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Preemptive Policies and Risk-Off Shocks in Emerging Markets

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ABSTRACT: We show that "preemptive" capital flow management measures (CFM) can reduce emerging markets and developing countries' (EMDE) external finance premia during risk-off shocks, especially for vulnerable countries. Using a panel dataset of 56 EMDEs during 1996–2020 at monthly frequency, we document that countries with preemptive policies in place during the five year window before risk-off shocks experienced relatively lower external finance premia and exchange rate volatility during the shock compared to countries which did not have such preemptive policies in place. We use the episodes of Taper Tantrum and COVID-19 as risk-off shocks. Our identification relies on a difference-in-differences methodology with country fixed effects where preemptive policies are ex-ante by construction and cannot be put in place as a response to the shock ex-post. We control the effects of other policies, such as monetary policy, foreign exchange interventions (FXI), easing of inflow CFMs and tightening of outflow CFMs that are used in response to the risk-off shocks. By reducing the impact of risk-off shocks on countries' funding costs and exchange rate volatility, preemptive policies enable countries' continued access to international capital markets during troubled times.

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WORKING PAPERS

Preemptive Policies and Risk-Off Shocks in Emerging Markets

Prepared by Mitali Das, Gita Gopinath and Şebnem Kalemli-Özcan[1]

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1 Introduction

Many emerging markets used capital flow management (CFM) policies and/or combined these with macroprudential measures (CFMs/MPMs) extensively in the aftermath of the Global Financial Crisis (GFC). The goal was to handle the influx of capital inflows as a result of the expansionary quantitative easing policies of advanced economies, most notably the U.S., as foreign investors searched for better yields in risky EM assets.[1]

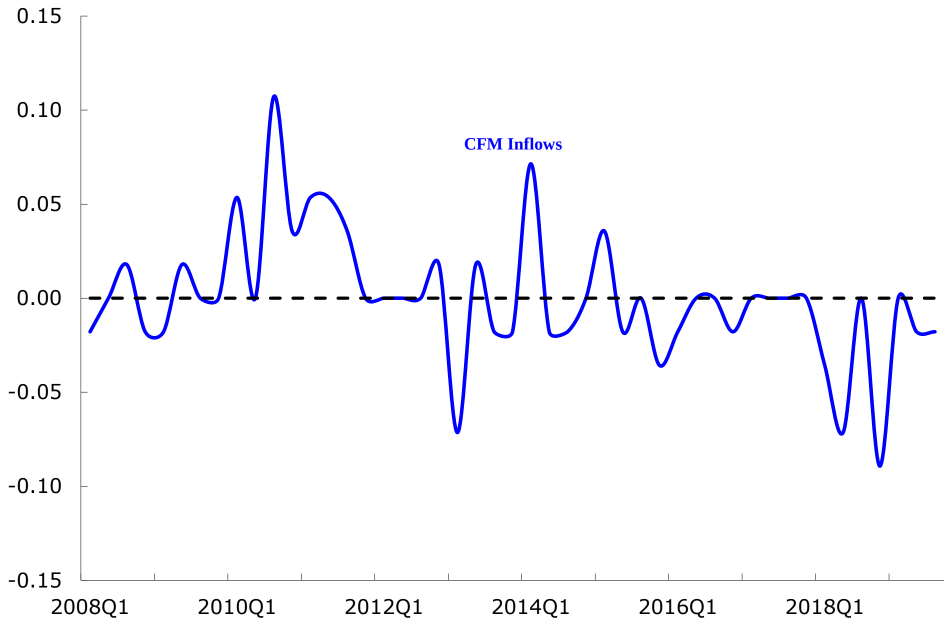
While the theoretical literature on the optimality of CFM policies is extensive (e.g., Korinek (2011); Korinek and Sandri (2016); Bianchi et al. (2012); Bianchi and Mendoza (2018); Bianchi et al. (2016); Mendoza (2016); Farhi and Werning (2016); Basu et al. (2020)), the empirical evidence on the use and effectiveness of these policies has been rather limited. The theoretical work shows that when these policies are used in a "preemptive" manner, they lead to a lower level of foreign currency (FX) debt, and a lower risk of future sudden stops and financial crises. This literature envisions a counter-cyclical use of CFMs. The empirical literature thus far has failed to test the predictions of these models as existing datasets on CFMs were limited in their granularity and time-varying use of these measures. Rather, the literature only measures the long-standing use of capital controls and cannot speak to their counter-cyclical use.

We use a new data set on CFMs to test the predictions of these models. Our data are conceptually different from popular measures of capital controls used in the literature. For example, the annual indices in Chinn and Ito (2006), Alfaro et al. (2017) and Fernández et al. (2016) take stock of the restrictions on the capital account at a point in time and thus indicate the overall convertibility of the capital account. Our data, by contrast, describes changes to capital account restrictions at business cycle frequency. While annual CFM indices generally are stable over time, there are significant intra-year changes as shown in Binici and Das (2020) and Binici et al. (2020). Our data plotted in Chart 1 also shows that CFMs are changed frequently.[2] It is clear from this figure that EMs tightened CFMs on inflows following the U.S. QE policies and then eased them

[1] EM policy makers have raised concerns about the financial stability implications of such an influx of capital. 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). Many other central bankers have raised similar concerns as documented in IEO Report on IMF advice during QE, 2016.

[2] We follow Binici and Das (2020) and Binici et al. (2020) and assign to each tightening action of a capital account policy in a quarter a value "1", and each instance of an easing measure is assigned the value "-1." The quarters with no CFMs are assigned the value 0. We then plot the average usage of CFMs by country-quarter.

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



Source: Data from Binici and Das (2020) and Binici et al. (2020). Notes. The figure shows the average country-quarter value of CFMs on inflows deployed by quarter in this time period, with positive values indicating average net tightening and negative values average net easing. Countries in the sample are Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Egypt, Georgia, Ghana, Honduras, Hungary, India, Indonesia, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Malaysia, Mexico, Moldova, Morocco, Nicaragua, Nigeria, North Macedonia, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, Saudi Arabia, Serbia, South Africa, Sri Lanka, Tanzania, Thailand, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Zambia.

after the Taper Tantrum shock of 2013.

We undertake a systematic analysis to investigate the effectiveness of these counter-cyclical policies in the face of risk-off shocks when they were used in a preemptive manner. As CFMs on inflows before a risk-off shock are often perceived differently by foreign investors than CFMs on outflows during the shock, it is important to treat them as distinct capital account policies. The empirical literature so far has focused on the impact of long-standing capital controls, most of the time without separating CFMs on inflows from those on outflows, or the preemptive use from the use during or after the shocks. Magud et al. (2011) conduct a meta-analysis of this literature and conclude that CFMs are ineffective in general. Discussing the research that focuses on CFMs on inflows, they argue that these inflow CFMs can alter the composition and maturity of capital flows, but are ineffective in reducing pressure on the exchange rate. With regard to CFMs on outflows, they point to its success in Malaysia during the Asian Financial Crisis as a one-time event.

We investigate the effectiveness of preemptive inflow CFMs (and CFM/MPMs) on monthly fluctuations in external finance (UIP) premium after a risk-off shock. The theoretical papers argue that preemptive CFM/MPM policies lower FX debt in the economy relative to its counterfactual level when these policies are not implemented preemptively. Although we cannot compare to this unobserved counterfactual, we provide evidence that FX debt is systematically lower in countries that employed such preemptive policies. As the level of FX debt is positively correlated with the FX premium (that is, the larger the FX debt, the larger is default risk on the FX debt), it is intuitive that in a country with low levels of FX debt, FX premia will be lower during normal times and also during a risk-off shock. There is no currency risk in FX debt. We argue that the UIP premium, that is the premium on local currency debt, will also be lower during the risk-off shock for the countries who used preemptive policies, as FX debt-related stress transmits to local currency debt, especially during episodes where local currency assets are getting riskier for foreign investors due to large and rapid exchange rate depreciations. With lower default risk on lower FX debt, the default risk on local currency debt and currency depreciations will both be lower, which in turn will reduce the UIP premium.

Our choice of the outcome variable is grounded in theory as models such as Basu et al. (2020) show the welfare maximizing role of decreasing the UIP premium during sudden stop crises. We also investigate the impact of preemptive policies on exchange rate volatility.[3]

There are two key empirical challenges. First, we need to identify the risk-off shock and second we need to isolate the causal effect of the preemptive policies during the risk-off shock. To address these challenges, we exploit the high-frequency nature of our data in a difference-in-differences setting and focus on two identifiable shocks: the Taper Tantrum shock of May 2013 and the COVID-19

[3] The empirical literature on UIP deviations is limited to AEs, showing, mostly with Fama regressions, that UIP does not hold, on average, leading to a UIP premium and hence excess returns. This literature measures the UIP premium using *realized* exchange rates most of the time with few exceptions such as Froot and Frankel (1989). See Engel (2014) for a review of this literature. A recent contribution to this literature is the systematic empirical analysis of endogenous time-varying UIP deviations undertaken by Kalemli-Ozcan and Varela (2021) focusing both on EMs and in AEs, and measuring UIP deviations both with *realized* and *expected* changes in the exchange rate. These authors show that in EMs, UIP does not hold regardless and the time variation in the premium is linked to capital flows, global risk aversion (VIX), and policy uncertainty, whereas in AEs the same time variation is only linked to VIX. See also Kalemli-Ozcan (2019) on the relation between UIP premium and ineffectiveness of monetary policy in managing capital flows in EMs.

shock of March 2020. The Taper Tantrum is well accepted as an exogenous and unanticipated risk-off shock, whereas, although also exogenous and unanticipated, COVID-19 represents a multitude of shocks. We argue that by focusing on high frequency movements in the early months of COVID-19, we can capture the risk-off portion of this shock as well.

To identify the causal effect of the preemptive policies, we differentiate the effect of the shock on the outcome variable by country. That is, we group countries into a "treatment" group (i.e., those who had preemptive CFMs in place) and a "control" group (those who did not have such policies in place). Then, we estimate a difference-in-differences regression where we do not allow these policies to be implemented as a response to the shock. This is the key endogeneity problem identified in the literature, where MPM, CFM and foreign exchange intervention (FXI) policies deployed in *response* to a shock raise methodological difficulties in identifying their effectiveness. We borrow our identification strategy from the policy evaluation literature of Katz and Murphy (1992) and Card et al. (1994) in terms of the effect of minimum wage laws on employment. Following these papers, we separate the time-series and cross-section variation so that the time-series variation emerges only due to the risk-off shock, while preemptive policies are captured by a static dummy variable defined over a five-year window prior to the shock, and thus do not change over time in response to the shock.[4]

A key threat to this identification strategy is an omitted variable that varies at the country-month level and is correlated with our key variable of interest, that is, the interaction of preemptive policies with the risk-off shock. The policies designed to be used "during the shock," instead of preemptively, are prime candidates for such omitted variables. Thus, we control all policies that may be used as a response to the shock, namely monetary policy, FXI, and inflow CFM easing and/or outflow CFM tightening. We use manually-collected actual FX intervention data, significantly improving on the typical empirical practice of using the change in FX reserves. Of course, country characteristics, such as current account deficits and fiscal deficits can create differences between our treatment and control group countries. Our focus on high-frequency data helps us mitigate these problems to a certain degree as we control the slow moving variation in these characteristics by

[4] We choose a five year window prior to the shock as the literature shows that a typical capital inflow bonanza lasts three to five years (e.g. Reinhart and Reinhart (2015), Milesi-Ferretti and Lane (2005)). We have done extensive robustness checks on this window, going to as short as three years in advance and as long as eight years in advance in the case of COVID-19 shock.

using country$\times$year fixed effects. Such variables are unlikely to move at the same high frequency within a month like the policy responses to the risk-off shock. Our identification is solely based on country$\times$month variation, that is month to month changes for the months before and after the shock, within a country. Using country fixed-effects further controls for average structural differences between countries, such as institutional quality, that may be correlated with the use of preemptive policies.

Our key results are as follows. We find that the preemptive use of CFM and/or CFM/MPM policies has a strong negative effect on the increase in the UIP risk premium during both Taper Tantrum and COVID-19 shocks. That is, countries which had these policies in place any time during the window of five years prior to the risk-off shock, in a preemptive manner, experienced 30% lower interest rate premia when borrowing externally in local currency during the given risk-off shock. Using a triple difference-in-differences regression, we further show that the results arise from the vulnerable countries with high levels of FX debt, as predicted by the theory. These preemptive policies also lead to lower exchange rate volatility during the risk-off shocks. These effects are shown to follow from preemptive policies on capital inflows and not on outflows. As capital inflows are linked directly to domestic credit growth (e.g. Baskaya et al. (2017)), policymakers using CFMs on inflows can slow down capital inflows and credit growth related to these inflows. In fact using an indicator for the preemptive use of inflow and outflow CFMs combined does not lead to any significant result.

The paper proceeds as follows. Section 2 reviews the literature. Section 3 presents our data and descriptive statistics. Section 4 details our identification methodology. Section 5 presents our benchmark results. Section 6 presents robustness results. Section 7 discusses threats to our identification methodology. Section 8 investigates the impact of policies on the exchange rate volatility. Section 9 runs placebo shocks. Section 10 investigates the effect on vulnerable countries with high FX debt and Section 11 concludes.

2 Literature

In terms of the empirical literature on CFMs, a first wave of papers emerged during the late 1990s and early 2000s. This body of work was focused on the usage of CFMs in individual countries and largely concerned with its impact on the volume, maturity or composition of net capital flows. A second wave of research emerged after the GFC, reflecting the higher usage of these policies to counter capital flow surges in 2009-11. Although, this recent body of work has also considered the experiences of individual country cases that deployed CFMs (e.g. Jinjarak et al. (2013), Chamon and Garcia (2016), Alfaro et al. (2017)), it has most significantly focused on cross-country analyses of the usage and effectiveness of CFMs.[5]

The findings of this literature are mixed with few general conclusions. A key problem has been the difficulty in surmounting the simultaneity bias due to the higher usage of CFMs as a response to capital flows surges or retrenchments. The main findings thus far suggest the effectiveness of CFMs in achieving monetary policy independence and to some extent changing the composition of capital flows, while the evidence that CFMs lower the volume of capital flows or affect the real exchange rate is less convincing (see e.g. Klein (2012), Magud et al. (2011)).

Klein (2012) considers the impact of longstanding CFM policies ("walls") versus those of state-contingent policies ("gates") in slowing capital flows, but this approach is constrained due to the use of annual data which obscures high-frequency changes to these policies. Ostry et al. (2012) analyze whether countries which had MPMs and CFMs in place before the global financial crisis (GFC) fared better in terms of financial fragilities than those which did not, also focusing exclusively on annual measures of CFMs and MPMs and without controlling for policies during the GFC shock. There is also a literature that focuses on leakages and circumvention. Ahnert et al. (2018) find that while currency-based regulations on banks (a CFM/MPM) appear to be successful in mitigating the vulnerability of banks to exchange rate movements and the global financial cycle, banks partially shift this FX vulnerability to other sectors. Keller (2019) finds a similar result for Peru where, after CFMs are eased, banks lend more in FX to firms as the CFM policy had previously hindered banks' ability to hedge their FX exposures.

The empirical literature on foreign exchange intervention goes back farthest. An initial wave of research in early 1990s focused on testing the effectiveness of FXI in advanced economies (e.g. Dominguez (1990, 1998), Dominguez et al. (1990); Dominguez and Frankel (1993), Kaminsky and Lewis (1996), Sarno and Taylor (2001)). In recent years however, following the rapid accumulation

[5]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)), Bergant et al. (2020)).

of foreign reserves in emerging markets (EMs), and concerns about global imbalances and "currency wars", the focus of the empirical research has shifted to the usage of FXI in EMs (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) and Adler et al. (2020)). The focus of this work has been on assessing the ability of FXI to smooth exchange rate fluctuations in EMs, although it has also considered related questions such as the ability of intervention to limit capital flows (e.g. Ahmed and Zlate (2014), Blanchard et al. (2017), Gelos et al. (2019)).

Overall, the findings of the empirical literature are inconclusive regarding the impact of FXI on the level or volatility of the exchange rate, or on the persistence of this effect. Systematic findings have been difficult to distill in part due to significant differences in the definitions and measurement of FXI, the focus on one country at a time, and methodological differences in addressing the endogenous determination of exchange rate movements and FXI. As highlighted by Basu et al. (2020), an additional issue that can explain the absence of an empirical relation between FXI and exchange rates is the inappropriate use of these policies by some countries in terms of targeting the level of the exchange rate instead of its volatility. In relation to this literature, our work is most closely connected with Fratzscher et al. (2019) whose approach is to use actual intervention data, in lieu of FX reserves data, to proxy for FXI.

With regard to the literature on MPMs, prior to the GFC, financial stability was largely considered from a microprudential perspective with little focus on its systemic dimension. As MPMs have become an essential part of the policy toolkit since then, research on the effectiveness of MPMs to lower systemic risks and reduce procyclicality (of financial sector aggregates such as credit growth, bank leverage, and asset prices) has surged. Examples within this large literature can be broadly divided into those which analyze the efficacy of MPMs on credit growth and house price growth.[6] The consensus that appears to have emerged from this large literature is that MPMs have been effective in improving financial sector resilience, including by raising capital and liquidity buffers, lowering the expansion of credit and reining in house prices (Lang and Forletta (2020)). Methodological concerns, particularly measurement and endogeneity, that arise in this literature

[6] 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), Araujo et al. (2020)) and those which are more narrowly focused on the impact of macroprudential policies on reducing bank lending or bank leverage (e.g. Claessens et al. (2013), Drehmann and Gambacorta (2012), Bruno et al. (2017), Altunbas et al. (2018).

are analogous to those which arise in assessing the impacts of FXI and CFMs. One such concern is that the adoption of these policies may occur simultaneously with a credit or house price boom.

3 Data and Descriptive Statistics

Our empirical analysis drops hard pegs and only works with emerging markets and developing economies (EMDEs) with floats and managed floats.

To construct the UIP premium at the monthly frequency, we follow the literature and use data from Bloomberg, Consensus Economics and the IMF's International Financial Statistics (IFS). We choose the U.S dollar as the reference currency and fix our time horizon at 12-months. The 12-month deposit interest rates are from Bloomberg.[7] Spot exchange rates and exchange rate forecasts, both quoted nominally vis-a-vis the U.S. dollar, are from the IFS and Consensus Forecasts respectively. The surveyed forecasts are for the exchange rate 12-months ahead.

We compile data on FXI along the lines described in Fratzscher et al. (2019). These data are obtained using all emerging market central bank websites that make their FXI information publicly available. Daily actual intervention data were collected from ten countries while monthly data were obtained from two.[8] All FXI data were aggregated at the monthly level and normalized by monthly nominal GDP. The definitions of the reported FXI are not identical across central banks. Our approach is to treat the reported purchases or sales of FX as an intervention in the foreign exchange market. In some cases, FXI includes off-balance sheet operations (i.e. transactions in derivatives). Brazil, for example, includes forward and settled contracts in reported FXI data. Some monetary authorities, such as in Peru, explicitly include their transactions in FX swaps, while these are not included in others and a few do not clearly document whether they are included. The Colombian central bank also specifies whether FX transactions included options and unspecified discretionary interventions.

For MPMs, we draw from the iMAPP data of Alam et al. (2019). These data are reported at monthly frequency, covering the macroprudential policy measures taken by 134 countries between January 1990 and December 2016. The iMAPP provides information on 17 instruments used as

[7] In a very small number of cases, where deposit interest rates were missing, we use, first, the money market rates, and then, 12-month government bond rates.

[8] Daily FXI data are published for Argentina, Brazil, Chile, Colombia, Croatia, Georgia, Kyrgyzstan, Mexico, Peru and Turkey; while Azerbaijan and Bolivia publish monthly FXI data.

MPMs. For the purposes of estimation, we distinguish MPMs that are targeted purely to domestic financial aggregates ("Domestic MPM") from those which, regardless of their intent, may also serve to limit capital flows and are thus equivalently capital flow management measures (so-called "CFM/MPM"). We classify as CFM/MPMs instruments in the iMAPP which may affect capital flows, including all MPMs that specify a regulation on FX. Using the classification of the iMAPP, the CFM/MPMs are: limits on foreign currency (LFC), reserve requirements on domestic or foreign currency (RR) and limits on net or gross open foreign exchange positions, exposures or funding (LFX). In robustness tests, we consider an expansion of this definition to include other measures which may also have a foreign currency element including Liquidity Measures, Taxes, and measures applied to Systemically Important Financial Institutions (SIFIs).

Our measure of "Domestic MPMs" includes countercyclical capital buffers, requirements for banks to maintain a capital conservation buffer, capital requirements for banks, a limit on leverage of banks, loan loss prevention requirements, limits on the growth or volume of aggregate credit, loan restrictions, such as loan limits and prohibitions, limits on loan-to-value ratios, on debt-service-to-income ratios, and on loan-to-deposit ratios, penalties for high loan-to-deposit ratios, and "Other measures" (e.g. stress testing, restrictions on profit distribution).

A general problem in the literature is the measurement of CFMs. CFMs can be on capital inflows or on outflows and may target a variety of asset classes (bonds, equity, direct investments etc.). Most datasets on CFMs draw on the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (e.g., Chinn and Ito (2006); Quinn et al. (2011); Fernández et al. (2016)). Many of these datasets, particularly on CFMs, aggregate over different measures; for example, they may combine reserve requirements with approval requirements on capital inflows. Capital account restrictions may further differ in the direction of the policy (i.e., restrictions on capital inflows may be in offsetting directions). In the case of CFMs, a preemptive CFM on non-resident inflows may be imposed simultaneously with an easing of CFMs on resident outflows.

To capture all this granularity, for "CFMs", we use a new dataset from Binici and Das (2020) and Binici et al. (2020), which draws on a detailed reading and classification of various measures in the IMF Taxonomy of Capital Flow Management Measures (2019), covering the CFMs undertaken by 25 emerging markets. These data can be traced back at most to 2008 and are available through the third quarter of 2019. As a second source, we use Aizenman and Pasricha (2013) obtaining similar results that are available upon request.

Our definition of a "preemptive" policy is as follows. If a policy was put in place prior to a risk-off shock in any month during the previous 5 years of the shock, we define a country-dummy that takes the value of 1 to indicate the use of a preemptive measure by that country before the risk-off shock. If there was no such policy in that time period, the dummy variable takes the value 0. The countries using preemptive measures (treatment group) are therefore defined differently for the Taper Tantum and COVID shocks. For each risk-off episode, we create five measures of preemptive policy implementation for each of the following: Domestic MPMs, CFMs on inflows, CFMs on outflows, CFMs (without distinguishing inflows from outflows) and CFM/MPMs. In each case, the preemptive policy measure is defined to be in place in two complementary ways: (a) there is a net tightening action in *at least* one instrument; and (b) the total number of tightening actions (across instruments) exceeds the total number of easing actions. We use both these dummies per the "aggregation problem" described earlier. This approach allows us to focus on individual policies, hence avoiding mixing policies of widely different nature or scope, as well as aggregate measures of the net effect, i.e. whether the policies on net are tightening or loosening. The dummy variables for CFMs on inflows, CFMs on outflows, all CFMs and CFM/MPMs that are used "during the shock" are analogously defined as dummy variables but their timing is in reference to the quarter in which the shock takes place, rather than the preceding period as we did for the preemptive policies. Note that all these dummies are to separate the countries using the policies preemptively and/or during the risk-off shock. The month-to-month time variation that we identify of off comes solely from the risk-off shock.

To illustrate, in the case of the Taper Tantrum which occurred in the second quarter of 2013, the dummy variable that designates the country as an implementer of the preemptive policy for the "aggregate" preemptive Domestic MPMs takes the value one if the total number of tightening actions on all the 11 domestic MPM measures together exceeded the number of easing actions on these measures between first quarter of 2008 and the first quarter of 2013, and zero otherwise. If we focus on the individual measure, then the dummy is set equal to one if there is tightening in any one of those 11 measures in that time period and zero otherwise.

3.1 Descriptive Statistics

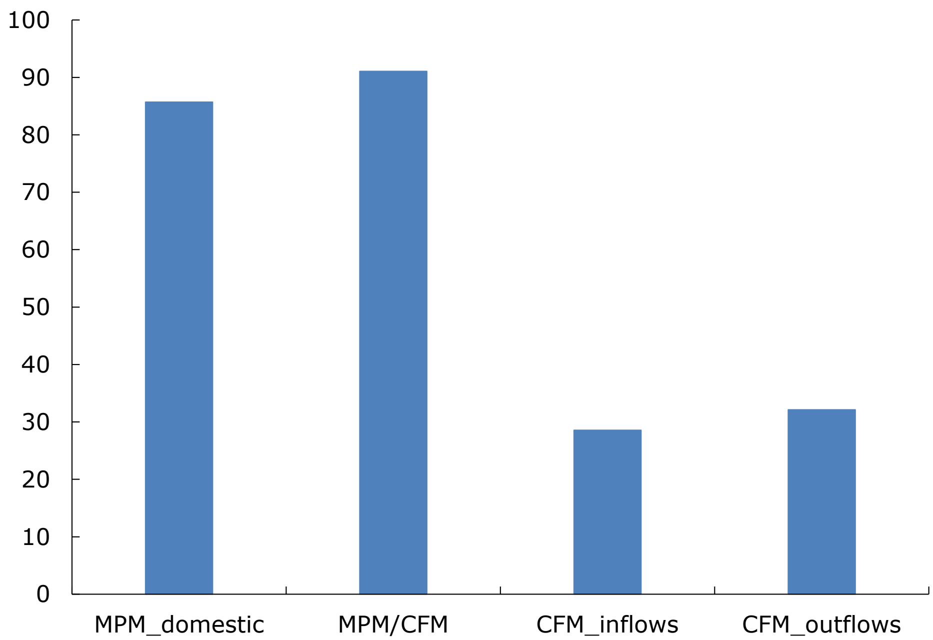
We illustrate some features of our data in Charts 2-3.

Chart 2 shows the usage of domestically-targeted MPMs ("MPM-Domestic"), CFM/MPMs and CFMs during 1996-2019, represented as the fraction of countries in our sample of 56 emerging markets that undertook these policies at least once during this period. We separately show the use of CFMs on capital inflows from CFMs on capital outflows. There are certain features that stand out. First, the usage of MPMs was high, with more than 80 percent of our sample implementing domestically-oriented prudential measures and over 90 percent implementing CFM/MPMs at least once in this peroid. It is well known that emerging markets had significantly higher usage of MPMs relative to advanced economies prior to the global financial crisis, and this is apparent in the data. CFM usage, in comparison is lower, and were used by approximately one-third of our sample for both inflows and outflow CFMs. In part, this reflects that our sample of emerging markets includes those in the European Union whose member obligations include the free flow of capital (except in extenuating circumstances).

Chart 3 shows the time series usage. As coded in the iMAPP database, each tightening action in a country-quarter pair is assigned the value "1", each easing action the value "-1" and country-quarters with no actions receive the value 0. Chart 3 shows the average usage of MPMs by country-quarter. Positive values indicate net tightening, while negative values indicate net easing in a given quarter. The time series evidence indicates that (a) domestic MPMs and CFM/MPMs generally move in the same direction; (b) the average usage of MPMs has trended up since the global financial crisis; and (c) since 2008, EMs, on average, have largely undertaken net tightening MPMs.

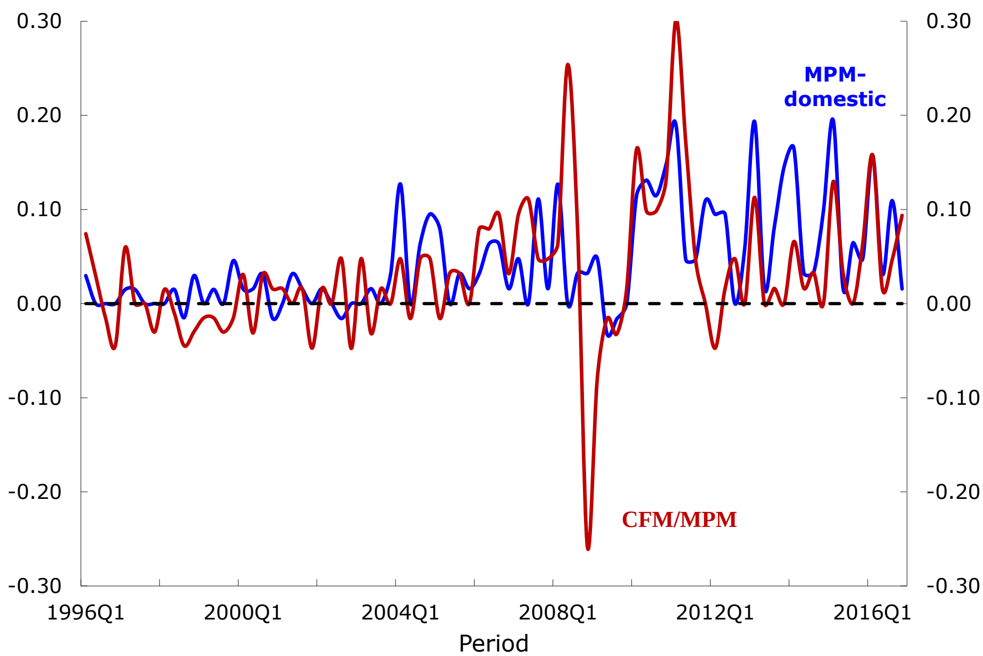
Table 1 presents summary statistics. It is clear that there is quite a bit of variation in our variables. The difference between the actual FXI variable versus FX reserves is noteworthy. In particular, both variables are in percent of GDP and the actual FXI variable is noticeably smaller than the stock of FX reserves. The Appendix Tables presents the set of countries in our sample together with detailed definitions of MPM and CFM measures.

Chart 2. MPMs, CFM/MPMs and CFMs Usage in Emerging Markets, 1996-2019 (percent)



Source: iMAPP database, Binici, Das and Pugacheva (forthcoming) and IMF Staff Reports. Notes. The figure shows the percent of the 56 Emerging Markets in our sample that used MPMs at least once in 1996-2016 and CFMs at least once in 1996-2019. The countries in the sample are Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Egypt, Georgia, Ghana, Honduras, Hungary, India, Indonesia, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Malaysia, Mexico, Moldova, Morocco, Nicaragua, Nigeria, North Macedonia, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, Saudi Arabia, Serbia, South Africa, Sri Lanka, Tanzania, Thailand, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Zambia.

Chart 3. Time-Series Variation in MPMs and CFM/MPMs, 1996-2016



Source: iMAPP database Notes. The figure shows the average country-quarter value of policies, with positive values indicating average net tightening and negative values average net easing. Countries are those listed above in Chart 1 footnote.

4 Identification

Before we present our identification methodology, let us first define our main outcome variable which is the UIP wedge. The UIP condition can be expressed as follows (for each country at time t). We follow Kalemli-Ozcan (2019) and Kalemli-Ozcan and Varela (2021) to calculate the UIP premium for emerging markets.

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

where t denotes time and k is the month-horizon considered. S_t and $E_t(S_{t+k})$ are the spot and expected exchange rates respectively, k-months-ahead. The exchange rate is denominated in units of local currency per U.S. dollar, such that an increase implies a domestic depreciation. i_t and i_t^* are the domestic and U.S interest rates with the same time of horizon of the expected exchange rate. We take logs and express the UIP deviation as:

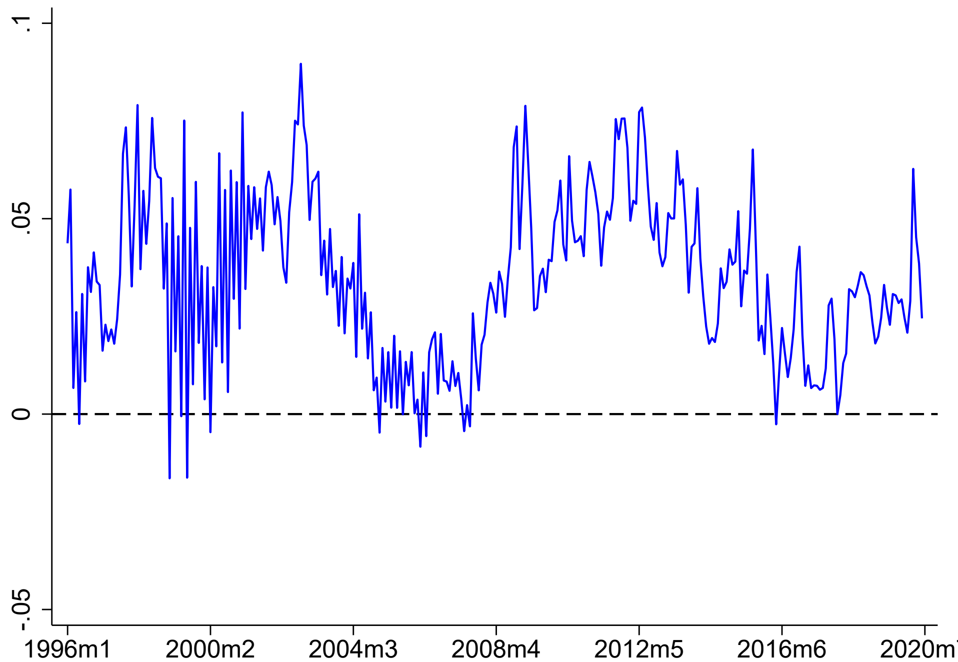
$$\lambda_t \equiv \tilde{i_t} - \tilde{i_t}^* + \tilde{s_t} - \tilde{s_{t+k}}^e, \tag{2}$$

where λ_t denotes the UIP deviation with respect to the U.S. dollar and k is the time horizon considered in the UIP condition. $\tilde{i_t}$ denotes $log(1 + i_t)$, $\tilde{i_t^*}$ denotes $log(1 + i_t^*)$, $\tilde{s_t}$ denotes $log(S_t)$, and $\tilde{s_{t+k}}^e$ denotes $log(E_t(S_{t+k}))$.

Under this specification, λ_t equal to zero implies that the UIP condition holds and that interest rate differentials and expected exchange rate movements offset each other. Otherwise, there are expected excess returns.[9] In particular, $\lambda_t > 0$ implies that there are profitable returns from going short in the U.S. dollar and long in the domestic currency, in expectation. We calculate the UIP premium over a 12-month horizon. We plot the UIP premium for the average country in Chart 4. As in Kalemli-Ozcan and Varela (2021), we find persistent UIP premia in EMs, where the UIP deviations are nearly always above 0 with an average expected excess return of 3 percent (as also

[9] Notice that we write and calculate the UIP condition in expectations as in the textbook model. Most of the literature uses realized exchange rates and hence calculate realized excess returns that can be positive or negative. The textbook model argues that an investor who is indifferent between returns in two different currencies in expectation (UIP holds) must be either a) hedging the currency risk, or b) not expecting big movements in the exchange rate during the duration of the contract. There is not any evidence in the literature on which explanation makes UIP to hold in expectation in AEs. In EMs it does not hold anyway either with expectations or with realized exchange rates, see Kalemli-Ozcan and Varela (2021).

Chart 4. UIP Premia in EM, 1996-2019



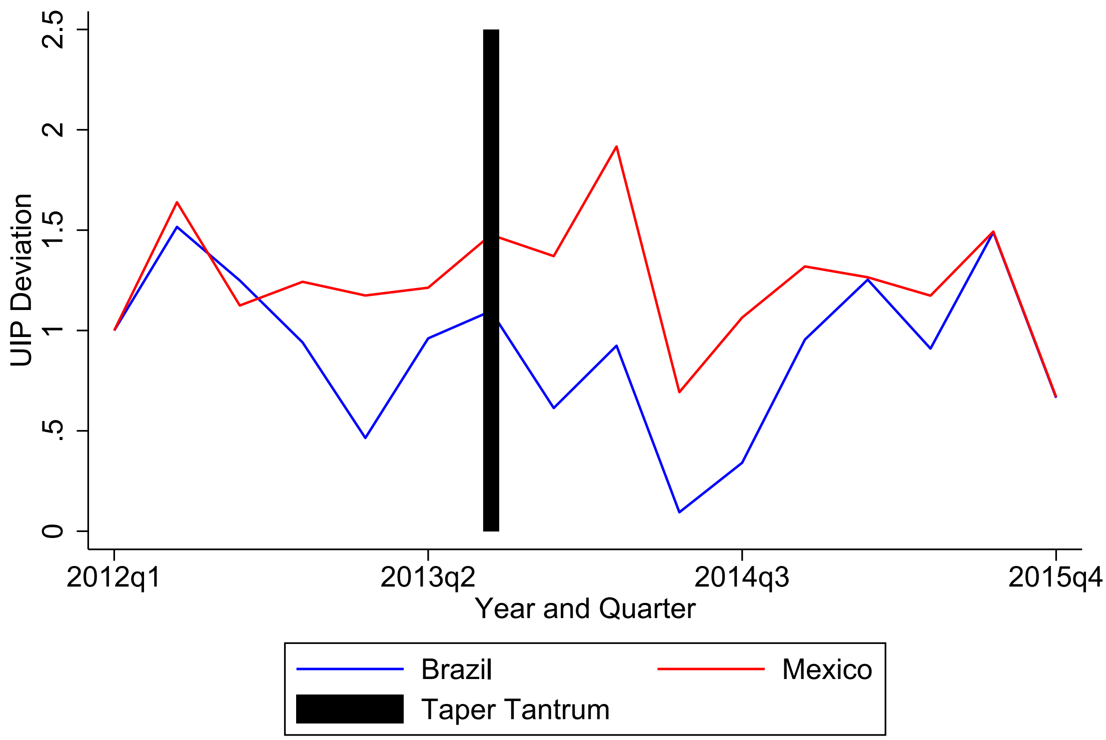
shown in Table 1).

We calculate the UIP premium for every country and regress on an interacted term of shocks and policies in a difference-in-differences regression with country and time (month) fixed effects, as shown in equation (3). Notice that the direct effect of the policy is absorbed by the country fixed effect, α_c, as the preemptive risk-off shock (common to all countries) is absorbed by the time fixed effect, ω_t. Thus, the coefficient β in equation (3) captures the differential effect of the shock on countries with and without preemptive policies:

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

In order to visualize our identification, we present the following thought experiment. Brazil imposed the IOF tax (a CFM on capital inflows in 2008) and expanded its scope significantly to cover different types of portfolio flows in 2012. Note that from the perspective of the Taper Tantrum, these taxes (which were only partially unwound by 2013Q2) are preemptive CFM policies.

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



Source: Authors' Calculations

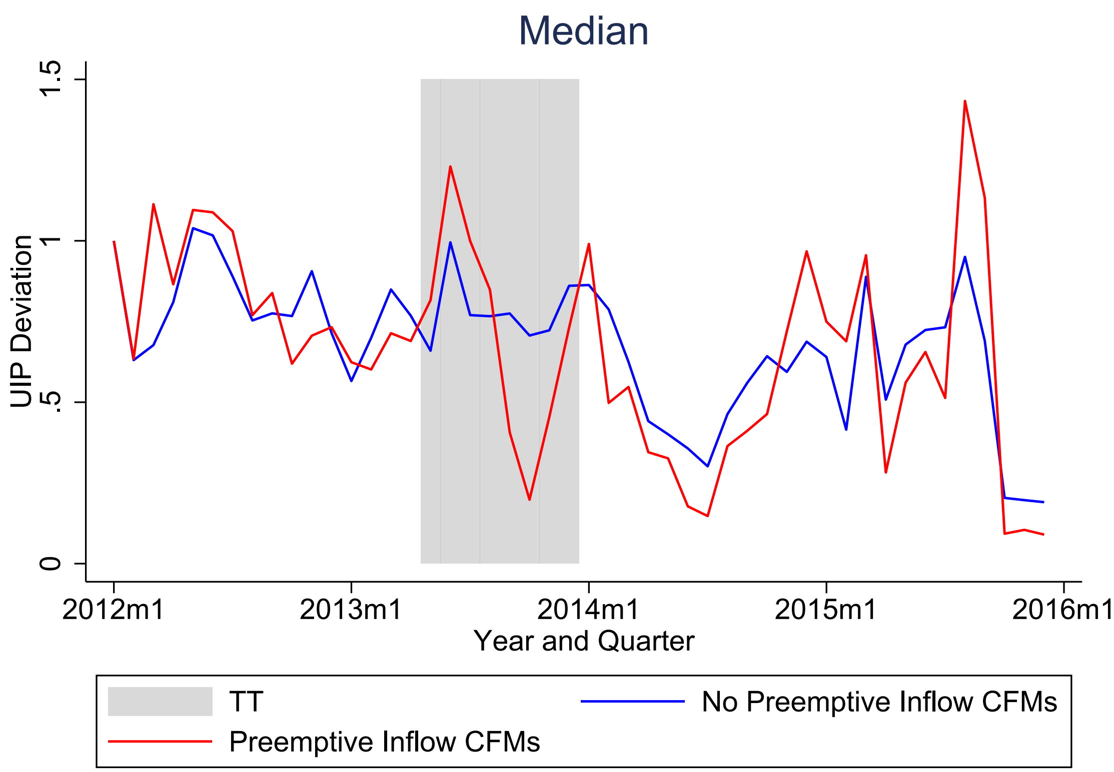
Compared to Brazil, Mexico did not have any CFMs at the time, but did employ domestic MPMs.[10] We normalize UIP deviations of both Mexico and Brazil to 2012Q1 and plot the evolutions in Chart 5, focusing on the dynamics around the Taper Tantrum shock of May 2013.

As the figure clearly shows, UIP deviations (the external finance premia for Mexico and Brazil) evolved very differently during the Taper Tantrum shock, during which Brazil had a much lower cost of external finance relative to Mexico, even though they were both subject to the same exogenous risk-off shock. This is the key insight of our identification methodology. Our empirical exercise performs this experiment for many more countries in the DD regression framework which permits us to further control other policies employed during the shock along with country and time fixed effects. Chart 6 shows the same pattern for the median control and treatment country.

Table 2 shows a list of our treatment and control group of countries, where we tabulate separately the countries that put preemptive CFM on inflows versus outflows. As we define the "preemptive"

[10]Specifically, they tightened requirements for banks to maintain a capital conservation buffer in 2013Q1. After the Taper Tantrum shock, they further tightened minimum capital requirements for banks in 2014Q4 and liquidity coverage ratios in 2015Q1. The only other measure that they implemented before the Taper Tantrum shock was the stress testing of banks in Q4 of 2012.

Chart 6. Preemptive CFM and UIP Risk Premia: Treatment vs. Control Countries

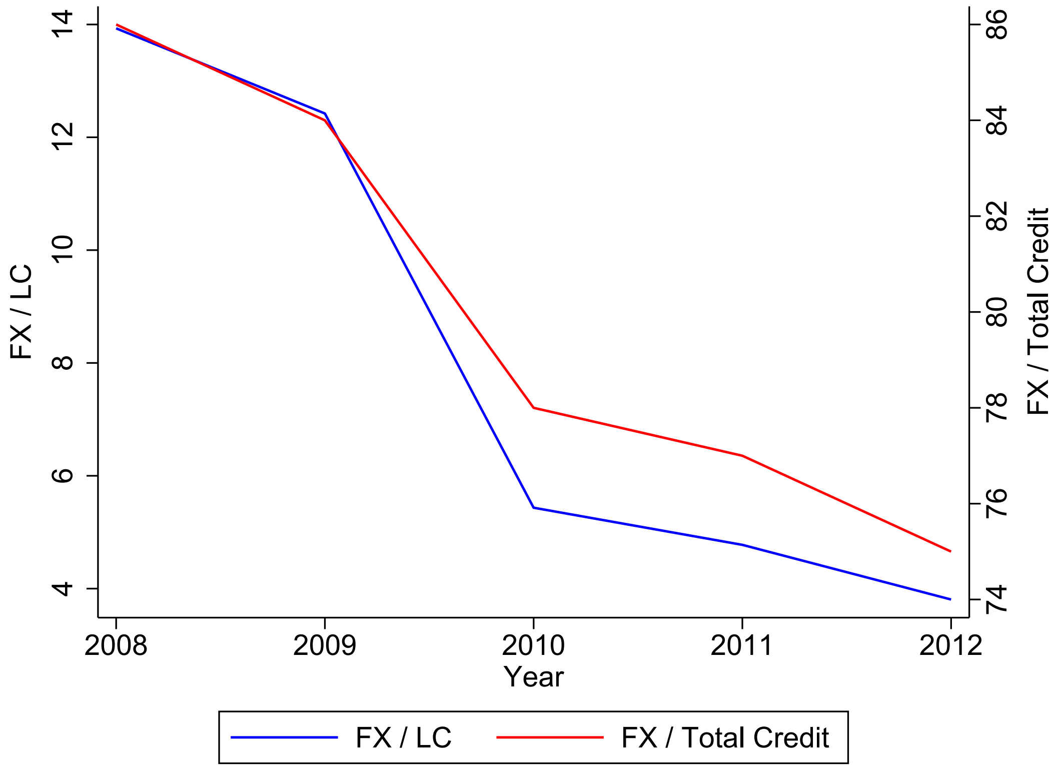


period to be 5 years before each shock, the treatment group of countries change for TT shock and COVID shock as we show.

Basu et al. (2020) predicts that preemptive policies like IOF tax in Brazil, will lead to a decline in FX debt. As shown in Chart 7 below, this is exactly what happened, on average, in our treatment group of countries for the Taper Tantrum shock. The ratio of FX/LC debt declined from 15 to 5 for the median treatment country and the ratio of FX to total debt decline from almost 90 percent to 76 percent. The size of the FX debt is not small in our treatment group of countries; it averages around 12 percent of GDP.

We next present our results from the systematic empirical analysis.

Chart 7. FX and LC Portfolio Debt Flows



5 Empirical Analysis

5.1 Benchmark Results

Table 3 shows our benchmark results for the Taper Tantrum shock. This is a well-accepted exogenous risk-off shock, initiated by then Federal Reserve Chairman Ben Bernanke's speech in May 2013. A first important observation is that preemptive CFM/MPMs and preemptive CFM on inflows both have negative effects on the UIP premium during the shock (columns (2) and (4)). That is, countries with such policies in place before May 2013 observed lower external finance risk premiums during the Taper Tantrum shock of May 2013. The preemptive domestic MPMs and CFM on outflows, on the other hand, both have a positive effect on the UIP premium. That is, countries with these policies in place experienced larger increases in their premia. When we use all policies together in column (6), these results hold up.

Our interpretation of the positive effect of the preemptive capital outflows on UIP premia is one of a "reputation effect" where the presence of preemptive CFMs on outflows lead foreigners to demand a higher premium from these countries during the Taper Tantrum shock. While CFMs on inflows are generally applied to nonresidents, CFMs on outflows are applied quite often on residents (comprising financial repression). When preemptive CFMs on outflows are applied to residents, it may signal to nonresident investors that they can be subject to outflow restrictions later if the shock is severe enough, leading them to demand a higher lending premium during the shock. The key here is whether or not preemptive CFMs can address the financial stability risk in advance of the shock and hence lower the premia during the shock. Any preemptive CFM that slows down capital inflows by nonresidents and lowers accumulation of FX debt in an economy will achieve this and most preemptive inflow CFMs and CFM/MPMs are designed for this purpose. If preemptive outflow CFM on nonresidents had the same design, that is, taxing the net inflow (inflow minus outflow by nonresidents) by nonresidents before the shock, these measures will also help to reduce the premia during the shock. However, if the preemptive outflow CFMs are mainly on domestic residents, they will not address the financial stability risks created by capital inflows by foreigners.

Preemptive CFMs on inflows are found to have a negative effect on the premium even when used together with other preemptive policies, as seen in column (6). In terms of the economic significance, the UIP premium is 0.03-0.06 percentage points lower in countries with preemptive policies (CFM/MPM and CFM on inflows). This represents a 30 percent lower external finance premium in those countries relative to the average premium, which is an economically large effect.

The positive effect of preemptive domestic MPMs on the premium during the shock might be capturing characteristics of countries that are slow moving and correlated with domestic credit growth (and hence lead to the use of preemptive MPMs), such as fiscal policies and current account deficits. To account for such effects, in column (7), we add country×year effects. We lose significance on preemptive CFM/MPM policies but our main result (of a negative effect of preemptive CFM policies on inflows) remains intact. Notice that this is a very restrictive specification under which all sources of country differences and policies that vary at an annual level are absorbed into these country×year fixed effect.

Table 4 repeats the same exercise for the COVID-19 shock. The top panel keeps the definition of "preemptive" policies as policies five years prior to 2020, as in Table 2. The bottom panel extends this window as it is possible that preemptive policies put in place in the wake of capital inflows after the 2008 crisis were still in place before the COVID-19 shock of 2020 so this panel uses a window of 12 years to define preemptive policies starting in 2008.

Our results are very similar to that in Table 3 with few exceptions. When we use the five year window in the top panel, we now have no effect from domestic MPMs. For the longer window of bottom panel, all preemptive policies affect the external finance premia during the COVID-19 shock negatively, with the exception of preemptive CFMs on outflows as before, which still has a positive impact on the premium. As the COVID-19 shock is both an external and domestic shock, the coefficient on domestic MPMs can be interpreted as indicating that prudential measures to rein in credit growth before the shock helped to reduce the external finance premia during the COVID-19 shock. The economic impact is similar to the one experienced under Taper Tantrum, which lends further credibility to the significance of our results as the economic magnitude of the effects is not volatile conditional on the shock.[11]

6 Robustness Analysis

6.1 Broader Preemptive Measures

We consider the robustness of our results to a wider definition of CFM/MPM measures. The motivation for this exercise is that, in addition to those CFM/MPMs that clearly have an FX dimension and thus may simultaneously affect capital flows and mitigate risks to the financial system, other domestically-oriented MPM measures may also affect capital flows. For example, measures targeted at global SIFIs may result in the cross-border movement of capital due to the inherent cross-border nature of their financial intermediation. Macroprudential measures taken to mitigate systemic liquidity risks or funding risks, such as regulations on liquidity coverage ratios, liquidity asset ratios and funding ratios, may also affect cross-border flows by altering domestic firms' demand for foreign capital. Taxes or levies applied to certain transactions, such as stamp duties or capital gains taxes, may similarly act as both an MPM and a CFM.

In Table 5, we consider an expanded definition of CFM/MPMs in which we add Liquidity Measures, Taxes and measures applied to SIFIs to our previous definition. We correspondingly

[11] As an alternative to single event risk-off shocks of Taper Tantrum and COVID-19, we also use monthly fluctuations in the VIX index, a well-known proxy for global risk aversion and foreign investors' risk appetite. The VIX is known to be a leading driver of capital flows to EMs (e.g. Rey (2013)) affecting domestic credit growth and loan rates in EMs (e.g. Giovanni et al. (2017)). These results are available upon request.

remove these additional measures from the "Domestic MPM" definition. Comparing Table 5 to Table 3, it is clear that our results are robust to the wider definition of CFM/MPMs. Indeed, the magnitude and significance of the estimated coefficients of both CFM/MPMs as well as other covariates are largely unaffected. We take these results as further evidence of the robustness of our measure of CFM/MPMs.

6.2 Granular Preemptive Measures

A second test of the robustness of our results is to determine whether different instruments of CFMs act similarly on UIP deviations. In particular, while Table 3 can be interpreted as the average effects of CFMs on inflows and CFMs on outflows on UIP premia, by considering different instruments we can examine whether those results are driven by the impacts on UIP premia of some instruments that dampen the impact of other instruments in the opposite direction.

Exploiting the detailed disaggregation of CFMs by instruments in Binici et al. (2020), we extend the results in Table 3 by separating both CFMs on inflows and CFMs on outflows into nine distinct instruments. That is, while the results in Table 3 define preemptive CFMs when there is an overall net tightening in a quarter, in Table 6 our results define preemptive CFMs on inflows (and similarly on outflows) when there is a net tightening in each individual instrument. One limitation of this exercise is that for certain instruments there is a limited number of observations; thus, such instruments are dropped from the estimated regressions (note that this is why not all instruments are shown for both CFMs on inflows and CFMs on outflows in Table 6).

The results of this exercise are in Table 6. We highlight three main findings. First, the estimated coefficients on all but one instrument used as CFMs on inflows are negative, which reinforces the finding in Table 3 that CFMs on inflows on average lower UIP deviations. However, among these inflow CFMs, only reserve requirements (column 6) and Other instruments (column 9) are statistically significant, suggestive that the results in Table 3 may be arising from the impact of just a few instruments. Second, we observe that for CFMs on outflows, every instrument in Table 6 bears both a positive and statistically significant coefficient. This includes approval requirements (column 1), bans (column 2), limits (column 4), limits used in conjunction with approval requirements (column 5), surrender and repatriation requirements (column 7), and Other Instruments (column 9).

The consistency of this finding across a range of instruments used as preemptive CFMs on outflows is striking and reinforces our previous finding, that there is likely a reputational cost from restricting outflows. Finally, we note that the estimated coefficients on Domestic MPMs and CFM/MPMs are virtually identical across every column in Table 6, and moreover, that they match the estimated coefficients in Table 3. Overall, we take these results as both showing robustness of the impact of preemptive inflow CFMs on UIP deviations, as well as providing new evidence on their impact across instruments.

7 Threats to Identification

A key threat to our identification strategy is an omitted variable that varies at the country-month level and that is correlated with our key interaction term (the preemptive policy of a given country $\times$ the shock that affects all the countries). The main suspects for such variables are policies employed by the countries at the time of the shock in order to respond and smooth the effects of the shock. For example, Chart 8 shows the country policy responses in our data to both the TT and COVID-19 shocks and it is clear that, apart from easing existing MPM policies, the most typical "new" policy used at the time of the shock is FXI. Of course, another policy that can be used during risk-off shocks is monetary policy. We find that, contrary to conventional wisdom, monetary policy was not tightened but rather appears to have been loosened by most countries during both risk-off shocks as shown in Chart 9.

Motivated by these observations, we control for FXI and monetary policy during the shock. We also control for easing of existing inflow CFMs and tightening of outflow CFMs during the shock. We use both FXI reserves to GDP and actual FX intervention data that we have manually collected to pin down the intervention done during the TT shock. We focus only on TT shock here as policies undertaken in response to COVID are still ongoing.

As shown in Table 7, our key result of the negative effect of preemptive CFMs (and CFM/MPMs) on inflows on UIP premia stays intact. Both FX reserves and actual FXI also have a negative effect on the premia even though these policies employed during the shock. Interestingly, monetary policy tightening has a positive impact on the UIP premia. This result is consistent with the results in Kalemli-Ozcan (2019), where in the face of shocks to risk premia, monetary policy tightening can

Chart 8. Policy Responses During Risk-Off Shocks

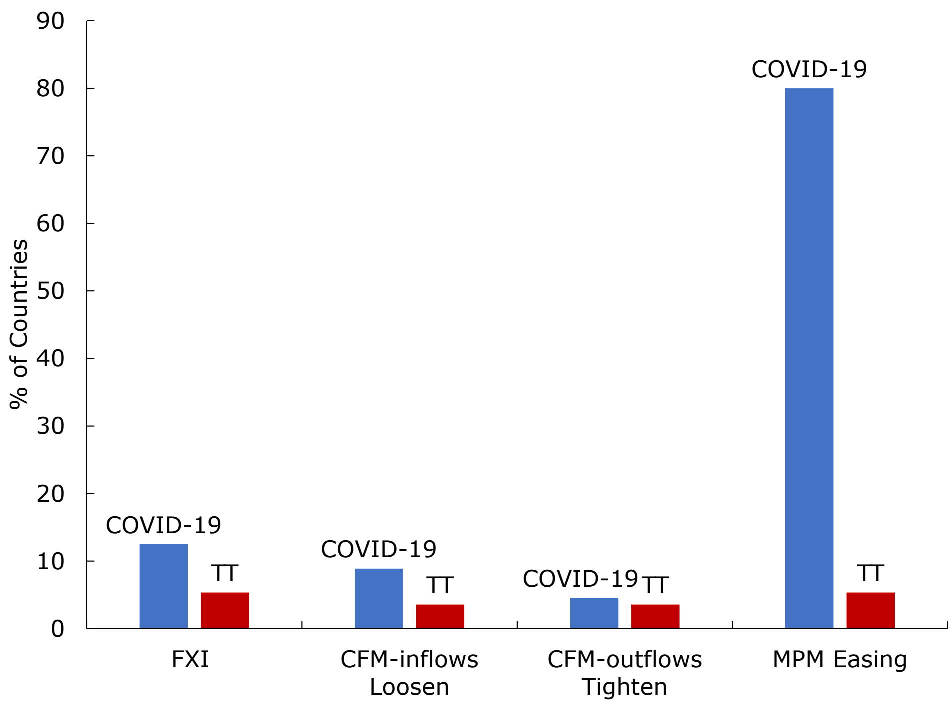
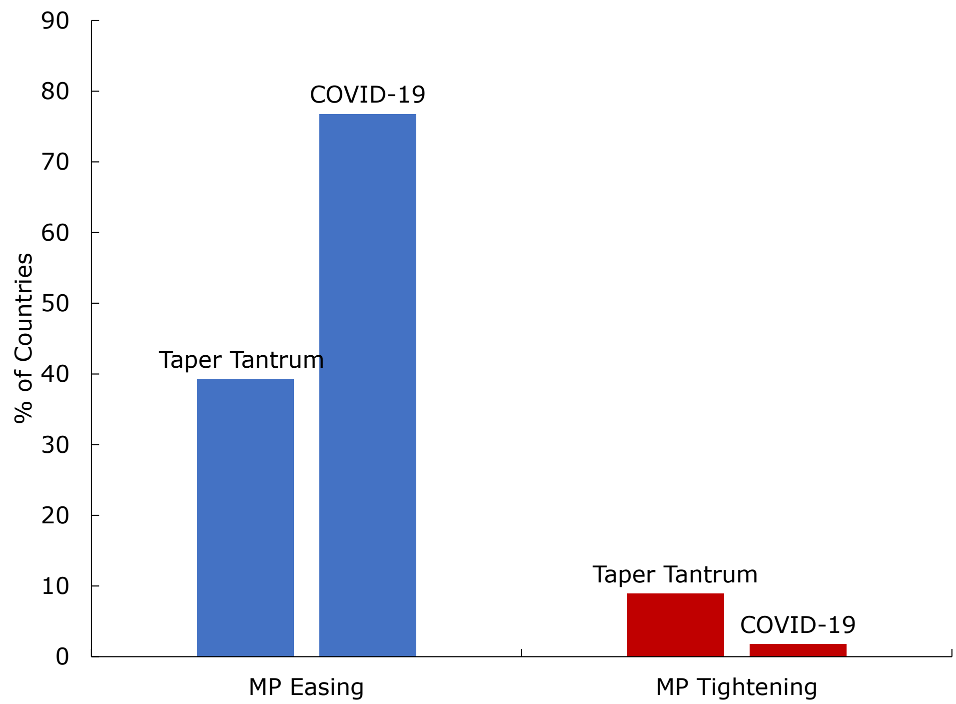


Chart 9. Monetary Policy Responses During Risk-Off Shocks



be ineffective and counterproductive by raising external finance premia. Although only around 10 percent of our countries tightened monetary policy during Taper Tantrum, these countries can still drive the result if the size of the tightening is large.[12] Loosening of preexisting CFMs on inflows and/or tightening CFMs on outflows also have a positive impact on UIP premia. This variable combines measures of loosening existing inflow CFMs on foreigners and tightening outflow CFMs on both domestics and foreigners as all are done during the shock as a response to the shock; thus, the estimated coefficient reflects the combined impact of these policies. The positive coefficient indicates that their net effect is to raise the UIP premium, perhaps reflecting the reputational cost from tightening outflow CFMs. Nevertheless, this result confirms that, employing preemptive policies to slow down capital inflows by foreigners and reduce the accumulation of FX debt helps much more to reduce financial stress as opposed to employing CFM policies to stop outflows during the shock.

8 Exchange Rate Volatility

In this section, we expand on our main results to consider the effects of preemptive policies and policies employed during Taper Tantrum shock on exchange rate volatility and exchange rate depreciation. Since the widely different scales of bilateral exchange rates vis-à-vis the US dollar make it difficult to compare the implied volatility of these exchange rates across countries, we first standardize each bilateral exchange rate by setting its value in 2008 January at 100. We then calculate the volatility of this index of the exchange rate over 8-month rolling windows, and the log change in this index of the exchange rate as a measure of the realized depreciation.

Starting with the results on volatility, as shown in Table 8 column (2), countries which had preemptive CFM and CFM/MPM on inflows in place experienced lower volatility during the shock than countries which did not. The estimated coefficient on preemptive inflow CFM is about -2, which is half of the sample mean volatility of the indexed exchange rate. It suggests an economically meaningful impact. The estimated coefficient on preemptive CFM/MPMs however, is statistically insignificant. Preemptive domestic MPM policies also contributed to lowering volatility during the

[12] Consistent with this argument, we do not find any significant effect of monetary policy on the UIP premia when we use the COVID-19 shock instead of the Taper Tantrum shock, although the policy action data for the COVID-19 shock remains incomplete at the time of our writing.

shock although, as with CFM/MPM policies, have economically small and sometimes statistically insignificant impact. By contrast, countries which used preemptive CFMs on outflows experienced an increase in exchange rate volatility of about half the mean volatility, consistent with the notion that foreigners perceived higher risk in such countries.

The use of CFMs during the shock, instead of preemptively, also increases exchange rate volatility. These results are consistent with our earlier results on the destabilizing effects of these policy tools on the UIP premia. Recall that CFMs used during the shock can, in principle, loosen inflow CFMs on nonresidents while tightening outflow CFMs on residents and hence its net effect on external premia is ambiguous. The use of monetary policy during the shock also raises exchange rate volatility, whereas the use of FXI has no significant effect. The result on monetary policy is consistent with the findings of Kalemli-Ozcan (2019), who shows that emerging markets with managed floats suffer more than pure floats during a risk-off shock when monetary policy is used to dampen the exchange rate volatility, as flexible exchange rates can absorb risk premia shocks.

In terms of the exchange rate itself, we estimate a statistically significant impact in column (4) of FXI on appreciating the local currency during the shock, consistent with our prior. However, the estimated impact is extremely small. Employing preemptive outflow CFMs leads to deprecation during the shock, most likely, again, due to a reputation effect linked to the measurement issue on this variable that we have talked above. As preemptive outflow CFMs on domestic residents cannot target financial stability issues linked to foreign inflows, it is not uprising that even they are used in a preemptive manner they do not deliver a smoothing effect during the risk-off shock.

Overall, the results of this section indicate that preemptive CFM/MPMs and inflow CFMs work to reduce exchange rate-related stress during a risk-off shock, which reduce external finance premia as shown in our earlier results.

9 Placebo Shocks

Our results thus far confirm that in line with the predictions of the theoretical models, preemptive CFM and MPM policies lower UIP deviations during risk-off shocks. As our empirical strategy focuses on two shocks which are widely accepted as global risk-off shocks, there is reason to believe that the estimated impacts are not spurious but rather reflect a causal relationship. However, in order to validate these findings we go a step further to rule out that the use of preemptive policies is coincidentally correlated with UIP deviations. One might wonder, for instance, whether countries with preemptive policies are intrinsically different from other countries in ways that generically lower UIP deviations in all periods and not just during risk-off shocks.

To rule out this alternative hypothesis, we consider the impact of preemptive policies on UIP deviations in normal periods. That is, we construct dummy variables of "placebo shocks" for periods that were not global risk-off shocks and re-estimate our baseline regression model. The chief challenge in this exercise is in identifying such periods and their duration. In particular, while global risk-off episodes are well identified, periods outside these episodes are not necessarily normal periods for the universe of EMs. For example, the acute phase of the European sovereign debt crisis in 2012-13 was very plausibly a risk-off episode for EU emerging market nations (which have high trade and financial exposure to southern eurozone member states) but not for EMs more broadly. In such cases, pooling all EMs together can result in a negative average impact on UIP deviations resulting from the countries where a risk-off episode was in place. Another example is the Chinese stock market turbulence in 2015. Although this episode not conventionally treated as a global risk-off shock, it may well may well have been one in practice given the signifiant number of EMs with which China has deep economic and financial linkages.

We test this hypothesis by estimating our baseline model with several "placebo shocks" between 2009 and 2017 and report the results in Table 9. For comparability with our main results, we retain the definition of the "preemptive period" as the preceding 5 years before the placebo shocks.[13] Despite the wide range of periods we test, we find that preemptive CFMs on inflows have no negative impact on UIP deviations during placebo shocks other than the 2015 shock, shown in column 2. We conjecture that 2015 normalization episode was for all practical purposes akin to a global risk-off shock for the reasons discussed above, and thus countries with preemptive policies in place experienced lower UIP deviations just as in the Taper Tantrum and Covid-19 shocks. Preemptive CFMs on outflows are positive and significant in certain cases, which is consistent with our earlier explanation that such measures lead investors to demand a higher risk premium. To summarize, the results in Table 9 provide evidence that our main results are not spurious but rather

[13]For placebo shocks in earlier periods, this requires using the Aizenman-Pasricha CFM data for preemptive policies as the coverage of our other CFM data begins at best in 2008 and in several cases not till 2010 or later.

rather that risk-off shocks indeed lower the UIP deviations in countries that used preemptive CFM and CFM/MPM policies.

10 Vulnerable Countries

The theory suggests that where FX-denominated debt (before the shock) is larger, the preemptive use of CFMs or CFM/MPMs will lower FX-denominated debt relative to its counterfactual level, and lead to a larger reduction in UIP deviations. That is, following a risk-off shock, countries with higher FX-denominated debt which imposed preemptive policies will have lower UIP deviations relative to countries with lower FX-denominated debt and relative to countries which did not use preemptive policies. This prediction can be tested by a straightforward extension of the baseline regression model, running a triple difference-in-differences regression, to include interactions of each of the variables in Table 3 with the level of FX-denominated debt prior to the shock.

We estimate this regression and report the results in Table 10. Analogous to our definition of the preemptive window, we use the average FX-denominated debt of households and the non-financial sector (in percent of GDP) in the 5 years prior to the shock in the regressions. Before discussing the results, we note two empirical limitations of this test. First, FX-denominated debt, which we derived from the BIS, are available for only 8 countries compared to 43 in the baseline regressions, reducing our estimation sample by approximately three-fourths of its original size. Second, the FX-denominated data are available only since 2013. This implies that we can test this hypothesis for the Covid-19 shock but not Taper Tantrum.

Overall, the results we obtain remain supportive of our main findings. First, to assess how FX-denominated debt affects UIP deviations we sum the estimated coefficients of the triple interaction with the interaction of the shock with FX-denominated debt. We find this to be negative in both columns. This suggests that consistent with our priors, the higher was average FX-denominated debt prior to the Covid-19 shock, the larger was the decline in UIP deviations for the countries using preemptive policies. To assess how the use of preemptive policies differentiallyy affected countries by the level of FX-denominated debt we compare the coefficients of the triple interaction and the interaction of the preemptive policy and FX-denominated debt, evaluating at the sample mean of FX-denominated debt (0.15). For both preemptive MPM policies and preemptive CFM/MPM policies, the impact is negative, respectively -0.006 and -0.07, consistent with our earlier results and the theoretical predictions. For countries with higher than average FX-denominated debt, the UIP deviations would be even more negative than these estimates, while for countries with lower than average FX-denominated debt, they would become smaller and potentially even positive for very low levels of FX-denominated debt.

11 Conclusion

An influential body of theoretical work has identified a role for the use of preemptive policies, including capital flow management and macroprudential measures, as a second-best policy response when conventional first-best stabilization policies cannot achieve both domestic output stabilization and smooth the effect of external shocks on domestic outcomes in an environment with financial frictions. The existing empirical evidence casts doubt on the ability of flexible exchange rates to fully insulate countries from external shocks, where the autonomy of monetary policy is in question as it must address capital flows even in floating exchange rate regime countries (Rey (2013)). Across all floating regimes, there is a further distinction as monetary policy is particulary ineffective in smoothing the effects of capital flows on domestic output and credit growth in emerging markets, although advanced countries' monetary policies are effective in this endeavor (Kalemli-Ozcan (2019)). Consequently, floating regime emerging markets are the focus of this paper, where we explore the effects of second-best policies.

The optimality of preemptive policies in the theoretical literature emerges when individual borrowers take on excessive risk as they fail to internalize that, in a crisis episode, risks are amplified through a feedback cycle of depreciating exchange rates, balance sheet deterioration and tighter financial conditions. In such instances, prudential measures which induce individuals to internalize these externalities lower borrowing in a welfare-enhancing manner. These are the conclusions of, among others, Korinek (2011), Bianchi et al. (2012), Farhi and Werning (2016) and Basu et al. (2020)).

It has nevertheless proved challenging to empirically support the policy prescriptions of this body of work. We advance this literature in two ways. First, we use a new data set on CFM and CFM/MPM policies that captures their counter-cyclical use and combine this data with a difference-in-differences identification approach by focusing on two risk-off shocks: the Taper Tantrum and COVID-19 shocks. Second, we analyze the response of external finance (UIP) premia and exchange rate volatility during the shock to preemptive policies which, by definition, cannot respond to ex-post outcomes. Using high-frequency monthly data from 56 EMDEs during 1996-2020, we provide evidence that preemptive CFM/MPM and CFM on inflows lower the premia during risk-off shocks in countries which imposed these preemptive policies before the shocks relative to those which did not. These countries also experience lower exchange rate volatility during risk-off shocks.

Lower premia during risk-off shocks preserve countries' access to international markets when they arguably need it most. Our findings indicate the important role of ex-ante policies that help limit the buildup of debt and currency mismatches in retaining access. As preemptive policies shift demand from normal times to bad times, policymakers need less recourse to monetary policy to stimulate demand after a severe shock. Furthermore, as discussed in Basu et al. (2020), they also need to defend the exchange rate less due to lower financial vulnerabilities. Consequently, preemptive policies free the hands of monetary policy to focus on domestic objectives. This is not only optimal from a theoretical perspective but also effective from an empirical perspective as the use of monetary policy as a response to the risk-off shock is counterproductive as it increases external finance premia and the exchange rate volatility.

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Table 1. Summary Statistics

	(Mean)	(Standard Deviation)	(Minimum)	(Maximum)
$\text{UIP}_t^{\text{premium}}$	0.03	0.16	-5.04	1.9
$\text{FXI}_t^{\text{actual}}$	0.0008	0.004	-0.03	0.05
$\text{FXI}_t^{\text{reserves}}$	17.44	11.5	0.74	85.94
Preemptive MPM_{TT}	0.75	0.43	0	1
Preemptive CFM/MPM_{TT}	0.69	0.46	0	1
Preemptive MPM_{COVID}	0.89	0.31	0	1
Preemptive CFM/MPM_{COVID}	0.82	0.39	0	1
Preemptive $\text{CFM}_{TT}^{\text{inflows}}$	0.24	0.46	0	1
Preemptive $\text{CFM}_{TT}^{\text{outflows}}$	0.29	0.46	0	1
Preemptive $\text{CFM}_{COVID}^{\text{inflows}}$	0.4	0.49	0	1
Preemptive $\text{CFM}_{COVID}^{\text{outflows}}$	0.41	0.49	0	1
Monetary Policy_t	0.07	0.05	0.001	0.7
$\text{CFM}_{TT}^{\text{inflows}}$	0.036	0.19	0	1
$\text{CFM}_{TT}^{\text{outflows}}$	0.008	0.09	0	1
FX debt	0.16	0.085	0.069	0.32

Notes: See the data section for the definition of variables.

Table 2. Preemptive CFMs on Inflows and Outflows: by Country and Episode

	Taper Tantrum		COVID-19	
	Inflows	Outflows	Inflows	Outflows
Albania				
Algeria				
Angola				
Argentina		Y	Y	Y
Armenia, Republic of				
Azerbaijan, Republic of				
Bangladesh				
Belarus				Y
Bolivia				Y
Botswana				
Brazil	Y	Y		
Bulgaria				
Chile				
China		Y	Y	Y
Colombia				
Costa Rica			Y	
Croatia		Y		
Egypt				
Georgia	Y	Y		
Ghana				
Honduras				
Hungary				
India			Y	Y
Indonesia	Y	Y	Y	Y
Jordan				
Kazakhstan	Y	Y	Y	Y
Kenya				
Kuwait				
Lebanon				
Malaysia		Y	Y	Y
Mexico				
Moldova				
Morocco				
Nicaragua				
Nigeria				
North Macedonia				
Pakistan				
Paraguay				
Peru	Y	Y	Y	Y
Philippines				
Poland				
Romania				
Russia			Y	Y
Saudi Arabia				
Serbia				
South Africa				
Sri Lanka			Y	Y
Tanzania	Y	Y		
Thailand	Y	Y		
Turkey				
Uganda				
Ukraine	Y	Y		
Uruguay	Y	Y		
Venezuela				
Vietnam				
Zambia				

Preemptive policies are defined as policies in place 5 years prior the shock. 2008Q1-2013Q1 for TT and 2014Q1-2019Q3 for COVID. Both inflow and outflow policies are net, that is tightening minus easing.

Table 3. Preemptive MPM and CFM Policies: Taper Tantrum

Dependent Variable:				$\text{UIP}_{c,t}$			
			Emerging Market Economies, 1996m1-2020m6				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Preemptive $\text{MPM}_c^{\text{domestic}} \times TT_t$	0.02***					0.02***	0.01***
	(0.003)					(0.004)	(0.004)
Preemptive $\text{CFM/MPM}_c \times TT_t$		-0.02***				-0.02***	-0.003
		(0.003)				(0.003)	(0.004)
Preemptive $\text{CFM}_c^{\text{total}} \times TT_t$			0.005*				
			(0.003)				
Preemptive $\text{CFM}_c^{\text{inflows}} \times TT_t$				-0.02***		-0.06***	-0.02**
				(0.004)		(0.005)	(0.01)
Preemptive $\text{CFM}_c^{\text{outflows}} \times TT_t$					0.005*	0.05***	0.02**
					(0.003)	(0.004)	(0.006)
Adjusted R^2	0.35	0.35	0.35	0.35	0.35	0.35	0.74
Observations	6816	6816	6816	6816	6816	6816	6816
Country FE	yes	yes	yes	yes	yes	yes	no
Month FE	yes	yes	yes	yes	yes	yes	yes
Country * Year FE	no	no	no	no	no	no	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. Taper Tantrum (TT) is a time varying dummy that takes the value of 1 in months May-December 2013. $\text{MPM}_c^{\text{domestic}}$ is a country specific and time invarying 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 2013Q1. CFM/MPM_c is a country specific and time invarying dummy that takes the value of 1 if a given country has at least one CFM/MPM tightening in place, that is an MPM tightening measure with a currency or residency dimension, any time between 2008Q1 and 2013Q1. MPM measures covered by the variable $\text{MPM}_c^{\text{domestic}}$ include countercyclical capital buffers, requirements for banks to maintain a capital conservation buffer, capital requirements for banks, a limit on leverage of banks, loan loss provision requirements, limits on the growth or volume of aggregate credit, loan restructions such as loan limits and prohibitions, limits to loan-to-value ratios, limits to the debt-service-to-income ratio, limits to the loan-to-deposit ratio (and penalties for high loan-to-deposit ratios), liquidity measures, tax measures, measures applied to Systemically Important Financial Institutions (SIFIs), and other measures that are not covered by other variables, such as stress testing and restrictions on profit distribution. MPM measures covered by the variable CFM/MPM_c include limits on foreign currency, reserve requirements on domestic or foreign currency, and limits on net or gross open foreign exchange positions, exposures, or funding. $\text{CFM}_c^{\text{total}}$ is a country specific and time invarying dummy that takes the value of 1 if a given country has a net CFM tightening in place regarding capital inflows or capital outflows any time between 2008Q1 and 2013Q1. $\text{CFM}_c^{\text{inflows}}$ and $\text{CFM}_c^{\text{outflows}}$ separates $\text{CFM}_c^{\text{total}}$ into CFM tightening for capital inflows vs. CFM tightening for capital outflows.

Table 4. Preemptive MPM and CFM Policies: COVID-19

Dependent Variable:	$UIP_{c,t}$					
	Panel A. 1996m1-2020m6 (5-year Window)					
	(1)	(2)	(3)	(4)	(5)	(6)
Preemptive $MPM_c^{domestic} \times COVID_t$	-0.01**					-0.008
	(0.005)					(0.005)
Preemptive $CFM/MPM_c \times COVID_t$		-0.01***				-0.005*
		(0.003)				(0.003)
Preemptive $CFM_c^{total} \times COVID_t$			-0.004			
			(0.004)			
Preemptive $CFM_c^{inflows} \times COVID_t$				-0.004		-0.02**
				(0.004)		(0.009)
Preemptive $CFM_c^{outflows} \times COVID_t$					-0.0006	0.03**
					(0.005)	(0.01)
Adjusted R^2	0.35	0.35	0.35	0.35	0.35	0.35
Observations	6816	6816	6816	6816	6816	6816
Country FE	yes	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes	yes

	Panel B. 1996m1-2020m6 (Longer Window)					
	(1)	(2)	(3)	(4)	(5)	(6)
Preemptive $MPM_c^{domestic} \times COVID_t$	-0.02***					-0.01**
	(0.005)					(0.005)
Preemptive $CFM/MPM_c \times COVID_t$		-0.03***				-0.03***
		(0.003)				(0.004)
Preemptive $CFM_c^{total} \times COVID_t$			-0.006			
			(0.004)			
Preemptive $CFM_c^{inflows} \times COVID_t$				-0.008*		-0.02***
				(0.004)		(0.005)
Preemptive $CFM_c^{outflows} \times COVID_t$					-0.003	0.02***
					(0.005)	(0.006)
Adjusted R^2	0.35	0.35	0.35	0.35	0.35	0.35
Observations	6816	6816	6816	6816	6816	6816
Country FE	yes	yes	yes	yes	yes	yes
Month FE	yes	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-19 (COVID) is a time varying dummy that takes the value of 1 in months February-June 2020. In Panel A, $MPM_c^{domestic}$ is a country specific and time invarying 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 2014Q1 and 2016Q4. In Panel B, the same criteria apply, except that the pre-period window has been expanded to 2008Q1-2016Q4. CFM/MPM_c is a country specific and time invarying dummy that takes the value of 1 if a given country has at least one CFM/MPM tightening in place, that is an MPM tightening measure with a currency or residency dimension, any time between 2014Q1 and 2016Q4 (Panel A) or 2008Q1-2016Q4 (Panel B). MPM measures covered by the variable $MPM_c^{domestic}$ include countercyclical capital buffers, requirements for banks to maintain a capital conservation buffer, capital requirements for banks, a limit on leverage of banks, loan loss provision requirements, limits on the growth or volume of aggregate credit, loan restructions such as loan limits and prohibitions, limits to loan-to-value ratios, limits to the debt-service-to-income ratio, limits to the loan-to-deposit ratio (and penalties for high loan-to-deposit ratios), liquidity measures, tax measures, measures applied to Systemically Important Financial Institutions (SIFIs), and other measures that are not covered by other variables, such as stress testing and restrictions on profit distribution. MPM measures covered by the variable CFM/MPM_c include limits on foreign currency, reserve requirements on domestic or foreign currency, and limits on net or gross open foreign exchange positions, exposures, or funding. CFM_c^{total} is a country specific and time invarying dummy that takes the value of 1 if a given country has a net CFM tightening in place regarding capital inflows or capital outflows any time between 2014Q1 and 2019Q3 (Panel A) or 2008Q1 and 2019Q3 (Panel B). $CFM_c^{inflows}$ and $CFM_c^{outflows}$ separate CFM_c^{total} into CFM tightening for capital inflows vs. CFM tightening for capital outflows.

Table 5. Robustness: Broader Measures of CFM/MPMs

Dependent Variable:				$\text{UIP}_{c,t}$			
			Emerging Market Economies, 1996m1-2020m6				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Preemptive $\text{MPM}_c^{\text{domestic}} \times TT_t$	0.02***					0.03***	0.02***
	(0.004)					(0.004)	(0.005)
Preemptive $\text{CFM/MPM}_c \times TT_t$		-0.03***				-0.03***	-0.002
		(0.003)				(0.003)	(0.004)
Preemptive $\text{CFM}_c^{\text{total}} \times TT_t$			0.005*				
			(0.003)				
Preemptive $\text{CFM}_c^{\text{inflows}} \times TT_t$				-0.02***		-0.06***	-0.02**
				(0.004)		(0.006)	(0.01)
Preemptive $\text{CFM}_c^{\text{outflows}} \times TT_t$					0.005*	0.04***	0.01**
					(0.003)	(0.004)	(0.007)
Adjusted R^2	0.35	0.35	0.35	0.35	0.35	0.35	0.74
Observations	6816	6816	6816	6816	6816	6816	6816
Country FE	yes	yes	yes	yes	yes	yes	no
Month FE	yes	yes	yes	yes	yes	yes	yes
Country * Year FE	no	no	no	no	no	no	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. Taper Tantrum (TT) is a time varying dummy that takes the value of 1 in months May-December 2013. $\text{MPM}_c^{\text{domestic}}$ is a country specific and time invarying 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 2013Q1. CFM/MPM_c is a country specific and time invarying dummy that takes the value of 1 if a given country has at least one CFM/MPM tightening in place, that is an MPM tightening measure with a currency or residency dimension, any time between 2008Q1 and 2013Q1. In the case of the regressions in this table, the category of CFM/MPM is broadened to include taxes and levies applied to specified transactions, assets, or liabilities, measures taken to mitigate systemic liquidity and funding risk, and measures that are taken to mitigate risks from global and domestic systemically important financial insitutions, known as SIFIs. $\text{CFM}_c^{\text{total}}$ is a country specific and time invarying dummy that takes the value of 1 if a given country has a net CFM tightening in place regarding capital inflows or capital outflows any time between 2008Q1 and 2013Q1. $\text{CFM}_c^{\text{inflows}}$ and $\text{CFM}_c^{\text{outflows}}$ separates $\text{CFM}_c^{\text{total}}$ into CFM tightening for capital inflows vs. CFM tightening for capital outflows.

Table 6. Robustness: Granular Preemptive Measures of CFMs

Dependent Variable:	$UIP_{c,t}$										
	Emerging Market Economies, 1996m1-2020m6										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$MPM_c^{domestic} \times TT_t$	0.02***	0.02***	0.03***	0.03***	0.03***	0.02***	0.03***	0.02***	0.03***	0.04***	0.02***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
$MPM/CFM_c \times TT_t$	-0.02***	-0.02***	-0.03***	-0.03***	-0.03***	-0.02***	-0.03***	-0.02***	-0.03***	-0.04***	-0.02***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Approval $Requirement_c^{outflows} \times TT_t$	0.09***										
	(0.006)										
$Bans_c^{outflows} \times TT_t$		0.09***									
		(0.006)									
Holding $Period_c^{inflows} \times TT_t$			-0.01								
			(0.009)								
$Limit_c^{inflows} \times TT_t$				-0.002							
				(0.003)							
$Limit_c^{outflows} \times TT_t$					0.007***						
					(0.003)						
Limit + Approval $Requirement_c^{outflows} \times TT_t$						0.09***					
						(0.006)					
Reserve $Requirement_c^{inflows} \times TT_t$							-0.01***				
							(0.002)				
Surrender + Repatriation $Requirement_c^{outflows} \times TT_t$								0.09***			
								(0.006)			
$Tax_c^{inflows} \times TT_t$									0.002		
									(0.006)		
$Other_c^{inflows} \times TT_t$										-0.04***	
										(0.008)	
$Other_c^{outtflows} \times TT_t$											0.09***
											(0.006)
Adjusted R^2	0.36	0.36	0.35	0.35	0.35	0.36	0.35	0.36	0.35	0.36	0.36
Observations	6816	6816	6816	6816	6816	6816	6816	6816	6816	6816	6816
Country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes	yes	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. Log UIP is winsorized at 1 and 99 percent. Taper Tantrum (TT) is a time varying dummy that takes the value of 1 in months May-December 2013. $MPM_c^{domestic}$ is a country specific and time invarying 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 2013Q1. MPM/CFM_c is a country specific and time invarying dummy that takes the value of 1 if a given country has at least one MPM/CFM tightening in place, that is an MPM tightening measure with a currency or residency dimension, any time between 2008Q1 and 2013Q1. In the case of the regressions in this table, the category of CFM/MPM is broadened to include taxes and levies applied to specified transactions, assets, or liabilities, measures taken to mitigate systemic liquidity and funding risk, and measures that are taken to mitigate risks from global and domestic systemically important financial insitutions, known as SIFIs. Granular CFM variables take the value of 1 if a given country experiences a net tightening between 2008Q1 and 2013Q1.

Table 7. Robustness: The Role of Policies During Taper Tantrum

Dependent Variable:	$\text{UIP}_{c,t}$				
	Emerging Market Economies, 1996m1-2020m6				
	(1)	(2)	(3)	(4)	(5)
Preemptive $\text{MPM}_c^{\text{domestic}} \times TT_t$	0.02***	0.02***		0.02***	0.02***
	(0.003)	(0.004)		(0.004)	(0.003)
Preemptive $\text{CFM/MPM}_c \times TT_t$	-0.02***	-0.03***	-0.12***	-0.02***	-0.02***
	(0.003)	(0.003)	(0.007)	(0.003)	(0.003)
Preemptive $\text{CFM}_c^{\text{inflows}} \times TT_t$	-0.04***	-0.07***	0.002	-0.06***	-0.06***
	(0.006)	(0.006)	(0.01)	(0.006)	(0.007)
Preemptive $\text{CFM}_c^{\text{outflows}} \times TT_t$	0.04***	0.05***		0.06***	0.05***
	(0.004)	(0.004)		(0.004)	(0.005)
$\text{Monetary Policy}_c \times TT_t$	0.61***				0.36***
	(0.06)				(0.07)
$\text{Loosening/Tightening CFMs}_c \times TT_t$		0.03***			0.05***
		(0.005)			(0.005)
$\text{Actual FXI}_c \times TT_t$			-1.68*		
			(0.93)		
$\text{FX Reserves}_c \times TT_t$				-0.001***	-0.001***
				(0.0002)	(0.0002)
Adjusted R^2	0.35	0.35	0.34	0.36	0.35
Observations	6176	6816	1080	6490	5887
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 UIP is winsorized at 1 and 99 percent. $\text{MPM}_c^{\text{domestic}}$ is a country specific and time invarying 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 2013Q1. CFM/MPM_c is a country specific and time invarying dummy that takes the value of 1 if a given country has at least one CFM/MPM tightening in place, that is an MPM tightening measure with a currency or residency dimension, any time between 2008Q1 and 2013Q1. $\text{CFM}_c^{\text{inflows}}$ and $\text{CFM}_c^{\text{outflows}}$ are country specific and time invarying dummies that take the value of 1 if a given country has a net CFM tightening in place regarding capital inflows or capital outflows any time between 2008Q1 and 2013Q1.

Table 8. Preemptive Policies, Policies During Taper Tantrum and Exchange Rate Volatility

Dependent Variable:	Standard Dev. of Exchange Rate Index		Δ Log Exchange Rate Index	
	(1)	(2)	(3)	(4)
$\text{MPM}_c^{\text{domestic}} \times TT_t$	-0.27	-0.77***	-0.002	-0.002
	(0.38)	(0.23)	(0.003)	(0.003)
$\text{CFM/MPM}_c \times TT_t$	-0.5***	-0.43*	-0.002	0.0001
	(0.16)	(0.23)	(0.002)	(0.002)
$\text{CFM}_c^{\text{inflows}} \times TT_t$	-2.22***	-2.24***	-0.001	-0.003
	(0.31)	(0.34)	(0.006)	(0.006)
$\text{CFM}_c^{\text{outflows}} \times TT_t$	2.39***	2.47***	0.01**	0.01**
	(0.41)	(0.56)	(0.005)	(0.005)
$\text{FX Reserves}_c \times TT_t$		-0.01		-0.0004***
		(0.02)		(0.0001)
$\text{Monetary Policy}_c \times TT_t$		8.83*		-0.08
		(5.13)		(0.05)
$\text{Loosening/Tightening CFMs}_c \times TT_t$		2.6***		-0.001
		(0.33)		(0.004)
Adjusted R^2	0.33	0.32	0.01	0.01
Observations	6816	5887	6783	5887
Country FE	Yes	Yes	Yes	Yes
Month FE	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 the standard deviation of the exchange rate index is calculated for a window of 8 months. The exchange rate index is indexed to January of 2008, and delta log exchange rate index at time t = ln(exchange rate index at time t + 1) - ln(exchange rate index at time t). $\text{MPM}_c^{\text{domestic}}$ is a country specific and time invarying 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 2013Q1. CFM/MPM_c is a country specific and time invarying dummy that takes the value of 1 if a given country has at least one CFM/MPM tightening in place, that is an MPM tightening measure with a currency or residency dimension, any time between 2008Q1 and 2013Q1. $\text{CFM}_c^{\text{inflows}}$ and $\text{CFM}_c^{\text{outflows}}$ are country specific and time invarying dummies that take the value of 1 if a given country has a net CFM tightening in place regarding capital inflows or capital outflows any time between 2008Q1 and 2013Q1.

Table 9. Robustness Check: Placebo Shocks

Dependent Variable:	$\text{UIP}_{c,t}$			
	Emerging Market Economies, 1996m1-2020m6			
	(1)	(2)	(3)	(4)
Preemptive $\text{MPM}_c^{\text{domestic}} \times \textit{hypotheticalshock}_t$	-0.02*	-0.004	0.005	0.004
	(0.01)	(0.008)	(0.009)	(0.008)
Preemptive $\text{CFM/MPM}_c \times \textit{hypotheticalshock}_t$	0.01	0.0004	-0.004	-0.006
	(0.009)	(0.009)	(0.007)	(0.008)
Preemptive $\text{CFM}_c^{\text{inflows}} \times \textit{hypotheticalshock}_t$	0.007	-0.03***	0.002	0.03***
	(0.005)	(0.009)	(0.008)	(0.01)
Preemptive $\text{CFM}_c^{\text{outflows}} \times \textit{hypotheticalshock}_t$	-0.004	0.02**	0.02**	-0.02
	(0.003)	(0.009)	(0.007)	(0.01)
Adjusted R^2	0.72	0.74	0.72	0.74
Observations	3679	6816	3679	6816
Country FE	no	no	no	no
Month FE	no	no	no	no
Country * Year FE	yes	yes	yes	yes
Hypothetical shock dates	2014:7 - 2014:12	2015:1 - 2015:6	2015:6 - 2015:12	2015:6 - 2015:12
Preemptive Period	2009 - 2014:6	2009-2014	2010 - 2015:6	2010 - 2015:6

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. "Hypothetical shock" is a time varying dummy that marks a placebo shock; placebo shock dates are shown for each regression, as are the corresponding preemptive periods. For each regression, the preemptive MPM and CFM variables are reconstructed according to the appropriate preemptive period. Results displayed in columns 1 and 3 correspond to regressions that use Aizenman and Pasricha's CFM data, while the remaining regression results use IMF Taxonomy CFM data.

Table 10. Robustness Check: FX-denominated Debt and UIP Shocks

Dependent Variable:	$\text{UIP}_{c,t}$	
	Emerging Market Economies, 1996m1-2020m6	
	(1)	(2)
Preemptive $\text{MPM}_c^{\text{domestic}} \times COVID_t \times FX$ debt	-0.67***	
	(0.09)	
Preemptive $\text{MPM}_c^{\text{domestic}} \times COVID_t$	0.11***	
	(0.02)	
$\text{COVID}_t \times FX$ debt	0.32***	0.02
	(0.05)	(0.05)
Preemptive $\text{CFM/MPM}_c \times COVID_t \times FX$ debt		-1.19***
		(0.29)
Preemptive $\text{CFM/MPM}_c \times COVID_t$		0.12***
		(0.04)
Adjusted R^2	0.435	0.431
Observations	1954	1954
Country FE	yes	yes
Month FE	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. "FX debt" is a variable containing data on FX debt of households and firms as a percentage of GDP, averaged over 2014-2019. These data come from the Bank for International Settlements.

Table 11. Appendix Table: Data Availability

	EMDE
Albania	2007-2020
Algeria	2015-2020*
Angola	2015-2020*
Argentina	1998-2015*
Armenia, Republic of	2012-2016*
Azerbaijan, Republic of	2000-2020*
Bangladesh	2008-2020*
Belarus	2017-2019*
Bolivia	2001-2002*, 2006*, 2011*, 2017*
Botswana	2015-2016*
Brazil	1999-2001*, 2002-2020
Bulgaria	2007-2019*
Chile	1998-2001*, 2002-2020
China	1996-2020
Colombia	2001-2020*
Costa Rica	2016*, 2017-2020
Croatia	2002-2007*, 2008-2020
Egypt	2006-2020*
Georgia	2009-2020*
Ghana	2015-2020*
Honduras	2015-2019*
Hungary	2000-2007*, 2008-2020
India	1999-2020**
Indonesia	1997*, 1998-2020
Jordan	2015-2020*
Kazakhstan	2007-2020*
Kenya	2015-2020*
Kuwait	2015-2020*
Lebanon	2015-2020*
Malaysia	1996-2020
Mexico	1996-2001*, 2002-2020
Moldova	2012-2016*
Morocco	2015-2020*
Nicaragua	2015-2018*
Nigeria	2002*, 2008-2020*
North Macedonia	2009*, 2012-2020*
Pakistan	1998-2002*, 2003-2020***
Paraguay	2012-2020*
Peru	1998-2001*, 2002-2020
Philippines	1997-1999*, 2000-2020***
Poland	1998-2007*, 2008-2020
Romania	1998-2007*, 2008-2020
Russia	2000-2007*, 2008-2020
Saudi Arabia	1999*, 2000-2020
Serbia	2009-2020*
South Africa	1997-1999*, 2000-2020
Sri Lanka	1996-2020
Tanzania	2015-2020*
Thailand	1997-2001*, 2002-2020
Turkey	1998-2007*, 2008-2020
Uganda	2015-2020*
Ukraine	2007-2020*
Uruguay	2001-2004*, 2015-2018*
Venezuela	2004-2006*, 2009-2017*
Vietnam	1997-1999*, 2000-2020
Zambia	2015-2020*

Notes:

* Some data are missing with this date range

** Only missing data are 3 missing observations in 2002

*** Only missing data are 5 missing observations in 2015

Table 12. Appendix Table: Description of Domestic 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).

Notes: Source: Alam et al. (2019)

Table 13. Appendix Table: Description of MPM/CFM Measures

Measure	Definition
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.

Notes: Source: Alam et al. (2019)

Table 14. Appendix Table: 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 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, Das and Pugacheva (forthcoming)

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