0.116***	0.120**	0.194***	0.086**
	(0.00)	(0.02)	(0.00)	(0.08)	(0.00)	(0.02)	(0.00)	(0.02)
(2) x MPP	-0.015	-0.313	-0.861*	-1.901	-0.119	-0.160	-0.614	-0.261
	(0.97)	(0.56)	(0.07)	(0.18)	(0.75)	(0.74)	(0.13)	(0.76)
(3) x MPP	-0.075**	-0.000	-0.027	0.014	-0.078*	0.008	-0.023	0.027
	(0.04)	(1.00)	(0.49)	(0.78)	(0.07)	(0.73)	(0.57)	(0.67)
(4) x MPP	-0.157	-0.068	-0.288	0.471	-0.023	0.039	-0.267	0.164
	(0.49)	(0.77)	(0.22)	(0.26)	(0.91)	(0.86)	(0.25)	(0.67)
(5) x MPP	-0.042	-0.036	-0.074	-0.024	-0.034	0.013	-0.054	-0.019
	(0.42)	(0.44)	(0.11)	(0.94)	(0.48)	(0.83)	(0.31)	(0.68)
(6) x MPP	-0.022	0.043	0.041*	0.076*	-0.026	0.040	0.023	0.047
	(0.59)	(0.16)	(0.10)	(0.07)	(0.53)	(0.20)	(0.37)	(0.36)
(1) x MPPINT	-0.014	-0.029	-0.003	-0.040	-0.082**	-0.027	-0.036***	0.092**
	(0.70)	(0.20)	(0.97)	(0.54)	(0.03)	(0.25)	(0.01)	(0.04)
(2) x MPPINT	-1.121*	-1.579**	-2.485**	-2.560**	-1.938	-3.082**	-4.281**	-5.211***
	(0.09)	(0.04)	(0.02)	(0.04)	(0.16)	(0.04)	(0.01)	(0.00)
(3) x MPPINT	-0.029	-0.011	0.023	0.079	-0.106	-0.040	-0.009	-0.071
	(0.55)	(0.76)	(0.71)	(0.12)	(0.29)	(0.57)	(0.90)	(0.56)
(4) x MPPINT	-0.248	-0.299	-0.088	-0.345	-0.570	-0.893*	-0.253	0.008
	(0.27)	(0.27)	(0.77)	(0.44)	(0.14)	(0.06)	(0.58)	(0.99)
(5) x MPPINT	-0.047	-0.072	-0.069	-0.121	-0.075	-0.246	-0.170	-0.302
	(0.34)	(0.14)	(0.51)	(0.19)	(0.52)	(0.14)	(0.38)	(0.25)
(6) x MPPINT	0.051	0.059**	0.088*	0.063	0.117	0.099*	0.150	0.169
	(0.22)	(0.02)	(0.10)	(0.29)	(0.13)	(0.08)	(0.16)	(0.15)
Constant	0.222	3.424	3.099	18.779	5.538	7.154	8.685	13.776
	(0.98)	(0.65)	(0.72)	(0.17)	(0.57)	(0.43)	(0.49)	(0.29)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1176	1175	1226	858	1176	1175	1226	910
R-squared	0.16	0.20	0.22	0.26	0.18	0.22	0.24	0.27
Countries	134	134	134	117	134	134	134	118

Note: Left-hand-side variable: Bank Flows = *Bank Flows in % of GDP*; Right-hand-side variables: MPP = *Domestic Macroprudential Policy Index (see column header, as Dummies)*, MPPINT = *International Macroprudential Policy Index (here: 1-4: Neighbor Country Version; 5-8: World Region Version)*, NR Loans = *Loans from Non-resident Banks (t-1)*, ROA = *Return on Assets in the Banking System (t-1)*, Private Credit = *Private Credit in % of GDP (t-1)*, Real Growth = *Real Growth Rate (t-1)*, Inflation = *Inflation Rate (t-1)*, Trade Integr. = *Trade Integration in % of GDP (t-1)*. Standard errors are clustered by country. P-values are in parentheses: *** = p <0.01, ** = p <0.05, * = p <0.1.