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Capital Flow Measures

Structural or Cyclical Policy Tools?

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Abstract

This paper analyzes the use of capital flow measures in emerging markets. Drawing on a specially compiled new database of capital flow measures, it establishes that policy makers in emerging market economies do not use capital flow measures as an active tool at business cycle frequency. While there is a general trend toward the liberalization of capital accounts, the use of capital flow measures as a countercyclical policy tool is rather sporadic. Instead, countries show a distinct preference for using monetary policy, exchange rate adjustments, macro prudential measures, and adjustments in external reserves to modulate the impacts of domestic business cycles, international liquidity cycles, and shocks to capital flows. Regulation of different kinds of capital flows—resident and nonresident flows; inflows and outflows; and foreign direct investment, portfolio, and banking sector flows—is changed infrequently and is acyclical to domestic business and external liquidity cycles.

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Capital Flow Measures: Structural or Cyclical Policy Tools?

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1. Introduction

Capital flows to emerging market economies are considered to be volatile, often driven more by external factors than by domestic factors. Surges in capital flows commonly generate macroeconomic imbalances in emerging markets, resulting in rapid credit growth, asset price inflation, and economic overheating. Capital flow reversals can be disruptive too, resulting in financial volatility, economic slowdown, and in some cases distress in the banking and corporate sectors. A view that has gained some currency since the global financial crisis is that the emerging market economies may be better off by keeping their capital accounts relatively closed (Rey, 2015); or by managing their capital account policies in a countercyclical fashion (IMF, 2012), designing them as a regular instrument of economic policy and not just as a measure of last resort (Jeanne, Subramanian, and Williamson, 2012). Commensurate with these views, recent theoretical contributions have established that capital account measures may indeed be welfare enhancing.[2]

Despite an active policy debate around it, and some theoretical contributions, not much is known about whether and how emerging market economies use capital flow measures (CFMs) in practice.[3] This gap is partly due to the lack of systematic high frequency data on capital flow measures for a representative set of countries. Existing measures of capital account policies, such as Chinn and Ito (2006), and Schindler (2009), are primarily based on annual information on broad capital controls in place. These measures do not record all changes in policies regulating the capital account. As such these measures are better suited for static cross-country comparisons of capital account openness in any given year, or for the direction of change in capital account policies over a fairly long period of time. They are less suited for analyzing the use of capital flow measures over a shorter horizon of business cycle frequency.[4]

In this paper, we inform the debate on CFMs by analyzing how emerging market economies use them in practice. We specifically ask the following questions: Do emerging market economies use CFMs at business cycle frequency; does the answer depend on the type of capital flow; and are there cross-country or regional differences in the use of CFMs? How does the use of CFMs align with domestic business or financial cycles, global financial conditions, or the pace of capital flows? Has the use of CFMs changed since the global financial crisis?

In order to answer these questions we construct a novel database of policy matrix including CFMs for 47 emerging market economies between 1999:Q1 and 2016:Q2. We use the term capital flow measures to refer to all quantitative or price-based regulations of capital flows, including

[2] See e.g. Korinek (2010), and Farhi and Werning (2014).

[3] Exceptions include Fernandez, Rebucci, and Uribe (2015) and Eichengreen and Rose (2014). Using annual data over 1995-2011, they show that capital controls are acyclical, i.e. they do not correlate with the pace of economic activity.

[4] Recent contributions by Ahmed and Zlate (2014) and Ghosh et al. (2017) have used the data on CFMs at quarterly frequency, albeit for a smaller set of countries and over a shorter period of time.

macroprudential measures pertaining to capital flows.[5] This subsumes other commonly and interchangeably used terms such as capital account policies, capital controls, or capital account liberalization.

We separately code CFMs for different kinds of capital flows--FDI, portfolio flows, and banking sector flows; for inflows and outflows; and for resident and non-resident flows, thus altogether 12 different series. We also construct various composite indices of CFMs, particularly for resident inflows, resident outflows, non-resident inflows, and non-resident outflows. To our knowledge, this is the first such database to be constructed at quarterly frequency for a large and representative set of countries. We relate the use of capital flow measures to domestic business cycles, capital flow cycles, and to global financial cycles; and compare the use of CFMs with a full array of policy tools including monetary policy, macroprudential measures, exchange rate adjustment and use of external reserves.

We show that emerging market economies use CFMs rather infrequently. There are significantly more easing events than tightening of CFMs, indicating a consistent trend toward the liberalization of the capital account, rather than a tendency to ease and tighten the capital account countercyclically. Restrictions on capital flows are changed in about 12½ percent of all country-quarter observations, substantially less often than monetary policy or macroprudential regulations. When countries use CFMs, they are more likely to change restriction on resident flows, than on non-resident flows; and on portfolio flows, than on FDI or banking sector related flows.

Use of CFMs varies across countries and regions. Liberalization of CFMs is evident more strongly in Asia, with India standing out as a strong liberalizer; while there is a more balanced use of CFMs in Latin America, entailing both easing and tightening of restrictions. In general, countries with a more closed capital account initially have liberalized it more actively over the last decade and half. On the other hand, countries with a substantially liberalized capital account initially are the ones who have tended to use CFMs as a cyclical policy tool more actively. Countries instead use a combination of other policy tools to respond to domestic business cycles, capital flow cycles, and global financial cycles. The mix of policies consists of countercyclical monetary policy, macroprudential measures, exchange rate adjustments, and intervention in foreign exchange markets.

Our results are consistent with Eichengreen and Rose (2014) and Fernandez et al. (2015), who show that CFMs are used infrequently; with Ghosh et al. (2017), who show that policies other than CFMs are used more frequently; and with Cordella and Gupta (2015), who show that countries

[5] Following IMF (2012), we refer to capital controls and prudential policies designed to influence cross-border capital flows as capital flow measures. This is similar to the definition adopted by Forbes et al (2015). Korinek and Sandri (2016) note that the IMF (2012) adopted the term "capital flow management measures" instead of capital controls, since the latter term seemingly had a negative connotation.

are increasingly using monetary policy and exchange rates as countercyclical policy tools. Increased countercyclicality of monetary policy is also established in McGettigan et al. (2013), Vegh and Vuletin (2012), and Eichengreen and Gupta (2016) who show that countries lower policy rates in a countercyclical fashion during sudden stops of capital inflows.

The remainder of the paper is organized as follows. Section 2 briefly summarizes the literature. Section 3 describes the database and establishes some stylized facts on the use of CFMs across countries. Section 4 documents the use of CFMs in response to domestic or external conditions, and compares it with the use of monetary policy, macroprudential measures, exchange rate changes and changes in reserves. Section 5 concludes.

2. Literature Survey

Despite several well-known instances when capital controls have been used in response to erratic capital flows, Chile in the 1980s, Malaysia during the Asian Crisis in the late 1990s, and Brazil on an ongoing basis, the use of capital flow measures has received rather modest attention in the literature.[6] This could be due to the lack of significant use of CFMs across countries; lack of data on CFMs; or the difficulty in resolving the endogeneity issue, especially if the interest is in analyzing the impact of capital flow measures. The academic interest in analyzing the use of CFMs as a legitimate policy tool has been spurred in recent years by the IMF updating its official view on its use in 2012; followed by several theoretical contributions and a few empirical contributions on this issue.

Theoretical work by Jeanne and Korinek (2010) characterizes the situations in which CFMs may be welfare enhancing—the situations when unhindered capital flows can be detrimental to economic or financial stability, yet individual agents do not internalize these effects into their own decisions, rendering a welfare enhancing role for their regulation. According to their model, an optimal policy would be to regulate the volume of capital inflows in order to curb them during the periods of large inflows (surges), and liberalizing them during large outflows (stops). CFMs are perceived to be particularly effective when there are limits on exchange rate adjustment or monetary policy.

In more recent work, Korinek (2017) quantifies the externalities of different types of capital flows – using both a statistics approach and model simulations. The paper finds that the externalities of different categories of flows differ by an order of magnitude: FDI imposes the smallest externalities, followed by portfolio equity investments, local currency debt, CPI-indexed local currency debt, GDP-linked dollar bonds, and regular dollar bonds, which impose the greatest externalities among the typical liabilities of emerging economies. The policy conclusion derived by Korinek (2017) is that CFMs should primarily aim to improve the composition of capital flows towards more insurance rather than affecting the total level of flows.

[6] Some emerging markets, Brazil for example, have made renewed use of controls since the global financial crisis of 2008-09 (Forbes, Fratzscher, Kostka, and Straub, 2016).

In other recent contributions, Farhi and Werning (2014) study optimal capital control policies in response to shocks to productivity, terms of trade, foreign interest rates, risk premia, and fluctuations in export demand, in a standard open economy model. The paper concludes that CFMs can be useful tools to mitigate the effects of shocks under both fixed and flexible exchange rate regimes. The case for CFMs under flexible exchange rates contrasts with the traditional Mundellian, but the authors argue that also under flexible exchange rates CFMs can allow to better navigate the dual objective of macroeconomic stabilization and terms of trade management. They help mitigate the depreciation of the exchange rate and of the terms of trade, the drop in consumption, the outflow of capital and the associated trade surplus.

Korinek and Sandri (2016) compare the effectiveness of capital controls and macroprudential measures in reducing financial fragility in a small open economy model in which agents do not internalize the economywide costs associated with financial crises and exchange rate depreciations, and may borrow excessively. They observe that capital controls apply exclusively to financial transactions between residents and non-residents and induce more precautionary behavior for the economy as a whole, including for savers; whereas macroprudential regulations apply to borrowers and reduce the indebtedness of leveraged borrowers. They establish that while both capital controls and macroprudential measures can restrain borrowing to socially optimal levels, macroprudential regulation can help mitigate booms and busts in asset prices both in advanced and emerging countries; while capital controls can be more effective in emerging economies, and can play only a limited role in advanced countries.

The IMF's "institutional view" (2012) highlights that since large inflows and outflows of capital can be disruptive, it would be welfare enhancing to modulate the pace of flows. It suggests that there might be a rationale for complementing the range of conventional measures such as monetary and fiscal policies, exchange rate adjustment, changes in reserves, and financial supervision and regulation, with capital flow measures. The view distinguishes between the structural liberalization of capital account transactions and the countercyclical use of capital flow measures. It envisages a temporary and active use of CFMs, requiring frequent changes based on the pace of capital inflows and outflows. It advises that the measures should be implemented in a transparent way, not discriminate between resident and nonresident flows, and should be used as a short-term measure that could be scaled back readily when capital flow pressures abate.

A relatively larger part of the empirical literature has focused on the effectiveness of capital controls, and finds the results to be non-definitive.[7] Examples include Forbes et al. (2016), who conduct an empirical study of Brazil, one of the largest emerging markets that has imposed capital controls in recent years. Using the data at the fund-country level, they show that these had a pernicious spillover impact on other countries—e.g. the increase in tax by Brazil was associated with some slowdown in allocation to Brazil, but an increase in allocation to other countries with a similar beta, and a decline in allocation to countries with a similar risk of imposing capital controls. Their

[7] A survey piece is Magud and Reinhart (2007).

results imply that there are externalities in the use of capital flow measures, possibly justifying the case for policy coordination.

Forbes and Klein (2015) analyze policy responses during two periods marked by crises, 1997 to 2001 and 2007 to 2011, addressing the issue of selection bias by using propensity-score matching. They find that the majority of the policy responses are taken in isolation rather than simultaneously (or within one quarter of) different policies. They find that the response to a crisis is conditioned by the specific external shock, country specific economic structure and vulnerabilities, and the specific response in the previous year. They also establish that the typical response to crises has changed over time--while in the crisis in the late 1990s, several countries increased their policy rates; countries resorted to alternative measures during the crisis in the late 2000s, not increasing the rates as frequently. Importantly, they find that none of the different policy measures-- major reserve sales, large currency depreciations, substantial changes in policy interest rates, and increased controls on capital outflows-- can help a country avoid the adverse impact of the crises on real GDP growth, unemployment, and inflation. In particular, a large increase in interest rates and new capital controls cause a significant decline in GDP growth. Sharp currency depreciations may raise GDP growth over time, but only with a lagged effect and after an initial contraction.

The empirical literature on the use of capital controls as a countercyclical policy tool includes contributions by Eichengreen and Rose (2014) and Fernandez et al. (2015). Both papers show that capital controls tend to be highly persistent, and do not vary much in response to economic and financial cycles. Eichengreen and Rose (2014), using annual data for a large number of countries, do not find evidence to support the hypothesis that capital controls are used to smooth the business cycle.[8] Fernandez et al. (2015) too analyze annual data on the use of capital controls for a large number of advanced and developing economies during 1995-2011, and establish that capital controls are used sporadically; they are not used in a countercyclical fashion, and are not used actively during economic boom or bust episodes. Their results are robust to controlling for the level of development, external indebtedness, exchange-rate regime, and hold for the period prior to and after the global financial crisis.

A more recent contribution is Ghosh et al. (2017). Working with changes in CFMs that include liberalization and tightening of regulation for 17 emerging market economies over 2005-2013. They find that policy makers respond proactively to capital inflows by using a combination of policy tools—policy interest rates, exchange market intervention, and macroprudential measures; and complement these by capital inflow controls when there are issues related to competitiveness and financial stability.

[8] Gupta (2016) notes that India has consistently liberalized its capital account since the late 1990s. The pace of liberalization has been faster during the periods of slow capital inflows, and slower during the period of rapid inflows. Once liberalized, capital flow measures have not been reversed for the most part.

One main limitation of the existing literature is that most of it uses annual data, and is thus unable to fully reflect changes in regulations at business cycle frequency. With the exception of Ghosh et al. (2017), the data used and the constructed indices of capital flow measure pertain to existing restrictions in place, like the Chinn and Ito (2006) index, rather than to changes in restrictions. These series change very slowly, if at all, and do not reflect changes in regulations at business cycle frequency. Besides some of the papers analyze the use of CFMs only around domestic economic cycles, while the theoretical and policy literature has advocated their use primarily around capital flow cycles.[9] Ghosh et al (2017) is one of the few papers which uses quarterly data, that consists of data on changes in regulations and not merely on existing measures, but is unable to address these issues fully since their database is limited to a rather small number of countries--their data on capital flow measures is for 17 countries.

3. A New Data Set on Capital Flow Measures

3.1 Construction of the Data Set

We construct the data set on CFMs using information provided in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The AREAER presents information in two parts for each member country of the IMF. The first part documents detailed information on existing regulations on all kinds of capital flows. This information, and the coding of regulation based on this information, does not change in response to incremental changes in regulations, when specific regulations are still broadly retained. Many prevalent and widely used series on capital account liberalization (such as Chinn and Ito, 2006 and Schindler, 2009) have been constructed using information contained in this first part of the database. As discussed above, these series are sticky and do not often reflect changes in regulations over time across countries.[10]

A second part of the AREAER documents changes in regulations, both liberalization and tightening of the capital account, that were introduced in the preceding year. We compile this information at a quarterly frequency from 1999:Q1 to 2016:Q2 for 47 emerging countries, the same set of countries included in Eichengreen and Gupta (2014).

We first code these data quantitatively giving a higher value for a larger change and a lower value for a change which is deemed to be more marginal. The indices take integer values between 4 and -4. A value of 4 indicates a large liberalization, 0 indicates no change in regulation, and a -4

[9] In a meta-analysis of more than 30 empirical studies, Magud et al. (2011) find that two prominent rationales for governments to impose capital controls are to lower real exchange rate pressures and reduce the volume of capital flows.
[10] A distinct example is the Chinn-Ito index for capital account liberalization for India, which shows that India has had a closed capital account in the last two decades, with very little change in the degree of openness. But in practice, India has consistently, even if incrementally, liberalized its capital account. This includes the liberalization of inflows and outflows of capital by both residents and nonresidents.

indicates a larger reversal or a new restriction on capital flows. We separately code CFMs for different kinds of capital flows--FDI, portfolio flows (debt and equity), and banking sector flows.[11] For each of these flows we code regulations separately for inflows and outflows, and for resident and non-resident flows, thus altogether we construct 12 different series. We then construct composite indicators of measures on inflows and outflows by residents and non-residents by adding to the respective indicators FDI flows, portfolio equity flows, portfolio debt flows and banking sector related flows.

Using these quantitative indicators of CFMs, we also construct a qualitative index, which takes a value 1 for liberalization, 0 when there is no change, and -1 when an earlier liberalization is reversed or new controls are introduced. In some of the analysis below we use this qualitative index, but in robustness tests (which are not reported in the paper for brevity but are available on request), we use the quantitative index, which upholds our results.

3.2. Stylized Facts on the Use of Capital Flow Measures

Below we highlight five key stylized facts on the use of CFMs by emerging countries.

Fact 1: CFMs are sticky

Countries use CFMs infrequently. Capital flow measures are changed in only 12½ percent of all country-quarter observations in our sample. Put differently, in more than 87 percent of all observations, CFMs have remained unchanged. CFMs appear particularly sticky when compared to alternative policy measures. For example, countries in our sample change macroprudential regulation in 20.7 percent of all country-quarters.[12] This means that whereas, on average, macroprudential regulations change every fifth quarter, CFMs are changed only once every two years.

These observations corroborate findings by others that the changes in capital account policies are infrequent events--Eichengreen and Rose (2014) e.g. note that capital controls remain in place for decades; and Forbes and Klein (2015) note a sparser use of capital flow measures as compared to reserve sales, currency depreciations, and changes in policy rates.

Fact 2: CFMs on resident flows are changed more often than on non-resident flows; CFMs on portfolio flows, especially for residents, are changed most often

A second key observation is that capital flow measures on resident flows are changed more often than those on non-resident flows. Restrictions on either inflows or outflows by residents are changed in 9.79 percent of all quarters, while restrictions on non-resident flows are changed only in

[11] Restrictions on banking sector flows refer to all types of restrictions that affect either bank lending, bank borrowing or external commercial borrowing. See technical appendix for more details.
[12] See Section 4 for a detailed discussion of these alternative policy instruments.

5.68 percent of all quarters. The overall difference is mainly driven by a more than three times higher frequency of changes in the measures on resident outflows than on non-resident outflows (see Table 1).

Table 1: Unconditional probability of change in CFMs by residence

	Inflows	Outflows	Inflows or Outflows
Resident	4.83%	7.08%	9.79%
Non-resident	4.26%	2.25%	5.68%
Difference	0.57%	4.83%***	4.10%***

Note: The table shows the number of country-quarter observation with a change in respective CFM as a percentage of all country-quarter observations. ***, ** and * indicate statistical significance of the difference (using a t-test) between the unconditional probabilities of changes in CFMs on resident and non-resident flows at the 1%, 5% and 10% level, respectively.

Looking at the changes in CFMs on different types of flows, changes in CFMs for portfolio flows have been most frequent, especially for resident flows. While the probability of changes to FDI regulations is roughly the same for resident and non-resident flows, regulations pertaining to banking sector flows are changed more often for residents (Table 2).

Table 2: Unconditional probability of changes in CFMs by the type of flow

	Resident	Non-resident
Probability of change:		
Portfolio flows	5.11%	2.89%
FDI	2.43%	2.07%
Banking sector flows	4.01%	0.70%
Differences compared to portfolio flows:		
FDI	-2.67%***	-0.82%**
Banking sector flows	-1.09%**	-2.18%***

Note: Table shows the number of country-quarter observations with a change in the respective CFM (both inflows and outflows) as percentage of all country-quarter observations. ***, ** and * indicate that the difference between unconditional probabilities of changes in CFMs on portfolio flows as compared to FDI and banking sector flows, is statistically significance at the 1%, 5% and 10% level, respectively.

Fact 3: CFMs are liberalized more often than tightened

Looking at the direction of CFMs, we note that capital flows have been eased more frequently than tightened. Restrictions on inflows and outflows, by both residents and non-residents, have been liberalized significantly more often than tightened. The difference is largest for the measures on resident outflows, which have been liberalized almost three times as often as tightened (Table 3).

Table 3: Unconditional Probability of change to CFMs by direction of change

	Resident		Non-resident	
	Inflows	Outflows	Inflows	Outflows
Liberalization	3.47%	5.44%	3.1%	1.49%
Tightening	1.37%	1.64%	1.16%	0.76%
Difference	2.10%***	3.80%***	1.94%***	0.73%***

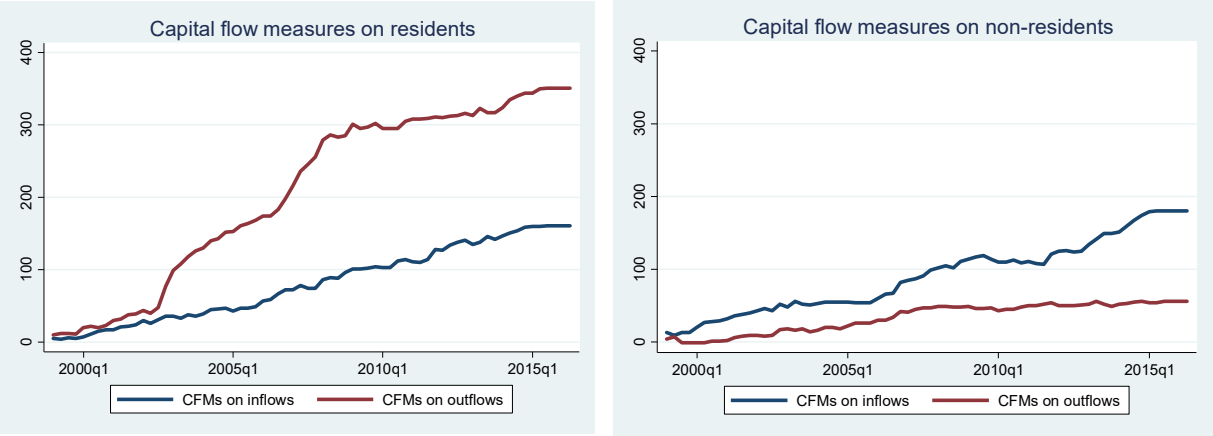
Note: The table shows the number of country-quarter observation with a change in the respective CFM as percentage of all country-quarter observations. ***, ** and * indicate statistical significance of the difference (using a t-test) between the unconditional probabilities of Liberalization and Tightening of capital flows at the 1%, 5% and 10% level, respectively.

The trend toward liberalization of capital flow measures over time is corroborated by Chart 1. The chart plots cumulative changes in CFMs across resident and non-resident flows. Each index is created by adding the quantitative index of the respective CFMs in a country over time, and then aggregating them over all 47 countries in the sample.[13] All four cumulative indices for CFMs plotted in Chart 1 are upward sloping indicating that there are more positive changes, i.e. incidents of liberalization, than negative changes, i.e. incidents of tightening. The extent of liberalization is largest for resident outflows (consistent with Fact 2) and smallest for non-resident outflows. Capital outflows by residents seem to have been liberalized rapidly in the 2000s, around 2003-2007, when emerging markets were deluged with capital flows, and seemingly, easing of capital outflows by residents was one way to handle the large inflows.[14]

[13] The index starts at 0 in time 1. If there is a strong easing in restrictions, and the flow index of CFM take a value 4 at t=5, the index changes to 4 at t=5 and remains at that level until another measure is taken. If there is another strong easing at t=12, and CFM takes a value of 4 again, the cumulative index changes to 8; if there is a slight reduction at t=15, and CFM takes a value of say -1, the cumulative index changes to 7 and so on. We first create the index for each country, and then add the country-specific indices in order to get the aggregate indices.

[14] This is consistent with Gupta (2016) who notes that in the past two decades, capital flow measures in India have consisted of continued relaxation, and the pace of liberalization has been countercyclical to the pace of capital flows—liberalization of resident outflows picked up during the period of rapid inflows, while the liberalization of non-resident inflows picked up during the periods of slow capital inflows.

Chart 1: Cumulative change in the index of Capital Flow Measures



Note: The chart displays the index of cumulative changes to CFMs over time. The red lines depict cumulative changes in CFMs on outflows and the blue lines show cumulative changes in CFMs on inflows. The left-hand panel shows changes in CFMs on Resident flows and the right-hand panel on Non-Resident flows.

The graphical impression of a trend towards liberalization is supported by the results of the regression analysis in Table 4. The table shows that all four cumulative indices of CFMs follow a linear and positive time trend. The coefficient is largest for resident outflows confirming that restrictions on resident outflows have been eased most rapidly over time.

Table 4: Trend in the Cumulative Index of CFMs

	Resident		Non-resident	
	Inflows	Outflows	Inflows	Outflows
	0.053**	0.121***	0.051***	0.019*
Time trend	[2.49]	[4.34]	[3.21]	[1.74]
Observations	3,290	3,290	3,290	3,290
R-squared	0.09	0.24	0.14	0.04
# of countries	47	47	47	47

Note: The table shows the coefficient of a panel regression of the respective country specific cumulative indices on a linear time trend. All regressions include country fixed effects. Robust t-statistics are reported in parenthesis. ***, ** and * indicate statistical significance at the 10%, 5% and 1% level.

Table 5 below shows that the slope of the trend of capital account liberalization depends on its initial openness. We estimate initial capital account openness by the level of the Chinn-Ito index at the beginning of our sample in Q1:1999 and include an interaction term between the Chinn-Ito index and the time trend in the regression. The results show that while the coefficients on the linear time trend remain positive and significant, the interaction effects are all negative and significant. This means that countries that had a more closed capital account, indicated by a lower value of the

Chinn-Ito index-in 1999, followed a steeper trend in liberalizing their capital accounts compared to countries that started with a more open capital account. The faster pace of liberalization for initially more closed countries suggests that the level of capital account openness has been converging over time.

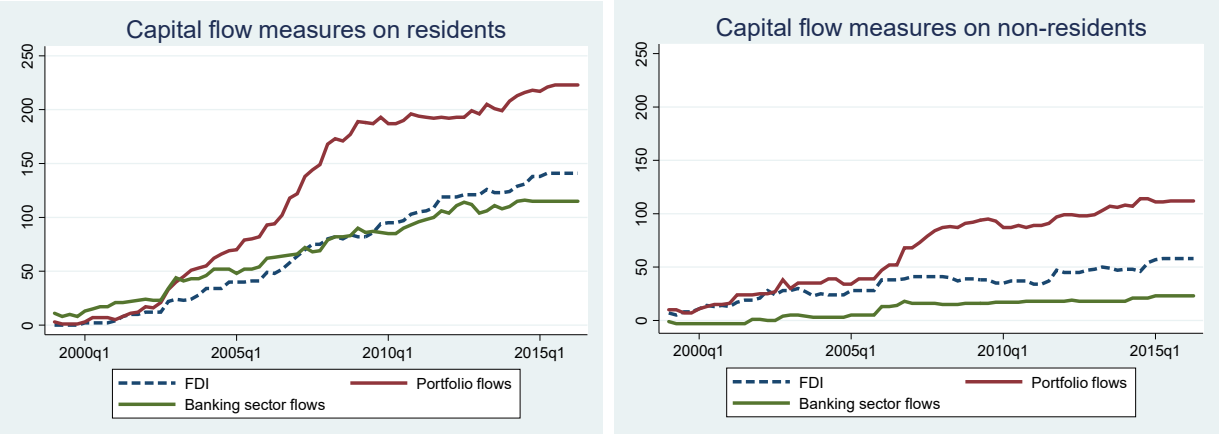
Table 5: Trend in the Cumulative Index of CFMs and Initial Openness

	Resident		Non-resident	
	Inflows	Outflows	Inflows	Outflows
Time trend	0.052**	0.119***	0.050***	0.019*
	[2.59]	[4.65]	[3.35]	[1.79]
Time trend*Chinn Ito	-0.034**	-0.055***	-0.025**	-0.024***
	[2.59]	[3.29]	[2.38]	[3.06]
Observations	3,290	3,290	3,290	3,290
R-squared	0.169	0.335	0.197	0.159
# of countries	47	47	47	47

Note: The table shows the coefficient of a panel regression of the respective country specific cumulative indices on a linear time trend and the interaction between this time trend and the initial level of capital account openness, measured by the level of the Chinn-Ito index in 1999:Q1. All regressions include country fixed effects. Robust t-statistics are reported in parenthesis. ***, ** and * indicate statistical significance at the 10%, 5% and 1% level.

The overall trend in the liberalization of capital flows holds also for each type of flow separately. The cumulative change indices displayed in Chart 2 are all upward sloping, indicating a trend toward liberalization. CFMs on resident portfolio flows have been liberalized most often, while CFMs on non-resident FDI and banking sector flows have been changed the least.

Chart 2: Cumulative change indices by type of flow



Note: The chart displays the index of cumulative changes to inflows and outflows of CFMs over time. The blue line shows changes to restrictions on FDI, the red line to restriction on portfolio flows and the green line to restrictions on

banking sector flows. The left-hand panel shows changes on restrictions to residents and the right-hand panel changes to non-residents.

Fact 4: Liberalization of outflows slowed after the global financial crisis, while the liberalization of inflows picked up

The pace of liberalization of capital inflows and outflows has evolved differently before and after the global financial crisis. Liberalization of resident and non-resident inflows and outflows followed a significant and positive trend until the crisis. However, after the crisis, only liberalization of non-resident inflows maintained a significant trend; and its coefficient was somewhat larger, suggesting that the pace of liberalization of non-resident inflows accelerated after 2008.

Table 6: Trends in CFM Before and After the Global Financial Crisis

	Resident		Non-resident	
	Inflows	Outflows	Inflows	Outflows
	0.043*	0.153***	0.043***	0.028**
Pre-crisis trend	[1.95]	[4.67]	[2.79]	[2.05]
Observations	1,692	1,692	1,692	1,692
R-squared	0.05	0.27	0.09	0.05
# of countries	47	47	47	47
	0.052	0.045	0.062***	0.007
Post-crisis trend	[1.62]	[1.57]	[2.92]	[0.69]
Observations	1,410	1,410	1,410	1,410
R-squared	0.04	0.03	0.11	0.00
# of countries	47	47	47	47

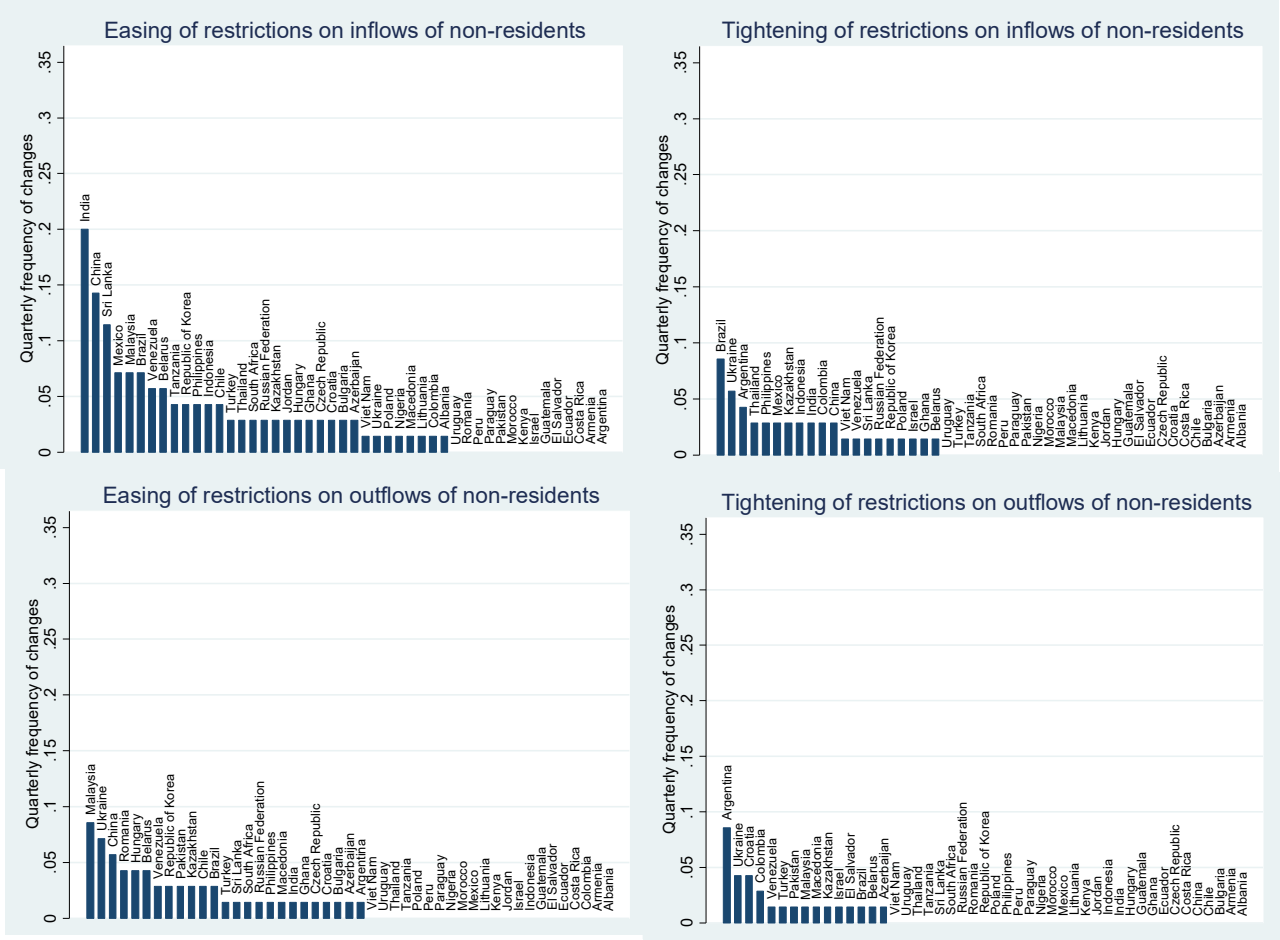
Note: The table shows the coefficient of regression of the respective cumulative indices on a linear time trend. The first row regresses a cumulative index that takes the value 0 in 1999:Q1, on a time trend from 1999:Q1 until 2007:Q4 (pre-crisis trend). The second row regresses a time trend that takes the value 0 in 2009:Q1, on a linear time trend from 2009:Q1 to 2016:Q2 (post-crisis trend). All regressions include country fixed effects. Robust t-statistics are reported in parenthesis. ***, ** and * indicate statistical significance at the 10%, 5% and 1% level.

Fact 5: Large cross-country and regional heterogeneity in the use of CFMs

The results presented so far mask significant heterogeneity across regions and countries. Not all countries use capital account policies regularly—some countries have not liberalized inflows by non-residents at all; and more than half of the countries in the sample never tightened restrictions on inflows by residents (see Charts 3 and 4).[15]

[15] Contrary to some perceptions, India stands out as a country that has consistently liberalized its capital flows starting from a very closed capital account (see Gupta, 2016). For the most part, it has been due to the liberalization of inflows by

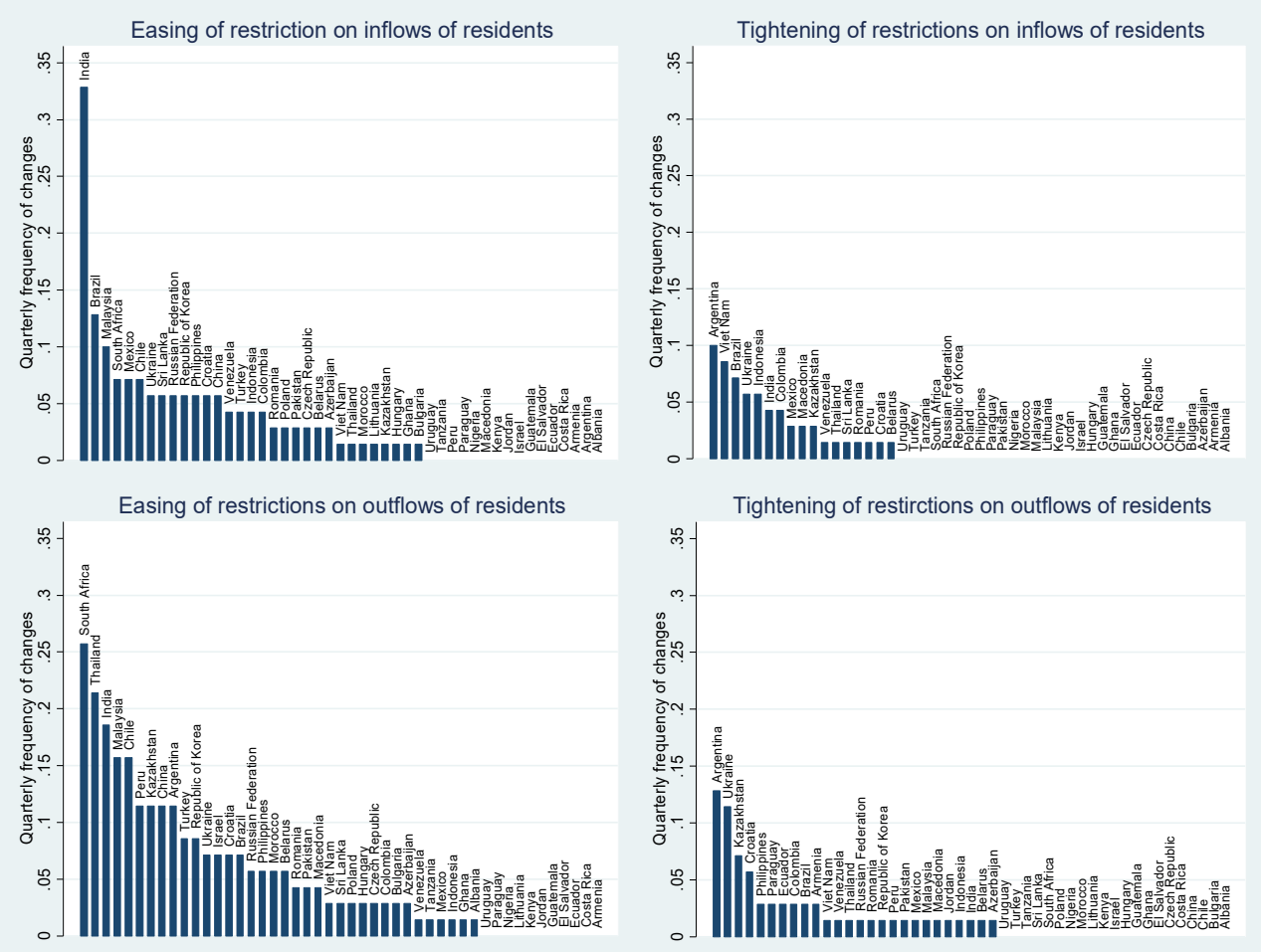
Chart 3: Average Frequency (per quarter) of capital flow measures on non-resident flows across countries



Notes: The chart shows the quarterly frequency of easing or tightening of CFMs per country. The quarterly frequency is obtained by dividing the number of changes by the number of quarters in the respective country. A frequency of 1 indicates that restrictions are changed every quarter and a frequency of 0.25 indicates that they are changed every four quarters, i.e. once a year.

nonresidents, and in part due to the liberalization of outward flows by residents. Capital outflows by residents were especially liberalized in the early-mid 2000s when large inflows deluged the country. Policy makers initially used other tools to minimize the impacts of large inflows and eventually resorted to liberalizing outflows by residents. Liberalization of capital flows has mostly been unidirectional, with few incidents of reversals.

Chart 4: Average Frequency (per quarter) of capital flow measures on resident flows across countries

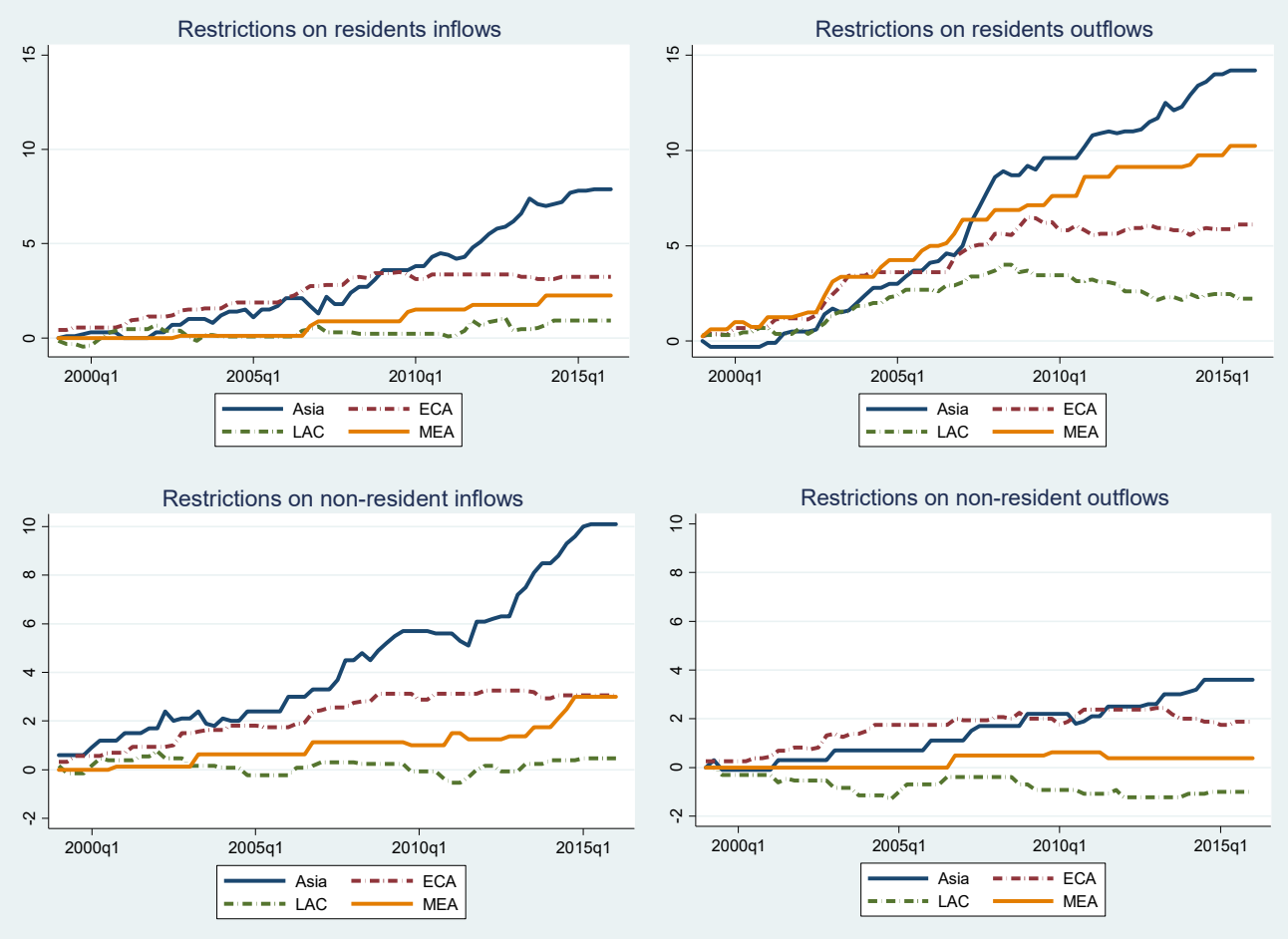


Notes: The chart shows the quarterly frequency of easing or tightening of CFMs per country. The quarterly frequency is obtained by dividing the number of respective changes by the number of quarters. A frequency of 1 indicates that restrictions are changed every quarter and a frequency of 0.25 indicates that they are changed every four quarters, i.e. once a year.

The use of CFMs varies strongly across regions. The cumulative change indices in Chart 5 show large regional differences in the pace and direction of changes to restrictions on capital flows. In particluar, Asia stands out as the region liberalizing restrictions on capital flows most strongly. This holds for inflows and outflows by both residents and non-residents. Restrictions on capital outflows have also been substanitailly liberalized in the Middle East and Africa region. The pattern is different for Latin America. The dashed green lines in Chart 5 are not continuously upward sloping, but also show negative changes. This suggests that countries in LAC did not follow a unidirectional trend towards easing of capital flow measures during this period, but at times also tightened

restrictions or reversed previous liberalization. This pattern can be best seen for restrictions on resident outflows, which were tightened after the global financial crisis and for restrictions on non-resident outflows where the cumulative change index is negative, meaning that restrictions have tightened in net terms since 1999.

Chart 5: Cumulative changes across regions



Note: The chart displays the index of cumulative changes to inflows and outflows of CFMs on residents and non-residents, respectively, over time per region. For comparability, indices are standardized by the number of countries in a region.

4. Are CFMs Used as a Cyclical Policy Tool?

In this section, we ask how the use of CFMs aligns with domestic business or credit cycles, country specific capital flow cycles, or with global financial cycles. We separately analyze the use of CFMs on resident inflows, resident outflows, non-resident inflows, and non-resident outflows. We also ask how other macroeconomic policy tools, such as monetary policy, exchange rate

adjustments, foreign reserves, and macro prudential measures are used in emerging market economies, and how the use of these other tools correlates with CFMs.[16]

4.1 Domestic Economic Cycles and Capital Flow Measures

We identify domestic economic cycles by calculating the cyclical components of real GDP and credit.[17] A positive value of the cyclical component implies that the variable is above its trend value, and a negative value implies that the variable is below the trend; in other words, the output/credit gap is positive or negative respectively.[18] We use the terms cyclical component and gap interchangeably to indicate the distance of the series from its trend in any period.

A positive correlation between the output or credit gap and CFMs on resident inflows indicates that resident inflows are liberalized when the economy or credit is growing rapidly. We define this as CFMs being *pro-cyclical*. A negative correlation between the output or credit gap and CFMs on resident inflows indicates that restrictions on capital inflows are tightened when the economy or credit is growing fast. We define this as CFMs being *counter-cyclical*. Similarly, a positive correlation between the output or credit gap and CFMs on resident outflows indicates a countercyclical use of CFMs; a positive correlation between the output or credit gap and CFMs on nonresident inflows indicates procyclical CFMs; and a positive correlation between the output gap and CFMs on nonresident outflows indicates countercyclical use of the CFMs.

We analyze the use of CFMs and other policy tools during domestic cyclical conditions using the regression specification below:

$$Policy_{it,k} = \beta_k Domestic\ Cycle_{it} + \varepsilon_{it,k} \qquad (1)$$

In Equation (1), *i* refers to the country and *t* to quarter. The dependent variable is the respective policy variable, *k,* including the indices of CFMs on inflows by residents, outflows by residents, inflows by non-residents, and outflows by non-residents. In the results presented below, each index of CFMs takes a value -1 if the regulations on respective flows are tightened, 0 if there is no change, and 1 if they are liberalized. Among alternative policy tools we include policy rates, measured by an index which takes the value 1 if policy rates are increased by at least 25 basis points (bps), 0 if there is no change and -1 if policy rates are reduced by at least 25 bps. We include an index of macroprudential regulation, which takes a value of +1 if the regulations are strengthened, 0

[16] We do not analyze the use of fiscal policy due to lack of quarterly data.

[17] The credit (to private sector) series is deflated by the CPI. We calculate the cyclical component of GDP and credit by applying an HP-filter to the respective log-level series (using a smoothing parameter of 1,600, as is customary with quarterly data). The series are indexed to take the value of 1 in Q1 2010, as is common in the literature (see Drehmann et al., 2012), in order to ensure comparability across countries.

[18] Fernandez et al. (2015) use a similar approach.

if there is no change, and -1 if the regulations are relaxed.[19] Finally, we include cyclical components of the nominal exchange rate, real effective exchange rate, and foreign exchange reserves, each calculated by applying an HP-filter to the log values of the respective series.[20]

We estimate the regressions by Least Square Estimates, and include country fixed effects. Though not reported here, results are robust to the inclusion of time fixed effects or a linear time trend. The results are also robust when the policy variables such as CFMs, macroprudential measures and policy rates take specific numerical values rather than taking index values of 1, 0 and -1; and when we estimate the regressions by limited dependent variable regressions rather than linear regressions.

Our first set of results is in Tables 7 and 8, which indicate that CFMs are not used procyclically or countercyclically in response to a domestic business cycle or credit cycle. Coefficients of CFMs on all four types of flows are insignificant, suggesting that the use of CFMs is acyclical. This result is consistent with Eichengreen and Rose (2014), and Fernandez et al. (2015) who similarly do not find evidence of a countercyclical use of CFMs. In contrast to CFMs, there is strong evidence of countercyclical use of monetary policy--policy rates are lowered when the the output or credit gap is negative, and raised when it is positive. Macroprudential measures are also used countercyclically with respect to business cycle fluctuations - they are strengthened when the output gap is positive, and relaxed when it is negative; but are acyclical to the credit cycle. Besides monetary policy and macroprudential measures, exchange rates play a significant adjustment role--a positive output gap is associated with an appreciation of both nominal and real exchange rates and vice versa. Evidently, while letting their exchange rates adjust, countries also modulate large impacts of business cycles on their exchange rate. This is reflected in a positive association between changes in reserves and the output gap—indicative of countries' attempt to temper the exchange rate appreciation (depreciation) when the output gap is positive (negative) by accumulating (using) reserves. The nominal exchange rate adjusts in a countercyclical fashion to credit cycles as well.[21]

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[19] Policy rates data are from Haver and IFS. We consider quarter-over-quarter changes in policy rates. We include change in monetary policy in two ways. We define an index that takes a value 1 when the policy rate is increased, 0 when it does not change; and -1 when it is lowered. Alternatively, we include all changes in policy rates in the regressions. The result holds when we replace the interest rate index by changes in the level of interest rates.

[20] Data on nominal exchange rate series (vis-à-vis US dollar) and reserves are from the IFS database of the IMF. The data on real effective exchange rate (weighted real exchange rate with respect to a basket of currencies) are from the IFS database, supplemented by data from JP Morgan. An increase in the nominal exchange rate is an exchange rate depreciation; while an increase in the real effective exchange rate is an appreciation of the exchange rate. Data for different variables are available for varying number of countries. While the data on CFMs and reserves are available for all 47 countries in the sample, quarterly GDP data are available for 42 countries, nominal exchange rates for 41, policy rates for 35, and the real effective exchange rates and macroprudential measures are available for 31 and 28 countries respectively. Results are robust if we confine the analysis to the smallest sample of 28 countries across all policy variables.

[21] As an extension, we test whether the results are symmetric for positive and negative output gaps, and we find that the results are symmetric.

Table 7: Domestic Business Cycles and Policy Tools

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Capital Flow Measures on								
	Resident Inflows	Resident Outflows	Non-Resident Inflows	Non-resident Outflows	Interest Rates	Macropru Regulation	Exchange Rate	Real effective exch rate	FX Reserves
Cyclical comp of GDP	0.145 [0.76]	0.291 [0.81]	-0.113 [0.68]	0.043 [0.35]	6.742*** [4.12]	1.421** [2.14]	-1.322*** [6.01]	0.598*** [5.20]	1.702*** [6.41]
Constant	0.024*** [209.63]	0.047*** [217.35]	0.020*** [199.6]	0.009*** [114.63]	-0.064*** [79.22]	0.074*** [6667]	-0.000*** [2.97]	0.001*** [7.30]	0.001*** [5.68]
Observations	2596	2596	2596	2596	1849	1588	2484	1995	2498
R-squared	0.000	0.001	0.000	0.000	0.052	0.006	0.145	0.063	0.105
# of countries	42	42	42	42	35	28	41	31	42

Notes: The RHS variable is the cyclical component of domestic real GDP. Dependent variables in Columns 1-4 are indices of CFM on respective type of flow. The indices take value of -1/0/1 (Tightening/no change/Easing). The dependent variable in Column 5 is a binary variable of policy rate changes. A value of -1/1 indicates a reduction/increase in policy rates by at least 25bps over previous quarter. Dependent variable in Column 6 is a measure of macroprudential regulation taken from Cerruti et al. (2017). A value of 1 indicates a tightening of restrictions and a value of -1 an easing. The dependent variables in Column 7-9 are the cyclical components of log nominal exchange rates, log real effective exchange rate and log foreign reserves, respectively. Robust t statistics are in parenthesis. *, ** and *** indicate that the coefficients are significant at the 10, 5 and 1 percent level.

Table 8: Domestic Credit Cycles and Policy Tools

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Capital Flow Measures on								
	Resident Inflows	Resident Outflows	Non-Resident Inflows	Non-Resident Outflows	Interest Rates	Macropru Regulation	Exchange Rates	Real effective exch rate	FX Reserves
Cyclical comp. of credit	-0.055 [0.14]	-0.493 [1.24]	-0.163 [0.72]	-0.065 [0.36]	12.760*** [5.06]	0.240 [0.19]	-1.132** [2.10]	0.008 [0.03]	0.678 [0.76]
Constant	0.025*** [381.47]	0.043*** [633.37]	0.021*** [536.56]	0.009*** [308.50]	-0.087*** [457.24]	0.077*** [327.91]	-0.001*** [14.81]	0.000*** [2.76]	0.000** [2.64]
Observations	2874	2874	2874	2874	2067	1560	2844	2331	2861
R-squared	0.000	0.000	0.000	0.000	0.026	0.000	0.022	0.000	0.002
# of countries	43	43	43	43	36	26	43	35	43

Notes: The RHS variable is the cyclical component of domestic real credit. Dependent variables in Columns 1-4 are indices of CFM on respective type of flow. The indices take value of -1/0/1 (Tightening/no change/Easing). The dependent variable in Column 5 is a binary variable of policy rate changes. A value of -1/1 indicates a reduction/increase in policy rates by at least 25bps over previous quarter. Dependent variable in Column 6 is a measure of macroprudential regulation taken from Cerruti et al. (2017). A value of 1 indicates a tightening of restrictions and a value of -1 an easing. The dependent variables in Column 7-9 are the cyclical components of log nominal exchange rates, log real effective exchange rate and log foreign reserves, respectively. Regressions include country fixed effects. Robust t statistics are in parenthesis. *, ** and *** indicate that the coefficients are significant at 10, 5 and 1 percent level.

4.2 Capital Flow Cycles and Capital Flow Measures

Next, we relate the use of various policy tools to the pace of capital inflows or outflows and during the episodes of sudden stops or sudden surges in capital flows. Following Eichengreen, Gupta and Masetti (2017) we identify episodes of sudden stops when capital inflows (FDI, portfolio equity and debt, and other inflows by nonresidents) as percent of trend GDP decline below the average of the previous 20 quarters by at least one standard deviation, when the decline lasts for more than a quarter, and when flows are two standard deviations below their prior average in at least one quarter.[22] The sudden-stop episodes end when capital flows recover at least to the level of the prior mean minus one standard deviation.

Similarly, we identify surges in capital flows when total capital inflows as percent of trend GDP exceed the average of the previous 20 quarters by at least one standard deviation, when the increase lasts for more than one quarter, and when flows are two standard deviations above their prior average in at least one quarter. The surge episode then ends when flows decline below their prior mean minus one standard deviation. Altogether we identify 25 episodes of sudden-stops, with an average duration of 2.6 quarters; and 55 episodes of surges with an average duration of 3.9 quarters.

We regress the use of various policy instruments on dummies for sudden stops or surges that take a value 1 for the country-quarter observations when a country experienced a sudden stop or surge, respectively, and 0 for all other observations. Since the regression of CFMs on episodes related to capital flows may be prone to endogeneity, we lag sudden stops and surges by one quarter.[23]

Our results suggest that CFMs are not used in response to the sudden stops of capital inflows. The coefficients for all four types of restrictions are insignificant in Table 9. However, policy makers use CFMs to modulate the impact of sudden surges in capital inflows. Table 10 shows that restrictions on capital outflows by residents are significantly liberalized when countries are confronted with a surge in capital flows, possibly as a way to mitigate the macroeconomic impacts of large inflows. Capital flow measures on other capital flows are not changed in response to surges.

[22] Data for capital flows are from the IMF's Balance of Payments Statistics. We identified sudden stops for total capital flows. One could identify sudden stops only for non-FDI inflows as in Eichengreen and Gupta (2016). Results are unaffected if we use this criterion instead.

[23] Some may argue that the endogeneity of capital flows should not be a concern. Rey (2015) argues that capital flows to emerging markets are driven primarily by global liquidity and financial conditions, and not by their domestic conditions. Eichengreen and Gupta (2016) confirm this in the period since 2002.

Table 9: Sudden Stops of Capital flows and Policy Tools

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Capital Flow Measures on								
	Resident Inflows	Resident Outflows	Non-Resident Inflows	Non-Resident Outflows	Interest Rates	Macroprud Regulation	Exchange Rates	Real effective exch rate	FX Reserves
Sudden stops, lag	-0.045	-0.014	-0.053	-0.038	-0.472***	-0.295**	0.054***	-0.033***	-0.100***
	[0.97]	[0.56]	[1.63]	[0.93]	[5.73]	[2.19]	[3.47]	[2.84]	[3.91]
Constant	0.022***	0.042***	0.016***	0.009***	-0.062***	0.065***	-0.003***	0.001***	0.004***
	[14.70]	[53.80]	[16.04]	[6.65]	[25.14]	[15.94]	[5.26]	[2.77]	[4.32]
Observations	2,164	2,164	2,164	2,164	1,601	1,356	2,102	1,870	2,126
R-squared	0.001	0.000	0.002	0.002	0.012	0.012	0.012	0.008	0.013
# of countries	43	43	43	43	35	27	42	34	43

Notes: Dependent variables in Columns 1-4 are indices of CFM on respective type of flow. The indices take value of -1/0/1 (Tightening/no change/Easing). The dependent variable in Column 5 is a binary variable of policy rate changes. A value of -1/1 indicates a reduction/increase in policy rates by at least 25bps over previous quarter. Dependent variable in Column 6 is a measure of macroprudential regulation taken from Cerruti et al. (2017). A value of 1 indicates a tightening of restrictions and a value of -1 an easing. The dependent variables in Column 7-9 are the cyclical components of log nominal exchange rates, log real effective exchange rate and log foreign reserves, respectively. The RHS variable is a dummy that indicates sudden stop periods. Regressions include country fixed effects. Robust t statistics are in parenthesis. *, ** and *** indicate that coefficients are significant at the 10, 5 and 1 percent level.

Table 10: Sudden Surges of Capital flows and Policy Tools

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Capital Flow Measures on								
	Resident Inflows	Resident Outflows	Non-Resident Inflows	Non-Resident Outflows	Interest Rates	Macroprudential Regulation	Exchange Rates	Real effective exch rate	FX Reserves
Surge, lagged	0.003	0.046**	-0.017	-0.002	0.357***	0.035	-0.044***	0.022***	0.048***
	[0.18]	[2.52]	[0.96]	[0.11]	[4.63]	[0.94]	[5.80]	[3.15]	[4.28]
Constant	0.020***	0.037***	0.016***	0.008***	-0.114***	0.052***	0.004***	-0.002***	-0.005***
	[11.14]	[20.42]	[9.30]	[4.86]	[14.04]	[11.59]	[4.64]	[3.19]	[3.98]
Observations	2,164	2,164	2,164	2,164	1,601	1,356	2,102	1,870	2,126
R-squared	0.000	0.002	0.001	0.000	0.023	0.001	0.023	0.009	0.009
# of countries	43	43	43	43	35	27	42	34	43

Notes: Dependent variables in Columns 1-4 are indices of CFM on respective type of flow. The indices take value of -1/0/1 (Tightening/no change/Easing). The dependent variable in Column 5 is a binary variable of policy rate changes. A value of -1/1 indicates a reduction/increase in policy rates by at least 25bps over previous quarter. Dependent variable in Column 6 is a measure of macroprudential regulation taken from Cerruti et al. (2017). A value of 1 indicates a tightening of restrictions and a value of -1 an easing. The dependent variables in Column 7-9 are the cyclical components of log nominal exchange rates, log real effective exchange rate and log foreign reserves, respectively. The RHS variable is a dummy that indicates surge periods. The regressions include country fixed effects. Robust t statistics are in parenthesis. *, ** and *** indicate that the coefficients are significant at the 10, 5 and 1 percent level.

Regarding the use of other policies, we find that countries generally lower their policy rates, when confronted by a sudden stop of capital flows; as well as relax their macroprudential regulations. This is consistent with Eichengreen and Gupta (2016), who note that in the period since the 2000s, counties have responded to sudden stops by lowering their policy rates, in order to support economic activity and financial markets; letting their exchange rates depreciate; and relaxing the macroprudential rules.[24] Similarly, countries typically respond to surges by raising the policy rates, letting their exchange rates appreciate, and accumulating reserves.

Finally, instead of analyzing the use of various policy measures only around the extreme events of sudden stops or sudden surges, we also analyze them for the regular pace of capital flows. Just like the cyclical components of output and credit, we calculate the cyclical component of capital flows by applying an HP-filter to capital flows as percent of trend GDP.[25] To alleviate the endogeneity concerns we lag the cyclical component of capital flows by a quarter in the regressions. Results are consistent with those established for the episodes of sudden stops and sudden surges. In the periods when capital inflows are above trend, monetary policy is tightened, the exchange rate appreciates, reserves are accumulated, but there is no change in capital flow measures.

Table 11: Pace of Capital flows and Policy Tools

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Capital Flow Measures on								
	Resident Inflows	Resident Outflows	Non-Resident Inflows	Non-Resident Outflows	Interest Rates	Macroprud Regulation	Exchange Rates	Real effective exch rate	FX Reserves
Cyclical comp. of capital flows, lagged	0.003	0.006	0.000	0.000	0.053**	0.010	-0.012***	0.007***	0.015***
	[1.05]	[1.24]	[0.03]	[0.10]	[2.71]	[1.01]	[4.74]	[3.24]	[3.53]
Constant	0.025***	0.041***	0.016***	0.007***	-0.089***	0.062***	0.001***	0.000**	-0.001***
	[279.27]	[249.39]	[181.64]	[57.13]	[106.21]	[93.32]	[14.83]	[2.54]	[9.44]
Observations	2292	2292	2292	2292	1641	1427	2254	1911	2258
R-squared	0.000	0.001	0.000	0.000	0.013	0.001	0.049	0.019	0.022
# of countries	37	37	37	37	30	25	37	30	37

Notes: Dependent variables in Columns 1-4 are indices of CFM on respective type of flows, which take value of -1/0/1 (Tightening/no change/Easing). The dependent variable in Column 5 is a binary variable of policy rate changes. A value of -1/1 indicates a reduction/increase in policy rates by at least 25bps over previous quarter. Dependent variable in Column 6 is a measure of macroprudential regulation taken from Cerruti et al. (2017). A value of 1 indicates a tightening of restrictions and a value of -1 an easing. The dependent variables in Column 7-9 are the cyclical components of log nominal exchange rates, log real effective exchange rate and log foreign reserves, respectively. The RHS variable is cyclical component of capital inflows. Regressions include country fixed effects. Robust t statistics are in parenthesis. *, ** and *** indicate that the coefficients are significant at the 10, 5 and 1 percent level.

[24] Eichengreen and Gupta (2017) note that monetary easing and currency depreciation have been feasible because countries have reduced their foreign currency mismatches, limiting adverse balance-sheet effects from depreciation.
[25] The series had some outliers, when values were more than 5 standard deviations further from the mean. We dropped these 12 observations.

4.3 Global Financial Cycle and Capital Flow Measures

Rey (2015) suggests that "global financial cycles" exist whereby monetary and financial conditions in major economies, most notably the United States, are transmitted internationally to advanced, emerging market, and developing countries. The phenomenon raises important questions about the mechanisms through which the transmission occurs; the role of exchange rates in insulating the economies from the impact of these cycles; scope for monetary policy (and fiscal policy) autonomy; and the role of capital controls and prudential measures in ensuring economic and financial resilience in the face of capital flows induced by such global financial cycles.

Next, we analyze the use of CFMs over the global financial cycle. We ask if the use of CFMs, or other policies coincides with global economic cycles. We proxy the global economic cycle by the cyclical component of GDP of G7 countries (US, Japan, Germany, France, UK, Italy and Canada) and analyze the response of policy variables to global economic conditions, using the regression equation in (1).[26]

Table 12: Global Economic Cycle and Policy Tools

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Capital Flow Measures on								
	Resident Inflows	Resident Outflows	Non-Resident Inflows	Non-Resident Outflows	Interest Rates	Macroprud Regulation	Exchange Rates	Real effective exch rate	FX Reserves
Cyclical comp. of G7 real GDP	0.243	0.602	0.483	0.070	14.030***	3.059***	-1.784***	0.635**	2.082***
	[0.71]	[1.41]	[1.53]	[0.28]	[8.03]	[3.17]	[7.48]	[2.46]	[5.01]
Constant	0.021***	0.038***	0.019***	0.007***	-0.086***	0.068***	0.001***	-0.000**	-0.001***
	[192.44]	[281.64]	[194.30]	[91.13]	[227.09]	[385.63]	[7.48]	[2.46]	[5.01]
Observations	3290	3290	3290	3290	2379	1680	3132	2479	3177
R-squared	0.000	0.001	0.001	0.000	0.060	0.007	0.066	0.013	0.027
# of countries	47	47	47	47	39	28	46	36	47

Notes: Dependent variables in Columns 1-4 are indices of CFM on respective type of flow. The indices take value of -1/0/1 (Tightening/no change/Easing). The dependent variable in Column 5 is a binary variable of policy rate changes. A value of -1/1 indicates a reduction/increase in policy rates by at least 25bps over previous quarter. Dependent variable in Column 6 is a measure of macroprudential regulation from Cerruti et al. (2017). A value of 1 indicates a tightening of restrictions and a value of -1 an easing. The dependent variables in Column 7-9 are the cyclical components of log nominal exchange rates, log real effective exchange rate and log foreign reserves, respectively. The RHS variable is the cyclical component of G7 countries' real GDP. Regressions include country fixed effects. Robust t statistics are in parenthesis. *, ** and *** indicate that coefficients are significant at the 10, 5 and 1 percent level.

[26] Results are very similar when we use the cyclical component of US GDP instead. The correlation of the output gap of G7 countries with the US output gap is 0.92.

The results in Table 12 indicate that, similar to the results for domestic economic cycles, the use of CFMs is not correlated with the global economic cycle. As far as the use of other policy tools is concerned, the results quite unambiguously show that in response to a global economic expansion, emerging economies raise their interest rates and strengthen their macroprudential measures, even as their exchange rates appreciate, and they accumulate reserves, possibly in order to deter a sharper appreciation of the exchange rate.

Passari and Rey (2015) show that the VIX is a key driver of risky asset prices worldwide and is highly correlated with credit growth and leverage in emerging countries. Hence, in an alternative approach (not reported here) we measure the state of the global financial cycle by the VIX (log). The results show that emerging economies, when confronted with enhanced global risk aversion, lower their policy rates, relax macro prudential measures, let their exchange rates depreciate, and defend a sharper adjustment in exchange rates, losing reserves in the process. They however do not use CFMs as a policy tool.[27]

4.4 Alternative Specification and Robustness Tests

Thus far we have consistently established that CFMs are not used proactively as a policy tool of choice to address the implications of domestic or global economic cycles. In this section, we check the robustness of our results under different model specifications. We ask whether the results we obtained for CFMs on individual capital flow series are also obtained when we consider an integrated index of CFMs. The consideration being that countries may use CFMs on different series of capital flows as substitutes; and thus, when we analyze them separately, each one of the indices is not used frequently enough to render significant results. Therefore, we combine the index on inflows of resident and nonresident flows and that on the outflows of resident and nonresident flows. The index of CFMs on inflows takes a value 1 when either resident or nonresident inflows are liberalized, -1 when they are restricted, and 0 when there is no change in the regulations. The index of CFMs on outflows is similarly defined. The first two columns of Table 13, show that the results are not affected by this changed specification. The coefficients on the integrated indices of CFMs remain insignificant, reinforcing our claim that the use of CFMs is acyclical.

We further ask whether the results we obtained with the binary index are also obtained with a more nuanced measure of CFMs that accounts for their intensity of use within the quarter. For this purpose, we replace the binary indices of CFMs used in Sections 4.1 to 4.3 with the qualitative index that accounts for the "magnitude" of the change in CFMs. This index ranges from -4 (very large tightening) to 4 (very large easing). The results are displayed in Columns 3 to 6 of Table 13. These too point to the acyclical use of CFMs.

[27] To ensure that the results are not driven by the heightened risk aversion following the collapse of Lehman Brothers in Q3:2008, we repeat the analysis including a dummy which takes a value for Q3:2008 – Q2:2009, the time of the peak of the global financial crisis. This does not change the results.

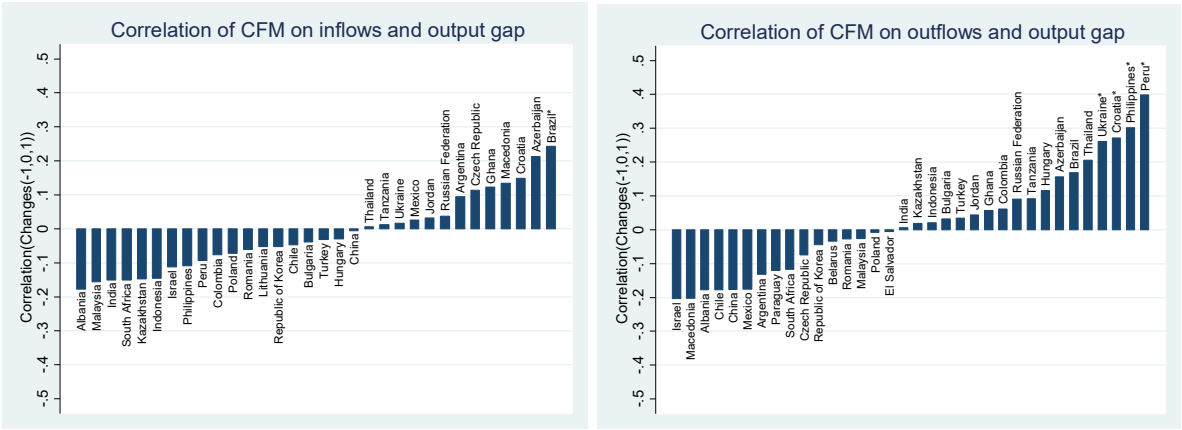
Table 13: Combined Index and Numerical Index

	(1) All Inflows	(2) All Outflows	(3) Resident Inflows^	(4) Resident Outflows^	(5) Non-Resident Inflows^	(6) Non-Resident Outflows^
Cyclical comp. of GDP	0.066	0.339	0.335	0.785	-0.212	0.269
	[0.35]	[0.87]	[0.64]	[0.89]	[0.51]	[0.80]
Constant	0.034***	0.045***	0.060***	0.135***	0.061***	0.022***
	[294.26]	[191.52]	[187.95]	[252.87]	[243.21]	[106.21]
Observations	2596	2596	2596	2596	2596	2596
R-squared	0.000	0.001	0.000	0.000	0.000	0.000
# of countries	42	42	42	42	42	42

Notes: The dependent variables in Column (1) and Column (2) are combined indices of restrictions on resident and non-resident inflows and outflows, respectively. ^ The dependent variables in Columns (3) – (6) are indices of CFMs on the respective type of flow. The indices can take values of -4 (Large Tightening), 0 (no change) and 4 (Large Easing). The regressions include country fixed effects. Robust t statistics are in parenthesis. *, ** and *** indicate that the coefficients are significant at the 10, 5 and 1 percent level.

Stylized Fact 4 in the previous section points to substantial cross-country differences in the use of CFMs. We test whether such differences also apply to the cyclicality of CFMs. Chart 6 plots for each country the unconditional correlation between the use of CFMs and the cyclical component of domestic real GDP. The chart shows that indeed there is a substantial degree of heterogeneity across countries, with roughly half the correlations being negative and the other half being positive. However, only one correlation coefficient is significantly different from zero for the use of CFMs on inflows and only four correlation coefficients are significantly different from zero for the use of CFMs on outflows (similar results are reported by Fernandez et al., 2015). These country-level observations, reinforce our conjecture that CFMs are not used as a cyclical policy tool even within specific regions or groups of countries.

Chart 6: Cross-country differences in the cyclicality of CFMs



Notes: Correlation between changes to CFMs and the cyclical component of GDP. * indicates that correlations are significantly different from 0 at the 5% significance level.

In a last extension, we ask whether the observed cross-country heterogeneity in the use of CFMs is related to differences in macroeconomic characteristics. IMF (2012) lays out different scenarios in which the use of CFMs may be more appropriate. These depend on the exchange rate regime, whether the exchange rate is appreciated or not, and on the health of the financial sector. In a similar vein Frahi and Werning (2014) relate the use of CFMs to the openness of the economy, the exchange rate regime and to different kinds of shocks. Accordingly, in Tables 14 and 15 we ask whether the cyclical or acyclical use of CFMs is related to a country's level of inflation, whether a country has an inflation targeting framework, its exchange rate regime, foreign currency position, or the level of external debt. We compare the average value of these variables between countries that show a relatively high correlation between the use of CFMs and the domestic business cycle (top 30-percentile) and those that have a relatively low correlation (bottom 30-percentile). As it turns out, these macro-variables do not differ significantly between the two groups of countries and, hence, cannot explain cross-country differences in the use of CFMs.

Table 14: Macroeconomic variables across top and bottom 30 percent of countries on the cyclicality of restrictions on capital inflows

	Inflation	FX exposure	Inflation targeting	Exchange rate regime	External debt
Bottom 30%	0.95	0.11	0.54	3.55	42.32
Top 30%	1.52	0.05	0.35	3.03	45.56

Notes: The table shows respective average macro characteristics of countries whose correlation between the use of CFMs on inflows and the domestic business cycle falls in the bottom or top 30-percentile of the sample, respectively. The macro characteristics are the average q-o-q inflation rate, foreign currency exposure, the share of quarters in the sample that the country is using an inflation target, the exchange rate regime (4 Float, 3 Crawling, 2 Fixed), external debt to GNI ratio. The differences are not significantly different at the 10% level (with the exception of exchange rate regime, where the difference is significant at the 8% level).

Table 15: Macroeconomic variables across top and bottom 30 percent of countries regarding cyclicality of restrictions on capital outflows

	Inflation	FX exposure	Inflation targeting	Exchange rate regime	External debt
Bottom 30%	1.11	0.10	0.48	3.36	34.58
Top 30%	1.23	0.00	0.45	3.32	40.08

Notes: The table shows the respective average macro characteristics of countries whose correlation between the use CFMs on outflows and the domestic business cycle falls in the bottom or top 30-percentile of the sample, respectively. The macro characteristics are the average q-o-q inflation rate, foreign currency exposure, the share of quarters in the sample that the country is using an inflation target, exchange rate regime (4 Float, 3 Crawling, 2 Fixed), external debt to GNI ratio. The differences are not significantly different at the 10% level.

5. Conclusion

In this paper, we analyze the use of capital flow measures by emerging market economies. Using a novel database of 47 countries from 1999:Q1 to 2016:Q2 we show that emerging market economies use CFMs rather infrequently. When countries use CFMs, they are more likely to change restriction on resident flows than on non-resident flows; and on portfolio flows rather than on FDI or banking sector related flows. There are more changes pertaining to easing of CFMs than to tightening, as evidence points to a steady trend toward the liberalization of capital accounts. Use of CFMs varies across countries and regions with countries with a more closed capital account initially, have liberalized CFMs more rapidly over the last decade and a half. However, policy makers in emerging market economies do not seem to use capital flow measures as an active tool at business cycle frequency. Instead, they primarily use monetary policy and adjustments in exchange rate, supplemented by macro prudential measures and reserve management to manage the impacts of domestic business cycles, international liquidity cycles, and shocks to capital flows. The use of capital flow measures is sporadic, and mostly acyclical when used. The systematic use of CFMs as advocated by IMF (2012), or Rey (2015) is not evident in the data.

There may be three reasons for why CFMs have not been used as a more active policy tool. First, as per an idea first explored by Bartolini and Drazen (1996), use of capital controls may have a negative signaling impact. Investors, with imperfect information about the future policy focus and the state of an economy, might perceive the use of capital controls as a signal that the underlying problems in the banking and political systems or elsewhere in the economy are worse than earlier anticipated. This adverse signal is perhaps stronger for countries that have not used CFMs in the past and weaker for countries which rely on such measures more regularly. A second reason could be that the institutional setup for monitoring the use of CFMs in emerging market economies does not exist, unlike other policies, such as monetary policy for which the clear mandate lies with the central banks. A third reason could be that CFMs are deemed to be a blunt and ineffective policy measure. While analyzing the effectiveness of these policy measures is beyond the scope of the paper, others have shown that capital flow measures are not particularly effective, since they leak, have spillovers on other countries, and generate stigma. These all could very well be the reasons why there seems to be a lack of interest in the use of CFMs.[28]

We have made progress on the existing state of knowledge in this paper, by collating a rich data set at an appropriately high frequency, and for a representative set of countries, which allows us to analyze the policy response to both external and domestic shocks. Yet our work remains subject to certain caveats. The main one being that we are unable to distinguish between *dejure* vs *defacto* regulations. The point is well taken, but we contend that since we are not focusing on the impact of regulation, only its incidence, this concern is less valid in the context of this paper.

[28] See Basu, Eichengreen and Gupta (2015) on the negative market reaction generated by the use of CFMs in India during the 2013 taper talk event.

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Appendix 1: List of Countries Across Regions

Asia	Europe and Central Asia	Latina America and Caribbean	Middle East and Africa
China	Albania	Argentina	Ghana
India	Armenia	Brazil	Israel
Indonesia	Azerbaijan	Chile	Jordan
Malaysia	Belarus	Colombia	Kenya
Pakistan	Bulgaria	Costa Rica	Morocco
Philippines	Croatia	Ecuador	Nigeria
Republic of Korea	Czech Republic	El Salvador	South Africa
Sri Lanka	Hungary	Guatemala	Tanzania
Thailand	Kazakhstan	Mexico	
Vietnam	Lithuania	Paraguay	
	Macedonia	Peru	
	Poland	Uruguay	
	Romania	Venezuela, RB	
	Russian Federation		
	Turkey		
	Ukraine		

Appendix 2: Sources of Data

Variable	Sources	Frequency	Description
Capital flow measures	Own coding based on data from the IMF's Annual Reports on Exchange Arrangements and Exchange Restrictions (AREAER)	quarterly	see Technical Appendix
Real GDP	National sources extracted via Haver	quarterly	Local currency, constant prices
CPI	IFS, supplemented by national sources	quarterly	
Credit	IFS	quarterly	IFS series 32d: Depository Corporations Claims on Private Sector (EOP, Mil. LC)
Chinn-Ito index	Author's website	annual	
Exchange rates	IFS	quarterly	Nominal exchange rate LC/USD
Real effective exchange rate	IFS, JP Morgan	quarterly	
Policy rates	IFS, supplemented by local sources	quarterly	
FX reserves	IFS	quarterly	USD bn
Macroprudential regulation	Cerutti et al. 2017	quarterly	
VIX	Haver Analytics	quarterly	