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Capital Flows at Risk: Taming the Ebbs and Flows

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Abstract

The volatility of capital flows to emerging markets continues to pose challenges to policymakers. In this paper, we propose a new framework to answer critical policy questions: What policies and policy frameworks are most effective in dampening sharp capital flow movements in response to global shocks? What are the near- versus medium-term trade-offs of different policies? We tackle these questions using a quantile regression framework to predict the entire *future* probability distribution of capital flows to emerging markets, based on current domestic structural characteristics, policies, and global financial conditions. This new approach allows policymakers to quantify capital flows risks and evaluate policy tools to mitigate them, thus building the foundation of a risk management framework for capital flows.

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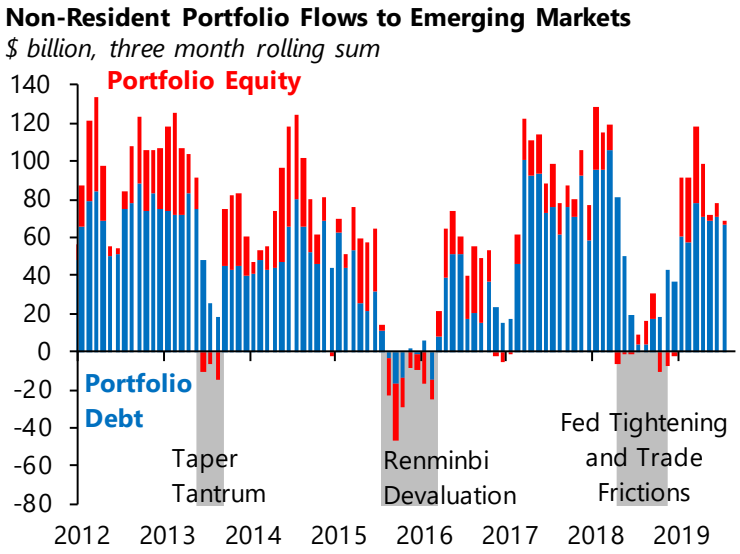
I. INTRODUCTION

Capital flows to emerging markets (EMs) remain highly volatile. Since the global financial crisis, unprecedented and prolonged monetary easing in advanced economies (AEs) has been associated with strong capital inflows to emerging markets. During the same period, these flows were sometimes disrupted by reversals in the face of unanticipated shocks, namely in 2013 (the "taper tantrum" episode), in 2015 (unanticipated depreciation of the Renminbi), and in 2018 (U.S. Federal Reserve tightening of monetary policy coinciding with rising trade tensions between the U.S. and China) (Figure 1).

Figure 1: Ebbs and Flows of Foreign Capital in the Post-2008 Global Crisis Period



Source: IIF, IMF staff calculations.

Capital inflows bring many benefits to countries because they supplement domestic investment, enhance efficiency of production, promote financial sector competitiveness, and facilitate consumption smoothing. But the ebbs and flows of foreign capital can create challenges.

Both capital flow surges and "sudden stops" entail risks. Large exchange rate appreciations and accelerated domestic credit growth that follow periods of inflows create concerns about loss of competitiveness, asset price bubbles, and the build-up of financial sector vulnerabilities (e.g., Cecchetti et al. 2019).[2] On the other hand, large exchange rate depreciations[3] and the sharp tightening of financial conditions that follow episodes of capital

[2] Cecchetti et al (forthcoming) explores policy options to contain the build-up of leverage.

[3] While flexible exchange rates can serve as buffers to absorb shocks, they may not always reflect economic fundamentals and can display excessive volatility themselves. And in the presence of currency mismatches, exchange rates may even become shock amplifiers through balance sheet effects (see early work by Krugman, 1998, Schneider and Tornell 2001, and a large subsequent literature). Recently, examining the Asian experience, IMF (2019c) finds that during capital flow surges the exchange rate can be a shock amplifier rather than a shock absorber, especially in the presence of shallow financial markets and corporate FX mismatches.

outflows threaten borrowers' access to finance and lead to a decline in asset prices, undermining financial stability and GDP growth (Calvo and Reinhart 1999, Guidotti, Sturzenegger, Villar, and de Gregorio 2004, among many others).

In practice, policymakers rely on a growing variety of policy instruments to deal with capital flow volatility—including monetary policy, macroprudential policies, foreign exchange interventions, and capital flows management measures.[4] We also observe that the same country may employ different tools at different points in time under seemingly similar circumstances. And policy makers in different countries facing a similar external environment may often react differently. Yet, the appropriateness and the effectiveness of many of these policies remains under debate, and several questions are still unanswered.

What policies are most effective in taming capital flows volatility in the face of changing global financial conditions? How do policy actions taken today affect the *likelihood* of large outflows and surges tomorrow? What is their impact over different time horizons? How do policy frameworks and structural country characteristics influence the probability of different outcomes? Answering such questions could help policymakers conduct better macroeconomic management when faced with external shocks.

Existing research so far does not provide guidance on how to monitor and manage risks of extremes in future capital flows. While a sizeable body of research has focused on understanding large in- and outflow episodes – "surges" and "sudden stops" (Calvo, Izquierdo, and Mejia 2004; Reinhart and Reinhart 2009; Cardarelli, Elekdag, and Kose 2010; Mendoza 2010; Sula 2010; Forbes and Warnock 2012; Sahay et al. 2014; Ghosh, Kim, Qureshi and Zalduendo 2014; Calderón and Kubota 2019, among others), few have examined in detail the role of policy frameworks and policy actions.[5] Moreover, nearly all of the existing work focuses only on the effect of policies on *average* capital flows, and studies have so far neglected the impact of policies on the whole probability distribution of *future* flows.

In this paper we propose a new method that lays the foundation for a capital flows risk management framework, and provide answers to some of the questions posed earlier.[6] We

[4] Understanding the cross-country heterogeneity of policy responses to exogenous portfolio flow shocks in EMs is the focus of a complementary analysis that uses quantile regressions to derive conditional probability distributions of policy responses at country level (Mano and Sgherri, forthcoming).

[5] Based on the early work by Calvo, Leiderman, and Reinhart (1993) and Fernandez-Arias (1996), a vast body of literature on capital flows has typically distinguished between "push" factors (such as financial conditions in the U.S.) and "pull" factors (such as domestic growth). Findings generally point to an important role of global "push" factors in explaining portfolio and banking flows (see Koepke, 2019, for a review of the literature). Regarding policies, some studies have analyzed the effects of capital flows management measures and generally have found little evidence that such measures affect the volume of capital flows (see the summary in Binici et al. 2010). They do, however, seem to affect the composition of capital flows (e.g., Montiel and Reinhart 1999), with the signaling channel playing an important role (Forbes et al. 2012). Some other studies have investigated the role of institutions. For example, Alfaro, Kalemli-Ozcan, and Volosovych (2008) find that institutional quality is the main causal explanation for why not more capital flows from rich to poor countries, and Gelos and Wei (2005) report that less transparent countries attract less investment by mutual funds.

[6] Some initial results were presented in the IMF's October 2018 Global Financial Stability Report (IMF 2018).

use a quantile regression approach to estimate the entire probability distribution of *future* portfolio flows as a function of current global financial conditions, current domestic structural characteristics, and current policy responses. In this framework, estimated probability densities of future capital flows facilitate a quantitative evaluation and forecasting of risks to portfolio flows. This can help policymakers decide what policy actions may be appropriate today to mitigate the risks to future flows caused by changes in global conditions, given the specific characteristics of their countries.

We proceed in three steps. First, we analyze aggregate EM portfolio flows, recognizing that emerging markets are exposed to common external shocks. Next, we conduct panel regressions to estimate the effects of policy actions and the role of structural characteristics and policy frameworks. To address endogeneity concerns, our analysis is based on well-identified policy shocks—namely residuals from estimated policy rules. Finally, we illustrate the application of our framework as a risk management tool with two case studies, Chile and Turkey.

Our results show that different country characteristics and policies matter for risks to capital flows in the short- and medium term, and that some policies involve important intertemporal trade-offs. These results highlight the complexity of policy making, and potentially shed light on why different countries choose different policy actions—for example, if the time discount factor is much higher for some policymakers than for others, they may choose a particular course of action even if their respective economies have similar characteristics and face the same global shocks.

We find that more flexible exchange rate regimes are linked to higher risks of both large in- and outflows in the immediate aftermath of an adverse global shock. In the medium term, however, more flexible exchange rate regimes seem to support a larger rebound of flows. Countries with better institutions and more transparent central banks face fewer large in- and outflows in response to global shocks in the medium term, defined here as 5–8 quarters ahead (although this is not the case in the short term, defined as 1–2 quarters ahead). While countries with more open capital accounts experience, on average, larger short-term inflows, they face fewer large inflows after an adverse global shock, while the likelihood of large outflows remains unchanged.

Looking at policies, foreign exchange interventions seem to help mitigate downside risks to portfolio inflows caused by worsening global conditions, but this effect is limited to the short term. A tightening of capital flow measures in response to an adverse global shock is found to be counterproductive (i.e. it exacerbates the risk of large outflows of capital) in the short term. This may well be because capital flow measures were not sufficiently comprehensive, leading to leakages. Finally, we find little evidence for the effectiveness of monetary and macroprudential policies in shielding countries from risks caused by global shocks, although the latter seem to reduce somewhat the likelihood of capital flow surges in the medium term.

The rest of the paper is structured as follows. Section II presents the risk management framework for capital flows and the quantile regression methodology, followed by a description of the data used. In Section III, we treat EMs as an asset class and show how

global financial conditions impact aggregate EM flows, highlighting how risks to capital flows can be monitored in the short- and medium term. In Section IV we conduct estimations for a panel of EMs and explore the role of institutional frameworks and domestic policies. In Section V, we focus on two country cases to show how our methodology can be tailored to reflect country specificities and used for monitoring of risks to capital flows. Section VI offers concluding remarks.

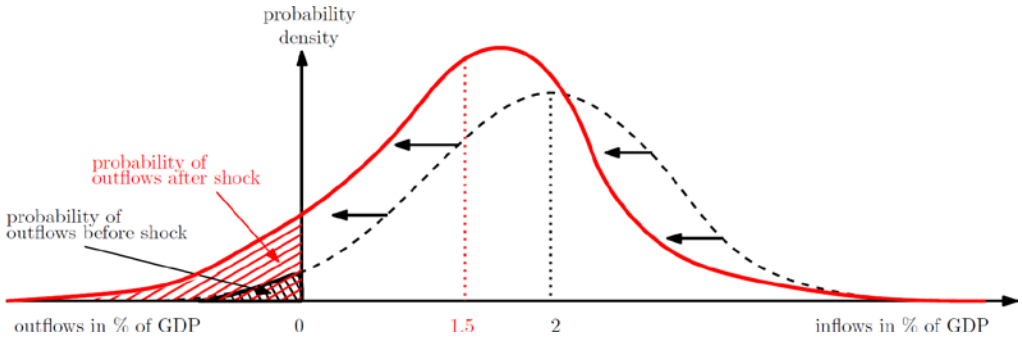
II. A Risk Management Framework for Capital Flows

A. Key Concepts

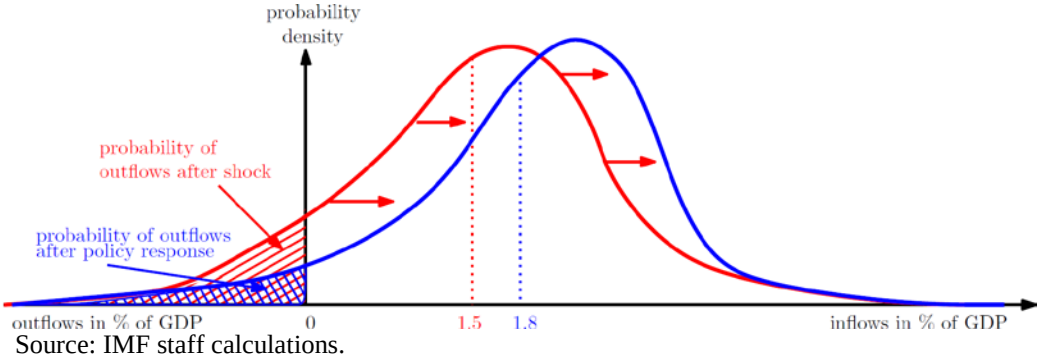
To understand the intuition for our framework, consider a stylized probability density of future capital flows to a given emerging market (Figure 2, Panel A). The black dashed line in Panel A represents the initial state, where the mass of the density is relatively far to the right, indicating positive inflows in most states of the world, and only a small probability of outflows (represented by the small dashed area in black). The dotted vertical line shows the median predicted flows of 2 percent of GDP. The red density represents a subsequent state where the outlook for capital flows has deteriorated (say, due to an adverse external shock). The median falls to 1.5 percent of GDP, and the probability of capital outflows is substantially higher, reflected in a larger dashed area in red.

Figure 2: A Risk Management Framework for Capital Flows

A) Monitoring Capital Flows: Shift in Predicted Capital Flows Density after a Shock



B) Managing Capital Flows: Domestic Policies and Resilience to Global Shocks



Source: IMF staff calculations.

Policy actions may affect the expected post-shock distribution of capital flows (Panel B of Figure 2). The red density function in panel B shows the same post-shock distribution of future capital inflows as in Panel A. Suppose next that in response to an adverse global shock, the central bank takes some mitigating actions—for example, by intervening in the foreign exchange market. In our stylized example, such a policy action not only increases the expected median inflows *conditional on a negative global shock* (blue density function) from 1.5 to 1.8 percent of GDP, but it also reduces the tail risks associated with the global shock (the left tail of the post-shock flows distribution becomes thinner and the probability of net capital outflows declines, as shown by the blue dashed area).

In this framework, risks to capital flows can be quantified in two ways. First, we can calculate the *probability* that capital flows will fall below a certain threshold. A threshold of zero (as in Figure 2) is a natural one, as it distinguishes inflows from outflows. Second, we can estimate the *amount of outflows* that would be reached or exceeded for a given probability, which we call "capital flows at risk" (CaR). The financial risk management literature and Adrian, Boyarchenko, and Giannone (2019) on Growth-at-Risk quantify the latter using the 5^{th} percentile of the distribution. In the country-level examples in Section V we use CaR at both the 5^{th} and the 10^{th} percentile, but policymakers can use any threshold that is meaningful to them.

B. Econometric Approach

To construct and analyze the distributions of future capital flows, we proceed in two steps. First, we estimate future flows using a quantile regression framework similar in spirit to the recent analysis on Growth-at-Risk (IMF 2017a and 2018; see also Adrian et al. 2019 and 2018). We then use estimates for a range of quantiles to construct an empirical distribution of predicted *average* capital flows during a specified period in the future.

In the second step, we fit the empirical distribution to a skewed-t probability distribution—proposed by Azzalini and Capitanio (2003)—which is characterized by 4 moments: mean, variance, skewness, and kurtosis. The skewed-t distribution is a very flexible function that nests both normal and standard t-distribution. Thus, it allows us to stay broadly agnostic about the shape of the distribution of future flows. To fit the distribution, we use a minimum distance estimator and the algorithm proposed by Azzalini (2019), as in Adrian et al. (2019).

In line with much of the recent literature, we focus on gross capital flows, and specifically on non-resident portfolio flows (“gross inflows”). The post-crisis literature emphasizes that gross inflows are the dominant driver of overall capital flows to emerging markets and matter most for financial stability considerations (e.g., Borio and Disyatat 2010; Obstfeld 2012). At the same time, due to the presence of resident outward investment in the definition of net inflows, the dynamics in net inflows cannot be attributed to changes in foreign investors' behavior only (Forbes and Warnock 2012). In terms of capital flows components, we focus on portfolio debt and equity flows because they are the most relevant for policy considerations due their volatility and sensitivity to external factors (Koepke 2019). By contrast, foreign direct investment flows are little affected by the types of drivers we consider, while banking flows (classified as "other flows") have been dwarfed by portfolio debt flows in the post-crisis period (Cerutti and Hong 2018).

Our general cross-country panel regression specification is as follows (for the aggregate and country-specific estimations, we use simplified versions):

(1) $\bar{y}^{\alpha}_{i,t+h-j:t+h|t} = \delta^{\alpha}_{i} + \beta^{\alpha}_{1} Global_{t} + \beta^{\alpha}_{2} Domestic_{i,t} + \beta^{\alpha}_{3} P_{i,t} + \beta^{\alpha}_{4} Global_{t} \times P_{i,t} + \epsilon_{it}$,

for α=0.05, 0.1, 0.15, …,0.95,

where $\bar{y}^{\alpha}_{i,t+h-j:t+h|t}$ stands for average gross portfolio inflows (in percent of GDP) to country *i* at percentile α between quarters *t+h-j* and *t+h*. We examine portfolio inflows over both short- and medium-term horizons. For the short term (*h=2, j=1*) we look at average inflows in the first and second quarters ahead. For the medium-term analysis, we use average quarterly portfolio inflows over the quarters 5–8 ahead (*h=8, j=3)*. In the robustness analysis, we also consider other horizons.

$Global_t$ is a vector of global "push" factors—we consider the U.S. corporate BBB spread or BBB yield, the U.S. sovereign 10-year yield, and the DXY index of the U.S. dollar against major advanced economy currencies. In some specifications, we also control for commodity prices and global growth. $Domestic_{i,t}$ stands for country-specific factors in country *i* at time *t*, that have been considered as "pull" drivers in the literature (for example, domestic year-on-year GDP growth and the ratio of short-term external debt to FX reserves).

$P_{i,t}$ stands for domestic policy frameworks, structural characteristics, and policy actions. As for structural characteristics and policy frameworks, we consider financial sector development, capital account openness, the exchange rate regime, and quality of domestic institutions, as measured by indices of rule of law and central bank transparency. In the panel regressions, we also control for a country's integration with global financial markets. Regarding policy actions, we investigate the role of monetary policy, macroprudential policies, FX interventions (FXIs), and capital flow management measures (CFMs). To investigate the role of domestic structural and policy variables in mitigating the effects of global shocks, we interact them with the global variables *(*$Global_t \times P_{i,t}$*)*.

Given that policy actions we are interested in are often deployed by EMs in response to (or in order to prevent) large movements of capital flows, we face an endogeneity problem, which complicates any causal inference. It is therefore key to obtain properly identified policy actions that do not reflect endogenous reactions to current capital flows and the economic environment. Here, we follow a similar approach as in Brandao and others (forthcoming) and Forbes and Klein (2015) in estimating policy functions for each instrument, country by country, and using the residuals from such regressions as the policy shocks. The Appendix describes the first-stage regressions and construction of the policy shocks in detail.

Our country panel is unbalanced. To compute the fit in panel regressions, we use the algorithmic method for unbalanced panels described in detail in Koenker and d'Orey (1987, 1994) and Koenker (2005). We also apply bootstrapping methods to construct standard errors, which we cluster at the country level and correct for potentially serially correlated error terms.

We use quarterly data from 1996: Q4 to 2018: Q4 for 35 emerging market and developing countries. The Appendix provides data descriptions. Table 1 shows summary statistics for some key variables.

Table 1. Summary Statistics for Selected Variables (Smaller Country Sample), 1996: Q4–2018: Q4

	Gross portfolio inflows	Policy rate (post GFC)		FX intervention	Macroprudential measures (index)		Capital flows measures (index)	
	(% of GDP)	tightening actions	easing actions	(% of GDP)	tightening actions	easing actions	CFMs introduced	CFMS abolished
Min	-24.1	1	2	-8.5	0	0	1	0
Median	1.1	4	9	0.0	2	0	3	3
Max	36.4	11	14	8.5	11	3	5	6

Notes: Table 1 shows summary statistics for the subsample of countries used for the analysis of policy actions (see Section IV for details). Data on gross portfolio inflows and FX interventions are based on the entire sample period. Macroprudential and capital flow measures, the summary statistics are by country over the entire sample period. The summary statistics for the policy rate cover the post-global-financial-crisis period to capture a typical business cycle period length.

The average magnitude of portfolio flows varies substantially across countries in our sample, and some countries experience much larger volatility of portfolio flows than others. For example, a one standard deviation of portfolio flows is equal to almost 8 percent of GDP for Malaysia, and "only" 2 percent for Colombia. Countries also differ in how frequently they apply the various policy tools. Countries in our sample have mostly *tightened* the macroprudential tools, while they have tightened or abolished CFMs equally frequently.

III. AGGREGATE FLOWS TO EMERGING MARKETS

This section illustrates the CaR approach focusing on the predicted distribution of aggregate portfolio debt inflows to the whole group of emerging economies in the sample.[7] This analysis is relevant given that many investors treat emerging markets as an asset class, sometimes with little regard for the differences in the characteristics of individual countries.[8]

For the EM aggregate flows analysis, we use a simplified version of specification (1):

(2) $\bar{y}^{\alpha}_{t+h-j:t+h|t} = \delta^{\alpha} + \beta^{\alpha}_{1} Global_t + \beta^{\alpha}_{2} GDPgrowth_t + y_{t-1} + \epsilon_t.$

Out of the global factors considered, three—the U.S. corporate BBB spread, the U.S. sovereign 10-year yield, and the DXY index of the U.S. dollar—have predictive power for portfolio debt flows to EMs in the short- or medium term and are thus included in the

[7] China is excluded from this analysis because of its unique country characteristics, including its size relative to the rest of EMs. We focus on portfolio debt flows because they have they are found to be most affected by external factors, which are the focus of this section.

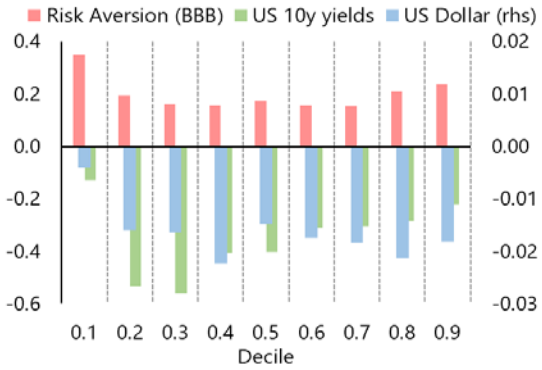
[8] This applies especially to so-called benchmark-driven investors who use the EM country weights from benchmark indices to guide their portfolio allocations (e.g., Arslanalp and Tsuda, 2015).

preferred specification.[9] In addition, aggregate EM real GDP growth is included as a domestic control variable. We also include the lagged dependent variable. Tables A4 and A5 in the Appendix show the detailed results of the regressions.

Higher U.S. interest rates and a stronger U.S. dollar are associated with weaker future inflows, both in the near- and in the medium term. This is consistent with the literature, which emphasizes that higher external interest rates and stronger dollar adversely affect flows to emerging markets (Koepke 2019).

As shown in Figure 3, our results suggest that large outflows and, to a lesser extent, surges of portfolio flows, are disproportionately explained by investor risk aversion (as proxied by the BBB spread). This is reflected in higher coefficient estimates at the lowest and highest percentiles and is consistent with the findings by Ghosh et al. (2014) for net capital flows.

Figure 3: Coefficients in Medium-Term Regressions by Percentile



Source: IMF staff calculations.
Notes: Figure 3 shows the coefficient estimates for the three global variables from different quantile regressions (horizontal axis). The estimates come from a regression of aggregate debt portfolio inflows to EMs (excluding China; scaled by GDP) in the medium term (5-8 quarters ahead) on the three global variables, aggregate EM real GDP growth, and one lag of gross portfolio inflows to the EMs (scaled by GDP).

The coefficient on global risk appetite displays a sign reversal pattern as the prediction horizon shifts further into the future (Figure 4). The coefficient for the median quantile is negative and significant in the current quarter, but turns positive (and significant) about 3–5 quarters into the future. This means that a change in global risk appetite has the opposite effect in the medium term compared to the short term. This finding may partly be explained by mean-reversion patterns in risk appetite; for example, periods of investor caution are followed by periods of greater investor confidence.[10] Our definition of the "short term" (1–2 quarters ahead) and "medium term" (5–8 quarters ahead) take this sign reversal into account by not including quarters where the sign is ambiguous.

[9] We also tested a range of additional explanatory variables that turned out to be statistically insignificant, including asset purchases by major central banks, the slope of the U.S. yield curve, a commodity price index, the price of oil, and U.S. real GDP growth.

[10] The risk appetite variable in the capital flows at risk framework behaves similarly to the financial conditions index in the growth at risk framework. In both cases, the coefficients exhibit a sign reversal as the prediction horizon shifts further into the future, indicating that a change in the explanatory variable has the opposite effect in the medium term compared to the short term (Adrian et al. 2018b).

In the next step, we use the results from quantile regressions to obtain empirical distributions of capital flows over the near- and medium term. Comparisons of the forward-looking distributions derived in this process enable us to assess changes in the outlook for aggregate flows to EMs (Figure 5).

Figure 4: BBB Spread: Term Structure of Coefficient Estimates

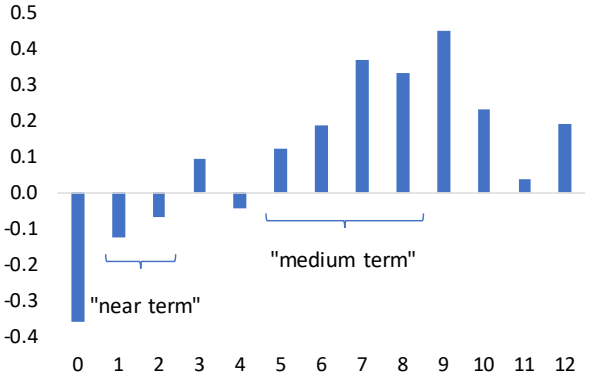
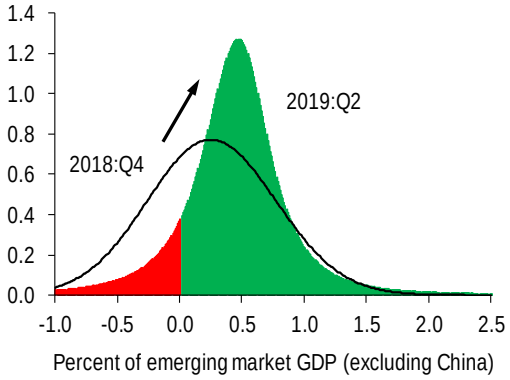


Figure 5: Conditional Densities for Portfolio Debt Flows in the Medium Term



Source: IMF staff calculations.

Notes: Figure 4 shows coefficients on the BBB spread in equation (2) (element of the $Global_t$ vector) in the *median* quantile regressions, when increasing the time horizon of the dependent variable: from the average portfolio inflows in the current period (zero on horizontal axis in Figure 4) to average portfolio inflows in quarters 9–12 ahead (12 on horizontal axis). In Figure 5, the distribution on the left (black line) is the one predicted with information up to 2018: Q4, for 2020: Q1–2020: Q4. The distribution to the right (red-green area) uses information as of 2019: Q2, projecting the distribution for 2020: Q3–2021: Q2.

In Figure 5, the distribution in black is the medium-term distribution predicted with information up to 2018: Q4—that is, the forecasts are for 2020: Q1–2020: Q4. By contrast, the green/red distribution uses updated information as of 2019: Q2, projecting the distribution for 2020: Q3–2021: Q2. The comparison shows that the outlook for aggregate portfolio flows to EMs improved over that period: the predicted distribution shifted to the right, and the probability of outflows declined, as marked by the red tail. This shift mainly reflected lower U.S. interest rates, with the 10-year Treasury yield falling markedly over this period.

Overall, the analysis of aggregate emerging market flows shows that external factors play an important role in predicting the future distribution of aggregate portfolio flows to the EMs. Downside and upside risks to flows vary considerably over time, reflecting fluctuations in external and other factors.

IV. Panel Data Analysis

In this section, we use cross-country panel regressions to investigate how global financial conditions and country characteristics shape total portfolio flows (equity and debt), and what policies are most effective in smoothing flows in the face of shocks. We are particularly interested in identifying policies and policy frameworks that are suitable for mitigating tail risks to future portfolio flows. Furthermore, the panel regressions also allow us to explore the role of slow-moving structural characteristics in influencing the dynamics of portfolio flows.

A. Specification

To keep the framework parsimonious, here we focus on a single measure of global factors: the U.S. corporate BBB yield. Changes in the BBB yield can be driven by different global developments, such as a rise in the risk sentiment of global investors or a U.S. monetary policy shock. This allows us to consider only one interaction term with domestic policies or characteristics and facilitates interpretation of the results.[11] The regression equation (1) becomes:

$$(3)\ \bar{y}^{\alpha}_{i,t+h-j:t+h|t} = \delta^{\alpha}_{i} + \beta^{\alpha}_{1} BBB_t + \beta^{\alpha}_{2} Domestic_{i,t} + \beta^{\alpha}_{3} Global\ Cycle_t + \beta^{\alpha}_{4} P_{i,t} + \beta^{\alpha}_{5} BBB_t \times P_{i,t} + \beta^{\alpha}_{6} FinInt_{i,t} + \beta^{\alpha}_{7} BBB_t \times FinInt_{i,t} + \epsilon_{it}.$$

A rise in the U.S. corporate BBB yield (BBB_t in eq. (3)) should *decrease* portfolio inflows to the EMs (at least in the short term), and thus the β^{α}_{1} coefficient is expected have a negative sign.

At the same time, in all regressions we also control for the U.S. GDP growth (detrended, average over last four quarters), which we interpret as a measure of the global economic cycle ($Global\ Cycle_t$). The expected sign of the coefficient β^{α}_{3} would depend on the timing of the global business cycle. For example, a stronger position in the cycle over the last four quarters could signal an imminent turn of the cycle, and thus have a negative effect on future portfolio inflows.

As before, we control for a range of domestic variables: in all regressions we include year-on-year GDP growth in the current quarter, GDP per capita, short-term external-debt-to-reserves ratio, financial market depth, and capital account openness. Higher domestic GDP growth today should increase portfolio inflows in the short term,[12] but might signal lower inflows in the medium term, as good economic conditions today are likely to be followed by a cyclical slowdown.[13] We also control for GDP per capita, a measure of economic development. In principle, a lower GDP per capita should be associated with higher average flows (since capital should be expected to flow to capital-scarce countries) but other effects are conceivable – for example, differences in GDP per capita are also correlated with differences in financial and institutional development.

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[11] In our sample, changes in commodity prices are correlated with changes in the U.S. corporate BBB yield. However, we have also tried a separate specification with the commodity price index as the single global factor. The results are in general not statistically significant. This is likely due to the difficulty in separating the impact of commodity prices between commodity exporters versus importers. To properly study the impact of policies or structural characteristics in the panel regression would require considering separate interaction terms $BBB_t \times P_{i,t}$ for importers and exporters in eq. (3). Finally, in all regressions we also control for the U.S. GDP growth, but we do not include an interaction term of U.S. GDP growth with domestic policy variables.

[12] Chen, Mancini-Griffoli and Sahay (2014) find that better domestic fundamentals, including higher real GDP growth and stronger external current account also significantly dampen spillover effects from U.S. monetary policy on capital flows and asset prices.

[13] Given that we express portfolio flows as a percentage of GDP, higher GDP growth also has a small negative mechanical effect through an increase in the denominator of the dependent variable.

We expect short-term external debt to have different effects on capital flows at different horizons and at different percentiles. For example, a higher level of debt today can increase financing needs—and thus capital inflows—in the short term but lead to a decline of flows in the medium term due to concerns about debt sustainability. These negative confidence effects might be particularly important during tail risk events, observed at the low percentiles of future flows, caused by sudden changes in investors' risk sentiment.

In line with the existing literature, we expect deeper financial markets to be associated with larger median short-term flows (e.g., Reinhardt, Ricci, and Tressel, 2013) but we are agnostic about the effects of deeper markets for the tails of predicted distributions (periods of surges and stops). On the one hand, deeper markets might mitigate the impact of capital outflows on the asset prices and thus discourage outflows. On the other hand, deeper markets allow investors to move in- and out of emerging markets at a faster pace than shallow markets. Similarly, while a more open capital account should encourage larger inflows, it might also lead to larger outflows during risk-off episodes.

Finally, in our preferred specification we also control for the integration with global financial markets ($FinInt_{i,t}$). In this case the sample size falls from 35 to 18 countries—listed in Table 1—for which we can compute the financial segmentation indicator as in Bekaert et al. (2011).[14] Following an adverse global shock, investors may pull out more easily from more internationally integrated financial markets. At the same time, a higher integration with global markets might reduce investors' incentives to withdraw, because they are likely to be more familiar with the market. To control for the impact financial integration might have on the response of portfolio flows to global factors, we also add an interaction term of $FinInt_{i,t}$ with the BBB yield to eq. (3).

We estimate equation (3) with one domestic policy or structural characteristic ($P_{i,t}$) at a time. If a policy mitigates the negative impact of a higher BBB yield on future portfolio inflows at a given percentile α, the β_5^{α} coefficient on the interaction term $Global_t \times P_{i,t}$ should have a positive sign. We expect good institutional frameworks to mitigate the effect of global shocks, since better institutions should increase investors' trust in domestic policies and fundamentals. As already mentioned, the impact of deep financial markets and greater capital account openness conditional on global shocks is difficult to predict. For similar reasons, we remain agnostic about the effects of the exchange rate regime.

Regarding policies, FX sales and monetary policy tightening can be expected to mitigate the negative impact of global shocks on portfolio inflows. With regard to macroprudential policies, we expect those to primarily reduce the likelihood and size of capital flows surges. But other effects are conceivable—for example, in the face of an adverse shock, global investors maybe more confident in remaining invested in a country if macroprudential policies have strengthened its financial system's resilience.[15] The hope of many policymakers is that CFMs will have a dampening effect on gross inflows or outflows. For example, the

[14] This is because computation of the indicator requires detailed information on stock market data at the industry (segment) level.

[15] For an analysis of the impact of portfolio flows on the credit cycle in EMs, see Fendoğlu (2017).

introduction of outflow restrictions might prevent capital from flowing out from a country, but it might also reduce new inflows when the tide turns. Similarly, a CFM designed to stem inflows may reduce surges, while also reducing a country's vulnerability to large outflows since it may help prevent the buildup of domestic financial imbalances. However, it is also possible that the introduction of CFMs might have a negative signaling effect and cause larger foreign capital withdrawals, especially if the capital controls are not sufficiently comprehensive or are operationally unenforceable.

In all regressions we include country fixed effects. As mentioned earlier, we consider future portfolio inflows at two horizons: To study short-term effects, we use average quarterly portfolio inflows over the next two quarters as the dependent variable. When we consider the medium-term effects of policies, we use average quarterly portfolio inflows over quarters 5–8 ahead.

B. Results

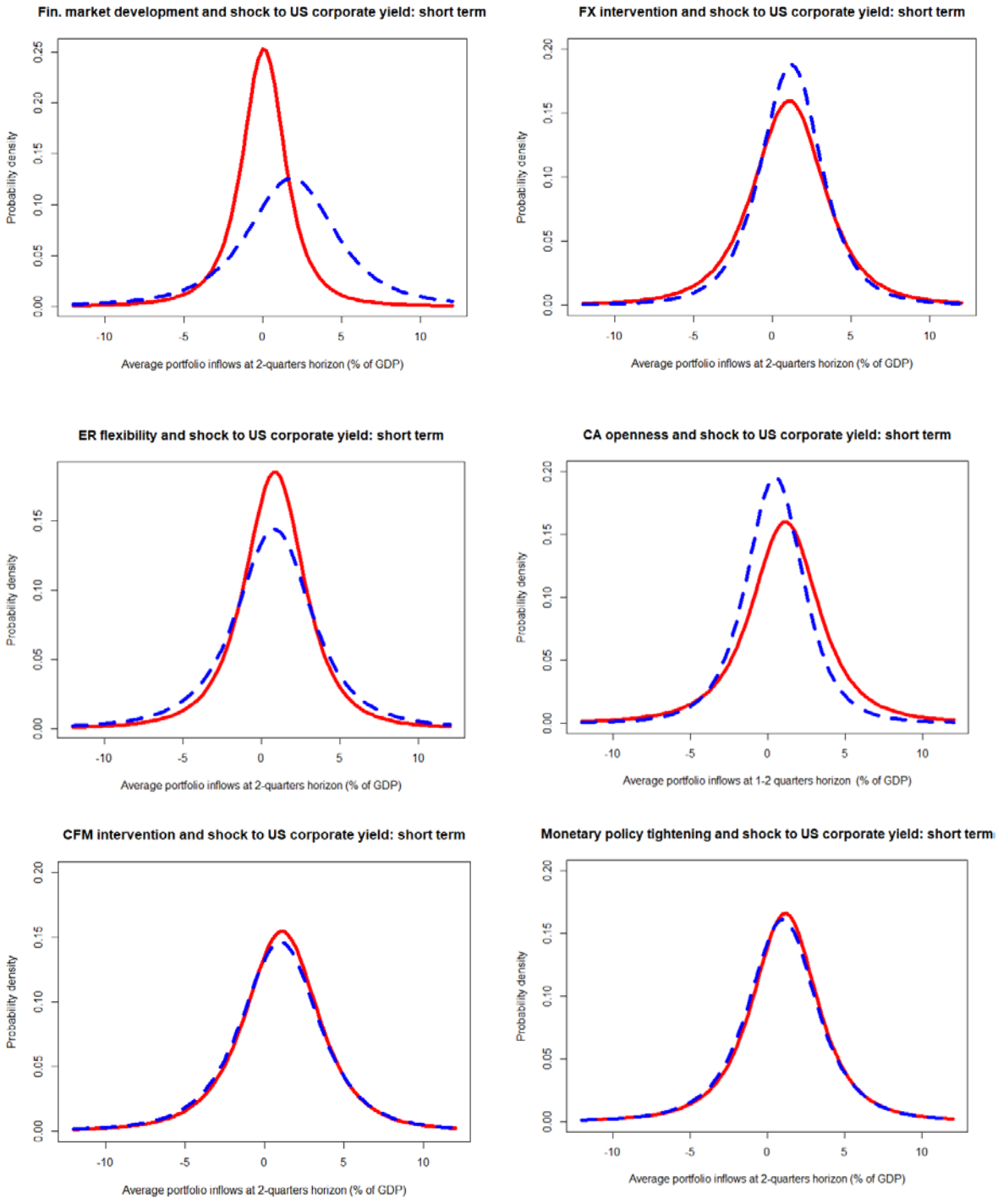
Baseline specifications without policy variable interactions show that an increase in the BBB has a statistically significant and negative impact on the short-term portfolio inflows across different quantiles. The impact continues to be mostly negative in the medium term, but it is statistically significant only for low quantiles (see Tables A6 and A7 in the Appendix).[16] In what follows, we focus on the role domestic factors play in shaping the post-shock distributions.

Structural Characteristics, and Policy Frameworks

We first look at the role of structural characteristics and policy frameworks in the face of a rise in the BBB yield (Tables A8 and A9). To quantify the results, Figure 6 shows the *total* effect of a structural characteristic or policy *conditional* on the rise in the BBB yield (i.e., $\beta_4^\alpha + \beta_5^\alpha BBB_t$). It compares distributions of the predicted portfolio inflows over the next two quarters following a one-standard-deviation increase in the U.S. BBB yield today (around 160 basis points) when domestic policy and structural variables are set at different levels. For structural variables, the distributions in red (solid) correspond to countries with weak structural characteristics (set at the value equal to the 20th percentile in the country sample), and distributions in blue (dashed) to countries with a high level of structural characteristics (values set at the 80th percentile).

[16] Regarding other variables, U.S. GDP growth is negatively and statistically significant associated with short- and medium-term portfolio inflows. Higher GDP per capita lowers portfolio inflows, although it is mostly insignificant. In the short term, higher FX debt relative to reserves implies higher inflows, consistent with larger financing needs of more indebted countries; in the medium term the effect becomes negative. Finally, financial market depth is positively and statistically significant associated with portfolio inflows in the short term.

Figure 6: Global Shocks, Policy Regimes, and Structural Country Characteristics in the Short Term



Source: IMF staff calculations.

Notes: Red solid lines show distributions of future portfolio inflows after an increase in the BBB yield when a structural characteristic (financial market depth, exchange rate regime, capital account openness) is set at the value equal to 20th percentile in the sample *or* when the policy action (FX intervention, CFM, monetary policy) is set to zero. Blue dashed lines show distributions when the structural characteristic is set at 80th percentile in the sample *or* when the policy action is equal to two standard deviation (the shocks correspond to FX sales, a monetary policy tightening and a CFM tightening).

In the short term, greater financial market depth increases the likelihood of a rebound in capital flows after an adverse shock to global financial conditions. In other words, the effects are visible mostly for the upper side of the predicted distribution: the median increases from 0.3 to 1.8 percent of GDP, and the 95th percentile value (corresponding to capital flows "surges") rises from 4 to 8.75 percent of GDP when comparing countries with shallow financial markets to countries with more developed markets. The effects are less pronounced in the medium term.

In the short term, more flexible exchange rate regimes are associated with higher probabilities of large in- and outflows in response to global shocks. This higher volatility of short-term inflows (following a global shock today) could be explained by higher uncertainty about the effects of global shocks on the exchange rate level and its pass-through to the domestic economy in countries with more flexible exchange rates.[17] In the medium term, however, only the positive effect (a higher probability of rebounds) persists (Figure 7).

While countries with more open capital accounts experience, on average, larger short-term inflows, they face fewer large inflows after an adverse global shock, while the likelihood of large outflows remains unchanged.

A high-quality legal framework (Figure 7, upper left panel) and perceptions of low corruption (not shown) are associated with higher *median* medium-term portfolio inflows conditional on an increase in the BBB yield today, and fewer large in- and outflows. Median medium-term inflows are also higher in countries with more transparent central banks: The medium-term median inflows are estimated at 1.6 percent of GDP for countries ranked at the 80th percentile in terms of the central bank transparency, while for countries at the bottom 20th percentile in the sample the median is equal to 1.2 percent of GDP (Figure 7, upper right panel).[18] There is, however, no significant effect in the short term.[19]

Policy Actions

FX interventions in the face of adverse shocks appear to be effective in the short term: sales of reserves are associated with a *smaller* likelihood of very large outflows in the quarters immediately after a global shock hits (consistent with the findings of Ehlers and Takats (2013) that FX intervention has a stabilizing effect on capital flows). The effects are quantitatively meaningful: an unexpected sale of FX reserves of 1.4 percent of GDP (corresponding to a two standard deviation shock in the sample) is associated with a reduction in the probability of outflows from around 35 percent to 29 percent. The CaR at

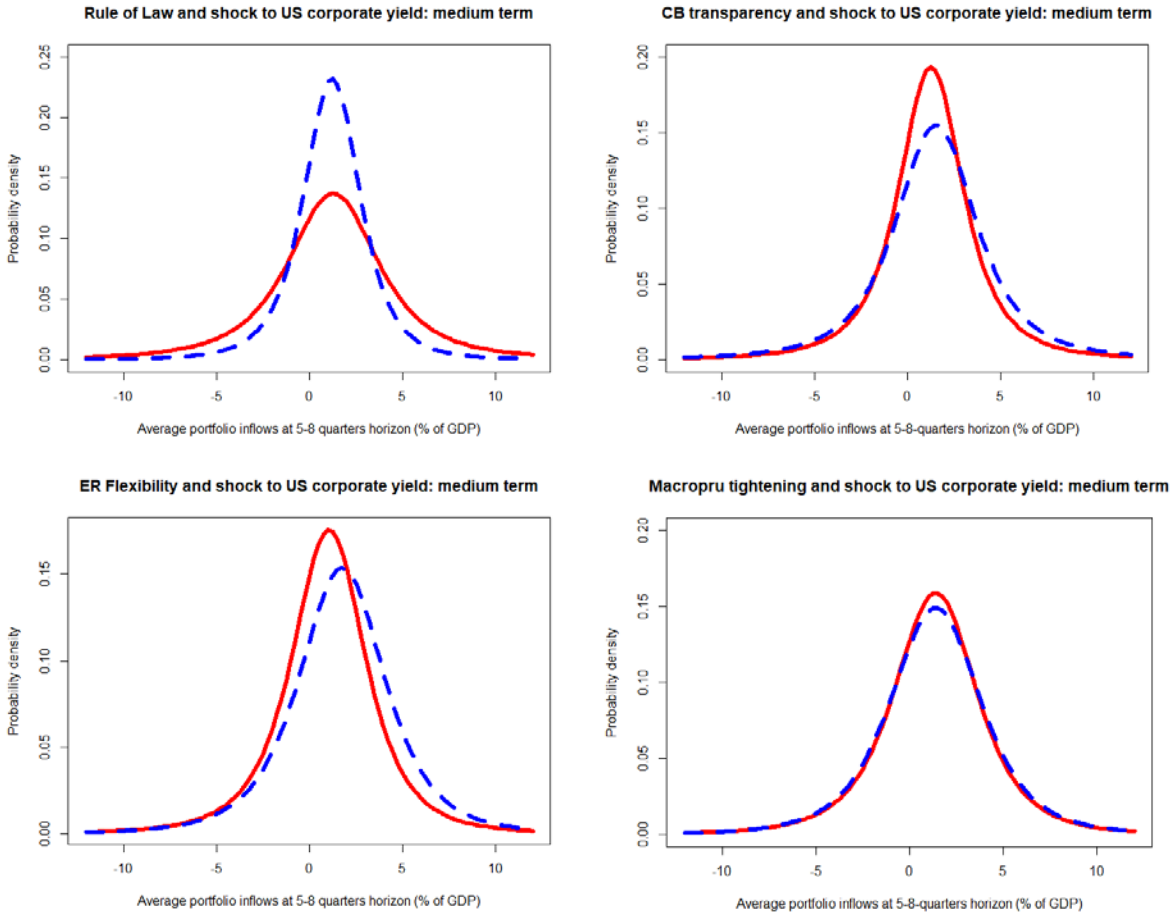
[17] Ghosh et al. (2014) find that countries with more fixed exchange regimes tend to attract higher net capital flows. They explain it by the implicit guarantee of a fixed exchange rate that is associated with higher control of the exchange rate, and which may encourage greater cross-border borrowing and lending.

[18] At the same time the probability of outflows remains broadly unchanged for both groups of countries.

[19] Brandao et al. (2018) find that increasing the availability of information about public policies, improving accounting standards, and enhancing disclosure by governments and firms can reduce the response of asset prices to shocks from global financial centers.

5th percentile improves from -4.5 percent of GDP to -3.5 percent of GDP. This possibly explains why many countries build reserves that may appear excessive.

Figure 7: Global Shocks and Structural Country Characteristics, Medium Term



Source: IMF staff calculations.
Notes. Red solid lines show distributions of future quarterly portfolio inflows 5–8 quarters ahead after an increase in the BBB yield when a structural characteristic (Rule of Law Index, Central Bank Transparency Index, exchange rate regime) is set at the value equal to 20th percentile in the sample *or* when the policy action (macroprudential policy) is set to zero. Blue dashed lines show distributions when the structural characteristic is set at 80th percentile in the sample *or* when the policy action is equal to two standard deviation (the shock corresponds macroprudential policy tightening).

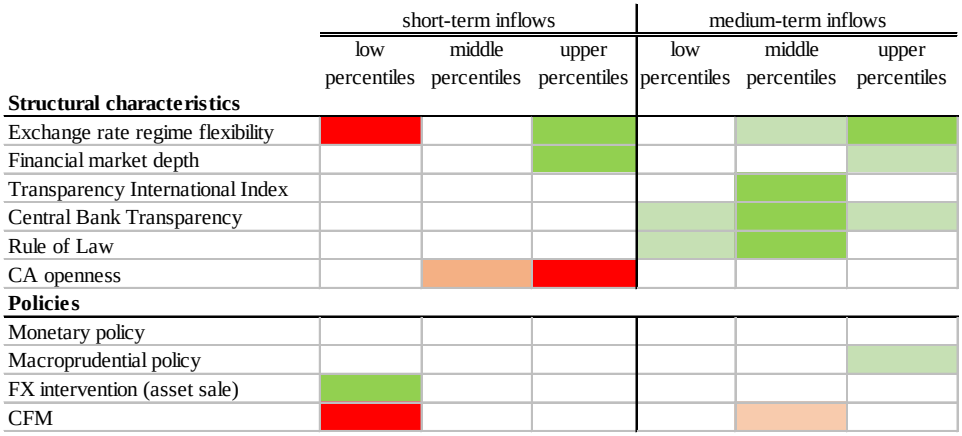
A tightening of capital flow measures in response to an adverse global shock is associated with larger outflows in the short-term, but not later on (while the existing literature generally finds that CFMs have no significant effect on the amount of capital flows—see Binici et al. 2010). In other words, attempts to reduce outflows after a global shock through outflow controls may backfire: a tightening CFM shock is associated with an increased likelihood of a sudden stop after a rise in the BBB yield (bottom left chart in Figure 6). The effect of the CFM tightening is quantitatively relevant only for the lowest percentiles of the predicted conditional distribution: After a rise in the BBB yield, the capital outflows at the lowest 5th percentile equal to -4.5 percent of GDP without CFM tightening, and to -5.0 percent of GDP in the presence of a two-standard deviation tightening. The difference persists at the 10th percentile (-2.75 percent versus -3.25 percent), but then quickly vanishes along higher

percentiles. The overall probability of outflows remains broadly unchanged.[20] Possibly, however, these results may be driven by other factors that we are insufficiently controlling for. For example, countries that adopt capital controls in the face of adverse global shocks may suffer from a worse political environment and higher policy uncertainty. In other words, the result may also reflect reverse causality: policy makers may have put in place capital controls anticipating heavy outflow pressures. Another possibility is that the implemented capital controls may have not been sufficiently comprehensive or were operationally unenforceable.

Interestingly, monetary policy (bottom right chart in Figure 6) and macroprudential policy actions (not shown) do not seem to affect the short-term outlook for portfolio inflows. However, we do find some evidence for the effectiveness of macroprudential policy tools in mitigating the risk of very large inflows in the medium term. The positive and highly significant coefficient on the interaction term with the BBB yield for top percentiles ($\alpha=90,95$) implies that a macroprudential tightening can help reduce the likelihood of portfolio flow surges following a period of very lax global conditions (a decline in the BBB yield). However, as Figure 7 (bottom right chart) shows, this effect is quantitatively small.

Figure 8 summarizes the results of the policy analysis in this section graphically. Overall, our analysis suggests that different policies matter for portfolio flows at different horizons and for different types of risks, and that some policies involve important tradeoffs.

Figure 8: Domestic Policies and Structural Characteristics and the Impact of Global Shocks on Gross Portfolio Flows



Source: IMF staff calculations.
Notes: The figure shows the impact of different domestic policies and structural characteristics on mitigating or exacerbating the effect of a global financial shock on the distribution of future gross portfolio inflows in the short term and in the medium term (interaction term with the BBB yield in eq. (3)). Red color corresponds to negative (i.e. exacerbating global shocks) and highly statistically significant impact of a domestic variable, orange color—to a negative but somewhat less statistically significant impact. Green color denotes positive (i.e. mitigating global shocks) and highly statistically significant impact of a domestic variable, light green color—a positive but somewhat less statistically significant impact.

[20] In other words, a CFM tightening does not reduce or increase the probability of net outflows, but it increases the severity of outflows if they happen.

For example, we find that more flexible exchange rate regimes are linked to higher risks of both large in- and outflows in the immediate aftermath of a negative global shock, but in the medium term such regimes seem to support a larger rebound of flows. Regarding capital account openness, countries with more open capital accounts experience, on average, larger short-term inflows, but they also face fewer large inflows after an adverse global shock. The effects of many policies and policy frameworks have asymmetric effects on the distribution of future portfolio inflows. Looking at policies, foreign exchange interventions seem to help mitigate *downside* risks to portfolio inflows caused by worsening global conditions, but they do not have a significant impact on median future flows. Similarly, a tightening of capital flow measures in response to an adverse global shock exacerbates the downside risks to portfolio inflows, while leaving median predicted flows unchanged. Instead, macroprudential policies seem to have some effect in shielding countries from risks of *large* portfolio inflows caused by global shocks in the medium term.

C. Robustness

We conduct a range of robustness exercises. First, we run the regressions based on the full sample of 35 economies (not controlling for financial integration). The results are broadly in line with the findings for our preferred regression, although sometimes less significant (see Tables A10 and A11 in the Appendix for details). We also run the regressions allowing for cross-section correlation of standard errors (by clustering standard errors at the year level). The vast majority of the results remains unchanged, although the interaction of the BBB yield with the macroprudential policy action ceases to be significant in the medium term. Finally, all results are robust to including a lag of the dependent variable.

V. Country-Level Flows: Two Examples

From a policymakers' perspective, country-level analysis is arguably the most useful, as it allows to account for country-specific dynamics when assessing capital flow risks, while taking structural characteristics and policy frameworks as given. In this section, we use two country examples (Chile and Turkey) to show how the CaR framework can be tailored to individual country cases.

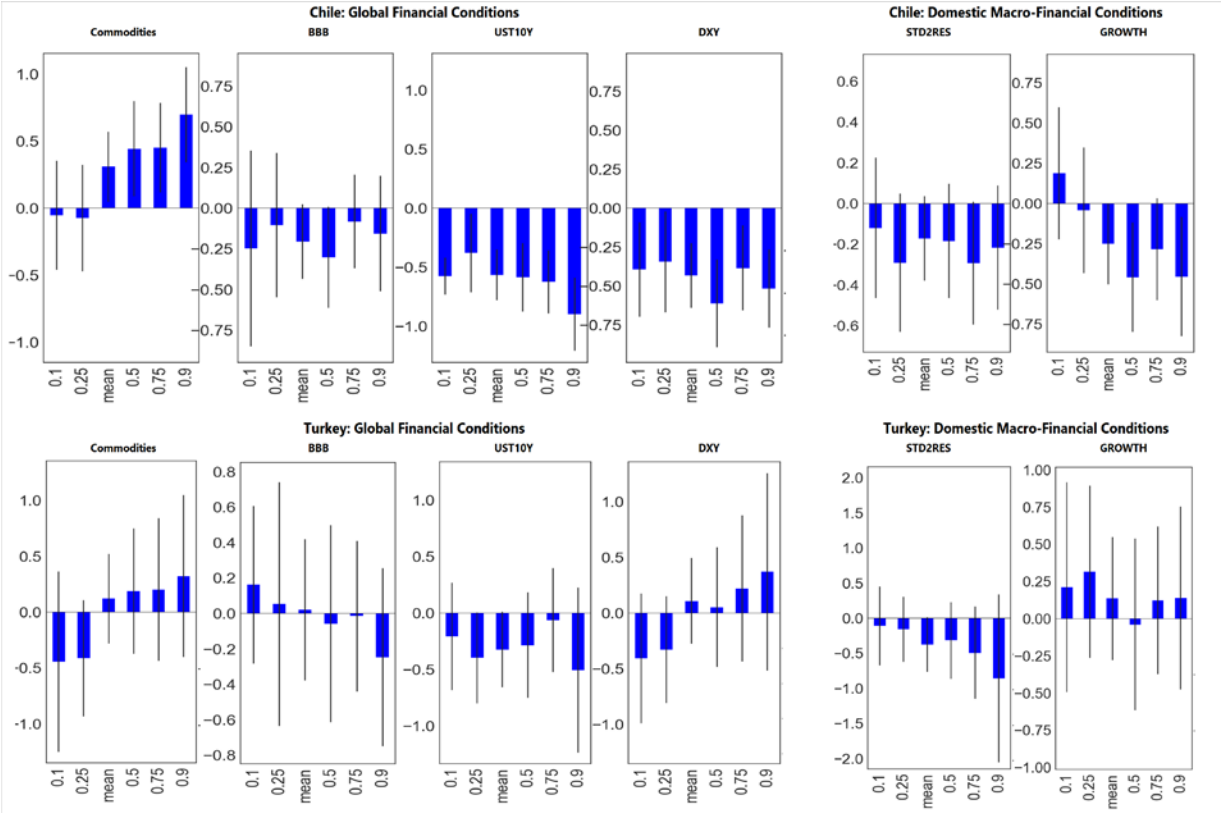
A. Unveiling Country-Specific Dynamics

Given that country characteristics change slowly over time, we do not include them in the country-level analysis. Instead, as country-specific variables, we consider lagged domestic GDP growth and the lagged ratio of short-term external debt to FX reserves. Regarding global factors, we explore the role of the U.S. corporate BBB spread, the U.S. 10-year Treasury yield, the U.S. dollar DXY index, and global commodity prices. For each of the two countries, we look at both short- and medium-term capital flows, as defined in previous sections. Detailed regression results are reported in Tables A12–A15 in the Appendix. For short-term predictions, country-specific *standardized* quantile regression coefficients are also portrayed in Figure 9.

Whereas for Chile, global financial conditions are a key driver of short-term capital flows, domestic factors appear relatively more important for Turkey. In the case of Chile, higher

international commodity prices tend to be strongly and significantly associated with a higher likelihood of very large inflows in the short term—consistent with the country's dependence on commodity exports. In addition to the buildup of domestic balance-sheet vulnerabilities, a higher U.S. 10-year Treasury yield and a stronger U.S. dollar today seem to significantly weaken capital flows prospects over the short term, but the strength and significance of the impact does not change markedly across quantiles (Table A12). For Turkey, the impact of global financing conditions on short-term future flows seems to be less clear and statistically less significant. By contrast, domestic balance sheet vulnerabilities are significantly and negatively related to short-term inflows. In particular, a higher short-term external debt to foreign reserves ratio is much more strongly associated with a reduction in the likelihood of surges than with an increase in the likelihood of large outflows (Table A13). Over the medium-term forecasting horizon, global financial conditions matter less for future inflows to Chile, while becoming more important for Turkey (Table A14). The relationship between short-term debt in foreign currency and portfolio flows remains statistically significant only in Turkey, where it displays a stark sign reversal pattern as the prediction horizon shifts further into the future (Table A17). This finding may be an indication of cyclical, mean-reverting foreign capital inflows to Turkey.

Figure 9. Scaled Quantile Regression Coefficients, Short-Term Portfolio Flows



Source: IMF staff calculations.

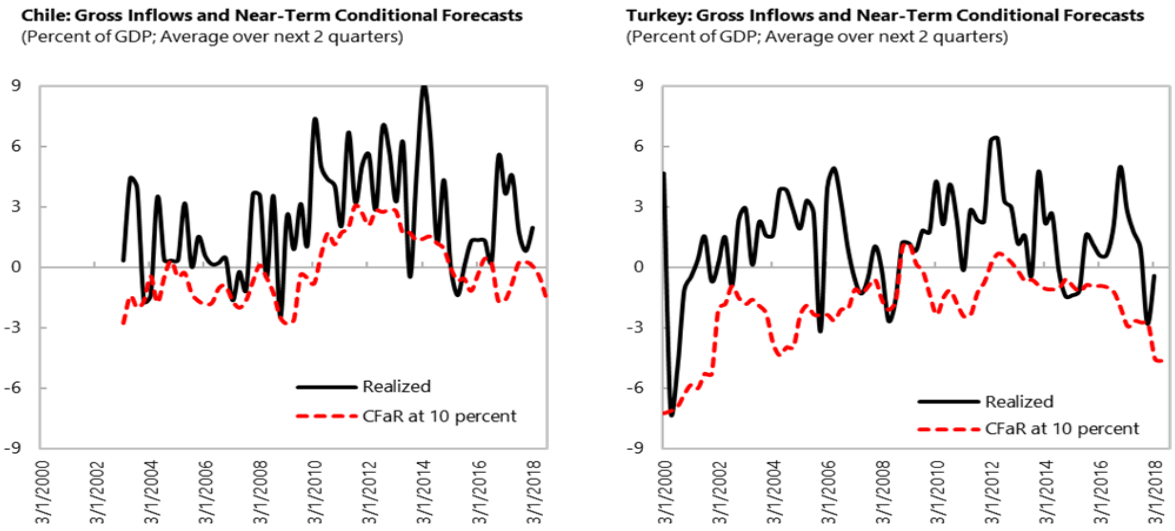
Notes: The blue bars denote *standardized* quantile regression coefficients for the 10th, 25th, 50th, 75th, and 90th percentiles along with the OLS coefficient (mean), whereas the black lines denote the 90 percent confidence intervals.

B. Tracking Risks to Portfolio Flows over Time

In the next step, we fit a t-skewed distribution to the predicted values from the country-specific quantile regressions discussed earlier, and compute conditional forecast distributions of portfolio inflows. By looking at the shifts in these conditional distributions over time, we can assess changes in the likelihood of (and risks to) future capital inflows.

CaR estimates display considerable variation over time in both countries. Figure 10 reports CaR estimates at the 10th percentile (red dashed lines) computed over the period 2003: Q1–2018: Q3 for Chile (left panel) and over 2000: Q1–2018: Q3 for Turkey (right panel), together with the corresponding realized values of portfolio inflows (black solid lines). After 2013, risks to inflows appear to have increased, amid heightened volatility of actual flows. For Chile, the CaR at the 10th percentile is estimated to have tumbled from +2.8 percent of GDP at the end of 2012 to -2 percent of GDP by the end of the sample, implying that—as of 2018: Q3—there was a 10 percent chance that over the next 2 quarters there would be portfolio *outflows* of at least 2 percent of GDP.

Figure 10: Capital Flows at Risk over Short Term



Source: IMF staff calculations.

Notes: The figure reports short-term CaR at the 10th percentile (red dashed line) from in-sample predictive densities estimated over the period 2003: Q1–2018: Q3 for Chile (left) and over 2000: Q1–2018: Q3 for Turkey (right) via a regression of average portfolio inflows over the next two quarters (in percent of GDP) on contemporaneous U.S. corporate BBB spread, U.S. 10-year Treasury yield, U.S. DXY dollar index, global commodity price index, lagged domestic GDP growth and lagged short-term debt to FX reserves. Corresponding realized values of portfolio inflows at each point in time are also reported for both countries (black solid lines).

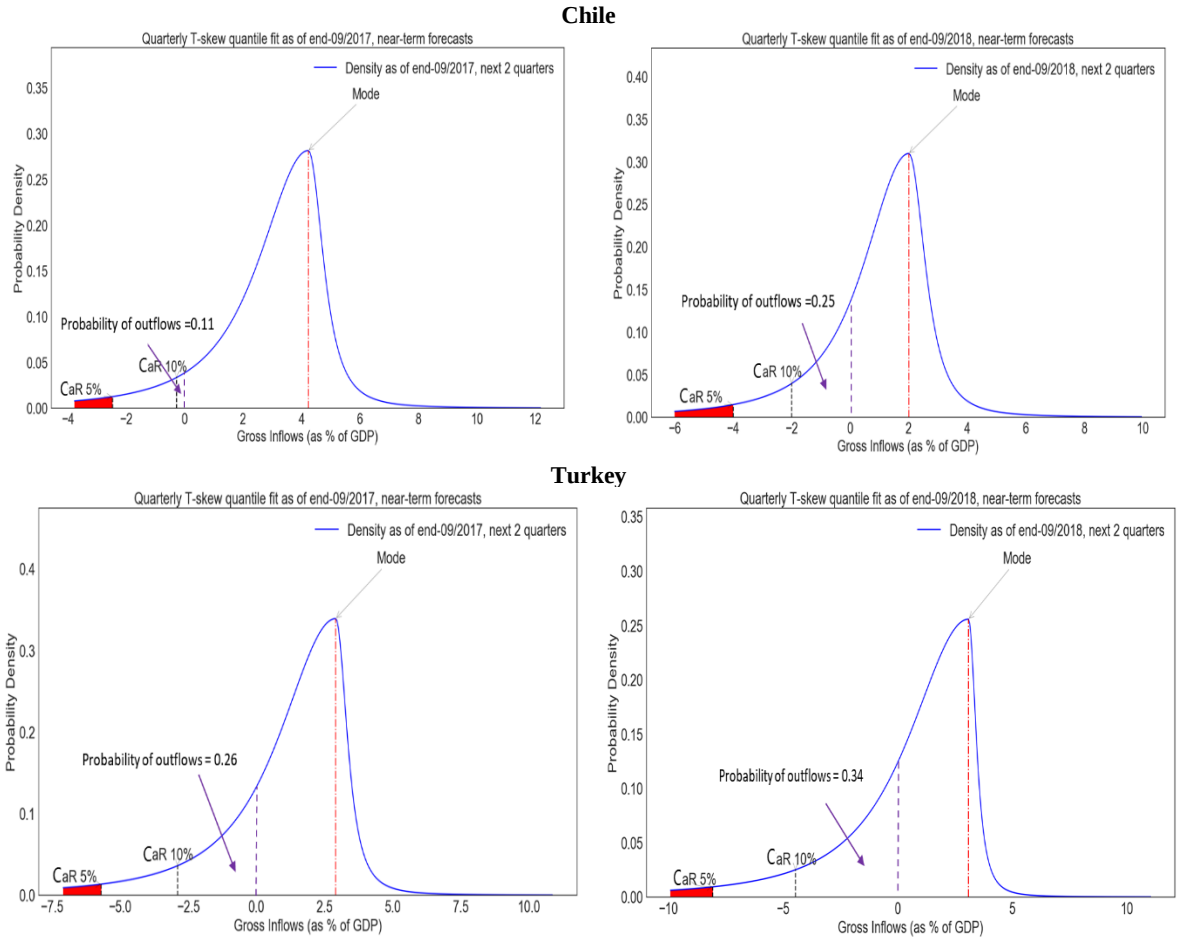
In the case of Turkey, Figure 10 shows a progressive deterioration of short-term inflows prospects since 2012, likely due to growing macro-financial vulnerabilities in the economy, tightening global financial conditions, and increasing global political uncertainties. . Turkey's short-term CaR was around -4.5 percent of GDP at the end of the sample, implying that—as of 2018: Q3—there was a 10 percent chance that Turkey would experience portfolio outflows of at least 4.5 percent of GDP over the next 2 quarters.[21]

[21] Over the medium term, capital flows prospects appear generally less bleak for both countries. In Chile, the medium-term CaR is predicted to hover around -1.5 percent of GDP; in Turkey—around -2.3 percent of GDP.

The CaR approach can also be used to assess how the distribution of short-term inflows—and associated tail risks—have shifted following a global shock. For example, the short-term outlook for portfolio inflows deteriorated in both Chile and Turkey between 2017: Q3 and 2018: Q3, as the U.S. Fed began to tighten monetary policy.

However, the way in which the distribution of future flows evolved was strikingly different in the two countries (Figure 11). For Chile, Figure 11 shows a sharp increase in the probability of short-term outflows between 2017: Q3 and 2018: Q3: from 11 to 25 percent of GDP (with a 5 percent chance that Chile's portfolio inflows over the next 2 quarters would fall by at least 4 percent of GDP as of 2018: Q3, rather than by 2.5 percent of GDP, as predicted 4 quarters earlier). At the same time, the mode of the distribution shifted leftward, from 4.2 to 2 percent of GDP.

Figure 11. Country-Specific Conditional Forecast Densities of Short-Term Portfolio Flows, 2017: Q3 vs 2018: Q3



Source: IMF staff calculations.

Notes: The figure reports conditional densities of short-term portfolio inflows for Chile (top panel) and Turkey (bottom panel) predicted using information up to 2017: Q3 (left charts) and using information up to 2018: Q3 (right charts).

In contrast, in the case of Turkey, the mode of the forecast distribution of short-term inflows remained virtually unchanged at 3 percent of GDP between 2017: Q3 and 2018: Q3. However, the skewness of the distribution increases, with downside risks to future flows

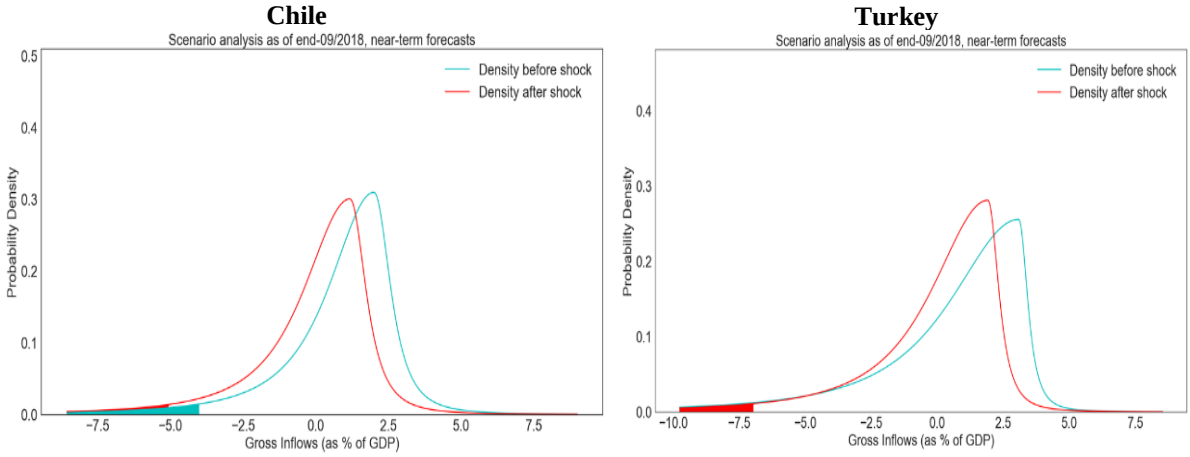
becoming much larger. The probability of short-term outflows soars from 26 to 34 percent of GDP between 2017: Q3 and 2018: Q3 and while in 2017: Q3 there was a 5 percent probability that short-term portfolio inflows would fall by 5.7 percent of GDP, this number declines to -8 percent of GDP as of 2018: Q3.

C. Risk-Off Scenario and Impact of Domestic Policies

The CaR framework enables scenario analyses. We use the estimates from country-level quantile regressions to assess how the short-term outlook for portfolio inflows would change following a significant increase in global risk aversion, proxied by a two-standard-deviation increase in the U.S. BBB spread.

As shown in Figure 12, the short-term outlook for portfolio flows in Chile (left panel) deteriorates following the increase in global risk aversion: the whole conditional distribution shifts leftward, thereby worsening the CaR at the 5th percentile, and reducing the likelihood of very large outflows (95th percentile of the distribution shifts to the left). Upside risks are sharply revised down for Turkey (right chart), while downside risks (as the estimated CaR at the 5th percentile) are predicted to remain almost unchanged.

Figure 12: Impact of a Risk-Off Scenario on the Distribution of Short-Term Portfolio Inflows



Source: IMF staff calculations.
Notes: The blue lines show the fitted distributions of portfolio inflows for 2018: Q4–2019: Q1 predicted in 2018: Q3 for Chile (left) and Turkey (right). The green shaded areas beneath these distributions indicate CaR at the 5th percentile in the absence of any shock. The red lines show the predicted distributions for the same horizon but assuming that in 2018: Q3 the U.S. corporate BBB spread rises by two times its standard deviation over the sample period (76 basis points). The red-shaded areas indicate how the CaR changes after the shock.

As in the previous section, we can also investigate whether different domestic policy actions can potentially mitigate the effects of heightened global risk aversion on the outlook of domestic portfolio inflows. For that purpose, we assume that the increase in global risk aversion is accompanied, in turn, by a simultaneous unexpected (i) monetary policy

tightening; (ii) a tightening in MPMs; (iii) a FX reserve *sale*; and (iv) a tightening in CFMs.[22] To allow for the effect of policy actions, we re-estimate the country-level regressions by adding an interaction term between the BBB spread and each policy action. If a given policy mitigates the negative impact of a higher BBB spread on future portfolio inflows at a given percentile α, the coefficient on the interaction term between the BBB spread and the policy action should have a positive sign (except for FX intervention shocks, for which the sign should be negative).

Country specificities matter in this context, as the underlying policy frameworks of the two countries under consideration are very different.[23] The Chilean financial system was not significantly affected by the global financial crisis, and its policymakers have not been active in the use of MPMs.[24] Chile also abandoned the use of CFMs—in particular its system of reserve requirements for certain forms of foreign credit, which came to be known as the Chilean *encaje*—in 1998.[25] The Central Bank of Chile has intervened in the FX market rather infrequently, under exceptional circumstances. The last two important intervention episodes (in 2008 and 2011) were aimed at increasing the stock of FX reserves for precautionary reasons (Werner et al. 2019).

In the case of Turkey, the Central Bank of the Republic of Turkey (CBRT) began to incorporate financial stability considerations into the inflation targeting framework from 2010 onward, while maintaining the primacy of price stability. With initially no formal institutional framework for macroprudential policies, the CBRT saw a role for itself in taming financial risks in a challenging external environment. It thus introduced multiple new instruments aiming at safeguarding financial stability, lower foreign exchange rate risk in the economy, achieving a less volatile exchange rate, and gaining additional degrees of freedom in setting domestic interest rates (IMF 2017). During crisis periods—such as in the context of the 2001 crisis or at the height of the 2008 global financial crisis—the central bank has also used CFMs to regulate foreign-exchange transactions. Finally, and although committed to a floating exchange rate regime, Turkey may engage in foreign exchange operations to smooth out excessive short-run exchange rate volatility.

Detailed results for policy actions are summarized in Tables A16–A19 in the Appendix. Given the above, in the case of Turkey we consider interactions of the BBB spread with all four types of policy interventions, while in regressions for Chile we analyze interactions with

[22] Since the CaR framework is based on a parsimonious, reduced-form forecasting system, the scenario analysis is here based on comparative statics analysis, which considers uncorrelated shocks.

[23] For a review of case studies looking into the role of macroprudential policies in increasing resilience to volatile capital flows, see IMF (2017b). For discussions of the Chilean approach to macro-prudential regulation and capital account management, see for example, Raddatz and Vergara (2016), Cifuentes, Claro and Jara (2017). For detailed analyses of Turkey's experience with macroprudential policies see, for example, Kara (2016), Uysal (2017).

[24] Throughout this paper, we focus on capital- and credit-targeting macroprudential policy actions.

[25] The *encaje* required that a fraction of the capital inflow be deposited in a non-interest bearing account in the Chilean Central bank. The *encaje* was introduced in June 1991 and was expanded and extended various times in the following years (for details, see Cowan and De Gregorio, 2007). It was reduced and finally eliminated in 1998.

monetary policy and FXI shocks only. In Turkey, a tightening in MPMs is found to be associated with a smaller likelihood of very large outflows in the quarters immediately after a global shock; over the medium term, these changes are likely to bring about significantly higher capital inflows across the whole distribution. The impact of FX intervention, on the other hand, appears to be largely insignificant. This is not the case in Chile, where, over the short term, FX intervention appears to play a significant role in stemming high inflows. The significance of these interventions, however, seems to vanish within two years. In both country cases, monetary policy actions do not appear to help mitigate risks to portfolio inflows associated with worsening global conditions—particularly over the medium term. The same seems to be the case for changes in CFMs in Turkey. These results are largely consistent with those obtained in panel regressions in Section IV.

VI. Conclusions and Policy Implications

In this paper, we propose an approach to predict the entire future probability distribution of capital flows to emerging markets based on current domestic structural characteristics, policies, and global shocks. The method allows for a range of useful applications, including the assessment of the joint impact of policy actions to mitigate the risks of capital outflows or inflow surges in the face of global shocks.

We illustrate the approach in three ways. First, we show how changes in global financial conditions shift prospects for aggregate flows to emerging markets. Specifically, the results suggest that future reversals and, to a lesser extent, surges of capital flows are disproportionately explained by changes in investor risk aversion. We then use panel regressions to illustrate the important role of country-specific characteristics and policy framework. Finally, we show how our approach can be used to analyze policy choices at the country level.

Our results indicate that structural characteristics, policy frameworks, and policy actions have different effects in shaping the response of portfolio inflows in response to an adverse global shock. For example, more flexible exchange rate regimes are linked to higher risks of both large in- and outflows in the immediate aftermath of a negative global shock, but more flexible exchange rate regimes support a larger rebound of flows in the medium term. Risks do not seem to be mitigated by better institutions and more transparency in the short term, but their effects are positive in the medium term.

Similarly, foreign exchange interventions seem to help mitigate downside risks to portfolio inflows caused by the changes in global conditions, but this effect is limited to the short term. A tightening of capital flow measures in response to an adverse global shock is associated with larger outflows in the short-term, but not later on. Finally, we find little evidence for the effectiveness of monetary and macroprudential policies in shielding countries from capital outflows and surges driven by global shocks, although the latter seem to reduce somewhat the likelihood of capital flow surges in the medium term.

The capital flows at risk methodology provides a promising framework for further research. In particular, further work could examine the role of fiscal policies and the differential effects of structural characteristics, policies, and global variables on different types of capital flows,

such as bank lending and foreign direct investment. The effects of combining different policies could also be explored. Moreover, higher-frequency fund flow data could be analyzed to shed further light on how investor behavior affects downside risks to capital flows, particularly given the rise of benchmark-driven investors in emerging markets in recent years (Arslanalp and Tsuda 2015). The framework could also usefully be applied to bilateral capital flows data to understand how downside risks differ across source and destination countries (McQuade and Schmitz 2019). Finally, the role of multiple simultaneous policy actions could also be explored.

VII. REFERENCES

Acosta-Henao, Miguel, Laura Alfaro, and Andres Fernandez, forthcoming. “Sticky Capital Controls”.

Adler, Gustavo, Noemie Lisack, and Rui Mano. 2015. “Unveiling the Effects of Foreign Exchange Intervention: A Panel Approach.” IMF Working Paper No. 15–130. International Monetary Fund.

Adrian, Tobias, Nina Boyarchenko, and Domenico Giannone, 2019. “Vulnerable Growth.” *American Economic Review*, Vol 109(4), pp. 1263–89

Adrian, Tobias, Federico Grinberg, Nellie Liang and Sheheryar Malik, 2018. “The Term Structure of Growth-at-Risk.” IMF Working Paper 2018/180.

Alam, Z., Adrian Alter, Joshua Eiseman, Gaston Gelos, Heedon Kang, Machiko Narita, Erlend Nier, and N. Wang, 2019. “Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database,” International Monetary Fund (IMF) Working Paper 19/66.

Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych, 2008. “Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation.” *Review of Economics and Statistics* 90, no. 2, pp. 347–368.

Arslanalp, Serkan, and Takahiro Tsuda. 2015. "Emerging Market Portfolio Flows: The Role of Benchmark-Driven Investors." IMF Working Paper, 15/263.

Azzalini, A. and A. Capitanio, 2003, “Distributions Generated by Perturbation of Symmetry with Emphasis on a Multivariate Skew t Distribution,” Journal of the Royal Statistical Society, Series B, 65, pp. 367–389.

Azzalini, A., 2019, “The Skew-Normal and Related Distributions Such as the Skew-t”, 'sn' package for R.

Bekaert, Geert, Campbell R. Harvey, Christian T. Lundblad, and Stephan Siegel, 2011, “What Segments Equity Markets?”, *The Review of Financial Studies* 24 (12), pp. 3841–3890.

Binici, Mahir, Michael Hutchison, and Martin Schindler, 2010. “*Controlling capital? Legal restrictions and the asset composition of international financial flows*,” *Journal of International Money and Finance* 29(4), pp. 666–684.

Borio, Claudio, and Piti Disyatat, 2010. “Global Imbalances and the Financial Crisis: Reassessing the Role of International Finance.” *Asian Economic Policy Review* 5(2): 198–216.

Brandao, Luis, Gaston Gelos, and Natalia Melgar, 2018. “Country Transparency and the Global Transmission of Financial Shocks,” *Journal of Banking and Finance*, Vol. 96: 56–72.

Brandao, Luis, Gaston Gelos, Machiko Narita, and Erlend Nier, forthcoming. “Leaning Against the Wind: An Empirical Cost-Benefit Analysis,” IMF Working Paper

Calderón, César & Kubota, Megumi, 2019. "Ride the Wild Surf: An investigation of the drivers of surges in capital inflows," *Journal of International Money and Finance*, vol. 92(C): 112–136.

Calvo, Guillermo A., and Carmen Reinhart, 1999. “When Capital Flows Come to a Sudden Stop: Consequences and Policy Options,” Working Paper, University of Maryland

Calvo, Guillermo A., Leonardo Leiderman, and Carmen Reinhart, 1993. “Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors,” IMF Staff Papers: 108–151.

Calvo, Guillermo A., Alejandro Izquierdo, and Luis-Fernando Mejía, 2004. "On the empirics of Sudden Stops: The Relevance of Balance-Sheet effects," Proceedings, Federal Reserve Bank of San Francisco.

Calvo, Guillermo A., and Carmen Reinhart, 2000, “When Capital Inflows Come to a Sudden Stop: Consequences and Policy Options,” in: Peter Kenen and Alexandre Swoboda, eds. Reforming the International Monetary and Financial System, (Washington DC: International Monetary Fund, 2000): 175–201.

Cardarelli, Roberto, Selim Elekdag, and Ayhan Kose, 2010. “Capital inflows: Macroeconomic implications and policy responses,” *Economic Systems*, vol. 34, issue 4: 333–356.

Cecchetti, Stephen, Tommaso Mancini-Griffoli, Machiko Narita, and Ratna Sahay, 2019. “U.S. or Domestic Monetary Policy: Which Matters More for Financial Stability?”, forthcoming in *IMF Economic Review.*

Cecchetti, Stephen, Tommaso Mancini-Griffoli, Machiko Narita, and Ratna Sahay, forthcoming. “International Spillovers of “Lower for Longer” U.S. Interest Rates: Can They Be Mitigated? ”, forthcoming

Cerutti, Eugenio, and Gee Hee Hong. "Portfolio Inflows Eclipsing Banking Inflows: Alternative Facts?", 2018. IMF Working Paper 18/29.

Chen, Jiaqian, Tommaso Mancini-Griffoli and Ratna Sahay, 2014, “Spillovers from United States Monetary Policy on Emerging Markets: Different This Time?”, IMF Working Paper 14/240.

Cifuentes, Rodrigo, Sebastian Claro, and Alejandro Jara, 2017. “Macroeconomic and financial volatility and macroprudential policies in Chile.” BIS Paper 94g.

Cowan, Kevin, and José De Gregorio, 2007, “International Borrowing, Capital Controls, and the Exchange Rate: Lessons from Chile”, in *Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences*, Edwards. 2007

Dominguez, K., 2012. “Foreign Reserve Management during the Global Financial Crisis,” *Journal of International Money and Finance*31 (8): 2017–2037.

Ehlers, Torsten, and Előd Takáts, 2013. “Capital Flow Dynamics and FX Intervention.” BIS Paper 73c.

Fendoğlu, Salih, 2017. “Credit Cycles and Capital flows: Effectiveness of the Macroprudential Policy Framework in Emerging Market Economies,” *Journal of Banking and Finance* 79: 110–128.

Fernandez-Arias, Eduardo, 1996. “The new wave of private capital inflows: push or pull?” *Journal of Development Economics* 48, no. 2: 389–418.

Forbes, Kristin J., and Francis Warnock, 2012. “Capital Flow Waves: Surges, Stops, Flight and Retrenchment,” *Journal of International Economics*, 88, No. 2: 235–251.

Forbes, Kristin J., and Michael W. Klein, 2015. “Pick your poison: the choices and consequences of policy responses to crises.” *IMF Economic Review* 63, no. 1: 197–237.

Gelos, Gaston and Shang-Jin Wei, 2005. “Transparency and International Portfolio Holdings,” *Journal of Finance*, Vol. 60 (6): 2987–3020.

Ghosh, Atish R., Mahvash S. Qureshi, Jun Il Kim, and Juan Zalduendo. 2014. “Surges.” *Journal of International Economics* 92: 266–285.

Guidotti, Pablo, Federico Sturzenegger, Agustín Villar, and José de Gregorio, 2004. “On the Consequences of Sudden Stops,” *Economía* Vol 4(2): 171–214.

Hamilton, James D., 2018. “Why you should never use the Hodrick-Prescott filter.” *Review of Economics and Statistics* 100, no. 5: 831–843.

International Monetary Fund, 2017a. “Global Financial Stability Report.” Washington, October 2017.

_____, 2017b. “Increasing Resilience to Large and Volatile Capital Flows—The Role of Macroprudential Policies—Case Studies.” IMF Policy Paper. Washington, June 2017.

_____, 2018. “Global Financial Stability Report.” Washington, October 2018.

_____, 2019c. “Facing the Tides: Managing Capital Flows in Asia,” International Monetary Fund, DP No. 19/17

Kara, Hakan, 2016. “Turkey’s experience with macroprudential policy.” BIS Paper 86q.

Koepke, Robin. 2019. “What Drives Capital Flows to Emerging Markets? A Survey of the Empirical Literature.” *Journal of Economic Surveys*, Vol. 33, No. 2, pp. 516–540.

Koenker, R. and V. d'Orey, 1987, 1994. "Computing regression quantiles". Applied Statistics vol. 36, pp. 383–393, and vol. 43, pp. 410–414.

Koenker, R., 2005. "Quantile Regression," Cambridge University Press.

Krugman, P., 1999. "Balance sheets, the transfer problem, and financial crises.", p.31–35, Springer

Mano, Rui, and Silvia Sgherri, forthcoming. "One Shock, Many Policy Responses," IMF Working Paper.

McQuade, Peter, and Martin Schmitz. 2019. "America First? A US-centric view of global capital flows." Working Paper No. 2238. European Central Bank

Mendoza, Enrique, 2010. "Sudden Stops, Financial Crises, and Leverage," *American Economic Review* 100, pp. 1941–1966.

Montiel, Peter and Carmen Reinhart, 1999. "Do capital controls and macroeconomic policies influence the volume and composition of capital flows? Evidence from the 1990s," *Journal of International Money and Finance* 18(4), pp. 619–635.

Obstfeld, Maurice, 2012. "Financial Flows, Financial Crises, and Global Imbalances." *Journal of International Money and Finance* 31 (3), pp. 469–480.

Raddatz, Claudio and Rodrigo Vergara, 2016. "Macroprudential Policies: General Analysis and a Look into the Chilean Experience." Documentos de Política Económica No. 59 (Banco Central de Chile).

Reinhardt, Dennis, Luca Ricci, and Thierry Tressel, 2013. "International capital flows and development: Financial openness matters." *Journal of International Economics* 91, pp. 235–251.

Reinhart, Carmen and Vincent Reinhart, 2009. "*Capital Flow Bonanzas: An Encompassing View of the Past and Present*," in: NBER International Seminar on Macroeconomics 2008, pp. 9–62.

Sahay, Ratna, Vivek Arora, Thanos Arvanitis, Hamid Faruqee, Tommaso Mancini-Griffoli, Papa N'Diaye, and an IMF Team, 2014, "Emerging Market Volatility: Lessons from the Taper Tatrum,", IMF Staff Discussion Note 14/09.

Schneider, Martin, and Aaron Tornell, 2001. Boom-bust cycles and the balance sheet effect

Sula, Oazn, 2010. "Surges and Sudden Stops of Capital Flows to Emerging Markets," O*pen Economies Review*, Springer, vol. 21(4), pp. 589–605.

Svirydzenka, K., 2016, "Introducing a New Broad-Based Index of Financial Development", IMF Working Paper 2016/5.

Uysal, Marat, 2017. “Financial stability and macroprudential policy in Turkey.” BIS Paper 94z.

Werner, Alejandro, Chamon, Marcos, Hofman, David, and Nicolas Magud, 2019, *Foreign Exchange Intervention in Inflation Targeters in Latin America*, Washington, DC, International Monetary Fund.

Appendix

Data

We use quarterly data from 1996: Q4 to 2018: Q4 for 35 emerging market and developing countries. For the structural variables that are only available on an annual basis, we simply assume that all quarterly values within one year are the same. Table A1 lists all countries that are included our sample.[26]

Table A1: List of Countries

Region	Countries: full sample	Countries: when controlling for financial integration
Emerging Europe and Central Asia	Bulgaria, Bosnia and Herzegovina, Belarus, Georgia, Hungary, Kazakhstan, North Macedonia, Poland, Romania, Russia, Serbia, Ukraine	Bulgaria, Hungary, Poland, Romania, Russia
Asia and Pacific	India, Indonesia, Republic of Korea, Malaysia, Philippines, Thailand	India, Indonesia, Republic of Korea, Malaysia, Philippines, Thailand
Middle East and Africa	Egypt, Morocco, Turkey, South Africa	Egypt, Turkey, South Africa
Central and South America	Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Guatemala, Jamaica, Mexico, Panama, Peru, El Salvador	Brazil, Chile, Colombia, Mexico, Peru

Dependent Variable. The dependent variable is gross portfolio inflows as percent of GDP and comes from the IMF's Financial Flow Analytics (FFA) database. To assess the short-term impact, we look at two-quarter average inflows *h* quarters ahead, with *h=2.* That is, for *h=2* we look at average inflows in the first and second quarters ahead. For the medium-term analysis, we use average quarterly portfolio inflows over 4 quarters at *h=8* quarters ahead.

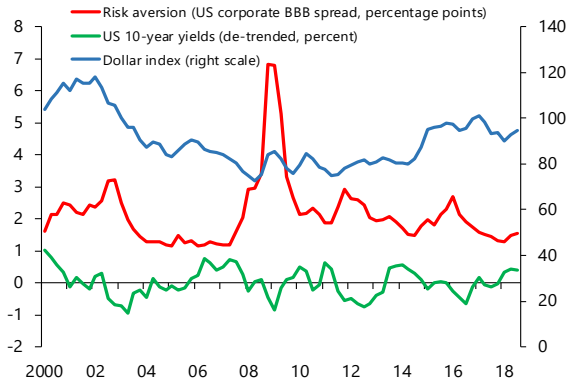
Domestic Factors. Data on foreign reserves and external debt are taken from the IMF's Assessing Reserve Adequacy (ARA) database and the World Bank's Quarterly External Debt Statistics database. We use the IMF's International Financial Statistics (IFS) and World Economic Outlook (WEO) databases for macroeconomic variables, such as GDP growth, policy rates, and exchange rates. GDP per capita is measured in constant international dollars based on purchasing power parity and comes from the World Bank's International Comparison Program database. Capital account openness is measured by the Chinn-Ito Index, computed using the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) database. To control for the level of financial development, we apply the market depth sub-index of the IMF's Financial Development Index (for details see Svirydzenka, 2016). To measure the level of a country's integration with global financial markets, we follow Bekaert et al. (2011) and extend their indicator until 2018.

[26] When collecting data, we started with a sample of 60 countries. Due to data limitations, and after eliminating outliers (e.g., we dropped Argentina, Ecuador, Bolivia, Pakistan, and Vietnam as the time series for portfolio inflows showed some unreliable patterns) we were left with 35 economies.

Global Factors. The BBB-rated U.S. corporate bond yield and spread come from the Federal Reserve Bank of St. Louis. U.S. 10-year Treasury yields (de-trended using an HP filter) and the U.S. dollar strength (measured by the DXY dollar index) are from Bloomberg, and the Commodity Price Index is from Haver Analytics. When controlling for global growth, we follow Forbes and Warnock (2012), and detrend U.S. GDP growth using an HP filter. We then use the average deviation from the trend over the last 4 quarters to capture the position of the global cycle.

Figure A1 shows the behavior of the three global factors: U.S. BBB spread, the de-trended U.S. 10-year yield, and the DXY dollar index (indicating the strength of the U.S. dollar) over the last 20 years. The global factors vary considerably over time, with the BBB spread increasing significantly during the global financial crisis.

Figure A1: Drivers of Medium-term Capital Flows



Structural Country Characteristics. We use a range of data sources for the structural country characteristics, including the World Bank's World Development Indicators (WDI) and the Worldwide Governance Indicators (WGI) databases, which contain Rule of Law, Political Stability, Central Bank Transparency, Government Effectiveness indicators. To capture corruption perceptions, we use the index by Transparency International. The exchange rate regime indicator is taken from the IMF's AREAER database.

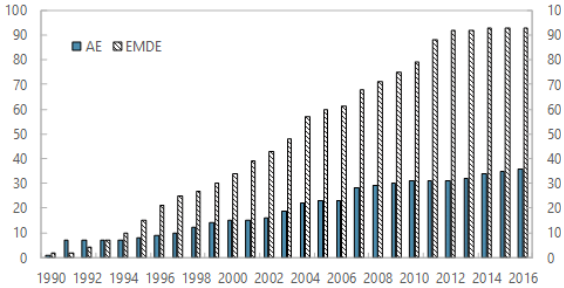
Domestic Policies. We take the domestic policy rates from the IMF's International Financial Statistics. The FX interventions come from official publications by national authorities and the FRED database. For countries whose data is not available, we manually constructed a proxy measure following Dominguez (2012) and Adler, Lisack, and Mano (2015). The capital flows measures are taken from the AREAER database, and the macroprudential policy indicators are constructed using the iMaPP database (Alam et al, 2019). Table A2 describes the definitions and the construction of policy variables in detail, and Table 1 in the main text shows sample summary statistics.

Table A2: Construction of Policy Variables

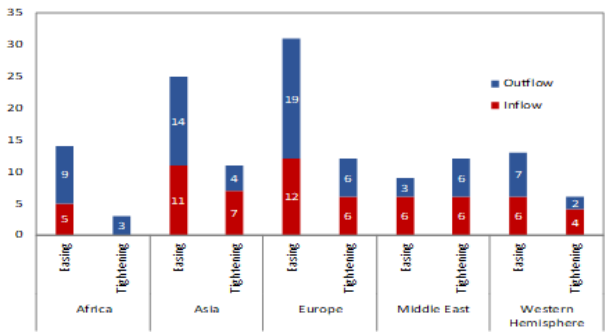
Variable	Construction	Data source
Policy interest rate	Quarterly average of the domestic policy rate (nominal)	IMF International Financial Statistics
FX intervention	Whenever possible, the FX intervention variable is based on actual interventions data from central banks. A positive value means an increase in FX assets (an FX purchase), and a negative value—a decline in FX assets (an FX sale); we scale the variable by GDP. When official data on FX interventions are not available, we follow Dominguez (2012) and Adler, Lisack, and Mano (2015), in using a valuation-adjusted measure of the change in the central bank's net foreign assets.	Central bank website, FRED database, IMF International Financial Statistics, Thomson Reuters Datastream, Haver Analytics, IMF's COFER database
Macroprudential policy	The iMaPP database records policy actions across different macroprudential tools subcategories. A tightening action is recorded as 1, and an easing is recorded as -1 (and zero otherwise). For our purposes, we construct the macroprudential indicator as a sum of actions related to capital requirements and credit-volume in a given quarter. The difference in the level of the indicator compared to the last quarter gives the magnitude of easing or tightening.	iMaPP database (Alam et al. 2019)
Capital flow management indicator	We use the broad restrictiveness index based on the AREAER report. The index is an average of binary indicators of restrictiveness in 62 categories of capital transactions. This broad restrictiveness index can have a value between zero and 1 and higher values represent more restricted cross-border capital flows. We derive an indicator of CFM actions by looking at the difference in the level of the restrictiveness indicator compared to the last quarter: An easing is assigned a -1 value, while a tightening is recorded as a +1 (and zero in other cases).	IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)

Figure A2: Selected Policy Actions Across Countries.

Number of Countries that Introduced Macroprudential Policy Tools



Application of Capital Controls (Number of Countries, 2014–18)

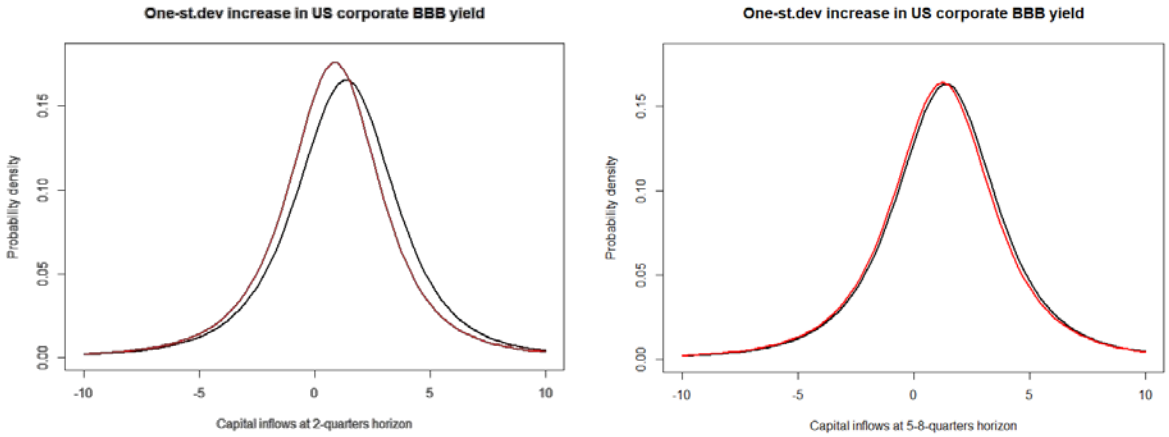


Policy Shocks. For each of the policy variables defined in Table A2, we run separate country-level regressions of the variable of interest on a range of explanatory variables listed in Table A3 below. We define monetary policy and FXI shocks as residuals from those first-stage regressions. For CFMs and macroprudential policies, we construct the policy shock variable in quarter *t* as a sum of the residual in the current quarter *t* and of the residuals in the last three quarters, *t-1*, *t-2*, *t-3*. This is in line with recent evidence in Acosta-Henao et al. (forthcoming), who document that changes in CFMs (and macroprudential policies) occur rather infrequently, but when they do—they display very little mean reversion.

Table A.3: Construction of Policy Shocks

Dependent variable	Explanatory variables	Details of the specification
Domestic policy rate (q/q change)	One-year-ahead Consensus inflation and GDP forecasts, 2 lags of the domestic policy rate, 2 lags of gross portfolio inflows (in % of GDP), current period and 2 lags of the U.S. corporate BBB yield, 2 lags of CPI inflation, 2 lags of real GDP growth, 2 lags of the nominal effective exchange rate.	Country by country OLS regressions.
Index of macroprudential measures which takes values {-2,-1,0,1,2} if, in net terms, there were more than one loosening measures, one loosening measure, no change, one tightening measure, or more than two tightening measures in the quarter, respectively.	1 lag of the U.S. corporate BBB yield, 1 lag of gross portfolio inflows (in % of GDP), 1 lag of real GDP growth, 1 lag of credit to GDP gap (deviation from trend as in Hamilton (2018)), 4 lags of the dependent variable.	Country by country ordered probit regression. The policy shock is recovered as follows: $\hat{\varepsilon}_{it}^{MPM} = MPM_{it} - \sum_{k=-2}^{2} \hat{p}_k k$ where MPM_{it} is the dependent variable, and $\hat{p}_k$ is the probability of $MPM_{it} = k$, with k in {-2,-1,0,1,2}, estimated through the probit regression.
Index of FXI actions which takes values {-1,0,1} if there was a sale, no change, or a purchase of FX, respectively.	Variables used in the first column of Table 2 in Forbes and Klein (2015), 1 lag of the BBB yield and of gross portfolio inflows (in % of GDP), exchange rate volatility, dollar exchange rate deviation from trend using Hamilton's (2018) approach.	Country by country ordered probit regression. The policy shock is recovered as follows: $\hat{\varepsilon}_{it}^{FXI} = FXI_{it} - \sum_{k=-1}^{1} \hat{p}_k k$ where FXI_{it} is the dependent variable, and $\hat{p}_k$ is the probability of $FXI_{it} = k$, with k in {-1,0,1}, estimated through the probit regression.
Index of CFM actions which takes values {-1,0,1} if there was an easing (decline), no change, or a tightening (increase) in the CFM restrictiveness indicator, respectively.	Variables used in the first column of Table 2 in Forbes and Klein (2015), 1 lag of the U.S. corporate BBB yield and of gross portfolio inflows (in % of GDP), exchange rate volatility, dollar exchange rate deviation from trend using Hamilton's (2018) approach.	Country by country ordered probit regression. The policy shock is recovered as follows: $\hat{\varepsilon}_{it}^{CFM} = CFM_{it} - \sum_{k=-1}^{1} \hat{p}_k k$ where CFM_{it} is the dependent variable, and $\hat{p}_k$ is the probability of $CFM_{it} = k$, with k in {-1,0,1}, estimated through the probit regression.

Figure A3: One Standard Deviation Increase in the U.S. Corporate BBB Yield and Predicted Distribution of Portfolio Inflows



Notes: This figure plots distributions of the predicted portfolio inflows in the short term (left chart) and in the medium term (right chart) based on the panel regression (3) when all explanatory variables are set to their sample means (black color) and when considering a one standard deviation increase in the BBB yield (around 160 basis points) above its historical average while all other control variables are set at the sample means (red color).

Results Tables

Tables below show results of the regression estimations conducted in sections III–V.

Table A4: Drivers of Short-Term Outlook for Aggregate Debt Portfolio Inflows to the Emerging Markets

Dependent variable: average gross debt portfolio inflows to the EMs (% of GDP) in the next two quarters

Variable	10	20	30	40	50	60	70	80	90
US corporate BBB spread	-0.31	-0.09	-0.07	0.00	-0.03	-0.05	-0.02	-0.06	0.04
	(0.34)	(0.10)	(0.10)	(0.15)	(0.14)	(0.14)	(0.15)	(0.14)	(0.23)
10-Year US Treasury yields	-0.66*	-0.53	-0.83***	-0.44*	-0.45*	-0.26	-0.04	-0.08	0.01
	(0.37)	(0.32)	(0.27)	(0.25)	(0.24)	(0.23)	(0.23)	(0.21)	(0.32)
US Dollar Index (DXY)	0.01	-0.01	-0.01	-0.03**	-0.03***	-0.04***	-0.04****	-0.04***	-0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)
EM ex. China Growth	0.04	0.04	0.06	0.02	0.03	0.03	0.02	0.02	0.05
	(0.06)	(0.06)	(0.05)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.07)
Lagged gross portfolio inflows (in % of GDP)	0.22	0.16	0.39	0.10	-0.06	-0.07	0.06	0.09	0.14
	(0.36)	(0.37)	(0.32)	(0.26)	(0.20)	(0.19)	(0.20)	(0.19)	(0.24)

*** p<0.01, ** p<0.05, * p<0.1

Notes: Table A4 shows results from regression of average quarterly aggregate debt portfolio inflows to the EM economies in the next two quarters on a set of global variables, the GDP-weighted EM growth rate, and the lagged dependent variable. The data is quarterly from 1997: Q3 to 2018: Q1, and dependent variable is computed based on 35 economies listed in Table A1.

Table A5: Drivers of the Medium-Term Outlook for Aggregate Debt Portfolio Inflows to the Emerging Markets

Dependent variable: average gross debt portfolio inflows to the EMs (% of GDP) in quarters 5-8 ahead

Variable	10	20	30	40	50	60	70	80	90
US corporate BBB spread	0.35**	0.19**	0.16**	0.16*	0.17**	0.16*	0.15	0.21*	0.24*
	(0.14)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.11)	(0.12)	(0.13)
10-Year US Treasury yields	-0.13	-0.53***	-0.56***	-0.41***	-0.40***	-0.31*	-0.30	-0.28	-0.22
	(0.25)	(0.17)	(0.16)	(0.13)	(0.15)	(0.18)	(0.20)	(0.22)	(0.28)
US Dollar Index (DXY)	-0.004	-0.02*	-0.02*	-0.02***	-0.02**	-0.02**	-0.02**	-0.02***	-0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EM ex. China Growth	0.03	0.004	0.01	0.01	0.02	0.02	-0.01	-0.01	-0.02
	(0.06)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Lagged gross portfolio inflows (in % of GDP)	-0.05	0.18	0.12	0.06	0.09	0.12	0.15	0.22	0.34**
	(0.34)	(0.24)	(0.21)	(0.13)	(0.13)	(0.12)	(0.13)	(0.13)	(0.17)

*** p<0.01, ** p<0.05, * p<0.1

Notes: Table A5 shows results from regression of average quarterly aggregate debt portfolio inflows to the EM economies 5–8 quarters ahead on a set of global variables, the GDP-weighted EM growth rate, and the lagged dependent variable. The data is quarterly from 1997: Q3 to 2018: Q1, and the dependent variable is computed based on 35 economies listed in Table A1.

Table A6: Panel Regression Results—Short Term and No Interaction Terms

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

	Percentile										
Variable	5	10	20	30	40	50	60	70	80	90	95
US corporate BBB yield	-0.77***	-0.40***	-0.40**	-0.32*	-0.29**	-0.27*	-0.34***	-0.31*	-0.47**	-0.64***	-0.68*
	(0.26)	(0.16)	(0.16)	(0.17)	(0.14)	(0.14)	(0.13)	(0.18)	(0.22)	(0.23)	(0.38)
US GDP growth (de-trended)	-1.01	-0.52	-0.56*	-0.52	-0.48**	-0.73***	-0.77***	-0.80**	-0.84**	-1.02**	-0.47
	(0.66)	(0.50)	(0.30)	(0.34)	(0.23)	(0.19)	(0.24)	(0.37)	(0.39)	(0.43)	(0.84)
GDP per capita (PPP)	-0.20	-0.18*	-0.17***	-0.09*	-0.09	-0.08	-0.10*	-0.09	-0.17*	-0.22**	-0.20
	(0.15)	(0.09)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.09)	(0.10)	(0.10)	(0.16)
Financial integration	-0.20*	-0.09	-0.09	-0.07	-0.06	-0.03	-0.03	-0.03	-0.08*	-0.09*	-0.16
	(0.12)	(0.07)	(0.06)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.11)
CA openness	0.90	0.57	0.65	0.01	-0.13	-0.12	0.18	-0.24	-0.18	-0.66	1.23
	(1.47)	(0.91)	(0.68)	(0.41)	(0.43)	(0.35)	(0.39)	(0.47)	(0.59)	(0.66)	(1.84)
Financial market depth	-2.63	-0.95	0.56	2.08*	2.19**	3.13***	3.35***	5.63***	5.71***	9.56***	8.83***
	(4.22)	(2.98)	(1.55)	(1.14)	(1.10)	(1.00)	(1.02)	(1.69)	(1.58)	(2.21)	(3.30)
Short-term external debt to reserves	-0.70	-0.70	-0.09	0.07	-0.034	0.30	0.64**	1.10**	1.18**	2.17***	2.31***
	(1.04)	(0.44)	(0.31)	(0.31)	(0.26)	(0.30)	(0.31)	(0.44)	(0.47)	(0.75)	(0.74)
Domestic y/y GDP growth	-0.31*	-0.10	-0.10	-0.08	-0.06	-0.03	-0.07	-0.01	-0.01	-0.23	-0.35
	(0.18)	(0.11)	(0.13)	(0.09)	(0.10)	(0.09)	(0.10)	(0.14)	(0.22)	(0.26)	(0.35)
Interaction BBB yield*Financial Int	0.03*	0.01	0.01	0.01	0.01	0.003	0.003	0.003	0.01	0.01	0.02
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Number of observations	1322	1322	1322	1322	1322	1322	1322	1322	1322	1322	1322

Bootstrapped standard errors (clustered at country level) *** p<0.01, ** p<0.05, * p<0.1

Notes: Table A6 shows results from regression (3) when domestic policies and the interaction term of the U.S. corporate BBB yield with domestic policy variables are not included.

Table A7: Panel Regression Results—Medium Term and No Interaction Terms

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

	Percentile										
Variable	5	10	20	30	40	50	60	70	80	90	95
US corporate BBB yield	-0.47*	-0.31**	-0.12	-0.12	-0.06	-0.04	-0.08	0.001	-0.02	-0.12	-0.07
	(0.28)	(0.15)	(0.10)	(0.11)	(0.13)	(0.16)	(0.17)	(0.16)	(0.15)	(0.21)	(0.46)
US GDP growth (de-trended)	-1.00	-0.68*	-0.42	-0.39*	-0.39**	-0.43**	-0.58**	-0.45	-0.15	-0.07	0.82
	(0.68)	(0.38)	(0.34)	(0.24)	(0.17)	(0.18)	(0.23)	(0.28)	(0.30)	(0.43)	(0.76)
GDP per capita (PPP)	-0.03	-0.05	-0.004	0.0001	0.02	-0.01	0.005	0.08	0.04	-0.06	-0.06
	(0.15)	(0.07)	(0.05)	(0.05)	(0.06)	(0.05)	(0.06)	(0.09)	(0.10)	(0.15)	(0.18)
Financial integration	-0.18	-0.11	-0.05	-0.04	-0.01	-0.007	-0.02	-0.007	-0.01	-0.02	-0.06
	(0.14)	(0.07)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.06)	(0.08)	(0.11)	(0.14)
CA openness	0.23	0.02	0.31	0.35	0.12	0.19	0.23	-0.49	-0.48	-0.45	-0.08
	(1.38)	(0.75)	(0.45)	(0.29)	(0.32)	(0.33)	(0.43)	(0.59)	(0.98)	(1.31)	(1.46)
Financial market depth	-5.71	-3.83**	-2.76*	-1.31	-1.31	-0.06	-0.39	0.003	-1.03	-1.06	-0.37
	(3.50)	(1.63)	(1.47)	(0.93)	(1.12)	(1.06)	(1.24)	(1.82)	(2.29)	(3.63)	(4.01)
Short-term external debt to reserves	-0.01	-0.33	-0.40	-0.57*	-0.66**	-0.41*	-0.46	-0.24	-0.71*	0.56	1.77**
	(0.62)	(0.50)	(0.29)	(0.34)	(0.28)	(0.24)	(0.33)	(0.32)	(0.42)	(0.81)	(0.72)
Domestic y/y GDP growth	-0.31	-0.19	-0.09	-0.21***	-0.15***	-0.09	-0.003	0.07	0.04	-0.004	-0.20
	(0.31)	(0.13)	(0.08)	(0.06)	(0.05)	(0.08)	(0.09)	(0.13)	(0.16)	(0.21)	(0.31)
Interaction BBB yield*Financial Int	0.02	0.01	0.01	0.003	-0.001	-0.001	0.0002	-0.002	-0.001	-0.005	0.003
	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Number of observations	1322	1322	1322	1322	1322	1322	1322	1322	1322	1322	1322

Bootstrapped standard errors (clustered at country level) *** p<0.01, ** p<0.05, * p<0.1

Notes: Table A7 shows results from regression (3) when domestic policy variables and the interaction term of the U.S. corporate BBB yield with domestic policy variables are not included.

Table A8: Panel Regression Results—Interaction Terms with Domestic Policies and Structural Characteristics, Short Term

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

		Percentile											
		5	10	20	30	40	50	60	70	80	90	95	Number of obs.
Exchange rate regime	β_4	-0.29	0.08	-0.31	-0.27	0.19	-0.13	0.04	0.03	-0.52*	-0.72**	-1.44**	
	(standalone term)	(0.48)	(0.19)	(0.23)	(0.26)	(0.25)	(0.28)	(0.24)	(0.27)	(0.31)	(0.32)	(0.67)	
	β_5 (interaction	-0.08*	-0.10***	-0.01	0.02	0.02	0.03	0.002	0.02	0.09**	0.15***	0.30**	1322
	with BBB yield)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)	(0.12)	
Financial market depth	β_4	2.08	0.41	-0.70	1.94	0.69	-0.69	0.40	-0.52	-4.76	-6.00	-8.33	
		(7.02)	(4.36)	(3.12)	(3.38)	(2.68)	(2.67)	(2.69)	(3.10)	(3.47)	(3.77)	(5.25)	
	β_5	-1.04	-0.25	-0.25	0.04	0.31	0.68	0.58	1.01**	1.74***	2.41***	2.72***	1322
		(1.02)	(0.65)	(0.53)	(0.54)	(0.40)	(0.46)	(0.44)	(0.51)	(0.53)	(0.55)	(0.70)	
Transparency International Index	β_4	-0.45	0.16	0.04	-0.28	-0.09	-0.36	-0.25	-0.42	-0.26	-2.10*	-2.35	
		(0.90)	(0.50)	(0.43)	(0.34)	(0.47)	(0.64)	(0.76)	(0.80)	(0.96)	(0.09)	(1.76)	
	β_5	0.009	-0.08	-0.03	-0.003	-0.008	0.02	0.02	-0.02	-0.01	0.22*	0.24	1318
		(0.10)	(0.05)	(0.07)	(0.05)	(0.08)	(0.10)	(0.10)	(0.11)	(0.14)	(0.13)	(0.20)	
Central Bank Transparency	β_4	-0.26	-0.10	0.003	-0.03	-0.30	-0.27	-0.33	-0.32	-0.52	-0.56	-0.82	
		(0.39)	(0.19)	(0.27)	(0.41)	(0.28)	(0.37)	(0.28)	(0.26)	(0.33)	(0.83)	(0.82)	
	β_5	-0.01	-0.01	-0.02	-0.007	0.03	0.04	0.05	0.05	0.07	0.08	0.10	1153
		(0.06)	(0.03)	(0.04)	(0.06)	(0.04)	(0.06)	(0.04)	(0.05)	(0.05)	(0.11)	(0.12)	
Rule of Law	β_4	4.43*	4.58***	2.49**	2.30**	1.59	0.63	0.69	1.03	1.73	-2.24	-3.12	
		(2.45)	(1.25)	(1.23)	(1.16)	(1.41)	(1.66)	(1.88)	(1.67)	(2.31)	(2.43)	(3.77)	
	β_5	-0.05	-0.21	-0.11	-0.01	0.01	0.11	0.05	0.05	-0.04	0.31	0.34	1322
		(0.21)	(0.15)	(0.11)	(0.11)	(0.16)	(0.21)	(0.26)	(0.23)	(0.30)	(0.27)	(0.40)	
CA openness	β_4	0.45	2.14	2.38*	1.37	1.61*	1.71*	1.89*	4.12***	4.03***	7.41***	9.56*	
		(3.06)	(1.70)	(1.36)	(1.07)	(0.97)	(0.90)	(0.99)	(1.33)	(1.29)	(2.43)	(5.36)	
	β_5	0.08	-0.30	-0.32	-0.25	-0.32*	-0.34**	-0.34**	-0.77***	-0.75***	-1.36***	-1.73**	1322
		(0.55)	(0.28)	(0.24)	(0.20)	(0.16)	(0.16)	(0.15)	(0.22)	(0.22)	(0.43)	(0.93)	
Monetary policy shock	β_4	0.02	0.26	0.03	0.21	0.15	0.01	-0.09	-0.11	0.17	-0.09	-0.19	
		(0.49)	(0.31)	(0.20)	(0.22)	(0.22)	(0.19)	(0.17)	(0.21)	(0.31)	(0.50)	(0.70)	
	β_5	-0.01	0.02	-0.01	-0.04	-0.04	-0.02	0.003	0.003	-0.04	0.02	0.04	1155
		(0.07)	(0.05)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.05)	(0.08)	(0.11)	
Macroprudential policy shock	β_4	1.35	0.66	-0.82	-1.09	-0.81	-0.40	0.18	0.49	0.82	1.66	2.77	
		(1.27)	(1.37)	(0.67)	(0.83)	(0.62)	(0.85)	(0.68)	(0.66)	(1.11)	(1.45)	(1.97)	
	β_5	-0.29	-0.12	0.17	0.23	0.15	0.05	-0.03	-0.06	-0.11	-0.35	-0.53	1070
		(0.26)	(0.26)	(0.15)	(0.14)	(0.13)	(0.14)	(0.13)	(0.15)	(0.24)	(0.29)	(0.40)	
FXI shock	β_4	1.30**	1.10**	0.68	0.17	0.06	0.55	0.39	0.33	0.88	1.11**	1.69	
		(0.65)	(0.51)	0.43	(0.33)	(0.39)	(0.51)	(0.51)	(0.67)	(0.66)	(0.47)	(1.34)	
	β_5	-0.32***	-0.25**	-0.13*	-0.05	-0.03	-0.09	-0.08	-0.04	-0.13	-0.15*	-0.27	990
		(0.12)	(0.10)	(0.07)	(0.06)	(0.06)	(0.07)	(0.08)	(0.10)	(0.11)	(0.07)	(0.21)	
CFM shock	β_4	13.42*	6.41	7.83**	7.25	7.37	5.67	3.57	6.69	5.73	8.00	12.57	
		(6.97)	(6.86)	(3.84)	(4.90)	(5.63)	(6.55)	(6.20)	(4.96)	(6.83)	(8.18)	(9.55)	
	β_5	-2.27**	-1.06	-1.17**	-1.11	-1.17	-0.86	-0.42	-0.98	-0.82	-1.01	-1.83	977
		(1.21)	(1.15)	(0.61)	(0.77)	(0.87)	(1.00)	(0.90)	(0.79)	(0.96)	(1.11)	(1.69)	

Bootstrapped standard errors (clustered at country level) *** p<0.01, ** p<0.05, * p<0.1

Notes: Table A8 shows the estimates of the coefficients β_4^{α} and β_5^{α} in regression (3) when interaction terms with policy variables and financial integration are included.

Table A9: Panel Regression Results—Interaction Terms with Domestic Policies and Structural Characteristics, Medium Term

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

		Percentile											
		5	10	20	30	40	50	60	70	80	90	95	Number of obs.
Exchange rate regime	β_4	-0.83	-0.21	-0.01	-0.21	-0.26	-0.22	-0.10	-0.24	-0.24	-0.98**	-1.72***	
	(standalone term)	(0.67)	(0.27)	(0.19)	(0.18)	(0.19)	(0.23)	(0.31)	(0.32)	(0.40)	(0.45)	(0.49)	
	β_5 (interaction	0.19	0.06	0.03	0.05*	0.07**	0.07	0.06	0.09*	0.11**	0.24***	0.34***	1322
	with BBB yield)	(0.15)	(0.07)	(0.05)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)	(0.06)	
Financial market depth	β_4	-6.63	-4.10	-4.05	-2.21	-2.78	-2.91	-2.94	-4.63	-4.92	-6.72	-19.56**	
		(5.96)	(3.10)	(2.75)	(2.31)	(2.52)	(2.27)	(2.82)	(2.83)	(3.43)	(7.02)	(9.60)	
	β_5	0.16	0.05	0.27	0.15	0.25	0.49	0.48	0.78*	0.77	0.98	3.43**	1322
		(1.07)	(0.48)	(0.36)	(0.39)	(0.34)	(0.31)	(0.42)	(0.41)	(0.53)	(1.05)	(1.69)	
Transparency International Index	β_4	-1.96*	-0.66	-0.70	-1.12	-1.56***	-1.49***	-1.53***	-1.38**	-0.96	-2.04	-2.73	
		(1.16)	(0.61)	(0.68)	(0.52)	(0.33)	(0.35)	(0.50)	(0.66)	(0.95)	(1.45)	(1.98)	
	β_5	0.16	0.07	0.07	0.13*	0.19***	0.19***	0.20***	0.16	0.12	0.20	0.28	1318
		(0.17)	(0.09)	(0.11)	(0.07)	(0.05)	(0.04)	(0.06)	(0.10)	(0.14)	(0.22)	(0.29)	
Central Bank Transparency	β_4	-0.90	-0.42	-0.73**	-0.66*	-0.54**	-0.75**	-0.68*	-0.74**	-0.86**	-0.82	-0.37	
		(0.67)	(0.47)	(0.33)	(0.35)	(0.27)	(0.31)	(0.36)	(0.31)	(0.44)	(0.79)	(1.42)	
	β_5	0.08	0.04	0.08**	0.08*	0.09**	0.12***	0.11**	0.12**	0.14**	0.14	0.09	1153
		(0.10)	(0.06)	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.06)	(0.11)	(0.18)	
Rule of Law	β_4	1.55	0.43	-0.75	-1.21*	-1.88**	-2.21***	-2.23**	-2.45	-2.03	-4.15	-5.69***	
		(3.05)	(1.60)	(1.55)	(0.68)	(0.76)	(0.74)	(1.07)	(1.53)	(2.06)	(2.66)	(2.68)	
	β_5	0.22	0.07	0.14	0.29**	0.34***	0.38***	0.33***	0.23	0.13	0.27	0.25	1322
		(0.33)	(0.17)	(0.21)	(0.13)	(0.11)	(0.10)	(0.10)	(0.16)	(0.19)	(0.30)	(0.36)	
CA openness	β_4	-3.34	-1.70	-0.82	-0.01	-0.03	0.04	0.19	-1.86	-1.85	-2.56	0.09	
		(2.99)	(1.85)	(1.12)	(1.01)	(1.39)	(1.48)	(1.94)	(1.91)	(1.93)	(2.85)	(4.42)	
	β_5	0.60	0.26	0.18	0.07	0.05	0.03	0.005	0.29	0.28	0.46	-0.04	1322
		(0.49)	(0.26)	(0.20)	(0.18)	(0.25)	(0.26)	(0.32)	(0.29)	(0.30)	(0.45)	0.65	
Monetary policy shock	β_4	-0.64	-0.13	-0.27	-0.11	-0.13	-0.06	0.17	0.15	0.01	0.07	0.66	
		(0.51)	(0.30)	(0.21)	(0.19)	(0.15)	(0.19)	(0.22)	(0.25)	(0.26)	(0.35)	(0.63)	
	β_5	0.07	0.004	0.04	0.01	0.02	0.01	-0.02	-0.02	-0.007	-0.02	-0.10	1155
		(0.06)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.06)	(0.10)	
Macroprudential policy shock	β_4	-0.02	-0.22	-0.03	-0.15	0.54	0.05	0.13	0.28	-0.64	-1.59*	-1.82	
		(1.50)	(0.79)	(0.57)	(0.85)	(0.83)	(0.78)	(0.80)	(0.85)	(0.64)	(0.87)	(1.36)	
	β_5	0.07	0.05	-0.005	0.002	-0.12	-0.03	-0.05	-0.09	0.13	0.33**	0.39*	1070
		(0.41)	(0.19)	(0.13)	(0.17)	(0.17)	(0.16)	(0.16)	(0.18)	(0.14)	(0.17)	(0.21)	
FXI shock	β_4	0.51	-0.43	-0.08	0.40	0.45	0.25	0.18	0.24	-0.09	-0.51	-0.33	
		(1.20)	(0.48)	(0.49)	(0.40)	(0.31)	(0.40)	(0.49)	(0.65)	(0.80)	(0.87)	(1.38)	
	β_5	-0.06	0.09	0.03	-0.03	-0.04	0.01	0.001	-0.002	0.03	0.07	0.04	990
		(0.20)	(0.09)	(0.07)	(0.06)	(0.06)	(0.08)	(0.10)	(0.12)	(0.12)	(0.16)	(0.24)	
CFM shock	β_4	1.81	-1.78	2.60	6.56**	5.45**	4.97*	4.55	2.12	2.92	7.10	6.56	
		(5.51)	(3.93)	(3.24)	(3.24)	(2.27)	(2.93)	(4.16)	(4.49)	(4.11)	(5.91)	(7.49)	
	β_5	0.46	0.50	-0.13	-0.73	-0.71**	-0.59	-0.46	-0.10	-0.15	-0.86	-0.86	977
		(0.91)	(0.65)	(0.45)	(0.46)	(0.35)	(0.49)	(0.73)	(0.71)	(0.65)	(0.95)	(1.37)	

Bootstrapped standard errors (clustered at country level) *** p<0.01, ** p<0.05, * p<0.1

Notes: Table A9 shows the estimates of the coefficients β_4^{α} and β_5^{α} in regression (3) when interaction terms with policy variables and financial integration are included.

Table A10: Panel Regression Results—Short Term, Full Sample

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

	Percentile											
Interaction term with BBB yield	5	10	20	30	40	50	60	70	80	90	95	Number of obs.
Exchange rate regime	-0.04	-0.03*	-0.01	-0.002	-0.001	-0.002	-0.01	-0.01	0.002	-0.01	0.04	2336
	(0.03)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.06)	(0.12)	
Financial market depth	-1.11**	-0.20	-0.11	-0.12	-0.07	0.13	-0.05	0.14	0.53**	1.26***	2.57***	2336
	(0.48)	(0.37)	(0.38)	(0.23)	(0.27)	(0.24)	(0.28)	(0.31)	(0.25)	(0.31)	(0.66)	
Transparency International Index	-0.05**	-0.05	-0.05***	-0.03	-0.02	-0.02	-0.02	-0.03	0.006	0.04	-0.006	2258
	(0.02)	(0.04)	(0.01)	(0.02)	(0.03)	(0.04)	(0.07)	(0.09)	(0.06)	(0.06)	(0.08)	
Central Bank Transparency	-0.02	-0.02	-0.03*	-0.03	-0.01	0.01	0.02	0.03	0.05	0.09	0.06	1810
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.07)	(0.09)	
Rule of Law	-0.07	-0.02	-0.05	-0.04	-0.04	-0.05	-0.07	-0.10	-0.14*	0.05	0.05	2336
	(0.11)	(0.07)	(0.04)	(0.06)	(0.06)	(0.08)	(0.10)	(0.14)	(0.08)	(0.09)	(0.35)	
CA openness	0.23	0.15	0.01	-0.006	-0.005	-0.03	-0.07	-0.08	-0.32***	-0.73***	-1.46**	2336
	(0.25)	(0.13)	(0.06)	(0.06)	(0.08)	(0.09)	(0.09)	(0.11)	(0.09)	(0.11)	(0.68)	
Monetary policy shock	-0.06	-0.01	-0.006	-0.05	-0.04	-0.02	0.008	-0.007	-0.03	-0.01	0.05	1155
	(0.10)	(0.06)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.02)	(0.04)	(0.07)	(0.11)	
Macroprudential policy shock	-0.30	-0.17	0.17	0.22	0.13	0.02	-0.03	-0.13	-0.11	-0.34	-0.53**	1076
	(0.34)	(0.25)	(0.14)	(0.13)	(0.13)	(0.12)	(0.12)	(0.14)	(0.24)	(0.24)	(0.22)	
FXI shock	-0.36***	-0.24**	-0.11*	-0.05	-0.02	-0.08	-0.07	-0.05	-0.14	-0.15*	-0.27	990
	(0.13)	(0.10)	(0.06)	(0.06)	(0.05)	(0.07)	(0.07)	(0.10)	(0.10)	(0.09)	(0.26)	
CFM shock	-2.1	-1.11	-1.25*	-1.23*	-1.05	-0.53	-0.47	-1.13	-0.96	-0.93	-1.69	1022
	(1.62)	(1.15)	(0.70)	(0.76)	(0.94)	(0.97)	(0.97)	(0.76)	(0.89)	(1.19)	(1.19)	

Bootstrapped standard errors (clustered at country level) *** p<0.01, ** p<0.05, * p<0.1

Notes: Table A10 shows the estimates of the coefficient β_5^{α} in regression (3) when standalone financial integration term and its interaction with the U.S. corporate BBB yield are *not* included.

Table A11: Panel Regression Results—Medium Term, Full Sample

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

	Percentile											
Interaction term with BBB yield	5	10	20	30	40	50	60	70	80	90	95	Number of obs.
Exchange rate regime	0.01	-0.003	-0.004	0.001	0.003	0.005	0.009	0.009	0.003	0.02	0.03	2336
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.07)	(0.08)	
Financial market depth	0.02	-0.005	-0.0002	0.001	0.003	0.005	0.009	0.009	0.003	0.02	0.03	2336
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.06)	(0.04)	
Transparency International Index	-0.04	-0.02	-0.02	0.01	0.03	0.07*	0.07*	0.06**	0.03	0.12	0.08	2258
	(0.09)	(0.04)	(0.03)	(0.02)	(0.04)	(0.04)	(0.04)	(0.03)	(0.11)	(0.11)	(0.05)	
Central Bank Transparency	0.03	0.00	0.01	0.01	0.02	0.04*	0.05**	0.06	0.05	0.06	0.04	1810
	(0.05)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.08)	(0.09)	
Rule of Law	-0.07	0.001	-0.03	-0.01	0.004	0.09	0.04	0.03	0.02	0.28***	0.18*	2336
	(0.19)	(0.03)	(0.06)	(0.04)	(0.06)	(0.09)	(0.10)	(0.08)	(0.06)	(0.10)	(0.10)	
CA openness	0.18	0.10	0.07	0.02	-0.008	-0.03	-0.05	0.004	-0.008	-0.15	-0.22	2336
	(0.07)	(0.15)	(0.08)	(0.07)	(0.09)	(0.08)	(0.10)	(0.08)	(0.17)	(0.12)	(0.22)	
Monetary policy shock	0.08	0.03	0.03	0.01	0.01	0.01	-0.03	-0.01	-0.01	-0.03	-0.07	1155
	(0.07)	(0.05)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.06)	(0.11)	
Macroprudential policy shock	-0.03	-0.02	-0.02	-0.0004	-0.11	-0.05	-0.04	-0.04	0.08	0.34**	0.46**	1076
	(0.40)	(0.17)	(0.13)	(0.17)	(0.16)	(0.16)	(0.15)	(0.16)	(0.17)	(0.14)	(0.22)	
FXI shock	-0.07	-0.06	-0.007	-0.06	-0.04	-0.01	0.01	-0.02	0.05	0.06	-0.004	990
	(0.19)	(0.10)	(0.08)	(0.07)	(0.05)	(0.10)	(0.10)	(0.12)	(0.13)	(0.16)	(0.22)	
CFM shock	0.88	0.0001	-0.28	-0.81**	-0.65*	-0.73	-0.61	-0.36	-0.01	-0.35	-0.09	1022
	(1.15)	(0.71)	(0.46)	(0.41)	(0.34)	(0.63)	(0.75)	(0.84)	(0.75)	(1.02)	(1.16)	

Bootstrapped standard errors (clustered at country level) *** p<0.01, ** p<0.05, * p<0.1

Notes: Table A11 shows the estimates of the coefficient β_5^{α} in regression (3) when standalone financial integration term and its interaction with the U.S. corporate BBB yield are *not* included.

Table A12: Drivers of Short-Term Outlook for Average Gross Portfolio Inflows to Chile

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

	Percentile								
Variable	10	20	30	40	50	60	70	80	90
Constant	13.44***	13.72***	14.02***	15.53***	14.16***	15.14***	17.07***	17.6***	28.19***
	(3.73)	(4.22)	(2.80)	(2.73)	(2.63)	(2.64)	(2.66)	(3.24)	(6.73)
Commodity price index	0.03	0.02	0.04**	0.04***	0.04***	0.04***	0.04***	0.05***	0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
U.S. corporate BBB spread	0.24	0.17	0.05	0.06	0.08	0.05	0.01	0.05	-0.13
	(0.26)	(0.21)	(0.17)	(0.18)	(0.18)	(0.18)	(0.17)	(0.15)	(0.26)
10-year U.S. Treasury yields	-1.26***	-1.02***	-0.85***	-0.96***	-1.03***	-1.11***	-1.13***	-1.19***	-1.16***
	(0.33)	(0.25)	(0.19)	(0.21)	(0.22)	(0.22)	(0.21)	(0.20)	(0.41)
U.S. dollar index (DXY)	-0.08	-0.08*	-0.08***	-0.09***	-0.08***	-0.08***	-0.1***	-0.09***	-0.18***
	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.06)
Short-term external debt to reserves	-3.37*	-3.66***	-2.95***	-3.06***	-2.62**	-2.8**	-2.96**	-3.69***	-4.38**
	(1.80)	(1.20)	(1.02)	(1.15)	(1.23)	(1.26)	(1.20)	(1.29)	(1.92)
Domestic y/y GDP growth	0	0.04	-0.14	-0.15*	-0.14*	-0.12	-0.13*	-0.17**	-0.4
	(0.10)	(0.12)	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)	(0.25)

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A13: Drivers of Short-Term Outlook for Average Gross Portfolio Inflows to Turkey

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

	Percentile								
Variable	10	20	30	40	50	60	70	80	90
Constant	11.37	8.54*	9.09*	8.73*	7.83**	7.6**	4.88	3.87	5.54*
	(7.31)	(4.75)	(5.05)	(4.75)	(3.97)	(3.56)	(3.46)	(3.2)	(2.94)
Commodity price index	-0.05	0	-0.01	0	0	0.01	0.02	0.01	0
	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)
U.S. corporate BBB spread	-0.39	-0.08	-0.16	-0.18	-0.21	-0.2	-0.09	-0.15	-0.29
	(0.28)	(0.21)	(0.25)	(0.27)	(0.28)	(0.27)	(0.31)	(0.32)	(0.26)
10-year U.S. Treasury yields	0.13	-0.65	-0.5	-0.52	-0.41	-0.42	-0.41	-0.07	-0.06
	(0.61)	(0.41)	(0.46)	(0.48)	(0.44)	(0.43)	(0.48)	(0.42)	(0.37)
U.S. dollar index (DXY)	-0.14	-0.06	-0.08	-0.07	-0.03	-0.02	0.05	0.07	0.07
	(0.09)	(0.07)	(0.08)	(0.08)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
Short-term external debt to reserves	0.4	-0.34	0.06	0	-1.38	-2.02	-4.38**	-5.39***	-5.81***
	(2.81)	(1.68)	(1.97)	(2.12)	(2.04)	(1.97)	(2.12)	(1.97)	(1.78)
Domestic y/y GDP growth	0.05	-0.04	-0.02	-0.02	-0.02	-0.01	0	0.05	0.07
	(0.1)	(0.07)	(0.08)	(0.08)	(0.07)	(0.06)	(0.06)	(0.07)	(0.06)

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A14. Drivers of Medium-Term Outlook for Average Gross Portfolio Inflows to Chile

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

	Percentile								
Variable	10	20	30	40	50	60	70	80	90
Constant	2.18	7.13	17.18*	19.35*	22.29**	17.45*	17.43*	17.01*	14.26*
	(10.88)	(14.68)	(9.59)	(10.49)	(10.8)	(10.01)	(10.31)	(9.4)	(8.3)
Commodity price index	-0.01	0.03	0.02	-0.02	-0.02	-0.02	-0.01	-0.03	-0.03
	(0.05)	(0.06)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
U.S. corporate BBB spread	0.46	0.41	0.05	0.76	0.77	0.92	1.07	0.58	0.39
	(0.67)	(0.6)	(0.69)	(1.3)	(1.32)	(1.21)	(1.16)	(1.22)	(1.08)
10-year U.S. Treasury yields	-0.94	-1.8	-1.31	-1.73	-1.97	-2.2*	-1.91*	-1.64	-1.62
	(1.22)	(1.1)	(1.01)	(1.33)	(1.33)	(1.24)	(1.05)	(1.16)	(1.06)
U.S. dollar index (DXY)	0.03	-0.03	-0.14	-0.14	-0.16	-0.1	-0.08	-0.12	-0.08
	(0.09)	(0.13)	(0.09)	(0.1)	(0.1)	(0.09)	(0.11)	(0.1)	(0.09)
Short-term external debt to reserves	-3.8	-1.68	0.18	-3.61	-4.04	-3.59	-6.46	-1.39	-0.14
	(5.91)	(5.37)	(5.68)	(5.78)	(5.84)	(5.77)	(6.24)	(6.76)	(5.84)
Domestic y/y GDP growth	-0.31	0.25	-0.07	-0.06	0.01	-0.01	0.16	0.28	0.27
	(0.3)	(0.58)	(0.27)	(0.23)	(0.24)	(0.22)	(0.22)	(0.2)	(0.18)

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A15. Drivers of Medium-Term Outlook for Average Gross Portfolio Inflows to Turkey

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

	Percentile								
Variable	10	20	30	40	50	60	70	80	90
Constant	7.23	-2.03	-1.59	5.15	8.2	6.86	8.96	9.75	18.44**
	(11.15)	(7.62)	(8.56)	(6.75)	(7.82)	(8.35)	(7.76)	(7.71)	(8.49)
Commodity price index	0	-0.02	-0.02	-0.03	-0.02	-0.03	-0.04	-0.05	-0.06
	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
U.S. corporate BBB spread	0.57	0.18	0.1	-0.02	0.41	0.58	0.3	0.23	0.11
	(0.37)	(0.45)	(0.49)	(0.44)	(0.56)	(0.86)	(0.71)	(0.73)	(0.51)
10-year U.S. Treasury yields	-0.63	-0.21	-0.07	-0.27	-0.97	-1	-0.64	-0.51	-1.1
	(0.86)	(0.89)	(0.94)	(0.68)	(0.79)	(0.92)	(0.78)	(0.72)	(0.68)
U.S. dollar index (DXY)	-0.17	-0.11	-0.15	-0.17*	-0.15	-0.16	-0.19**	-0.32***	-0.32***
	(0.11)	(0.09)	(0.1)	(0.09)	(0.1)	(0.1)	(0.1)	(0.1)	(0.11)
Short-term external debt to reserves	3.68	8.69	10.79	8.53	4.9	5.9	6.89	14.87***	10.1*
	(6.16)	(7.05)	(7.72)	(5.47)	(6.02)	(5.96)	(5.9)	(5.39)	(5.8)
Domestic y/y GDP growth	-0.1	-0.08	-0.06	-0.01	0.04	0.03	0.02	0.11	0.18
	(0.1)	(0.09)	(0.1)	(0.1)	(0.11)	(0.12)	(0.12)	(0.14)	(0.13)

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A16: Estimated Interaction Term of Policy Actions with BBB Spread: Chile, Short Term

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

	Percentile								
Interaction term with BBB spread	10	20	30	40	50	60	70	80	90
Monetary policy shock	0.08*	0.07	0.06	0.05	0.04	-0.04	-0.08	0.07	-0.16
	(0.04)	(0.05)	(0.05)	(0.06)	(0.06)	(0.19)	(0.17)	(0.56)	(0.16)
Macroprudential policy shock	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
FXI shock	-0.22	-0.19	-0.18	-0.18	-0.46**	-0.53***	-0.55***	-0.42**	-0.35
	(0.23)	(0.26)	(0.21)	(0.23)	(0.21)	(0.19)	(0.18)	(0.21)	(0.31)
CFM shock	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A17: Estimated Interaction Term of Policy Actions with BBB Spread: Turkey, Short Term

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 1-2 ahead

	Percentile								
Interaction term with BBB spread	10	20	30	40	50	60	70	80	90
Monetary policy shock	0.01	-0.16	-0.17	-0.06	-0.1	-0.09	-0.08	-0.06	-0.03
	(0.2)	(0.12)	(0.13)	(0.07)	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)
Macroprudential policy shock	0.23**	0.17	0.05	0.02	-0.02	-0.02	-0.08	-0.12	-0.05
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.12)
FXI shock	-0.07	0.35	-0.1	-0.09	-0.17	-0.06	-0.12	-0.21	0.13
	(0.41)	(0.52)	(0.23)	(0.24)	(0.24)	(0.19)	(0.18)	(0.19)	(0.24)
CFM shock	0.33	0.41	0.97	0.63	0.97	0.1	1.53	1.43	3.1*
	(1.47)	(1.31)	(1.42)	(1.43)	(1.42)	(1.41)	(1.33)	(1.16)	(1.77)

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A18: Estimated Interaction Term of Policy Actions with BBB Spread: Chile, Medium Term

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

	Percentile								
Interaction term with BBB spread	10	20	30	40	50	60	70	80	90
Monetary policy shock	-0.03	-0.02	0	0.06	0.03	0	0.01	-0.05	0.13
	(0.06)	(0.07)	(0.06)	(0.12)	(0.14)	(0.19)	(0.18)	(0.17)	(0.29)
Macroprudential policy shock	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
FXI shock	-0.08	-0.07	0.01	0.08	-0.02	-0.12	-0.31	-0.2	-0.22
	(0.27)	(0.3)	(0.24)	(0.29)	(0.31)	(0.29)	(0.28)	(0.3)	(0.49)
CFM shock	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A19: Estimated Interaction Term of Policy Actions with BBB Spread: Turkey, Medium Term

Dependent variable: average gross portfolio inflows (% of GDP) in quarters 5-8 ahead

	Percentile								
Interaction term with BBB spread	10	20	30	40	50	60	70	80	90
Monetary policy shock	0.03	0.03	0	0	-0.04	-0.01	-0.01	-0.04	-0.1
	(0.06)	(0.05)	(0.05)	(0.06)	(0.07)	(0.06)	(0.06)	(0.06)	(0.11)
Macroprudential policy shock	0.16**	0.15**	0.15**	0.15*	0.22**	0.3***	0.24*	0.18*	0.2
	(0.07)	(0.07)	(0.08)	(0.08)	(0.1)	(0.11)	(0.12)	(0.11)	(0.15)
FXI shock	-0.16	-0.1	-0.07	0.1	0.12	0.19	0.32	0.37	0.25
	(0.18)	(0.21)	(0.18)	(0.13)	(0.14)	(0.15)	(0.3)	(0.33)	(0.33)
CFM shock	0.78	0.76	0.65	0.86	-0.17	0.62	0.28	0.25	0.5
	(0.95)	(1.04)	(1.11)	(1.34)	(1.25)	(1.56)	(1.62)	(1.60)	(1.34)

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1