Preemptive Policies and Risk-Off Shocks in Emerging Markets *

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Abstract

Theory predicts that by limiting the accumulation of foreign currency debt, preemptive controls on capital flows smooth emerging markets' exposure to risk-aversion shocks. We test this prediction for 34 emerging markets over 1996–2024 using new high-frequency data on capital controls. In a difference-in-differences design around the unanticipated 2013 Taper Tantrum shock, countries that tightened controls before the Tantrum experienced increases in uncovered interest parity premia 1.4 to 2.2 percentage points smaller than countries that did not. Preemptive controls on outflows raised risk premia. Aggregate capital control measures mask these opposing effects. Our estimates are conditional on contemporaneous policy responses.

JEL classification: F31, F32, F38, F41, G15, G28.
Keywords: capital flow management, macroprudential policy, UIP premium, currency risk.

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I have nothing to disclose.

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1 Introduction

Emerging markets (EMs) borrow short-term at a premium to compensate investors for holding risky EM assets. This premium, proxied by the uncovered interest parity wedge (UIP), moves with global risk appetite (e.g. di Giovanni et al. (2022), Kalemli-Ozcan (2019)). When international investors retreat from risky assets, EM currencies depreciate, external borrowing costs jump, UIP rises and often these countries face a sudden stop. Can policies adopted in good times improve these outcomes? In the aftermath of the Global Financial Crisis (GFC), many EMs, facing a surge of capital inflows, tried policies with such a goal. They tightened capital flow management (CFM) measures, often in combination with macroprudential measures (MPMs).[1] Their stated concern was financial stability once the inflows reversed.[2] This paper asks whether these preemptive policies paid off when global risk appetite did reverse.

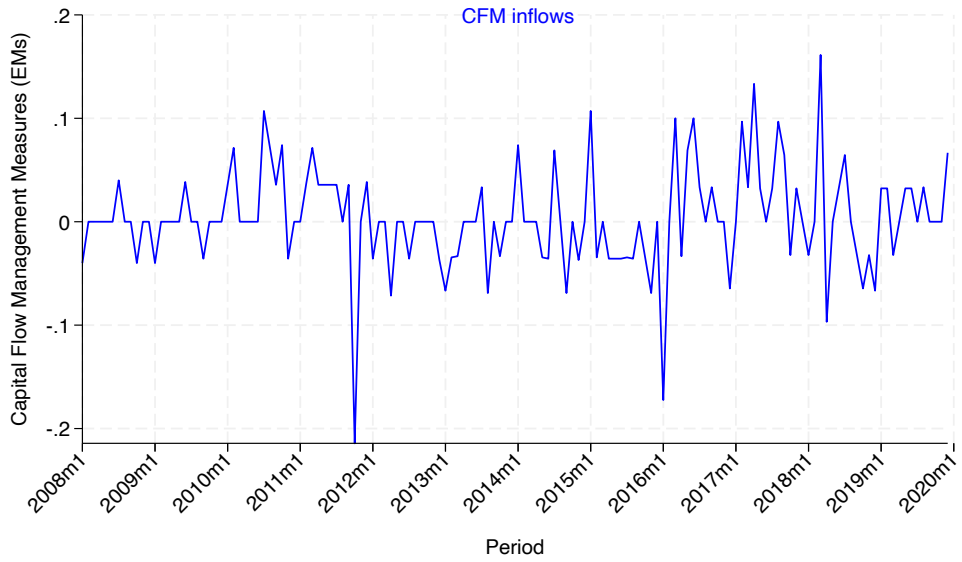
A large theoretical literature says that they should (e.g., Korinek (2011); Bianchi et al. (2012); Bianchi and Mendoza (2018); Bianchi et al. (2016); Mendoza (2016); Farhi and Werning (2016); Basu et al. (2020)). In these models, private borrowers do not internalize that their FX borrowing in good times amplifies the spiral of depreciation, balance sheet deterioration, and tighter financial conditions in bad times. CFMs imposed preemptively—before the shock, when inflows are strong—lower the accumulation of FX debt and hence the risk and severity of a future sudden stop. The policy these models envision is countercyclical: tightened during the boom, relaxed in the bust.

Testing this prediction has proved difficult for two reasons. The first is measurement. The standard indices of capital controls (e.g., Chinn and Ito (2006); Fernández et al. (2016)) are annual and record the stock of restrictions on the capital account at a point in time. They capture long-standing differences in capital account convertibility across countries, and are generally stable over time, so they cannot speak to the countercyclical use of CFMs that theory has in mind. The second is identification. Countries adjust CFMs, MPMs, monetary policy, and foreign exchange intervention (FXI) in response to the very shocks whose effects one would like to measure, so the correlation between policies and outcomes is contaminated by reverse causality. Magud et al. (2011)

[1] Since 2012, the IMF has referred to capital controls as "capital flow management" (CFM) measures. The literature also refers to them as "capital account restrictions" or "capital account regulations." We use the CFM terminology throughout.

[2] For example, Raghuram Rajan, then Governor of the Reserve Bank of India, warned in August 2014 of the risk of "a global market crash" when investors began to pull out of risky assets (Times of India, August 8, 2014). Other central bankers raised similar concerns, as documented in IMF (2019).

Figure 1. Capital Flow Management Measures in EMs, 2008-2019



Source: Binici et al. (2023a).

Notes: The figure shows for each month the average value of net tightening CFMs on inflows (that is, tightening measures minus easing measures), with positive values indicating average net tightening and negative values average net easing. The sample countries, and the CFM policies used in each, are listed in Appendix Table A.1.

conclude from a meta-analysis of this literature that inflow CFMs can alter the composition and maturity of capital flows but are ineffective in reducing pressure on the exchange rate, and that the success of outflow CFMs in Malaysia during the Asian Financial Crisis was a one-time event.

We address the measurement problem with a new dataset that records *changes* to capital account restrictions at business-cycle frequency, separately for inflows and outflows and for tightening and easing actions (Binici and Das (2020); Binici et al. (2023b)).[3] Figure 1 shows that these changes are frequent and cyclical.[4] Between 2008 and 2012, EMs on net tightened CFMs on inflows as U.S. quantitative easing pushed capital toward them; after the Taper Tantrum of 2013, they on net eased. None of this variation is visible in the annual indices.

Our test focuses on the uncovered interest parity (UIP) premium: the expected excess return that investors require to hold local currency assets or, equivalently, the premium that EM borrowers

[3] We use the public version of these data, described in Binici et al. (2023a).

[4] We assign each tightening action of a capital account policy in a month the value "1," and each easing action the value "−1." Months with no action are assigned the value 0. We then plot the average across countries in each month.

pay on their local currency debt relative to U.S. dollar debt. The logic is that of risk pricing. The UIP premium compensates investors for the risk that an EM currency depreciates sharply and credit risk rises exactly when global conditions deteriorate. This UIP premium is increasing in the quantity of risk (country specific) and the price of risk (global). By lowering FX debt, preemptive CFMs reduce the quantity of risk that investors bear and hence lowers the price of risk both before and during the shock. Countries with preemptive CFMs should therefore pay lower premia on average and, when a risk-off shock raises the global price of risk, should experience a *smaller increase* in their premia. We test the second prediction. The first is confounded by the many time-invariant country characteristics that determine the average level of the premium; the second can be identified from within-country variation around a common shock as a function of different ex-ante policies.

There are two empirical challenges: identifying a common, exogenous and unanticipated risk-off shock, and isolating the effect of preemptive policies from that of everything else that happens during the shock. We address both in a difference-in-differences (DID) design that exploits the monthly frequency of our data. For the shock, we use the Taper Tantrum of May 2013, which is widely regarded as an exogenous and unanticipated global risk-off shock.[5] For the policies, we follow the policy evaluation literature (e.g., Katz and Murphy (1992); Card et al. (1994)) and separate the time-series from the cross-sectional variation. The time-series variation comes only from the shock, which is common to all countries. The cross-sectional variation comes from a time-invariant dummy that equals one for countries that tightened a given policy during the roughly five years before the shock.[6] Because this dummy is fixed before the shock, it cannot respond to it. Country fixed effects absorb the level effect of the policy along with all time-invariant differences between treated and control countries, such as institutional quality; month fixed effects absorb the common effect of the shock and of every other global factor. The coefficient of interest is identified solely from the differential month-to-month change in premia, within country, around the shock, where differential response is a function of ex-ante policies.

[5] We also report results for the COVID-19 shock of 2020. That shock was exogenous and unanticipated, but it combined a health shock, a real shock, and a liquidity shock with a risk-off shock, and triggered a near-universal policy response. We therefore do not regard it as a clean test and treat it separately in Section 5.3.

[6] A five-year window matches the typical duration of a capital inflow bonanza, which the literature puts at three to five years (e.g., Reinhart and Reinhart (2015); Milesi-Ferretti and Lane (2005)), and it is the longest window the CFM data allow for the Taper Tantrum. Our results are robust to a shorter window.

The main threat to this design is an omitted variable that varies at the country-month level and is correlated with the interaction of ex-ante policy and the shock. Slow-moving fundamentals such as current account or fiscal deficits are poor candidates, since they barely move at monthly frequency. Policies deployed *during* the shock are the prime candidates. We therefore control for monetary policy, FX reserves, FXI, and changes in CFMs during the shock, each interacted with the shock. For FXI we complement the usual reserves-based proxy with actual intervention data that we collect from central bank publications for the subset of countries that publish them.

We have three main findings. First, preemptive CFMs on inflows reduce the sensitivity of UIP premia to the risk-off shock. In our baseline estimates, the premium of countries with preemptive inflow CFMs rises by 1.7 to 2.2 percentage points less during the Taper Tantrum than that of countries without them. The effect is large: it amounts to about half of the sample mean premium of 3.5 percent, and it is of the same order as the rise in the average EM premium at the onset of the episode. It is robust to controlling for policies used during the shock, with estimates between 1.4 and 2.2 percentage points.

Third, the results for other preemptive policies and other outcomes are weaker. We find no differential effect of preemptive MPMs on UIP premia, although this test has little power because nearly all countries in our sample tightened MPMs before the shock. In placebo tests built around periods without a global risk-off shock, preemptive inflow CFMs have no effect on premia in two of three windows, and the third window coincides with the 2014 collapse in commodity prices.

Taken together, the evidence supports the central prediction of the theoretical literature. As capital inflows fuel domestic credit booms (e.g., Baskaya et al. (2017)), policymakers who lean against inflows with CFMs not only slow the boom but also, when the global price of risk rises, face a smaller increase in the cost of external finance.

The paper proceeds as follows. Section 2 reviews the related literature. Section 3 describes the data. Section 4 presents the empirical strategy. Section 5 reports the baseline results, and Section 6 addresses threats to identification from policies used during the shock. Section 7 presents placebo tests, and Section 8 concludes.

2 Related Literature

Our paper relates to three empirical literatures: on capital controls, on foreign exchange intervention, and on macroprudential policy.

A first wave of empirical work on capital controls, in the late 1990s and early 2000s, studied their static use and their effect on the volume, maturity, and composition of capital flows. A second wave followed the GFC, motivated by the active use of CFMs to counter the inflow surge of 2009–11 (e.g., Jinjarak et al. (2013); Chamon and Garcia (2016)).[7] The findings are mixed. The central difficulty is simultaneity: CFMs are tightened in response to inflow surges and relaxed in response to retrenchments. The most robust conclusions are that CFMs help preserve monetary policy independence and, to some extent, change the composition of flows; evidence that they reduce the volume of flows or affect the exchange rate is weaker (Klein (2012); Magud et al. (2011)).

Closest to our paper are studies of ex ante policies. Klein (2012) distinguishes long-standing controls ("walls") from episodic ones ("gates"), but with annual data that obscure high-frequency changes. Ostry et al. (2012) ask whether countries with MPMs and CFMs in place before the GFC were less financially fragile, again with annual measures and without controlling for policies adopted during the crisis. Chari et al. (2022) study whether ex ante MPMs change the effect of risk-off shocks on portfolio flows, but do not consider CFMs or the price of external finance. We differ from these papers in using high-frequency data on policy changes, in separating inflow from outflow CFMs, in controlling for contemporaneous policy responses, and in studying risk premia rather than quantities. A related set of papers documents leakages. Ahnert et al. (2018) find that currency-based regulations on banks reduce banks' exposure to exchange rate movements and the global financial cycle, but partly shift FX vulnerability to other sectors. Keller (2019) finds for Peru that capital controls, by limiting banks' ability to hedge, led banks to shift FX risk onto firms.

The literature on FXI is older. Early work tested its effectiveness in advanced economies (e.g., Dominguez (1990, 1998); Dominguez et al. (1990); Dominguez and Frankel (1993); Kaminsky and Lewis (1996); Sarno and Taylor (2001)). Following the rapid accumulation of reserves by EMs in the 2000s, amid concerns about global imbalances and "currency wars," attention shifted to EMs

[7] See, among others, Binici et al. (2010), Forbes and Warnock (2012), Ostry et al. (2012), Aizenman and Pasricha (2013), Saborowski et al. (2014), Forbes et al. (2015), Ghosh et al. (2016), Forbes et al. (2016), Giordani et al. (2017), Beirne and Friedrich (2017), Pasricha et al. (2018), and Bergant et al. (2020).

(e.g., Kearns and Rigobon (2005); Mohanty and Berger (2013); Chamon et al. (2017); Blanchard et al. (2014); Kuersteiner et al. (2018); Fratzscher et al. (2019); Adler et al. (2020)), including the ability of intervention to lean against capital flows (e.g., Ahmed and Zlate (2014); Blanchard et al. (2017); Gelos et al. (2019)). The evidence on whether FXI affects the level or volatility of the exchange rate, and for how long, remains inconclusive, owing to differences in the definition and measurement of FXI, a focus on single countries, and the endogeneity of intervention to exchange rate movements. Basu et al. (2020) add that some countries use FXI to target the level rather than the volatility of the exchange rate. We follow Fratzscher et al. (2019) in using actual intervention data rather than changes in reserves where such data exist.

Finally, a large literature studies whether MPMs lower systemic risk and the procyclicality of credit, bank leverage, and asset prices.[8] The emerging consensus is that MPMs have improved financial sector resilience by raising capital and liquidity buffers, slowing credit growth, and restraining house prices (Lang and Forletta (2020)). This literature shares the endogeneity problem of the CFM and FXI literatures: MPMs are typically adopted during a credit or house price boom. Our design sidesteps this problem because preemptive policies are, by construction, in place before the shock.

3 Data and Descriptive Statistics

3.1 Sample and Variables

We start from the set of countries that the IMF classifies as EMs and restrict attention to floats and managed floats. Specifically, we drop every country-month in which the currency was pegged, but keep the non-peg months of countries that pegged at other times during our sample period, 1996:1–2020:6.[9]

UIP premium. We construct the UIP premium at monthly frequency and at a 12-month horizon, with the U.S. dollar as the reference currency; Section 4 gives the formula. Twelve-month deposit

[8] On credit and house price growth see, for example, Lim et al. (2011), Tovar Mora et al. (2012), Zhang and Zoli (2016), Kuttner and Shim (2016), Vandenbussche et al. (2015), Alpanda and Zubairy (2016), Bruno et al. (2017), Cerutti et al. (2017), Akinci and Olmstead-Rumsey (2018), Alam et al. (2019), Forbes (2019), and Araujo et al. (2020). On bank lending and leverage see, for example, Claessens et al. (2013), Drehmann and Gambacorta (2012), and Altunbas et al. (2018).

[9] For example, Argentina pegged its currency to the U.S. dollar until the end of 2001 and enters our sample in 2002:1. Exchange rate regimes are from Ilzetzki et al. (2019).

interest rates are from Bloomberg.[10] Spot exchange rates against the U.S. dollar are from the IMF's International Financial Statistics (IFS), and 12-month-ahead survey forecasts of the exchange rate are from Consensus Economics. Using survey expectations, rather than realized exchange rates, means that our premium is an ex ante measure. Requiring all components leaves a sample of 34 EMs. Of these, 30 have data both before and after the Taper Tantrum, and 32 both before and after the COVID-19 shock. Appendix Table A.1 lists the countries and their sample periods.

Capital flow management measures. Measuring CFMs is a well-known problem. CFMs can apply to inflows or outflows, can be tightened or eased, and can target different asset classes. Most datasets draw on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (e.g., Chinn and Ito (2006); Quinn et al. (2011); Fernández et al. (2016)) and aggregate over instruments—for example, reserve requirements, taxes, and approval requirements. Some aggregate regardless of direction, netting a tightening of inflow restrictions against a simultaneous easing, or even combine tightening on nonresident inflows with easing on resident outflows. We instead use the dataset of Binici et al. (2023b), whose public version is Binici et al. (2023a). It is based on a detailed reading and classification of the measures in the IMF Taxonomy of Capital Flow Management Measures (2019), which records all CFMs undertaken globally between 2008Q1 and 2019Q3. The data distinguish 11 instruments, including limits, fees, surrender requirements, and outright bans (Appendix Table A.5), and cover actions by 44 countries, 25 of them EMs. For earlier years we supplement these data with Aizenman and Pasricha (2013), who document CFMs for about 18 of our countries through 2015.

Macroprudential measures. MPMs are from the iMaPP database of Alam et al. (2019), which records monthly policy actions for 134 countries from January 1990 to December 2016 across 17 instruments, including countercyclical capital buffers, loan loss provisioning requirements, and limits on loan-to-value ratios. Some of these instruments regulate FX positions, such as limits on net open FX positions and on FX borrowing. Appendix Table A.4 describes each instrument.

Foreign exchange intervention. We use two measures. The first is the conventional proxy, the stock of FX reserves as a percent of GDP. The second is actual intervention, compiled along the lines of Fratzscher et al. (2019) from the websites of the EM central banks that publish it.[11]

[10] In a small number of cases in which deposit rates are missing, we use money market rates or, failing that, 12-month government bond rates.

[11] Daily FXI data are published by Argentina, Brazil, Chile, Colombia, Georgia, Mexico, Peru, and Turkey. Azer-

We aggregate these data to monthly frequency and scale by monthly nominal GDP. Definitions of reported FXI differ across central banks. We treat all reported purchases and sales of FX as intervention. In some cases this includes off-balance-sheet operations: Brazil reports forward and settled derivative contracts, Peru explicitly includes FX swaps, and Colombia identifies FX options and discretionary interventions; other central banks exclude such operations or do not document their treatment.

3.2 Defining Preemptive Policies

We call a policy preemptive if it was tightened before the shock. For each shock, we define time-invariant country dummies over a window that begins in January 2008—the first month of the granular CFM data—and ends on the eve of the shock, which gives a window of about five years for the Taper Tantrum.[12] The dummy Preemptive $\text{CFM}_c^{\text{inflows}}$ equals one if country c tightened CFMs on inflows on net over the window, that is, if its tightening actions exceed its easing actions. Preemptive $\text{CFM}_c^{\text{outflows}}$ is defined analogously for outflows, and Preemptive $\text{CFM}_c^{\text{total}}$ equals one if the country tightened on net on either inflows or outflows, which is the information that an aggregate index would convey. Preemptive MPM_c equals one if the country tightened at least one MPM over the window.

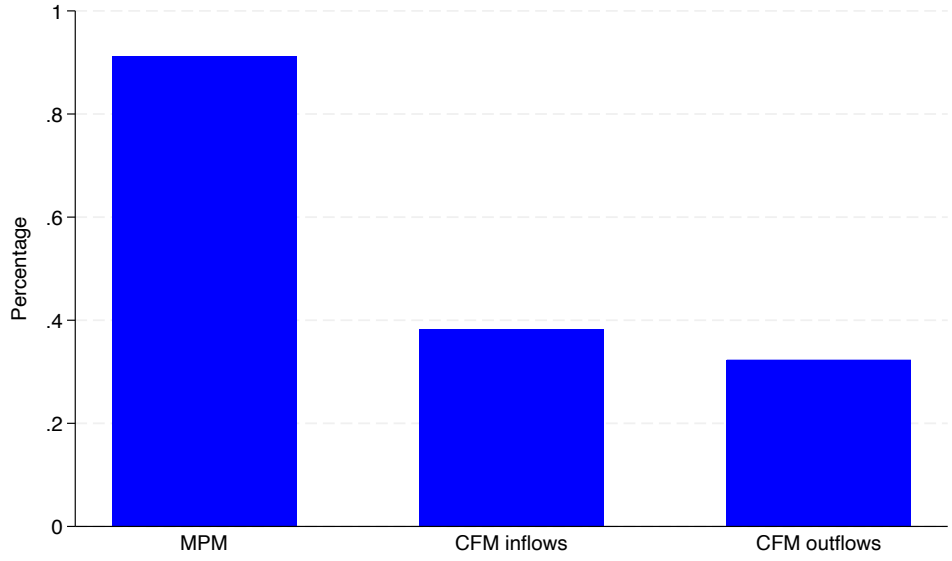
We use dummies rather than counts of actions because of an aggregation problem. CFM and MPM actions differ in nature (price-based or administrative), in scope (the asset classes targeted), and in intensity, so adding them up would treat very different measures as equivalent. The dummies simply sort countries into those that leaned against the boom with a given policy and those that did not.

Under these definitions, 8 of the 30 countries in the Taper Tantrum sample had preemptive CFMs on inflows (Brazil, Georgia, Indonesia, Kazakhstan, Malaysia, Peru, Russia, and Thailand), 4 had preemptive CFMs on outflows (Argentina, Brazil, China, and Peru), and 20 had neither. By contrast, 27 of 30 countries tightened at least one MPM. Appendix Tables A.1 and A.6 list the countries in each group. The near-universal use of MPMs means that the preemptive MPM dummy has little cross-sectional variation, a point to which we return when interpreting the results.

baijan publishes monthly data; it is in the COVID-19 sample but not in the Taper Tantrum sample.

[12] For the COVID-19 shock analyzed in Section 5.3, the window spans the full period covered by the CFM data, 2008–2019. Windows before 2008 are not feasible because the data of Binici et al. (2023b) start in 2008.

Figure 2. MPM and CFM Usage in Emerging Markets, 1996-2019 (percent)



Source: iMaPP database and Binici et al. (2023a).
Notes: The figure shows the share of the 34 emerging markets in our sample that used MPMs at least once in 1996-2016 and CFMs at least once in 1996-2019. Countries are listed in Appendix Table A.1.

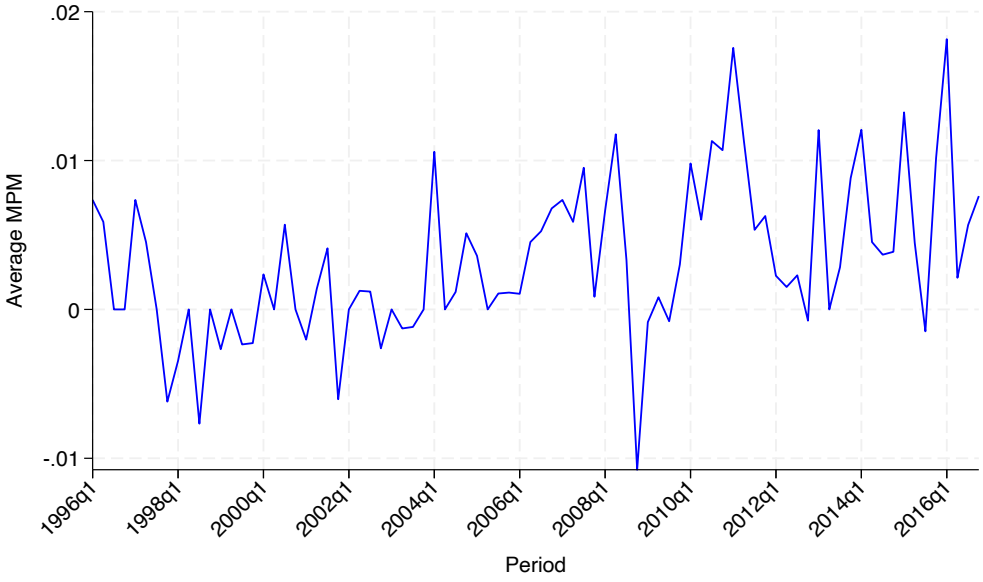
Dummies for CFMs used *during* the shock are defined analogously but with reference to the months of the shock: the dummy equals one if a country loosened CFMs on inflows or tightened CFMs on outflows during the shock. In all cases the dummies only sort countries into groups. The time variation that identifies our estimates comes solely from the shock.

3.3 Descriptive Statistics

Figure 2 shows the share of our 34 EMs that used each policy at least once. About 90 percent used MPMs, consistent with the well-known reliance of EMs on domestic prudential tools even before the GFC. CFMs are less common: about 40 percent of countries used CFMs on inflows and about one-third used CFMs on outflows. The lower incidence of CFMs partly reflects the presence in our sample of European Union members, whose obligations mandate the free movement of capital outside of exceptional circumstances.

Figure 3 plots the average MPM stance over time, with each tightening action coded as 1, each easing action as -1, and quarters without action as 0. The use of MPMs has trended up since the

Figure 3. Time-Series Variation in MPMs, 1996-2016



Source: iMaPP database.
Notes: The figure

GFC, and since 2008 EMs have on average been tightening.

Appendix Table A.2 reports summary statistics separately for the Taper Tantrum and COVID-19 samples, which differ slightly in country composition. The mean UIP premium is about 3.5 percent in both samples, close to the values reported by Kalemli-Ozcan and Varela (2021), with a standard deviation of about 5 percent and a range from -7.5 to 16.5 percent. This dispersion underscores how volatile the cost of external finance is for EMs. The means of the preemptive dummies give the share of treated countries: in the Taper Tantrum sample, 27 percent for inflow CFMs, 13 percent for outflow CFMs, and 90 percent for MPMs. Exchange rate volatility is also highly dispersed, with a mean of 4.4 and a standard deviation of 5.7.[13] Actual FXI is far smaller than the stock of reserves, both measured in percent of GDP, which is one reason to prefer it as a measure of intervention. The table also reports statistics for the months of each shock. Policy rates are lower during the shocks than on average, a pattern we return to in Section 6. Actual FXI is on average negative during the shocks and positive otherwise: central banks sell FX to limit

[13]The minimum of exchange rate volatility, computed over 8-month rolling windows, is close to zero even though we drop pegs. This reflects a few countries with consecutive months of either freely falling exchange rates or dual markets with missing parallel market data (categories 5 and 6 in the coarse classification of Ilzetzki et al. (2019)).

depreciation in risk-off episodes and rebuild buffers in normal times.

4 Empirical Strategy

4.1 The UIP Premium

Our main outcome variable is the UIP premium, which we compute following Kalemli-Ozcan (2019) and Kalemli-Ozcan and Varela (2021). For each country, the UIP condition is

$$E_t(S_{t+k})(1+i_t^*) = S_t(1+i_t), \tag{1}$$

where S_t is the spot exchange rate in units of local currency per U.S. dollar, so that an increase is a depreciation of the local currency, $E_t(S_{t+k})$ is the exchange rate expected k months ahead, and i_t and i_t^* are the domestic and U.S. interest rates at the same horizon. Taking logs, the UIP premium is the deviation from this condition:

$$\lambda_t \equiv \tilde{i}_t - \tilde{i}_t^{\,*} + \tilde{s}_t - \tilde{s}^e_{t+k}, \tag{2}$$

where $\tilde{i}_t = \log(1+i_t)$, $\tilde{i}_t^* = \log(1+i_t^*)$, $\tilde{s}_t = \log(S_t)$, and $\tilde{s}^e_{t+k} = \log(E_t(S_{t+k}))$. We set $k = 12$.

When $\lambda_t = 0$, UIP holds: the interest rate differential is exactly offset by expected depreciation. When $\lambda_t > 0$, investors expect an excess return from borrowing in U.S. dollars and investing in the local currency; from the perspective of an EM borrower, λ_t is the premium paid for borrowing in local currency rather than in dollars. Figure 4 plots the cross-country average.[14] As in Kalemli-Ozcan and Varela (2021), UIP premia in EMs are persistent and almost always positive, averaging about 3.5 percent (Appendix Table A.2).

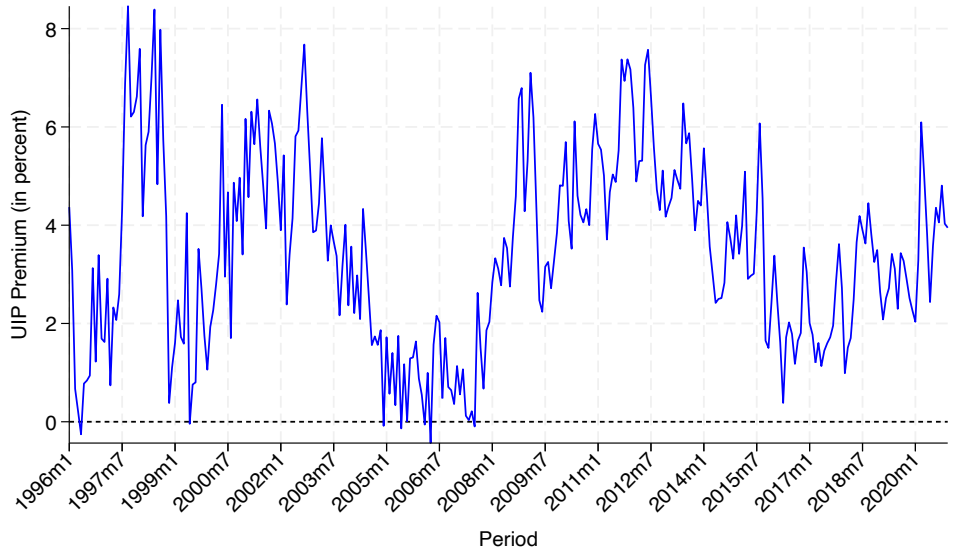
4.2 Difference-in-Differences Specification

We estimate

$$\lambda_{c,t} = \alpha_c + \omega_t + \beta\,\text{Preemptive Policy}_c \times \text{Risk-Off Shock}_t + \epsilon_{c,t}, \tag{3}$$

[14] In equation ((2)) the interest rates i and i^* are in decimal form, so that an interest rate of 10 percent is 0.1, and so is the resulting premium. In all figures and regressions we multiply the premium by 100 and express it in percent.

Figure 4. UIP Premia in Emerging Markets, 1996-2019



Source: Bloomberg, Consensus Economics, International Financial Statistics (IFS).

Notes: The figure shows the average UIP premium of the emerging markets in our sample. Countries are listed in Appendix Table A.1. The UIP premium is calculated using equation ((2)) and multiplied by 100 to express it in percent. It is winsorized symmetrically at 1% and 99%. The last month of the UIP premia on this chart is December 2019.

where $\lambda_{c,t}$ is the UIP premium of country c in month t, Preemptive Policy$_c$ is one of the time-invariant dummies defined in Section 3, and Risk-Off Shock$_t$ is a dummy for the months of the shock, May to December 2013 for the Taper Tantrum. The country fixed effect α_c absorbs the direct effect of the preemptive policy, and the month fixed effect ω_t absorbs the direct effect of the shock, which is common to all countries. The coefficient β measures the differential change in the premium during the shock for countries with preemptive policies relative to countries without them. A negative β means that the premium of treated countries rises by less.[15] Identification does not require treated and control countries to have the same level of premia before the shock, only that their premia would have moved in parallel during the shock absent the policy. Because β is identified from monthly within-country movements around the shock, it cannot be driven by slow-moving fundamental determinants of the level of UIP premia. Standard errors are clustered by month.

To address the concern that treated and control countries responded differently to the shock, we augment equation ((3)) with policies used during the shock:

$$\lambda_{c,t} = \alpha_c + \omega_t + \beta\,\text{Preemptive Policy}_c \times \text{Risk-Off Shock}_t + \gamma\,\text{Policy Response}_c \times \text{Risk-Off Shock}_t + \epsilon_{c,t}, \tag{4}$$

where Policy Response$_c$ is, in turn and jointly, the policy rate, FX reserves in percent of GDP, actual FXI in percent of GDP, and the dummy for loosening inflow CFMs or tightening outflow CFMs during the shock.

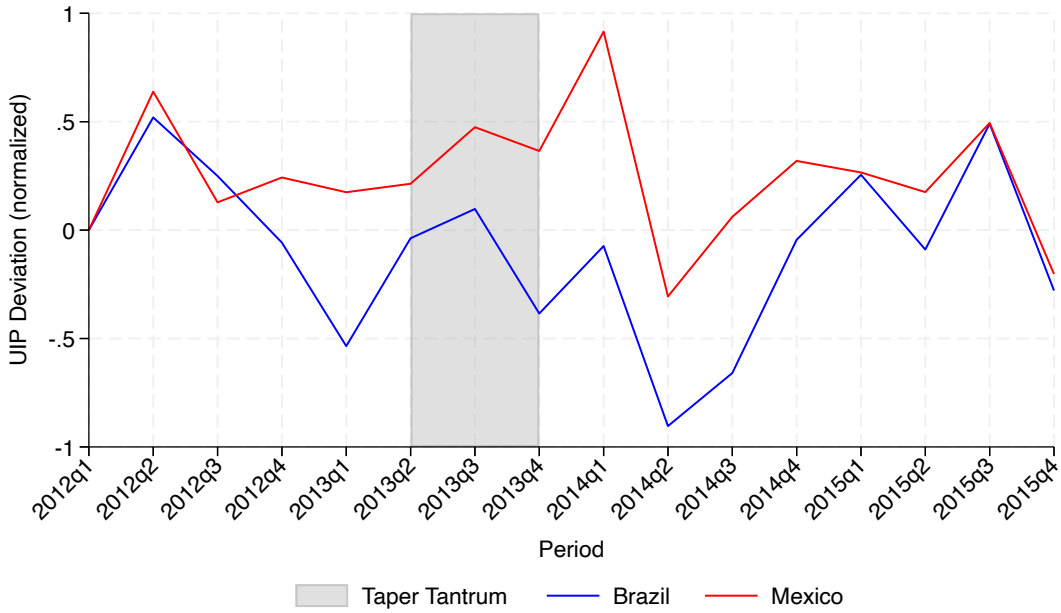
4.3 An Illustration

A comparison of Brazil and Mexico illustrates the design. Brazil imposed the IOF tax, a CFM on capital inflows, in 2008, and extended it to further categories of portfolio flows in 2012. These taxes had been only partially unwound by 2013Q2, so from the perspective of the Taper Tantrum they are a preemptive CFM. Mexico had no CFMs over this period, although it did use MPMs.[16]

[15] Strictly, a negative coefficient means that the premium of treated countries either rises by less or falls by more than that of control countries, and a positive coefficient means the reverse. Since we find that the average premium rises during the Taper Tantrum, we use "smaller increase" and "larger increase" as shorthand.

[16] Mexico tightened requirements for banks to maintain a capital conservation buffer in 2013Q1, having introduced bank stress tests in 2012Q4. After the Taper Tantrum it tightened minimum capital requirements in 2014Q4 and liquidity coverage ratios in 2015Q1.

Figure 5. Preemptive CFM and UIP Risk Premia in Brazil vs. Mexico



Source: Bloomberg, Consensus Economics, International Financial Statistics (IFS), and Binici et al. (2023a).
Notes: The figure shows the UIP premia of Brazil and Mexico between 2012Q1 and 2015Q4, normalized to zero in 2012Q1.

Figure 5 plots the UIP premia of the two countries, normalized to zero in 2012Q1.

Although both countries faced the same shock, their premia evolved differently. Mexico's premium rose during the Taper Tantrum and peaked in early 2014, whereas Brazil's stayed below Mexico's throughout the episode, with the gap widening as the episode unfolded. Our regressions carry out this comparison for all countries in the sample, while controlling for country and month fixed effects and for policies adopted during the shock.

5 Preemptive Policies and the UIP Premium

5.1 Baseline Results

Table 1 reports estimates of equation ((3)) for the Taper Tantrum, the risk-off shock set off by Federal Reserve Chairman Ben Bernanke's remarks of May 2013 on tapering asset purchases. Columns (1) to (4) include one preemptive policy at a time, and column (5) includes them jointly.

Table 1. Preemptive CFM and MPM Policies: Taper Tantrum

Dependent Variable:	$UIP_{c,t}$				
	1996m1-2024m12				
	(1)	(2)	(3)	(4)	(5)
Preemptive $CFM_c^{inflows} \times TT_t$	-1.671***				-2.187***
	(0.374)				(0.350)
Preemptive $CFM_c^{outflows} \times TT_t$		2.596***			3.188***
		(0.338)			(0.286)
Preemptive $CFM_c^{total} \times TT_t$			0.073		
			(0.306)		
Preemptive $MPM_c \times TT_t$				-0.180	-0.007
				(0.472)	(0.455)
Observations	6,962	6,962	6,962	6,962	6,962
Adjusted R-sq	0.267	0.267	0.266	0.266	0.268
No. months	348	348	348	348	348
No. countries	30	30	30	30	30
Country FE	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at time level are in parentheses. Regressions use country-month observations, and log UIP premium is winsorized at 1 and 99 percent. Taper Tantrum (TT) is a time varying dummy that takes the value of 1 in May-Dec 2013, and 0 otherwise. MPM_c is a country specific and time invariant dummy that takes the value 1 if a country has at least one MPM tightening between 2008M1 and 2013M1, and 0 otherwise. CFM_c^{total} is a country specific and time invariant dummy that takes the value 1 if a given country has a net CFM tightening in place on either capital inflows or capital outflows between 2008M1 and 2013M1 and 0 otherwise. $CFM_c^{inflows}$ and $CFM_c^{outflows}$ separate CFM_c^{total} into net tightening CFMs on capital inflows and net tightening CFMs on capital outflows. The list of countries with preemptive policies is provided in Appendix Table A.6.

CFMs on inflows. Countries with preemptive CFMs on inflows experienced a significantly smaller increase in UIP premia. The coefficient is −1.67 (standard error 0.37) when inflow CFMs enter alone in column (1), and −2.19 (0.35) when all preemptive policies are included in column (5). Both are significant at the 1 percent level. The effect is economically large. A differential of 1.7 to 2.2 percentage points is between one-half and three-fifths of the sample mean premium of 3.5 percent, more than one-third of its standard deviation, and as large as the rise in the average EM premium at the onset of the episode. In other words, the Taper Tantrum raised the cost of external finance mainly for countries that had *not* leaned against the preceding inflow boom.

CFMs on outflows. Preemptive CFMs on outflows have the opposite effect. Countries that had them saw their premia rise by 2.60 percentage points (0.34) more than other countries in column (2), and by 3.19 percentage points (0.29) more in column (5). At first sight this is surprising, since restrictions on outflows might be expected to promote stability just as restrictions on inflows do. The difference lies in who is restricted and in what the restriction does to the national balance sheet. Inflow CFMs fall mostly on nonresidents and slow the accumulation of FX liabilities. Outflow CFMs fall largely on domestic residents, often as a form of financial repression; they limit residents' accumulation of FX assets, which works against reducing the country's net FX exposure, and they signal to foreign investors that capital may be costly to repatriate in bad times. Both channels imply that investors demand a higher premium when risk appetite falls. We note that only four countries in the sample had preemptive outflow CFMs (Argentina, Brazil, China, and Peru), so this estimate, although precise, rests on a small treated group.

Aggregate CFMs. Column (3) uses the preemptive dummy that does not distinguish the direction of the control. The coefficient is 0.07 with a standard error of 0.31: a precisely estimated zero. The aggregate measure nets a negative effect of inflow CFMs against a positive effect of outflow CFMs. This result is a caution for studies based on indices that pool controls on inflows and outflows. Such indices would lead one to conclude that preemptive capital controls are irrelevant for external borrowing costs, when in fact inflow controls lower them and outflow controls raise them.

MPMs. We find no differential effect of preemptive MPMs. The coefficient is −0.18 (0.47) in column (4) and −0.01 (0.46) in column (5). Since MPMs, like inflow CFMs, restrain the build-up of debt, one might have expected a negative effect. The most likely explanation for the null result is lack of power. Tightening MPMs was nearly universal before the Taper Tantrum: 27 of 30 countries

did so, which leaves three countries in the control group. A dummy with so little variation cannot separate countries that leaned heavily against the credit boom from those that did not. A second consideration is that the MPMs most relevant for external vulnerability are those that operate on FX positions, such as limits on FX funding and currency mismatch regulations. These measures act much like inflow CFMs, but the iMaPP database does not identify them separately, so we cannot isolate them.[17] We therefore read column (4) as uninformative about MPMs rather than as evidence that they are ineffective.

5.2 Alternative Window for Preemptive Policies

Preemptive policies are by definition in place until the eve of the shock, but theory offers little guidance on when the window over which they are measured should begin. Our baseline window opens in 2008Q1, motivated by the typical length of a capital flow bonanza (Reinhart and Reinhart (2015)). We cannot examine longer windows, because the granular CFM data begin in 2008Q1, so we examine a shorter one.

Table 2 re-estimates the baseline with preemptive policies defined over 2010Q1–2013Q1. Countries that tightened only in 2008–09, at the height of the GFC, are no longer classified as having preemptive policies. The number of countries with preemptive inflow CFMs falls from 8 to 6 (Brazil and Malaysia leave the group), the number with preemptive outflow CFMs from 4 to 3 (Brazil), and the number with preemptive MPMs from 27 to 25; see Appendix Table A.6.

The results are robust. The coefficients on the preemptive CFM variables keep their signs and statistical significance, the estimates for inflow CFMs are numerically close to those in Table 1, and those for outflow CFMs are somewhat larger.[18]

5.3 The COVID-19 Shock

Appendix Table A.3 repeats the exercise for the COVID-19 shock, with the shock dummy equal to one from February to June 2020 and preemptive policies defined over the full period covered by the policy data, beginning in 2008. The evidence is mixed. Preemptive inflow CFMs enter with a negative coefficient on their own (-0.75, standard error 0.30), but the sign reverses when all

[17] MPMs that also act as CFMs are often referred to as "CFM/MPMs"; see, e.g., Binici et al. (2023b).

[18] We have examined other window lengths and find that they do not materially affect our conclusions. These results are available on request.

Table 2. Robustness: Alternate Preemptive Window for CFM and MPM Policies

Dependent Variable:	$UIP_{c,t}$				
	1996m1-2024m12				
	(1)	(2)	(3)	(4)	(5)
Preemptive $CFM_c^{inflows} \times TT_t$	-1.610***				-1.994***
	(0.264)				(0.268)
Preemptive $CFM_c^{outflows} \times TT_t$		3.955***			4.237***
		(0.236)			(0.241)
Preemptive $CFM_c^{total} \times TT_t$			0.444		
			(0.244)		
Preemptive $MPM_c \times TT_t$				0.135	0.095
				(0.447)	(0.467)
Observations	6,962	6,962	6,962	6,962	6,962
Adjusted R-sq	0.267	0.268	0.266	0.266	0.269
No. months	348	348	348	348	348
No. countries	30	30	30	30	30
Country FE	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at time level are in parentheses. Regressions use country-month observations, and log UIP premium is winsorized at 1 and 99 percent. Taper Tantrum (TT) is a time varying dummy that takes the value of 1 in May-Dec 2013, and 0 otherwise. In contrast with Table 1, the preemptive window in Table 2 is defined as 2008M1-2013M1. MPM_c is a country specific and time invariant dummy that takes the value 1 if a country has at least one MPM tightening between 2010M1 and 2013M1, and 0 otherwise. CFM_c^{total} is a country specific and time invariant dummy that takes the value 1 if a given country has a net CFM tightening in place on either capital inflows or capital outflows between 2010M1 and 2013M1 and 0 otherwise. $CFM_c^{inflows}$ and $CFM_c^{outflows}$ separate CFM_c^{total} into CFM net tightening for capital inflows vs. CFM net tightening for capital outflows, respectively. The revised list of countries with preemptive policies in the shorter window of Table 2 is provided in Appendix Table A.6.

policies are included (0.93, standard error 0.29). Preemptive outflow CFMs are associated with *smaller* increases in premia (-2.05 to -2.76), the opposite of what we find for the Taper Tantrum.

We do not view COVID-19 as a clean test of the theory, for three reasons. First, it was not purely a risk-off shock: it combined a health shock, a collapse in real activity, and a global liquidity shock, each of which affected countries differently. Second, the policy response was massive and nearly universal. As we document in Section 6, more than 80 percent of the countries in our sample intervened in FX markets, nearly 80 percent eased MPMs, and almost all cut policy rates, which leaves little room for preemptive policies to differentiate outcomes. Third, the preemptive window necessarily spans more than a decade, so the dummies are coarse: 44 percent of countries are classified as having preemptive inflow CFMs and 34 percent as having preemptive outflow CFMs, and the two groups overlap heavily (Appendix Table A.1), which makes their separate effects hard to identify. For these reasons the remainder of the paper focuses on the Taper Tantrum.

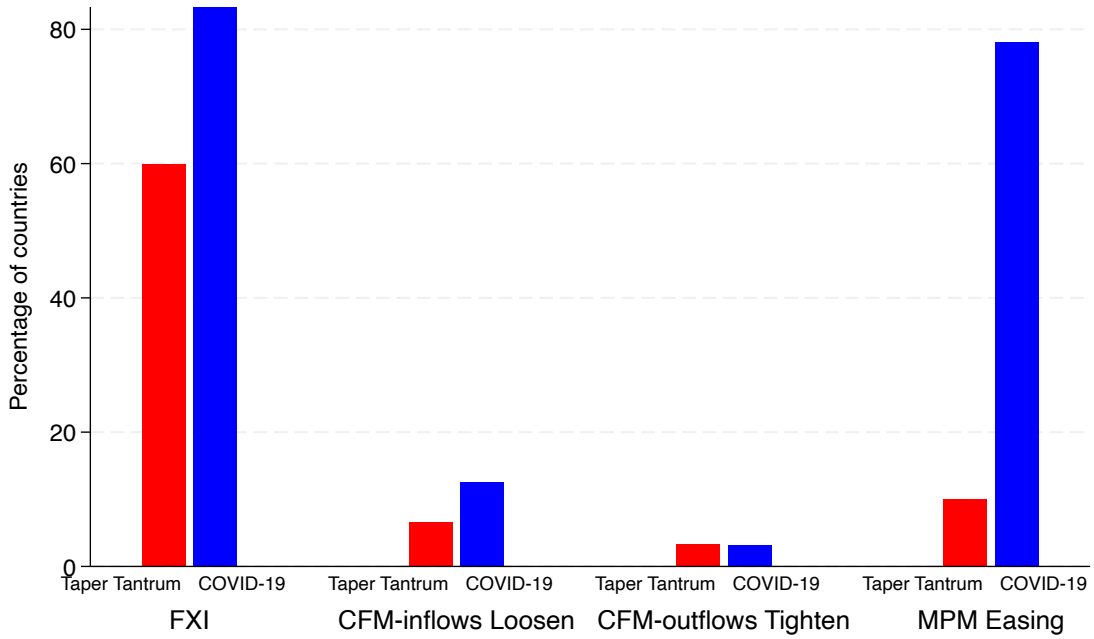
6 Threats to Identification: Policies During the Shock

The main threat to our identification is an omitted variable that varies by country and month and is correlated with the interaction of preemptive policy and the shock. The natural suspects are the policies that countries deploy during the shock to cushion its effects. If countries with preemptive inflow CFMs also responded more forcefully once the shock hit, our estimates would wrongly attribute the effect of the response to the preemptive policy.

Figures 6 and 7 document these responses. FXI was by far the most common: about 60 percent of countries intervened during the Taper Tantrum and more than 80 percent during COVID-19. Changes to CFMs during the shocks were rare, and the easing of MPMs was rare during the Taper Tantrum but widespread during COVID-19. Monetary policy, contrary to the conventional view that EMs must raise rates to defend their currencies in a risk-off episode, was more often eased than tightened: nearly half of the countries cut policy rates during the Taper Tantrum, against roughly one in five that raised them, and almost all cut rates during COVID-19.

Table 3 reports estimates of equation ((4)). Columns (1) to (4) add, one at a time, the policy rate, the dummy for loosening inflow CFMs or tightening outflow CFMs during the shock, actual FXI, and FX reserves, each interacted with the Taper Tantrum dummy. Column (5) includes all

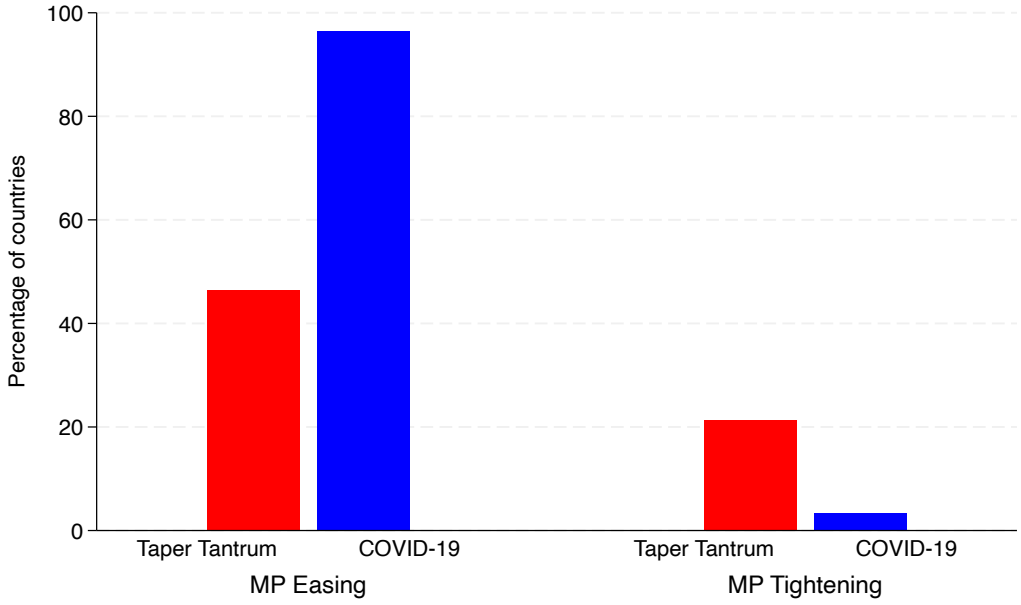
Figure 6. Policy Responses During Risk-Off Shocks



Source: iMaPP database, Binici et al. (2023b), IMF (2020), Central Bank websites (Argentina, Azerbaijan, Brazil, Chile, Colombia, Georgia, Mexico, Peru and Turkey).

Notes: The figure shows the share of EMs in our sample that eased MPMs or CFMs on inflows, tightened CFMs on outflows, and used FXI either during the period 2013:5-2013:12 (for the Taper Tantrum) or during the period 2020:2-2020:6 (for the COVID-19 shock). The countries in each sample are those listed in Appendix Table A.1.

Figure 7. Monetary Policy Responses During Risk-Off Shocks



Source: International Financial Statistics (IFS) and IMF (2020).

Notes: The figure shows the share of EMs in our sample that used monetary policy during the Taper Tantrum and COVID-19 shocks. MP easing (respectively, MP tightening) is defined as a negative (respectively, positive) average monthly change in the policy rate between 2013:5 and 2013:12 for Taper Tantrum and between 2020:2 and 2020:6 for the COVID-19 shock. The countries in each sample are reported in Appendix Table A.1.

of them except actual FXI, which is available for only seven countries.

Our main result survives. In the full-sample specifications, the coefficient on preemptive inflow CFMs ranges from −1.36 to −2.19 and is significant at the 1 percent level throughout; in the most demanding specification, column (5), it is −1.37 (0.35). The effect of preemptive outflow CFMs remains positive and significant and, if anything, becomes larger, ranging from 2.39 to 5.97. The coefficient on preemptive MPMs remains small and insignificant. In column (3), where the sample falls to the seven countries with actual FXI data, the coefficients on inflow and outflow CFMs keep their signs but are several times larger (−10.10 and 9.42). With so few countries, we attach little weight to these magnitudes.[19]

The coefficients on the policy responses are of independent interest, with the caveat that, unlike the preemptive policies, the responses are chosen during the shock and their coefficients should not be read as causal. Three patterns stand out. First, countries with larger reserve buffers fared better: an additional 10 percentage points of GDP in reserves is associated with an increase in the premium that is 0.8 to 1.2 percentage points smaller (columns (4) and (5)). The coefficient on actual FXI is also negative but imprecisely estimated in the small sample for which it is available (−1.49, standard error 0.86). Second, higher policy rates during the shock are associated with *larger* increases in premia (0.42 in column (1) and 0.25 in column (5)). This is consistent with Kalemli-Ozcan (2019), who shows that when the shock is to the risk premium itself, monetary tightening may fail to stabilize the currency and can be counterproductive by raising the cost of external finance. Third, countries that loosened inflow CFMs or tightened outflow CFMs during the shock saw premia rise by more than 5 percentage points less (columns (2) and (5)). This dummy pools actions on nonresidents and residents, so its coefficient is a combined effect, and only 7 percent of the countries in the sample took such actions (Appendix Table A.2); we therefore interpret it with caution.

7 Placebo Shocks

Country fixed effects absorb any permanent difference in the level of premia between treated and control countries. A remaining concern is that countries with preemptive policies differ in ways

[19] All seven countries in column (3) have preemptive MPMs, so the preemptive MPM interaction is collinear with the Taper Tantrum dummy and cannot be estimated.

Table 3. Robustness: The Role of Policies During Taper Tantrum

Dependent Variable:	$UIP_{c,t}$				
	1996m1-2024m12				
	(1)	(2)	(3)	(4)	(5)
Preemptive $CFM_c^{inflows} \times TT_t$	-1.984***	-2.191***	-10.104***	-1.361***	-1.372***
	(0.317)	(0.350)	(0.960)	(0.336)	(0.353)
Preemptive $CFM_c^{outflows} \times TT_t$	2.387***	5.971***	9.417***	3.656***	5.479***
	(0.293)	(0.367)	(0.620)	(0.269)	(0.345)
Preemptive $MPM_c \times TT_t$	-0.573	-0.005		0.682	0.095
	(0.419)	(0.455)		(0.408)	(0.380)
Policies during the shock					
Monetary $Policy_c \times TT_t$	0.417***				0.251***
	(0.036)				(0.054)
Loosening/Tightening $CFMs_c \times TT_t$		-5.535***			-5.339***
		(0.477)			(0.472)
Actual $FXI_c \times TT_t$			-1.486		
			(0.862)		
FX $Reserves_c \times TT_t$				-0.118***	-0.083***
				(0.021)	(0.023)
Observations	6,066	6,962	989	6,962	6,066
Adjusted R-sq	0.312	0.270	0.402	0.270	0.314
No. months	329	348	222	348	329
No. countries	29	30	7	30	29
Country FE	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at time level are in parentheses. Regressions use country-month observations, and log UIP premium is winsorized at 1 and 99 percent. Taper Tantrum (TT) is a time varying dummy that takes the value of 1 in May-Dec 2013, and 0 otherwise. MPM_c is a country specific and time invariant dummy that takes the value 1 if a country has at least one MPM tightening between 2008M1 and 2013M1, and 0 otherwise. CFM_c^{total} is a country specific and time invariant dummy that takes the value 1 if a given country has a net CFM tightening in place on either capital inflows or capital outflows between 2008M1 and 2013M1 and 0 otherwise. $CFM_c^{inflows}$ snd $CFM_c^{outflows}$ separate CFM_c^{total} into CFM net tightening for capital inflows and CFM net tightening for capital outflows, respectively. Policies during the shock: Monetary $Policy_c$ is the policy rate; Loosening/Tightening CFMs are either loosening inflow CFM policies or tightening outflow CFM policies; FXI $Reserves_c$ is foreign reserves as a percentage of GDP; and Actual FXI_c denotes actual FX interventions during the shock. The list of countries with preemptive policies is provided in Appendix Table A.6.

that lower their premia periodically for reasons unrelated to risk-off shocks, so that a DID around almost any date would produce a negative coefficient. To assess this concern, we re-estimate the baseline specification around placebo dates on which no global risk-off shock occurred.

The difficulty is to find windows that are tranquil for *all* EMs. Global risk-off episodes are well identified, but the periods between them are not free of shocks to subsets of countries. The acute phase of the European sovereign debt crisis in 2012–13 was plausibly a risk-off episode for the EMs of the European Union, given their trade and financial exposure to the euro area, but not for other EMs. The Chinese stock market turbulence of 2015 is not conventionally viewed as a global risk-off shock, yet may have acted as one for the many EMs with deep economic and financial links to China. Swings in commodity prices can act as risk-off shocks for commodity exporters or importers. In a geographically diverse sample, such regional shocks make truly tranquil windows hard to find, and they work against finding a zero effect in a placebo test.

With this caveat, Table 4 reports results for three placebo windows: 2014:7–2014:12, 2016:7–2016:12, and 2018:7–2018:12. For comparability with the baseline, preemptive policies are redefined over the five years preceding each placebo date, so the groups of treated countries change from column to column (Appendix Table A.6).

In two of the three windows, 2016 and 2018, the coefficient on preemptive inflow CFMs is small, positive, and insignificant (0.16 and 0.60). In the 2014 window it is negative (-1.58, standard error 0.61). That window is not tranquil, however. The second half of 2014 saw the collapse of oil and other commodity prices and a sharp appreciation of the U.S. dollar, which put many EMs under pressure, and the countries with preemptive inflow CFMs include several large commodity exporters. The estimate for 2014 may thus reflect the same mechanism as our main result rather than a failure of the placebo, though we do not lean on this interpretation. For preemptive outflow CFMs, no placebo window reproduces the large positive effect found for the Taper Tantrum: the coefficients are 0.43 in 2014 and 1.55 in 2016, neither significant at the 5 percent level, and the coefficient turns negative (-1.34) in 2018. The coefficient on preemptive MPMs is insignificant in 2014 and negative in 2016 and 2018; since nearly all countries have preemptive MPMs in every window, this coefficient is identified from very few countries and is unstable, and we do not interpret it.

Overall, we find no systematic association between preemptive CFMs and UIP premia outside

Table 4. Robustness Check: Placebo Shocks

Dependent Variable:	$UIP_{c,t}$		
	1996m1-2024m12		
	(1)	(2)	(3)
Preemptive $CFM_c^{inflows} \times placeboshock_t$	-1.577*	0.158	0.598
	(0.614)	(0.488)	(0.419)
Preemptive $CFM_c^{outflows} \times placeboshock_t$	0.426	1.546	-1.338**
	(0.306)	(0.832)	(0.419)
Preemptive $MPM_c \times placeboshock_t$	0.406	-2.265***	-3.109***
	(0.401)	(0.644)	(0.479)
Placebo shock date	2014:7 - 2014:12	2016:7 - 2016:12	2018:7 - 2018:12
Preemptive period	2009:1 - 2014:6	2011:1 - 2016:6	2013:1 - 2018:6
Observations	6,882	6,831	6,980
Adjusted R-sq	0.267	0.283	0.285
No. months	348	348	348
No. Countries	29	31	31
Country FE	yes	yes	yes
Month FE	yes	yes	yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at time level are in parentheses. Regressions use country-month observations, and log UIP is winsorized at 1 and 99 percent. "Placebo shock" is a time varying dummy that creates a risk-off shock; placebo shock dates and the corresponding preemptive periods are shown for each regression. For each placebo shock, the list of preemptive MPM and CFM are reconstructed according to the appropriate preemptive period. Thus, each column is based on a slightly different country sample due to differences in the timing of the shock and the preemptive window. The list of countries with preemptive policies (different for each column) is provided in Appendix Table A.6.

of risk-off episodes. The differential behavior of premia in countries with preemptive CFMs appears to be specific to periods in which the global price of risk rises, as the theory predicts.

8 Conclusion

An influential theoretical literature argues individual borrowers take on too much risk because they do not internalize that, in a crisis, their borrowing feeds a spiral of exchange rate depreciation, balance sheet deterioration, and tighter financial conditions. Policies that make borrowers internalize this externality reduce borrowing in good times and the severity of crises in bad times.

Empirical support for this prescription has been elusive, because conventional measures of capital controls that will serve to limit the borrowing do not capture their countercyclical use, that is, increase controls in good times and reduce them in bad times. Most measures are based on the contemporaneous use of controls as a response to shocks. We use new data that record changes in the use of these measures at business-cycle frequency, separately for inflows and outflows, and we combine them with a difference-in-differences design around the Taper Tantrum in which preemptive policies are fixed before the shock and so cannot respond to it.

Using monthly data for 34 EMs over 1996–2024, we find that countries that tightened CFMs on inflows before the shock experienced increases in UIP premia 1.4 to 2.2 percentage points smaller than other countries. The result is robust to controlling for monetary policy, reserves, FX intervention, and changes in CFMs during the shock, and we find no systematic counterpart in placebo periods without a global risk-off shock. CFMs on outflows had the opposite effect, raising UIP premia, so that measures of capital controls that pool inflows and outflows show no effect at all.

Our evidence has limits. It comes from one clean risk-off episode and even while 30 percent of our sample implements preemptive CFMs, prior, these represent the actions of only 10 countries. Still, a smaller increase in premia during a risk-off shock preserves access to international capital markets when countries need it most. Ex ante policies that limit the build-up of FX debt reduce the need to defend the currency with monetary policy after the shock, and free monetary policy to focus on domestic objectives.

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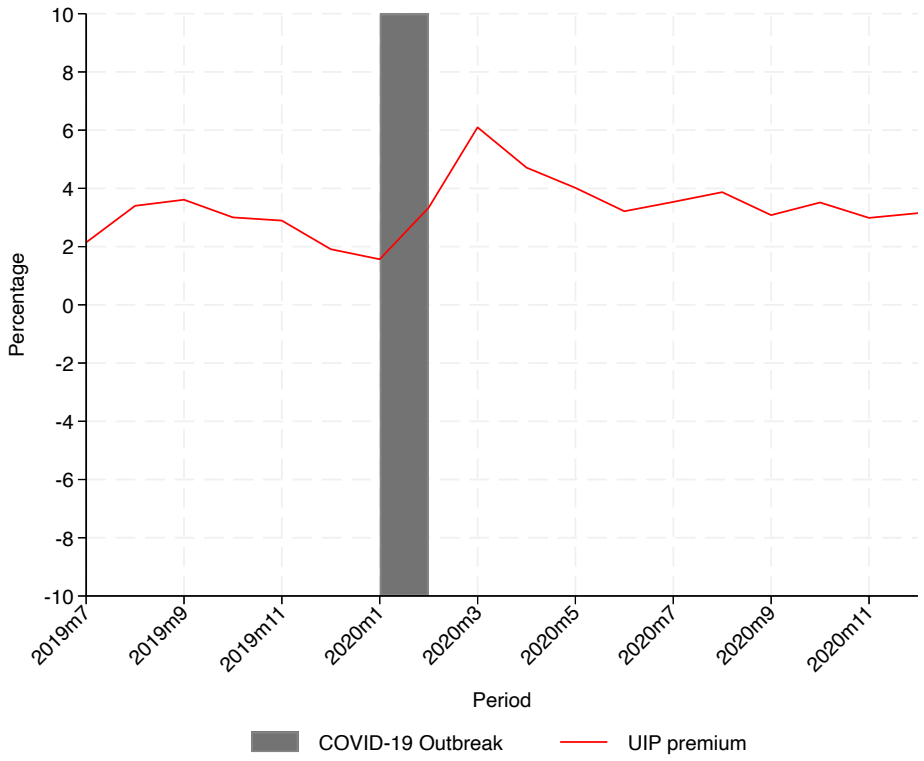
Appendix A

Figure A.1. Covid and UIP Premia (12-months horizon)



Source: IMF IPF Metrics. Notes: The figure shows the median UIP premium of the sample countries. The UIP premium is constructed by fixing the time horizon at 12-months.

Table A.1. Preemptive CFMs on Inflows and Outflows: by Country and Episode

	Taper Tantrum			COVID-19			
	In sample	Inflows	Outflows	In sample	Inflows	Outflows	Sample period
Albania	Y						2007m5 - 2013m12
Algeria				Y			2015m10 - 2024m12
Argentina	Y		Y		Y	Y	2002m1 - 2015m9
Armenia	Y			Y			2012m9 - 2024m12
Azerbaijan				Y			2015m2 - 2024m12
Brazil	Y	Y	Y	Y	Y	Y	1999m10 - 2024m12
Chile	Y			Y			1998m12 - 2024m12
China	Y		Y	Y	Y	Y	2005m8 - 2024m12
Colombia	Y			Y			2001m4 - 2024m12
Costa Rica				Y	Y		2016m3 - 2024m12
Dominican Republic	Y			Y			1996m2 - 2024m12
Egypt	Y			Y			2006m3 - 2024m12
Georgia	Y	Y		Y	Y		2009m9 - 2024m12
Guatemala	Y			Y			2009m1 - 2024m12
Hungary	Y			Y			2000m3 - 2024m12
India	Y			Y	Y	Y	2000m6 - 2024m12
Indonesia	Y	Y		Y	Y		1997m4 - 2024m12
Kazakhstan	Y	Y		Y	Y	Y	2007m8 - 2024m12
Malaysia	Y	Y		Y	Y	Y	1996m1 - 2024m12
Mexico	Y			Y			1996m2 - 2024m12
Nigeria	Y			Y		Y	2002m3 - 2024m12
Pakistan	Y			Y			1998m7 - 2024m12
Paraguay	Y			Y			2012m9 - 2024m12
Peru	Y	Y	Y	Y	Y	Y	1998m10 - 2021m7
Philippines	Y			Y			1997m8 - 2021m12
Poland	Y			Y			1998m7 - 2024m12
Russia	Y	Y		Y	Y	Y	2000m9 - 2024m12
Serbia	Y			Y			2009m8 - 2024m12
South Africa	Y			Y			1997m10 - 2024m12
Sri Lanka	Y			Y	Y	Y	1996m1 - 2024m12
Thailand	Y	Y		Y	Y		1997m8 - 2024m12
Turkey	Y			Y	Y	Y	1998m7 - 2024m12
Ukraine		Y	Y	Y	Y	Y	2014m7 - 2024m12
Vietnam	Y			Y			2007m4 - 2024m12

Notes. Table A.1 lists all 34 emerging markets used in the paper. Preemptive CFM policies are defined as policies in place 5 years prior the shock for the Taper Tantrum shock (2008m1-2013m4) and 11 years prior for the COVID-19 shock (2008m1-2019m12). "Y" indicates that a preemptive CFM (on inflows or outflows) was in place when the Taper Tantrum or COVID-19 shock hit. Both inflow and outflow policies are measured on a net basis, that is tightening minus easing. The last column reports the time period over which data for the country is available. Some series are discontinuous with missing data in some months. For both shocks, only countries with data both before and after the shock hits are included in the analysis.

Table A.2. Summary Statistics

	Mean	Std. Deviation	Minimum	Maximum
Taper Tantrum Sample				
Whole sample				
UIP^{premium} (percent)	3.51	(4.90)	-7.52	16.48
Preemptive CFM$^{inflows}_{long}$ (per country)	0.27	(0.45)	0.00	1.00
Preemptive CFM$^{outflows}_{long}$ (per country)	0.13	(0.35)	0.00	1.00
Preemptive CFM$^{total}_{long}$ (per country)	0.33	(0.48)	0.00	1.00
Preemptive MPM$_{long}$ (per country)	0.90	(0.31)	0.00	1.00
Preemptive CFM$^{inflows}_{short}$ (per country)	0.20	(0.41)	0.00	1.00
Preemptive CFM$^{outflows}_{short}$ (per country)	0.10	(0.31)	0.00	1.00
Preemptive CFM$^{total}_{short}$ (per country)	0.27	(0.45)	0.00	1.00
Preemptive MPM$_{short}$ (per country)	0.83	(0.38)	0.00	1.00
Exchange Rate Volatility	4.38	(5.67)	0.03	30.76
Monetary Policy (percent)	5.96	(5.89)	0.01	70.11
FXI^{actual} (percent of GDP)	0.07	(0.37)	-2.62	3.06
FXI^{reserve} (percent of GDP)	15.51	(9.54)	0.46	52.52
Policies during the shock				
Monetary Policy (percent)	4.51	(2.88)	0.06	11.33
FXI^{actual} (percent of GDP)	-0.11	(0.34)	-1.62	0.24
FXI^{reserve} (percent of GDP)	16.44	(10.59)	1.37	41.71
CFM Loosening Inflow/Tightening Outflow	0.07	(0.25)	0.00	1.00
COVID-19 Sample				
Whole sample				
UIP^{premium} (percent)	3.47	(4.87)	-7.52	16.48
Preemptive CFM^{inflows} (per country)	0.44	(0.50)	0.00	1.00
Preemptive CFM^{outflows} (per country)	0.34	(0.48)	0.00	1.00
Preemptive CFM^{total} (per country)	0.47	(0.51)	0.00	1.00
Preemptive MPM (per country)	0.94	(0.25)	0.00	1.00
Exchange Rate Volatility	4.40	(5.76)	0.03	30.76
Monetary Policy (percent)	5.79	(5.63)	0.01	67.00
FXI^{actual} (percent of GDP)	0.04	(0.36)	-2.62	3.06
FXI^{reserve} (percent of GDP)	15.79	(9.96)	0.46	78.98
Policies during the shock				
Monetary Policy (percent)	3.94	(3.40)	0.03	12.66
FXI^{actual} (percent of GDP)	-0.14	(0.27)	-0.88	0.19
FXI^{reserve} (percent of GDP)	18.38	(9.11)	3.94	46.02
CFM Loosening Inflow/Tightening Outflow	0.15	(0.35)	0.00	1.00

Notes. The upper (respectively, bottom) panel of the table is based on the 30 (respectively, 32) emerging markets for which data are available both prior and subsequent to the Taper Tantrum (respectively, COVID-19) shock; see Table A.1 for the list of countries in each sample. The UIP premium is calculated as per equation (2) and multiplied by 100 to report it in percent form (e.g., the reported mean of 3.69 in the upper panel represents 3.69 percent). UIP premia and exchange rate volatility are symmetrically winsorized at 1 percent and 99 percent. All exchange rate arrangements are from Ilzetzki et al. (2019).) All preemptive variables are dummy variables. Summary statistics for policies during the shock are calculated over just the period of the shock, which are: 2013:5-2013:12 for Taper Tantrum and 2020:2-2020:6 for the Covid shock.

Table A.3. Preemptive MPM and CFM Policies: COVID-19

Dependent Variable:	$UIP_{c,t}$				
	1996m1-2024m6				
	(1)	(2)	(3)	(4)	(5)
Preemptive $CFM_c^{inflows} \times COVID_t$	-0.751*				0.927**
	(0.296)				(0.285)
Preemptive $CFM_c^{outflows} \times COVID_t$		-2.045***			-2.759***
		(0.367)			(0.442)
Preemptive $CFM_c^{total} \times COVID_t$			-1.903***		
			(0.260)		
Preemptive $MPM_c \times COVID_t$				0.080	0.654
				(0.648)	(0.586)
Observations	7,056	7,056	7,056	7,056	7,056
Adjusted R-sq	0.284	0.285	0.285	0.284	0.285
No. months	348	348	348	348	348
No. countries	32	32	32	32	32
Country FE	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at time level are in parentheses. Regressions use country-month observations, and log UIP is winsorized at 1 and 99 percent. COVID is a time varying dummy that takes the value of 1 in months February-June 2020. MPM_c is a country specific and time invariant dummy that takes the value of 1 if a given country has at least one MPM tightening in place regarding the domestic economy any time between 2008Q1 and 2016Q4. CFM_c^{total} is a country specific and time invariant dummy that takes the value of 1 if a given country has a CFM tightening in place regarding capital inflows or capital outflows any time between 2008Q1 and 2019Q3. $CFM_c^{inflows}$ and $CFM_c^{outflows}$ separates CFM_c^{total} into CFM tightening for capital inflows vs. CFM tightening for capital outflows. The sample of countries in this analysis are reported in Table A.1.

Table A.4. Description of MPM Measures

Measure	Definition
CCB	Requirements for banks to maintain countercyclical capital buffers.
Conservation	Requirements for banks to maintain capital conservation buffers.
Capital	Capital requirements for banks, such as minimum capital requirements and risk weights.
LVR	A limit on leverage of banks.
LLP	Loan Loss Provision requirements, in this case for macroprodential purposes.
LCG	Limits on the growth or volume of aggregate credit, and penalties for high credit growth.
LoanR	Loan restrictions, such as loan limits and prohibitions, which may be conditioned on loan characteristics (for example, the maturity, size, or LTV ratio), bank characteristics, and other factors.
LTV	Limits to loan-to-value ratios, including those targeted at housing loans, automobile loans, and commercial loans.
DSTI	Limits to the loan-to-income ratio and the debt-service-to-income ratio, including limits targeted at housing loans, commercial real estate loans, and consumer loans.
LTD	Limits to the loan-to-deposit (LTD) ratio, as well as penalties for high LTD ratios.
OT	Macroprodential measures, such as stress testing and limits on exposures between financial institutions, that are not covered by other variables.
Tax	Taxes and levies, such as capital gain taxes and stamp duties, that are applied to specified transactions, assets, or liabilities.
Liquidity	Measures, such as liquid asset ratios, net stable funding ratios, and external debt restrictions, that are taken to mitigate systemic liquidity and funding risks.
SIFI	Measures, such as capital and liquidity surcharges, that are taken to mitigate risks from global and domestic systemically important financial institutions (SIFIs).
RR	Reserve requirements for macroprodential purposes (domestic or foreign currency).
LFC	Limits on foreign currency lending, as well as rules or recommendations on foreign currency loans.
LFX	Limits on foreign exchange (FX) exposures and funding, currency mismatch regulations, and limits on net or gross open FX positions.

Source: Alam et al. (2019)

Table A.5. Description of CFM Measures

Measure	Definition
Approval Requirement	An administrative control on cross-border transactions of a specified asset category that requires the approval of a government agency.
Limit	A broad range of measures covering regulations to limit, such as commercial banks' positions in foreign currencies, specified commercial bank balance sheet items (including capital), investment abroad, foreign exchange transfers abroad including for the acquisition of financial instruments and of securities, oversease case or credit withdrawals, and domestic foreign exchange withdrawals.
Limit/Approval Requirement	Measures that simultaneously impose the limit and approval requirements described above.
Ban	The prohibition of the transfer, purchase or sale of certain types of financial assets by residents and/or non-residents. Prohibitions may also apply to specified off-balance sheet transactions of financial institutions.
Fee	Additional change/cost for transactions that require the remittance of or settlement in foreign currency (including both current and capital account transactions) or charges on non-residents' property (for example, on under-utilized residential property.)
Holding perios requirement	Requirement that a specified period of time elapse between a capital inflow and its outflow.
Reserve Requirement	Differential treatment of deposits held by non-residents, or of certain debt inflows with the reserve amount subject to different ratio or a holding period.
Repatriation Requirement	The obligation of exporters to repatriate export proceeds within a specified period of time.
Surrender Requirement	Regulations requiring the recipient of repatriated export proceeds to sell, sometimes at a specified exchange rate, any foreign exchange proceeds in return for local currency to the central bank or commercial banks or exchange dealers authorized for this purpose.
Surrender / Repatriation Requirement	Measures that simultaneously impose surrender and repatriation requirements.
Tax	Tax on a specified type of cross-border capital or financial account or currency.
Other	Resudial measures that do not fit any of the aforementioned categories.

Source: Binici et al. (2023b)

Table A.6. Countries with Preemptive Policies

CFM Inflow Policies				
Table 1, 3, 4 All columns	Table 2 All columns	Table 5 Column (1)	Table 5 Column (2)	Table 5 Column (3)
Brazil	Georgia	Argentina	China	China
Georgia	Indonesia	Brazil	Costa Rica	Costa Rica
Indonesia	Kazakhstan	Georgia	Georgia	Georgia
Kazakhstan	Peru	Indonesia	India	India
Malaysia	Russia	Kazakhstan	Indonesia	Indonesia
Peru	Thailand	Malaysia	Kazakhstan	Kazakhstan
Russia		Peru	Malaysia	Malaysia
Thailand		Russia	Peru	Peru
		Thailand	Russia	Russia
			Sri Lanka	Sri Lanka
CFM Outflow Policies				
Table 1, 3, 4 All columns	Table 2 All columns	Table 5 Column (1)	Table 5 Column (2)	Table 5 Column (3)
Argentina	Argentina	Argentina	China	China
Brazil	China	Brazil	India	India
China	Peru	China	Kazakhstan	Kazakhstan
Peru		India	Nigeria	Malaysia
		Peru	Peru	Nigeria
			Russia	Peru
			Sri Lanka	Russia
			Ukraine	Sri Lanka
				Ukraine
MPM Policies				
Table 1, 3, 4 All columns	Table 2 All columns	Table 5 Column (1)	Table 5 Column (2)	Table 5 Column (3)
Albania	Albania	Argentina	Algeria	Algeria
Argentina	Argentina	Armenia	Armenia	Armenia
Armenia	Armenia	Brazil	Brazil	Brazil
Brazil	Brazil	Chile	Chile	Chile
Chile	Chile	China	China	China
China	China	Colombia	Costa Rica	Colombia
Colombia	Georgia	Dominican Republic	Georgia	Costa Rica
Dominican Republic	Hungary	Georgia	Hungary	Georgia
Georgia	India	Hungary	India	Hungary
Hungary	Indonesia	India	Indonesia	India
India	Kazakhstan	Indonesia	Kazakhstan	Indonesia
Indonesia	Malaysia	Kazakhstan	Malaysia	Kazakhstan
Kazakhstan	Mexico	Malaysia	Mexico	Malaysia
Malaysia	Nigeria	Mexico	Nigeria	Mexico
Mexico	Pakistan	Nigeria	Pakistan	Nigeria
Nigeria	Paraguay	Pakistan	Paraguay	Pakistan
Pakistan	Peru	Paraguay	Peru	Paraguay
Paraguay	Philippines	Peru	Philippines	Peru
Peru	Poland	Philippines	Poland	Philippines
Philippines	Russia	Poland	Russia	Poland
Poland	Serbia	Russia	Serbia	Russia
Russia	Sri Lanka	Serbia	South Africa	South Africa
Serbia	Thailand	South Africa	Sri Lanka	Sri Lanka
Sri Lanka	Turkey	Sri Lanka	Thailand	Thailand
Thailand	Vietnam	Thailand	Turkey	Turkey
Turkey		Turkey	Ukraine	Ukraine
Vietnam		Vietnam	Vietnam	Vietnam

Notes. This table lists the countries with preemptive policies in Tables 1-5, which vary due to variations in the interval over which preemptive policies are defined (see text).