Dissecting Capital Flows: Do Capital Controls Shield Against Foreign Shocks? *

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Abstract

To rationalize the increased use of capital flows regulations in recent times, we study the capacity of capital flow management measures (CFMs) to insulate an economy from external shocks. We examine the extent to which CFMs mitigate the effects of US monetary shocks and whether measuring this mitigation at the net or gross level of flows matters. Our analysis is carried out for a panel of emerging market economies and for different disaggregations of the flows. Our results indicate that the level of aggregation matters for evaluating the effects of CFMs, and that analyses with excessively aggregated flows or with only net measures may lead to biases in assessing the insulation features of the CFMs. Furthermore, CFMs have insulation properties that mitigate capital repatriations; however, these are mostly related to risky portfolio and banking flows.

JEL Codes: F32, F38, F62, G18

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1 Introduction

In the aftermath of the Global Financial Crisis (GFC), capital flow management policies have been widely employed in emerging market economies (EMEs) to mitigate the impact of external shocks.[1] Accordingly, empirical studies have been undertaken to assess the effectiveness of these policies. Although mixed, the results generally suggest that capital controls or capital flow management measures (CFMs) lower EMEs exposure to external shocks.[2] Similarly, Erten, Korinek, and Ocampo (2021) suggest that recent estimations show "a tightening in capital controls reduces financial fragility indicators such as bank leverage, bank credit, and exposure to portfolio liabilities" (p. 76).[3] This view seems to be supported by recent revisions of the policy stance regarding capital controls by international institutions (e.g., IMF, 2018). On the other hand, and in stark contrast, an established view in the literature suggests that controls lead to efficiency losses and misallocations (Forbes, 2007; Alfaro, Chari, and Kanczuk, 2017; Andreasen, Bauducco, Dardati, and Mendoza, 2023). Now, given the latter views on CFMs and considering their increased usage, it is only natural to wonder if there is any overlooked aspect of these policies that justifies their use despite the potential costs.

We attempt to unveil such a feature by studying: 1) the effectiveness of CFMs in curbing the cycles of international capital flows, and 2) whether there is a meaningful difference between the effect of CFMs on gross flows and on net flows. The second question is motivated by the growing interest in the literature on the differential role of gross capital flows in policy design and macroeconomic outcomes. Based on recent literature (e.g., Forbes and Warnock, 2012; Broner, Didier, Erce, and Schmukler, 2013; Cavallo, 2019), overseas investment of domestic agents (i.e., gross outflows) increased significantly in EMEs in the 2000s, indicating the need to distinguish gross outflows from gross inflows. This trend can also be found in the selected economies as shown in Figure 1.[4] On the other hand, another relevant feature (visible in the figure), is the increased covariance between gross inflows and outflows after the global financial crisis. This phenomenon is denoted as global retrenchment (Davis and Van Wincoop, 2018) and ultimately translates into a lower variance in the resulting net flows that could lead to underestimating the role, need, and effects of policies targeting this variable. In this context, we verify whether the international shocks' insulation properties of the CFMs are more appropriately assessed in terms of separate gross flows.

[1] According to the IMF 2019 Taxonomy of Capital Flow Management Measures (IMF, 2019), 36 economies have introduced capital flow management policies since 2000. See Appendix A for the list of economies and the time series of the implementations.

[2] See Kokenyne and Baba (2011); Ahmed and Zlate (2014); Forbes, Fratzscher, and Straub (2015); Akinci and Olmstead-Rumsey (2018) for examples.

[3] On the other hand, empirical studies using annual data sources such as Magud, Reinhart, and Rogoff (2018) and Reinhart and Smith (2002) often find no significant evidence that capital controls are effective in reducing capital flows. It can be argued against these studies that the introduction of capital controls during a specific month may not be captured by annual data. See Erten, Korinek, and Ocampo (2021).

[4] The details of how capital flows are constructed are presented in the data description section.

To address these questions, we construct a quarterly panel dataset for 32 economies that have employed CFMs during 2000-2018, and assess, based on local projections (Jordà, 2005; Coman and Lloyd, 2022), whether CFMs can offset the effects of US monetary shocks on both net and gross flows. We focus on the effect of US monetary policy shocks on capital flows and compare how these are different in the presence of CFMs.

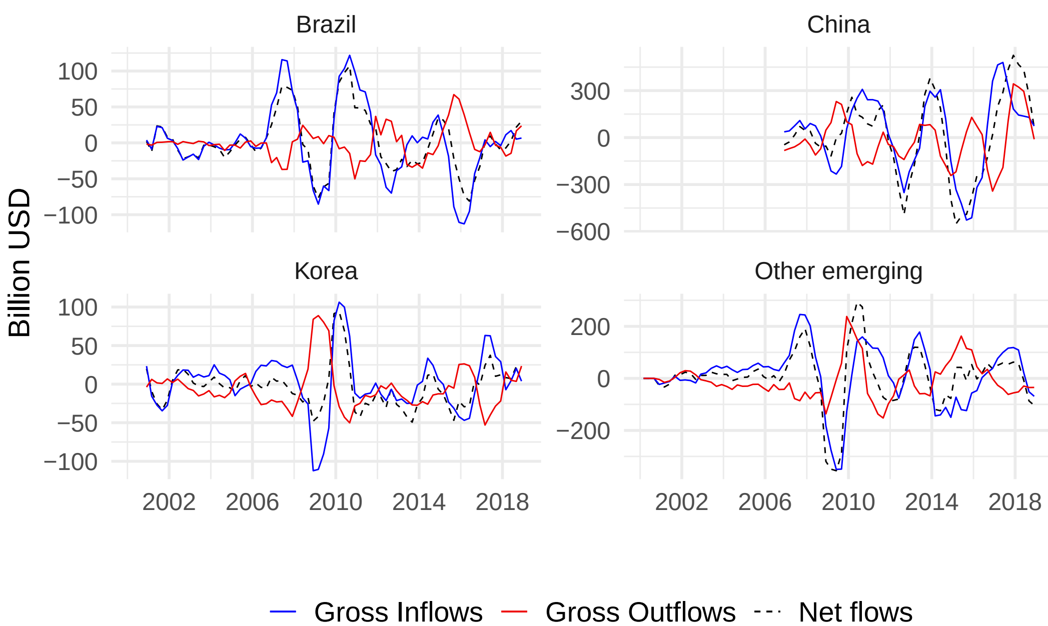
We find that CFMs can mitigate the impact of shocks on capital flows, and these offsetting effects are more evident with gross inflows and outflows. In contrast, they appear relatively ambiguous with net flows. We further gauge this insulation features with different disaggregations of the capital flows, of the CFMs, and even of the foreign shock itself. By disentangling these latter variables, we show that the level of aggregation is crucial when assessing the effect of CFMs. Specifically, depending on the type of capital flow, policy instrument, or shock, we identify three types of effects. First, while the foreign shock is impactful and leads to a decrease in domestic flows as expected, the CFMs successfully insulate the capital flows from it. Second, the insulation occurs but only partially if we look at aggregated flows categories. Third, when disaggregating by type of capital flow, we can associate the retrenchment effects to risky flows, and the —initally puzzling— positive effects (higher inflows) to safe investment flows. Thus, In the latter case the foreign shocks can have a positive effect which is contrary to the one dictated by standard intuition (based on a covered interest rate parity argument).

The presence of cases with potentially positive spillovers is exactly the reason why a positive effect can arise in some horizons when looking at the effect on total flows (when we would expect a negative effect), or why the spillover effects may be underestimated by studies looking only at broad flows (too aggregated) categories where positive and negative spillovers partially offset. The positive effect, on the other hand, can be rationalized as a risk hedging response —favoring the demand for safe assets everywhere— once the global shock is interpreted as a risk premium increase in all locations resembling of a global retrenchment episode documented in the literature when all risky flows comove.

At the same time, the type of investment flows where the insulation takes place at full and more clearly mitigates the expected decrease in inflows are the risky investments, defined as the portfolio equity plus foreign direct investment as in Davis and Van Wincoop (2018). Within these, the mitigation by CFMs is occurring for the portfolio equity only, which are precisely the most volatile subtype of capital flows. This implies that CFMs can be useful to insulate the economy from external shocks when most necessary. On the other hand, within safe flows, where the opposite (positive) effect can manifest, we find that this risk hedging behaviour is partly attributed to banking flows and derivatives.

Finally, we analyze whether the insulation inducing effect of CFMs change in times of tighter foreign monetary conditions along the lines of Jordà, Singh, and Taylor (2020). We find that the insulation feature is present regardless of the type of monetary conditions; however, the insulation is less strong in times of foreign interest rate hikes, which poses challenges for policy design and potentially calls for the combination of CFMs with other policy interventions. This heterogeneity in the results, which ranges from unnecessary to partial and then to full insulation, is a significant consideration for policy design. In fact, it aligns with other findings in the literature, such as those by Benigno et al. (2016), which explain how capital controls are substitutable with other policies in some cases, but become a relevant part of the policy mix in others.

Figure 1: Net and Gross Capital Flows in selected economies



Source: IMF - International Finance Statistics.
Note: This figure includes "smoothed" capital flows constructed as in Cavallo, Izquierdo, and León (2017) (see the Appendix A for details). The category "Other emerging" means other emerging market economies, including Argentina, Barbados, Belarus, Bolivia, Costa Rica, Ecuador, Georgia, Ghana, India, Indonesia, Kazakhstan, Liberia, Madagascar, North Macedonia, Peru, Russia, Sri Lanka, Ukraine, and Uzbekistan. The correlation between gross inflows and net inflows for the other emerging economies' group is 0.93 for pre-GFC periods and 0.79 for post-GFC periods.

These results add further evidence to the empirical literature on CFMs. Broadly speaking, by outlining an additional indirect effect of CFM interventions —that complements the direct effect of these policies usually explored in the literature— we contribute to the literature on the policies' effectiveness vis-à-vis external shocks. In particular, our result complements the research on the impact of US monetary policy shocks on EMEs, which tend to be more vulnerable relative to advanced economies (e.g., Kalemli-Ozcan, 2019). The spillovers from the US monetary shocks into EMEs have drawn much attention after the GFC. Rey (2015), for example, notes that countries with both fixed and flexible exchange rate regimes are affected by the global financial cycle and calls this phenomenon a dilemma between monetary policy independence and international capital flows. In other words, EMEs can have independent monetary policies only when they manage actively their international capital flows with CFMs (among other additional tools).

More recently, Miranda-Agrippino et al. (2020) compare the spillovers to emerging economies of monetary policies in the US and China and conclude that the former mainly affect financial integration, prices, and capital inflows, whereas the latter operates through trade channels. This result aligns closely with our notion that the CFMs could be helpful in shielding the EMEs' capital flows from monetary innovations in the US. Other studies also mention that this relationship between lower inflows and monetary tightenings is not too clear cut and can be intermediated by other fundamentals and their exchange rate regimes (Dedola et al., 2017; Georgiadis, 2016; di Giovanni and Shambaugh, 2008) and also be generated by policy news shocks (Vicondoa, 2019). Noticeably, a common thread on this studies is the idea that "when the US sneezes, the emerging countries catch a cold", meaning that the cross-border effects of the monetary shocks may be even stronger than the local ones (Maćkowiak, 2007).

Our findings also support recent studies showing that CFMs effectively guard against financial turmoil and that countries with tighter measures are less affected by external shocks. In a similar vein to this paper, Pasricha, Falagiarda, Bijsterbosch, and Aizenman (2018) showed that CFMs can have domestic and multilateral effects on gross capital flows, while the effect on net is ambiguous. We depart from a similar idea but also contribute by highlighting the relevance of an analysis based on disaggregated types of capital flows —on top of different formats, such as net and gross— and in contrast to their work, we focus on the insulation effect of CFMs in presence of global shocks originating in advanced economies. We also depart on other dimensions, mostly through our attempt to disentangle several of the features involved in the insulation effect (e.g., types of CFMs, and of monetary changes abroad, among others). On the other hand, another study that disaggregates types of flows is Ahmed and Zlate (2014) who estimate, based on a sample for the period 2002-2013, that capital controls introduced after 2009 have significantly discouraged net capital inflows to EMEs in terms of both total and portfolio capital flows. While our study shows similar results, we focus on the insulation mechanism in presence of tighter global financial conditions.

On the other hand, despite the focus of this study on capital controls, our exploration also relates to studies on the effect of similar policies, such as the macroprudential toolkit. On this front, Coman and Lloyd (2022) use the dataset constructed by Cerutti, Correa, Fiorentino, and Segalla (2017) to find that prudential policies —and particularly the loan-to-value ratio— can offset negative spillovers from the US monetary policy changes, suggesting that such policies can help EMEs maintain their monetary policy autonomy in the face of the global financial cycle. At the same time, and on par with some our results for CFMs, Akinci and Olmstead-Rumsey (2018) conclude, based on an index of macroprudential policy in 57 economies for the period 2000-2013, that tighter macroprudential measures are associated with lower growth of banking credit.

Finally, we also consider the special role of gross capital flows on intermediating the effects of global shocks on EMEs. In that sense, it builds on the literature emphasizing the distinction between gross capital inflows and outflows, such as Cavallo, Izquierdo, and León (2017) and Davis and Van Wincoop (2018). The former authors, for example, argue that sudden stops in net capital inflows can be prevented if a repatriation of domestic investors' overseas investment can offset a reduction in foreign lending to the domestic economy. Similarly, the IMF (2013) points out that EMEs can be resilient against the global financial cycle when they are able to mitigate the impact of foreign gross inflows with domestic gross outflows. We contribute to these findings by examining whether the effectiveness of CFMs against external shocks differ by type of capital flows (net versus gross or safe versus risky) and across different monetary regimes, on this latter point, we also contribute empirical evidence to the theoretical results in Devereux and Yetman (2014) which explain that, even if potentially welfare decreasing, capital controls depict insulation properties that may complement monetary policy actions in environments with liquidity traps that leak across countries.

The remainder of this paper is organized as follows. Section 2 explains the panel dataset. Section 3 describes the empirical methodology. The results for aggregated flows are shown in Section 4 and those for disaggregated flows in section 5. In Section 6 and 7 we discuss the effects conditional on the global monetary conditions and robustness checks, respectively. Finally, we conclude in Section 8.

2 Data Description

We construct a quarterly panel dataset with 32 economies that implemented CFMs during 2000-2018 according to the IMF 2019 Taxonomy of CFMs. The sample consists mainly of emerging economies and includes countries such as Brazil, China, India, Indonesia, Korea, and Russia, among others.[5] Our specifications use the net capital inflows, gross inflows, and gross outflows of different types of investment flows as dependent variables.[6] All types of capital flows are

[5]Initially, 36 economies that introduced CFMs since 2000 are considered. However, four economies are excluded from the dataset since there was very limited data for three economies (CEMAC, Cyprus and Greece), and Seychelles did not use any CFMs until 2019. See Appendix A for the full list of economies.

[6]Following Cerutti, Correa, Fiorentino, and Segalla (2017) and Cavallo, Powell, Pedemonte, and Tavella (2015) and Cavallo (2019), we measure gross capital inflows by the sum of net incurrence of liabilities and measure gross capital outflows by the negative sum of net acquisition of assets. These series of liabilities and assets include direct investment, portfolio investment, financial derivatives and other investments (excluding reserve assets). Since gross outflows are computed with a negative sign, net capital inflows are defined as the sum of gross inflows and gross outflows. In our dataset, for example, when domestic agents sell their foreign assets and repatriate funds into the home country by 10, reducing the size of their foreign asset holding during the period from 100 to 90, it implies that the value of gross capital outflows changes from -100 to -90, which raises net capital inflows. Conversely, if domestic agents increase their holdings of foreign assets by 10 (e.g., in response to higher

calculated using the IMF balance of payment (BoP) dataset base on Cerutti, Correa, Fiorentino, and Segalla (2017). Following Forbes and Warnock (2012), capital flows are smoothed out by aggregating series for four quarters (past three quarters and the current quarter), and then taking year-over-year differences. We account for the size of each economy by considering the ratio to GDP for each type of capital flow. Importantly, it should be noted that the scale of our responses may increase with this smoothing, after all it implies, first, accumulating the flows for four quarters and subtracting the analogous quantity for the previous year, and second, dividing the resulting quantity by the GDP of a single quarter only.[7]

For independent variables, we use measures of US monetary shocks that represent a major source of international financial shocks to most economies. To this end we use the shocks reported by Jarociński and Karadi (2020) (and updated by the authors) and that are constructed along the lines of Gertler and Karadi (2015) using surprises in the 3-month-ahead Federal Funds Futures Rates. We also construct CFM dummy variables by collecting the data from the IMF (2019) Taxonomy of Capital Flow Management Measures.[8] We indicate as 1 if any kind of CFM is used during the period t. If not, the variable takes the value of 0. For example, Brazil introduced CFMs by imposing a tax on external loans in January 2008, while Peru placed a reserve requirement on foreign credit lines in February 2010. Thus, CFM dummies for these periods in both countries are ones. [9]

There are two types of control variables in this study. First, the change in the Chicago Board Options Exchange Volatility Index (VIX) and US output growth rates are considered as global control variables. Second, some variables are used as country-specific control variables. For example, we collect the Industrial production (IP) indexes from the World Bank Global Economic Monitor (WB GEM) database. We also include the consumer price index (CPI), the nominal foreign exchange rate relative to the US dollar that we take from the IMF IFS database, and finally, we consider the domestic interest rates (3-month government bond rates) which are collected from Bloomberg.[10]

3 Empirical Strategy

The methodological framework of this study follows a lag-augmented local projection (LP) approach along the lines of Coman and Lloyd (2022) or Richter, Schularick, and Shim (2019)

US interest rates), gross outflows become more negative (from -100 to -110), reducing net capital inflows by 10.

[7] To clarify on this, note that the first part of the calculation may lead to a larger scale if the annual flows for the past year are negative (and the current are positive), and moreover, this potentially higher scale of the flows can also be reflected in the associated responses to shocks. Despite this, and thinking about the gains in terms of lower volatility and seasonality adjustment we retain the smoothed format in line with other studies.

[8] We provide the time series of CFMs' implementation in Appendix A.

[9] See Appendix A and the IMF (2019) Taxonomy of Capital Flow Management Measures for details.

[10] See Appendix A for the summary of variables used.

that build on the projection method of Jordà (2005).[11] The method is being increasingly applied in empirical studies, as it is found to be more robust to misspecification than the traditional VAR methods (Haug and Smith, 2012; Montiel and Plagborg-Møller, 2021). According to Montiel and Plagborg-Møller (2021), "local projection inference robustly handles two issues that commonly arise in applications: highly persistent data and the estimation of impulse responses at long horizons" (p. 1789). We apply this method to analyze the effect of foreign monetary shocks and CFM policies on the net and gross capital flows dynamics.

At the same time, we correct for potential endogeneity issues between our response variable, the capital flows, and the foreign monetary policy by working with a Local Projections with Instrumental Variables (LP-IV) specification. For this correction we use a series of US monetary policy shocks based on Gertler and Karadi (2015) and Jarociński and Karadi (2020).[12]

Finally, as we show in later sections, distinguishing between gross and net flows is insufficient to delimit the actual effect of CFMs. An actual delimitation of their effects will require to also disaggregate the capital flows by the type of investment asset and of policy instrument involved. We perform such explorations as well.

3.1 Specifications

For our baseline LP-IV estimation, we use a two-stage IV regression similar to Kalemli-Ozcan (2019) and Jordà, Schularick, and Taylor (2020). In the first stage, we use the three-month-ahead Fed futures rate as the instrument. We identify the US monetary policy shocks and obtain the fitted values ($\widehat{USMP_t}$)) from a first-stage regression of Fed rates on the futures rates surprises. In the second stage, we consider the impact of a US monetary shock in quarter t ($\widehat{USMP_t}$), of CFMs implemented domestically ($CFM_{i,t-1}$) and of their interaction ($\widehat{USMP_t} \times CFM_{i,t-1}$), on the capital flows (as a share of GDP) in the economy i at quarter $t+h$ ($y_{i,t+h}$). For the capital flows variable, as mentioned before, we consider separate estimations for net flows, gross inflows, and gross outflows in every exercise.

Note that we consider the lag of the CFM measures at each date in order to mitigate sources of simultaneity bias. In contrast, the monetary policy is contemporaneous since it is already

[11] Coman and Lloyd (2022), for example, focus on macro-prudential policies, differentiating them from capital flow management. We use a different set of CFMs from the IMF (2019) Taxonomy of CFMs. Also, we used different dependent variables. Instead of using the total and bank credits of 29 EMEs from the BIS database, we use capital flows calculated from the IMF BoP database for 32 economies. The choice of variables also differs from those in Coman and Lloyd. For example, we include additional global controls such as exchange rate depreciation rate and domestic interest rates. Time dummies are also added before and after the Global Financial Crisis.

[12] Kalemli-Ozcan (2019) describes the notion as follows: "In popular discourse, when the center country —most often the U.S.— runs a contractionary monetary policy, policy rate differentials across the world ($i_{\text{country}} - i_{\text{US}}$) contract, affecting short-term and possibly long-term market interest rates. Global investors re-balance their portfolio by shifting capital from low-interest rate countries to the high-interest rate center" (p. 1).

instrumented. Thus, our estimation equation, for horizons $h = 0, 1, \ldots, H(= 8)$ is:

$$\begin{aligned} y_{i,t+h} - y_{i,t-1} = \alpha^h + \beta_1^h \widehat{USMP}_t + \beta_2^h CFM_{i,t-1} + \beta_3^h (\widehat{USMP}_t \times CFM_{i,t-1}) \\ + \gamma^h IndividualControl_t + \delta^h GlobalControl_t \\ + \eta^h \sum_{j=1}^{J} Lag_{i,t-j} + \theta^h GFCdummy_t + FE_i^h + \epsilon_{i,t+h}, \end{aligned} \quad (1)$$

where t and h denote quarter and horizon.

$GlobalControl_t$ is a vector that contains the change in VIX and US growth rate, which reflect global economic and financial conditions. $IndividualControl_{i,t}$ represents the economy-specific control variables, including the growth rate, inflation rate, exchange rate depreciation rate, and the domestic interest rate. As a proxy for domestic interest rates, we use government bond rates with a maturity of three months for consistency with the quarterly dataset. We include these controls because domestic conditions can affect the capital flows for reasons apart from international markets' features. By incorporating the exchange rate depreciation rate and domestic interest rates, we can better focus on the effect of external US monetary shocks and CFMs. To note, there is a loss of observations in our dataset due to data restrictions on domestic interest rates. The results without using domestic interest rates as controls are provided in the section on robustness checks.

Lagged terms for most of the variables for the previous J periods are included as well (in $\sum Lag_{i,t-j}$). In that vector, we include independent variables (US monetary shocks, CFM dummy, and the interaction term), economy-specific and global controls, and dependent variables.[13] We set the number of lags to four ($J = 4$) to capture past effects up to one year.[14] GFC time dummy variables are added to capture the possible structural changes in the international financial markets.[15] Fixed effects (FE_i^h) are included to capture potential confounding factors specific to each economy. Similar to Coman and Lloyd (2022), our estimation equation does not include time fixed effects, as the US monetary shocks variable is common to all countries in the sample.

$\alpha, \beta_1, \beta_2, \beta_3, \gamma, \eta, \theta$ and ϵ are the coefficients and error term in the second-stage regression, respectively. Here, β_1 measures the effect of a US monetary shock in quarter y on capital flows at quarter $t + h$. Thus, $\hat{\beta}_1^h$ for each horizon h are the estimated impulse responses to a US monetary shock when CFMs are not implemented ($CFM = 0$), and $\hat{\beta}_1 + \hat{\beta}_3$ represents the

[13]The lag terms of dependent variables (capital flows) in the right-hand-side start from two-period prior term as the left-hand-side of the estimating equation already includes a one-period prior term for capital flows.

[14]There appear to be different choices in the number of lags in the empirical studies using the lag-augmented LP method. For simplicity, we assume the structural break started at the beginning of 2008. The results derived with a higher number for lag terms ($J = 6$) are reported in the following sections.

[15]The GFC is included as a time dummy taking the value of 1 starting in 2008Q1 (in accordance with the crisis dates following the NBER recession indicator) and in the subsequent periods. The results derived without using GFC dummies are provided in the following sections.

impulse responses when CFMs are implemented ($CFM = 1$). The differences between the two responses correspond to the interaction term $\hat{\beta}_3$.

The relevance of distinguishing between gross and net capital flows. We can illustrate why the distinction between net and gross capital flows is relevant in recent years —and for our measurement purposes— with a toy example. Consider an economy with zero net flows but with \$100 millions in each type of gross flows. After a foreign interest rate increase, we might expect gross inflows to decrease and gross outflows to increase. Assuming the size to be \$10 million in each case, ultimately, the economy would experience a \$20 millions decrease in net flows (\$90M - \$110M). Now, consider an emerging economy with no gross outflows but similar movements in gross inflows (a \$10 million decrease). In this scenario, the net flows would also decrease, in this case by the exact amount that the inflows decreased. In either case, the implications of considering gross or net flows are similar, indicating a decrease in investment appetite.

However, in the post-GFC world, characterized by great retrenchments (Milesi-Ferretti and Tille, 2014; Davis and Van Wincoop, 2018) and an increased correlation of both gross flows. We could have a situation in which there is both a decrease of gross inflows and outflows. If, for the sake of the example, these also happen by the same amount, the net flows would remain unchanged, leading to the misconception that there was no effect on the investment conditions in the economy.

The latter case seems even more relevant now, given the heightened financial globalization and the increasing engagement of emerging economies in higher volumes of gross outflows (Kalemli-Ozcan, 2019). This context underscores the importance of exploring both gross and net flows in all our exercises.

4 Results

We present the impulse response functions (IRFs) of net and gross capital flows after a US monetary shock based on the local projection estimates. The resulting responses for two years ($H = 8$), depicting the percentual change in the capital flows after a 1pp (100 basis points) increase in US monetary policy shock are shown in Figure 2. The solid lines are the IRFs when CFMs are not implemented, and the dashed lines are responses in the presence of CFM measures. The left panel shows IRFs where net capital flows are included as a dependent variable, whereas the center and right panels are the responses of gross capital inflows and outflows, respectively. For example, the solid line on the left panel in Figure 2 indicates that a 1pp increase in the Fed rates is associated with approximately 18pp increase in net capital flows as a share of GDP after three quarters when CFMs are not implemented.

Setting aside for now the confidence intervals, we can already discern some implications of the shock on capital inflows. There is an initial response on the inflows, and a negative medium-run response. The short-run response is potentially puzzling, while the latter aligns with the conventional covered interest rate parity intuition. In a nutshell, this first result already encompasses one of our main results: it can be misleading to look at the effects for the total capital flows as some types of investments may react positively and others negatively over different periods. We uncover in Section 5 which types of flows react as expected (negatively) and which other explain a positive reaction, a result that will confirm our intuition that additional to the usual negative response, a positive impact on inflows may be triggered in some cases as a risk-hedging reaction by investors. Such reaction —increasing the inflows for safe assets— has been documented in literature and linked to factors such as fiscal dominance and increases in risk premium, among others (Kohlscheen, 2014; Hnatkovska, Lahiri, and Vegh, 2016).[16] In this case, the shock is perceived to a greater measure as an increased risk premium than as an improvement in the average profitability of US asset returns, making plausible for EMEs to experience an increase in inflows following the shock. Consistently, this positive effect dissipates over longer horizons, aligning with the expectation that the risk premium features of the asset should become less relevant over time.

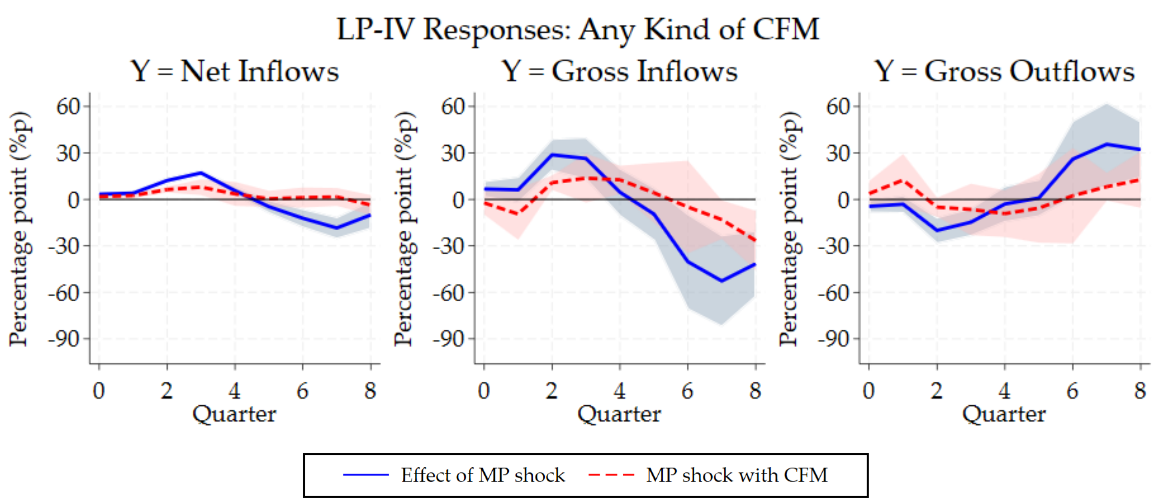
Now, concerning the outflows, we initially observe the expected negative response. This response, as recorded in terms of payment income for assets (as described in Cavallo, Izquierdo, and León, 2017), implies increased outflows towards foreign economies. However, a reversal also occurs. Further examination into the types of capital flows reveals that both inflow and outflow responses consistently exhibit the expected signs across all horizons. This is particularly true when focusing on specific types of capital where the foreign shocks have significant effects and where CFM measures have a substantive insulation role.

In any case —beyond the sign of the effect without CFM policies— what is crucial for this study is the insulation of foreign shocks. On this front, we can see that the effect of the shock in presence of CFMs now is pushed towards zero, thereby implying a mitigation role for the CFMs for either type of flows, although reflected more clearly for gross flows. We can see this in the dashed lines, that include the CFMs implementation. In that case, the initial increase in net flows is lower, and a similar effect is shown in both types of gross flows (center and right panels of Figure 2). It is noteworthy that during the initial two quarters, the mitigation

[16] The other potential drivers refer to additional sources of interest premia or funding, as an example of the former, Caballero and Upper (2023) document short-run increases in equity inflows after a foreign monetary shock due to a higher US term premium. As for the latter, London and Silvestrini (2023) focus on the role of the trade-credit channel and explain that firms in emerging economies rely on their trade partnerships as an alternative source of credit that could be used to offset the effects of the shocks. Another explanation can be related to the procyclicality of all types of flows in a scenario of global economic cycles as studied in Davis and Van Wincoop (2018) and Broner et al. (2013).

appears weaker for the net flows (left panel). This phenomenon can largely be attributed to the response in the gross inflows, for which the mitigation is only partially effective. The gross outflows' effects, on the other hand, are fully mitigated at all horizons once the CFMs are implemented. On the other hand, for longer horizons, we see an almost complete mitigation of the net flows —negative— effects. Similarly, it is noticeable that although the mitigation on the inflows' response is stronger, the initial effect to mitigate is larger and, in contrast to that of the outflows, cannot be fully offset with the CFM measures.

Figure 2: LP-IV IRFs to an Increase of 1% in the US MP Shock



Note: Impulse response functions (IRFs) of capital flows in response to a 1% US monetary policy shock (100 basis points increase). The Federal Funds Futures Rates (three-month-ahead) surprises are used as the instrument for the shocks. The vertical axes measure the percentage change in capital flows as a share of GDP. The solid lines depict the responses of the capital flows to the shock, and the dashed lines the response of the flows when CFMs are also in place. Any kind of CFMs implemented are considered. The shaded areas represent the 68% confidence intervals. Left panel: response of net capital flows; center panel: response of gross inflows; right panel: response of gross outflows.

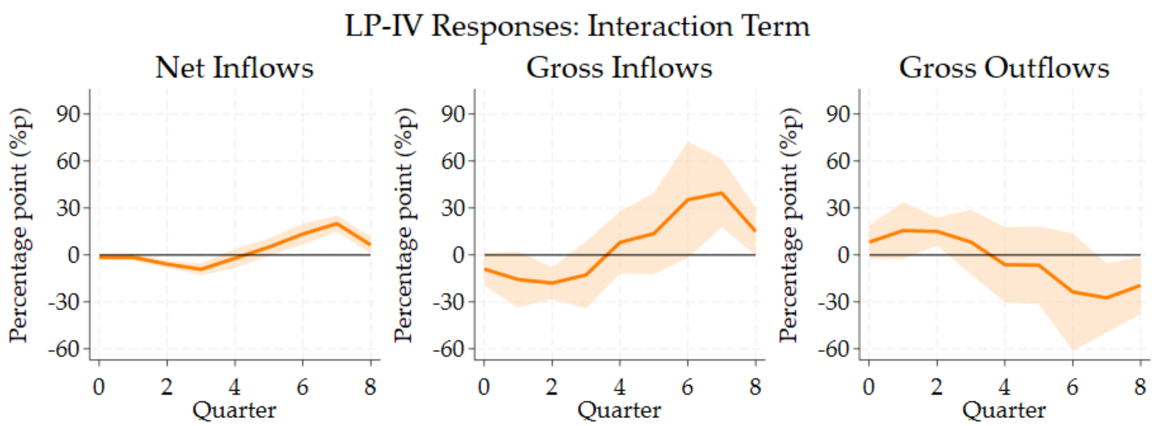
A second result is already observed in this first estimation. Focusing on net flows is no longer isomorphic to veryfing gross inflows and by only measuring the effects on the latter, the impact of the shock and policy may be underestimated. Taking stock, it is relevant to disentangle the capital flows before gauging any effects, both on the type of flows (e.g., direct investment, baking flows, etc.) and on the format of the flows (net, gross). Given this, we delve deeper into these results in what remains of the paper by inquiring whether the mitigation of the foreign policy shocks varies by type of CFM policy —that targets specifically outflows or inflows, and in later sections we study the effects with different levels of aggregation of the type of investment flow (e.g., portfolio, banking, risky or safe investments).

The reason why it is relevant to analyze both gross flows and measures targeting them separately is that, by construction, the mitigation on each type of gross flows cancels out in the net-flows measure, which makes it difficult to gauge the actual effect of these measures and represent our and the literature's motivation on analyzing each type of flows separately after the onset of the GFC of 2008.[17] In fact, for the phenomenon to be observable at certain horizons, as depicted in Figure 2, it would be necessary for the effect to be more pronounced during specific periods in one of the two types of gross flows.

Nonetheless, before turning to further exercises, it is useful to analyze the direct mitigation effect of our baseline estimations. This is gauged by the interaction terms in our IRF specification ($\hat{\beta}_3$). The dynamics of the pure interaction are shown in Figure 3. In this case, the coefficient represents the change in the effect of the monetary shock on the capital flows after the implementation of the CFMs.

The overall results show that the effect of CFMs is more visible when gross flows are considered; conversely, they are opaque when determined by the magnitude between two offsetting effects as in for net flows. In effect, looking only at net inflows' measures could lead to underestimating the potential insulation effects of the CFMs and can help explain why their impact on net flows is not clearly established in the literature.

Figure 3: LP-IV IRFs (Coefficient of Interaction Term)



Note: IRFs of capital flows in response to a 1% increase in the US monetary policy shock. The Federal Funds Futures Rates (three-month-ahead) surprises are used as the instrument for the shocks. The vertical axes show the estimated coefficient of the interaction term between US monetary shocks and the CFM measures.

A side caveat that should be mentioned is that the evidence of mitigation effects can be more limited in the cases where the confidence intervals of the effect of capital flows overlap with those that also account for the CFMs (dashed line in Figure 2). In these instances, the case can be made that both effects cannot be rejected to be statistically different. Although not shown here, such cases are less prevalent in our identification than in preliminary OLS-based estimates (where endogeneity is an issue). In any case, our notion of mitigation is instead more focused on significant capital flows' effects in the absence of CFMs that become null after the

[17] Kalemli-Ozcan (2019) explains that this change from net to gross flows is justified recently due to the higher investment activity in every type of economy, including the emerging markets where traditionally accounting for gross inflows or net inflows was roughly equivalent.

controls' implementation.

On the other hand, there are other limitations to this exercise. First, there still can be other sources of endogeneity: the implementations of both CFMs and US monetary shocks may be correlated to other economic variables that reflect country-specific features such as output growth. The potential endogeneity from US monetary policy shocks is widely known in many studies (e.g., Romer and Romer, 2004; Gertler and Karadi, 2015; Bu, Rogers, and Wu, 2021) and partly addressed in this study with the LP-IV specifications. However, it is challenging to find a good instrument to address the endogeneity issues of the CFM measures (Erten, Korinek, and Ocampo, 2021). As an alternative, we use lag terms of the CFM variables as additional controls to partially address this issue, i.e., we include them in the lag-augmented component of the setup (Coman and Lloyd, 2022; Kalemli-Ozcan, 2019).[18]

Finally, the intensity and direction of CFMs are not captured; the data only considers the presence of CFMs. This limitation arises not only from data constraints but also from the challenge of aggregating the intensity of different types of CFMs, even within the same country. According to Batini and Durand (2021), a simple binary indexing (zero or one) without accounting for intensity may be more practical, given the associated subjectivity risks in scoring the intensity of CFMs, which vary across countries. Extensions incorporating indexes that reflect the intensity and direction of CFMs remain to be developed.[19]

4.1 Effects by types of CFM tools

We further investigate the effects of different types of CFMs. In particular, we exploit the data from the IMF 2019 Taxonomy of Capital Flow Management Measures, which disaggregates CFMs into several sub-categories.[20] The major distinction is between CFMs on capital inflows and CFMs on capital outflows. According to the IMF (2019), the data contains some details about CFMs including "whether they are designed to limit capital inflows and/or outflows" (p. 2). From these, we focus on the distinction between CFMs on inflows and on outflows.

Unlike before, we are not pooling every CFM intervention in our policy indicator but will consider specific estimations—analogous to (1)— for CFMs on inflows and on outflows. This specification is designed to capture the effect of each type of CFMs on capital flows in the

[18]Specifically, we use $CFM_{i,t-1}$ instead of $CFM_{i,t}$ as main regressors. See the next section.

[19]Fernández, Klein, Rebucci, Schindler, and Uribe (2016) attempt to account for intensity with a policy index that encompasses a range of values. However, this indicator is based on the count of control implementations across various assets rather than an actual measure of policy intensity. Consequently, their measure is more related to the breadth or comprehensiveness of controls and is analogous to the indicators we consider.

[20]The classification is based on the IMF's Institutional View on Capital Flows in Practice 2018. Examples of CFMs on inflows are taxes, reserve requirements and stamp duties on nonresident property transactions. Examples of CFMs on outflows include restrictions on financial institutions' overseas investment and surrender requirement of export proceeds. See IMF (2018) for more details.

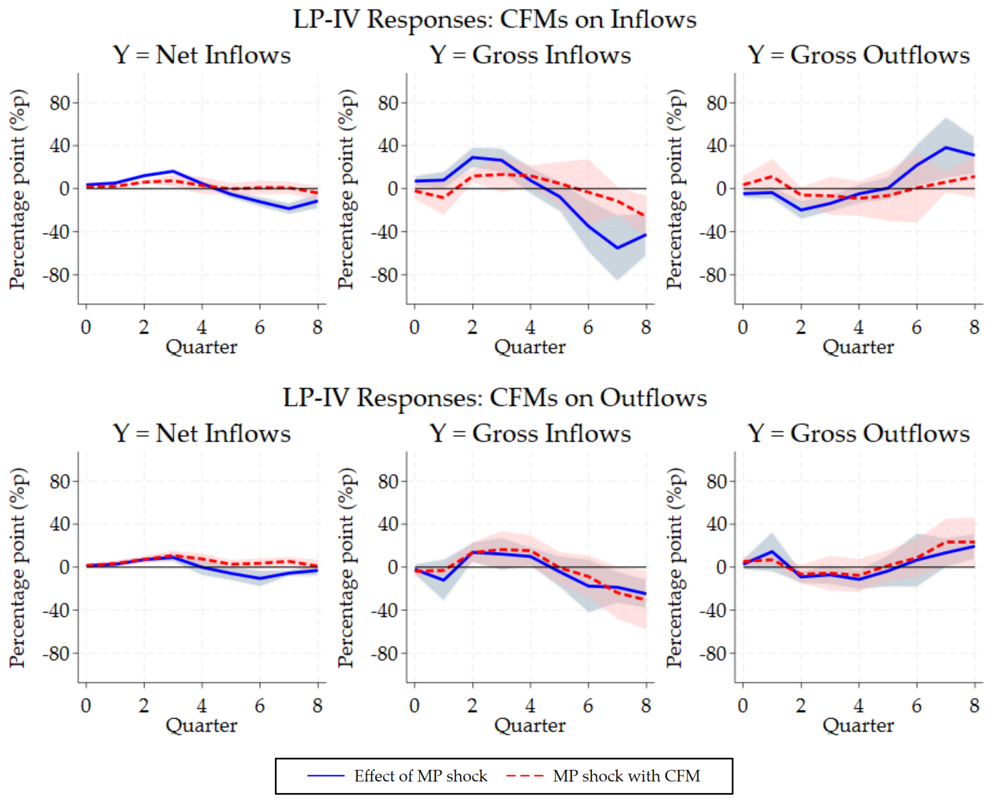
event of foreign monetary shocks. It offers the benefit of enabling us to examine whether each type of CFMs achieves its expected policy outcome. For example, we anticipate that CFMs on inflows will primarily influence foreign investors' behavior and reduce gross inflows, as opposed to affecting outflows. [21]

The results for CFMs on inflows and on outflows are shown in Figure 4. We can see in the top panel that the mitigation effects for policies targeting inflows are still present on both gross inflows and outflows, similar to the baseline results with the aggregate CFMs (Figure 2).[22] By type of flow reacting, we can expect the mitigation effects to be more salient for inflows given the specific aim and scope of the policies. However, we still obtain that domestic investors reduce the amount of overseas investment with the implementation of CFMs on outflows. Notably, we see a reduction of the gross inflows (measured by the interaction term) and then a compensation in the opposite direction in later periods, which in either case shows a reversal of the monetary policy shock effect and towards an overall null, or a mitigation effect of the shock in the local economy.

[21] Nonetheless, some measures could also affect the residents' ability to repatriate outflows, i.e., the reversal of a previous capital outflow towards its country of origin.

[22] Part of the similarity may be explained by the fact that the economies included used CFMs on inflows more frequently than in outflows, particularly in the second part of the sample. See Figure 13 in Appendix A.

Figure 4: LP-IV IRFs for CFMs on Inflows and Outflows



Note: IRFs of capital flows in response to a 1% US monetary policy shock. The vertical axes measure the percentage change in capital flows as a share of GDP. The vertical axes measure the percentage change in capital flows as a share of GDP. In the top panels the solid lines depict the response of the flows to the shock, and the dashed lines represent the response when CFMs are implemented. CFMs on inflows are considered. Left panel: response of net capital flows; center panel: response of gross inflows; right panel: response of gross outflows. In the lower panels, vertical axes measure the interaction coefficient between shocks and the CFMs.

Conversely, we obtain weaker mitigation effects from the CFMs targeting outflows in the bottom panel. In this case, the interactions are not significant for either gross flows. This supports the hypothesis that although the fragility of both types of gross flows to external shocks is moderated by the CFMs, the prevailing mitigation effect is observed in gross inflows. This, in turn, is what allows us to observe a mitigation effect on net inflows at some horizons.[23]

Finally, regarding net flows, although the CFMs on outflows still show a mitigation effect for later horizons, it's hard to associate it to the effects on either type of gross flows. Until now we discussed how we can obtain null effects on net flows as a result of offsetting effects on gross flows. However, the reverse scenario is less reasonable (i.e., no effects on gross flows but mitigation effects on net flows). For this reason, the effects by type of CFMs tend to favor the measures specific to controls on capital inflows as the main driver of the mitigation effects, which in the case of the effects on outflows, would possibly be attributed to policies affecting

[23]These results with each type of CFMs are also robust to alternative specifications. Results of alternative specifications are presented in the Appendix B.

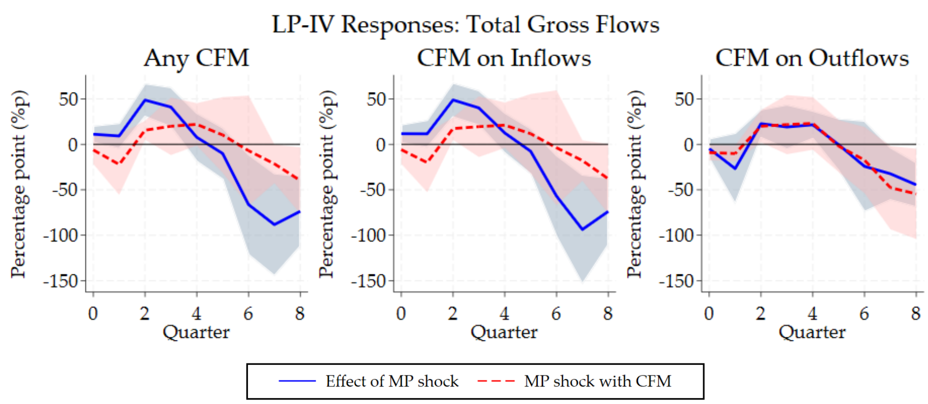
the repatriation of assets by domestic investors.[24]

4.2 Financial integration effects

We can also analyze the total gross flows, defined as the sum of gross outflows and inflows. This variable can be associated with the general level of financial integration and has been shown to co-move with the global financial cycle by Davis and Van Wincoop (2018), as well as to be more detached from the dynamics of the net flows given the stronger comovement of the gross flows after the GFC of 2008 (Forbes and Warnock, 2012; Davis, 2015).

The magnitude of large retrenchment episodes has been associated with the level of financial integration and the reliance on banking flows (e.g., in Milesi-Ferretti and Tille, 2014), and at the same time, the total gross flows are more procyclical and volatile than their net counterpart (Broner, Didier, Erce, and Schmukler, 2013); thus, looking at the latter only (net or parts of it) may lead to an underestimation of the effect of the foreign shock. Therefore, exploring the mediation of the CFMs for total gross flows can be revealing. Similarly, in our specific setup, it is also relevant to consider this variable. It allows us to set aside considerations related to the offsetting between flows that arise by construction in the net flows, and instead, focus on the impact of the foreign shocks on the scale of financial integration.

Figure 5: LP-IV IRFs for Total Gross Flows



Note: IRFs of total gross capital flows in response to a 1% US monetary policy shock. In the upper panels, the vertical axes measure the percentage change in total gross flows as a share of GDP. Left panel: response with any type of capital flow management (CFM) measures; center panel: response with CFMs on inflows; right panel: response with CFMs on outflows. Lower panel: corresponding interaction terms. The figure highlights that CFMs on inflows provide a stronger insulation effect against foreign shocks relative to CFM on outflows.

The effects of the foreign policy shock on the total gross flows is shown in Figure 5. We can see that the reaction of the total flows aligns with the ones obtained in previous sections and

[24]Consistent with these results, Ghosh, Qureshi, Kim, and Zalduendo (2014) find that the flows affected more largely by global factors are those associated to investment flows rather than repatriation of assets. Similarly, Cerutti, Claessens, and Puy (2019) link this sensitivity to global factors (and lack thereof to local ones) to the gross inflows of equity and bonds.

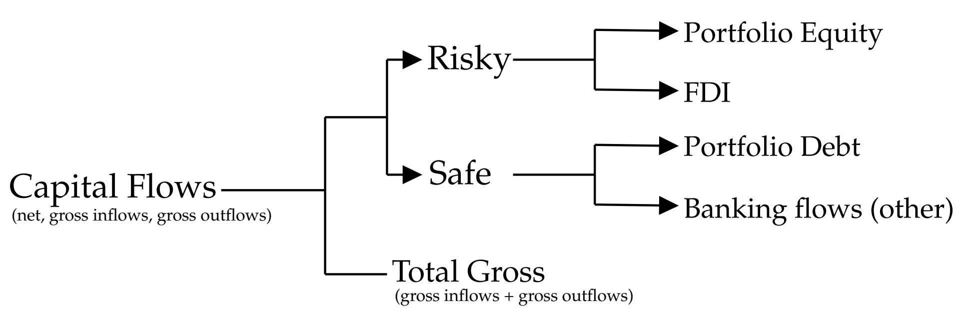
that, similarly, the implementation of CFM measures mitigates this effect and insulates the level of financial integration. In the middle column, we show the effect when implementing controls on capital inflows only, and we can verify that this instrument is the one generating the insulation to the foreign shock. In contrast, the controls on outflows (right panel) depict little to no mitigation. This result enables us to confirm that the insulation is present and is not trivial when considering any definition of gross flows, that is aggregated or separately as before, and that at the same time, the policies with stronger mitigation effects are those aimed to control the capital inflows.

5 Effects in Disaggregated Capital Flows

The previous results show an insulation pattern that is apparently stronger on the gross inflows side, and when stemming from policies that specifically aim to control the capital inflows. However, there are other features that are less clear-cut in these estimations. To begin, in some cases, signs are switching between periods, and simultaneously, the effects of CFMs on outflows are not null.

A possible reading is that there are some capital flows for which the CFMs do generate insulation but other for which such effect is absent. Alternatively, there can be flows for which the foreign shock has little impact, and thus, the insulation feature loses relevance. To explore these possibilities further and establish where is the insulation taking place, we conduct the estimates in more disaggregated flows. The aggregation considered are the branches of the diagram in Figure 6.

Figure 6: Capital flows aggregations considered



Note: The disaggregation considered follows the definition of Risky and Safe flows of Davis and Van Wincoop (2018). The usual label for the last subcategory is "Other Investments" but these consists mainly of banking flows plus financial derivative assets, we rename it here for clarity.

The first disaggregation is based on the risk profile of the capital flows and considers the risky and safe assets investments separately. Each of the latter categories is further disaggregated:

the risky one into portfolio equity and foreign direct investment (FDI), and the safe type into portfolio debt and banking flows (other investments). As before, we examine each type of flows in both its net and gross (inflows and outflows) formats. Whenever an insulation effect of the CFMs is identified, we provide additional estimates categorized by the type of capital controls, whether on inflows or outflows.

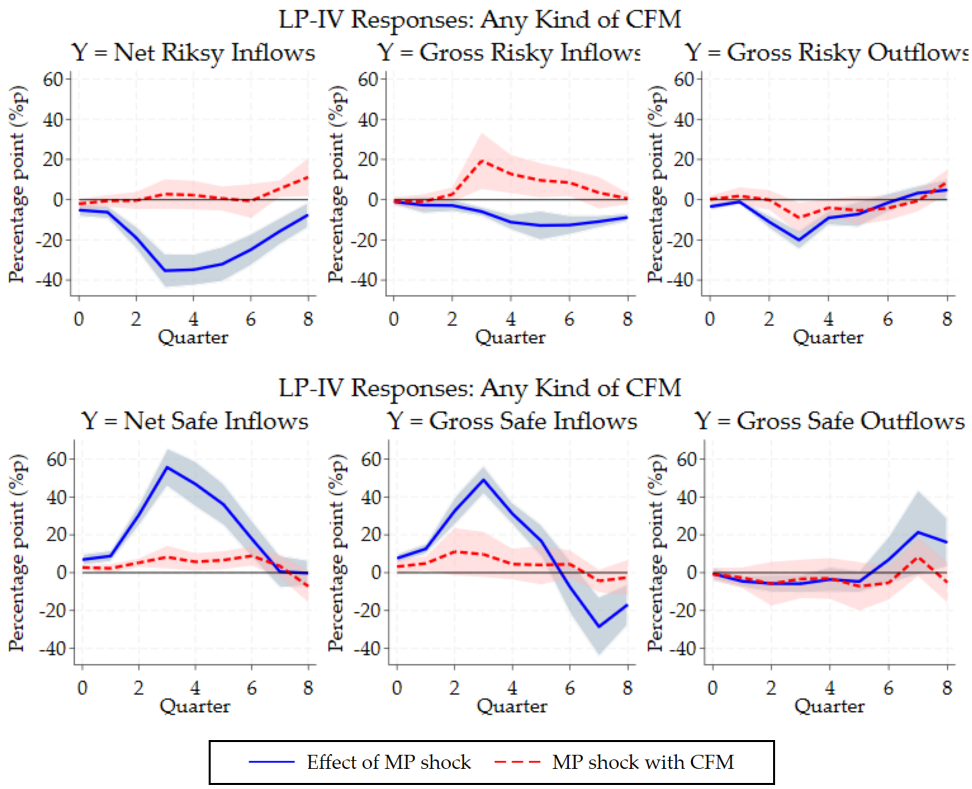
5.1 The risk profile of the capital flows

We follow the definition of "risky" and "safe" flows of Davis and van Wincoop (2022), where the risky flows consist of the Foreign Direct Investment and Portfolio Equity flows, while the safe flows are the Portfolio Debt, and the Other Investments (banking flows including financial derivatives).[25] For each of these types of flows, we perform separate estimations of Equation (1), and show the associated impulse responses in Figure 7.

Three salient features emerge: First, the expected negative effect of the foreign monetary shock is present only in the risky flows while the insulation features of the CFMs take place for both risky and safe flows. This is noteworthy as the intended target of the CFM policies is to prevent an interruption of the inflows that are most fickle and volatile flows. This result is also consistent with the renewed outlook of the IMF on capital controls and their potential as part of the standard policy toolkit (see IMF (2018) and Qureshi et al. (2011)) as well as with Farhi and Werning (2014), Caballero and Simsek (2018), and Caballero and Simsek (2020) where the fickleness of the flows is a key factor in determining the incentive to tighten the capital controls.

[25] Our definition works along the lines of Davis and van Wincoop (2022) but do not include foreign reserves to be consistent with our data construction following Cavallo, Izquierdo, and León (2017). Relatedly, it should be mentioned that there are alternative definitions of safe and risky assets in the literature that focus on specific types of portfolio flows (for example, see the one in Forbes and Warnock, 2014). At the same time, we recognize that within FDI, the risky component is FDI-equity, not FDI-portfolio, however, we retain the usual classification and do not consider necessary to split further this subcategory after ascertaining that FDI-equity is the largest component of FDI for our sample (averaging, across countries, respective shares of 83%, 71%, and 66%, for gross inflows, gross outflows, and net inflows).

Figure 7: LP-IV IRFs for capital flows: Risky and Safe assets



Note: IRFs of capital flows, split into risky (portfolio equity and FDI—upper panels) and safe flows (portfolio debt and other investments—lower panels), in response to a 1% US monetary policy shock. The vertical axes measure the percentage change in capital flows as a share of GDP. The solid lines response of the flows to the shock, and the dashed lines the response when CFMs are implemented. Left panel: response of net flows; center panel: response of gross inflows; right panel: response of gross outflows.

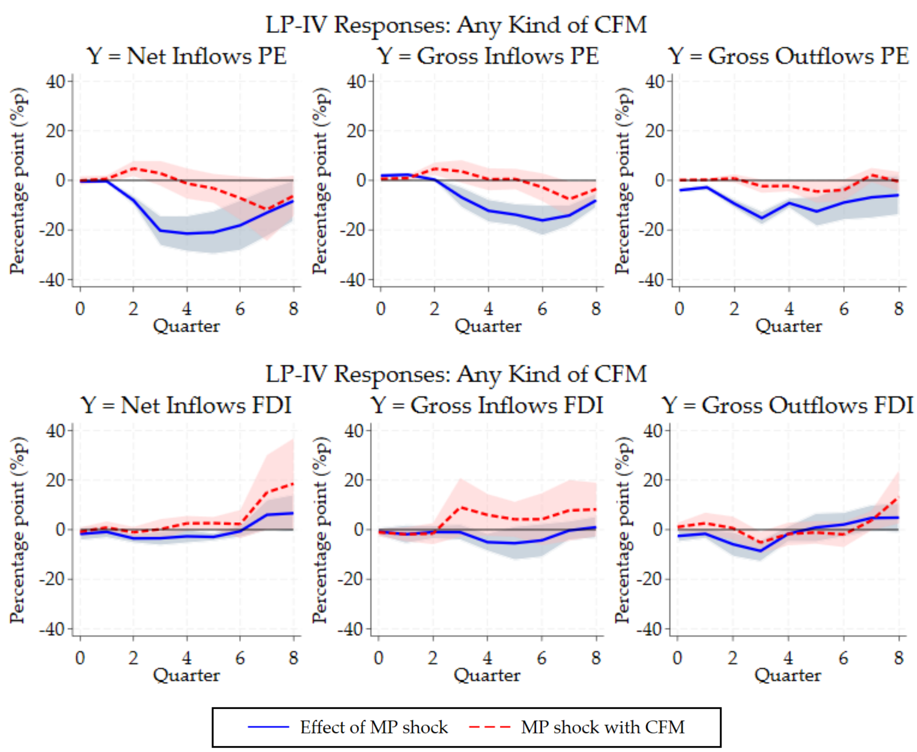
Secondly, in contrast to previous exercises with aggregated types of flows, now the responses to the foreign monetary shock are displaying the expected sign from the start, that is, there is no sign switching. This, together with the fact that the effect on the side of the safe flows is positive, allows us to identify better what flows to focus on for the remainder of this study —the risky ones where there can be a situation that resembles a sudden stop. With this in mind, we are exploring the risky flows in even more detail to determine whether the mitigation properties of the CFM measures manifest more strongly in a particular type of asset investment. On the other hand, a third interesting feature is that for more disaggregated flows the effect of the monetary shock —and the insulation of CFMs— is salient for both net and gross flows. However, it is still noticeable that without taking a closer look at the gross flows dynamics, we may underestimate both the effects of the foreign shock and of the CFM measures.

In summary, with this disaggregation we can see more clearly the broad patterns of the capital flows that were opaque when looking only at the total capital flows: The higher US returns (after a shock) lower the inflows of risky investments (as expected), but also increase the inflows of safe investments, which reflects that the shock is also perceived as indicative of tighter global financial conditions originating in the US that prompt risk-averse investors to increase their investments in other locations. These two conflicting yet co-existing effects could offset each other in an aggregate flows measures which may lead to underestimating the overall effect of the shocks.

5.2 Exploring the risky assets flows

Given the negative effect of the CFMs seems to concentrate on the risky flows, it is natural to disaggregate further this category into its portfolio equity and foreign direct investment components. We perform separate estimations of Equation (1) for each of these types of investment flows. The results, shown in Figure 8, indicate that the mitigation effect is strongly present only for the portfolio equity investments, which aligns with our notion that the insulation takes place for the more fickle —or volatile— flows.

Figure 8: LP-IV IRFs for disaggregateed risky assets flows: Portfolio Equity (PE) and Foreign Direct Investment (FDI)



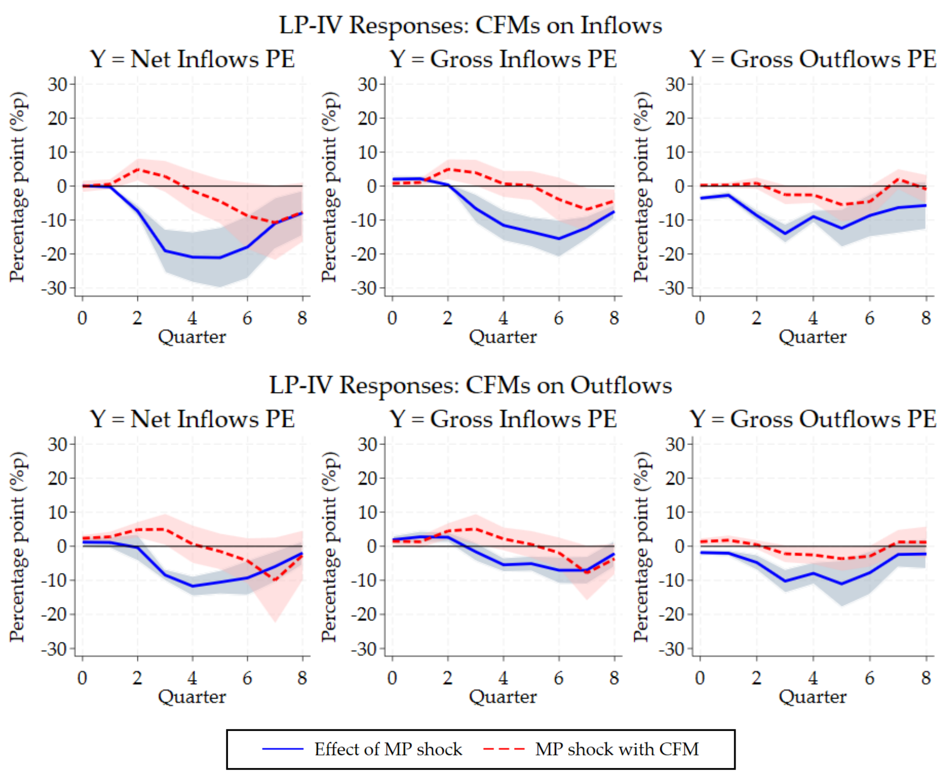
Note: IRFs of disaggregated risky asset flows—portfolio equity (PE) in the top panels and foreign direct investment (FDI) in the bottom panels—in response to a 1% US monetary policy shock. The vertical axes measure the percentage change in each type of flow as a share of GDP. The solid lines depict the response of the capital flows to the shock, and the dashed lines represent the response when CFMs are implemented. The figure highlights that the mitigation effect of CFMs is strongly present for portfolio equity investments.

On the other hand, for the foreign direct investment there is not an international spillover effect to mitigate to begin. This may be because these flows, although considered risky in the literature, are still considerably more stable than the portfolio equity flows, which explain their "autonomous" resilience to the foreign monetary shock.

The key takeaway from these exercises is that the most fickle capital flows are those affected by the foreign monetary shock. It is in these cases where CFM measures can play a significant insulation role.

Effects by specific type of controls. As before, it can be interesting to determine whether the insulation is different for capital controls on inflows relative to those on outflows. We report the effects for those policies in Figure 9. We obtain that, similarly to the aggregate capital flows, the portfolio equity flows are more insulated by the CFM measures that target Inflows. However, in this case, the controls on outflows also have a significant insulation effect.

Figure 9: LP-IV IRFs for CFMs on Inflows and Outflows: Portfolio Equity flows (PE)



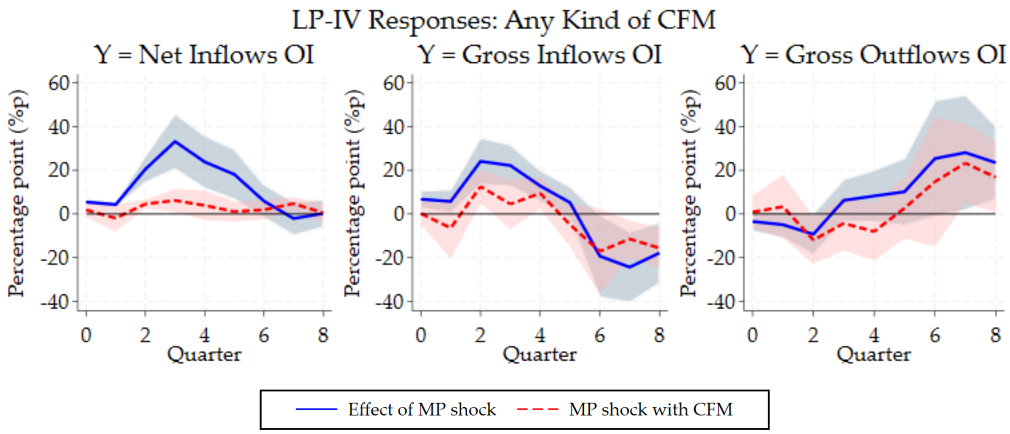
Note: IRFs of portfolio equity flows in response to a 1% increase in the US monetary policy shock. The vertical axes measure the percentage change in portfolio equity flows as a share of GDP. Top panels: responses with CFMs on inflows; bottom panels: responses with CFMs on outflows. The figure highlights that CFMs on inflows provide a more significant insulation effect compared to CFMs on outflows.

5.3 Banking flows

Another interesting exercise consists on disentangling the effect on safe flows. More specifically, we can verify if the risk hedging effects leading to a positive effect in presence to the shock are driven by the banking flows, which are documented as potentially crucial for transmitting international shocks and as the flows behind the increase in the correlation of inflows and outflows after the GFC of the 2008 (Avdjiev, Hardy, Şebnem Kalemli-Özcan, and Servén, 2022).

The estimation results for the banking flows are shown in Figure 10.[26] We can see that in this case there is an effect to mitigate on both net and gross flows. At the same time, the CFMs have an insulation effect, however, it is only partial (at least in one period).

Figure 10: LP-IV IRFs for CFMs: Banking flows (Other Investments —OI)



Note: IRFs of banking flows (classified as "other investments") in response to a 1% US monetary policy shock. The vertical axes measure the percentage change in banking flows as a share of GDP. The solid lines depict the responses of the capital flows to the shock, and the dashed lines represent the response of the flows when CFMs are implemented. The figure illustrates that CFMs provide some insulation effect for banking flows, although it is only partial and more limited compared to other capital flows.

Effects by specific type of controls. As in previous exercises, we can estimate the insulation effects by type of capital control measures. We illustrate this in Figure 11. As in most capital flows types, the results are consistent with the effects found for the total capital flows in the sense that the mitigation effects are stronger for the CFMs that target capital inflows.

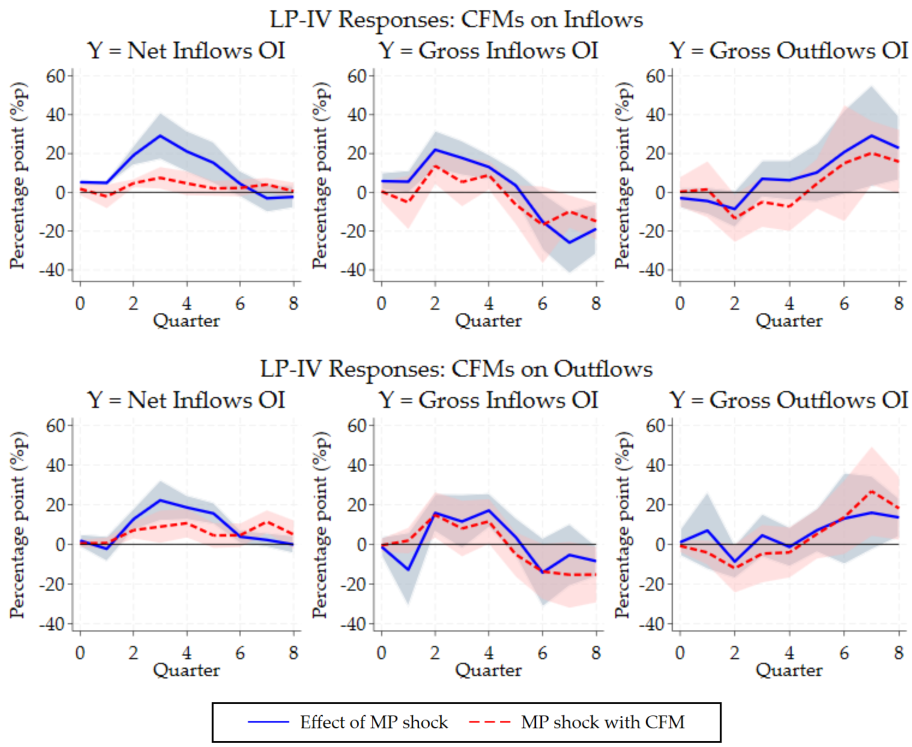
From this final category, we observe a new type of result. There may be an effect to mitigate, but the insulation brought by the CFMs is incomplete. That, however, does not make the CFMs inconsequential, and instead leads to similar consequences and policy lessons as the partial insulation results for flexible exchange regimes found in Obstfeld, Ostry, and Qureshi (2019).

On the other hand, for other categories, the situation varies: either there is an effect to mitigate and full insulation is feasible —for example, in the case of total gross, risky, and portfolio equity flows— or there is no initial effect to mitigate, as seen with safe assets aggregates. Therefore, mitigation is present whenever necessary, either partially or completely. Equally important, however, is the recognition that the extent of the effect to mitigate and the degree of

[26]The results for the other investment flows in the safe asset category, namely portfolio debt, can be seen in the Appendix B.

insulation should be evaluated based on several factors. These include the level of aggregation of the investment flows, the format of the presented aggregate (net, gross and total gross), and even the specific type of regulation considered (on inflows or outflows).

Figure 11: LP-IV IRFs for flow-specific CFMs: Banking flows (Other Investments —OI)



Note: IRFs banking flows (classified as "other investments") in response to a 1% increase in the US monetary policy shock. The top panels show the responses for CFMs applied on inflows and the bottom panels for CFMs on outflows. The solid lines depict the response of the flows to the shock, and the dashed line the response when CFMs are implemented. The figure highlights that CFMs provide some degree of insulation for other investment flows, though the effect varies between gross inflows and outflows.

The relevance of a disaggregated analysis. We have seen that the effects of CFMs throughout all types of capital flows is not homogeneous. For once, there is no effect to mitigate in all cases (e.g., safe flows). However, when there is an effect to mitigate, the insulation generated by the CFMs may be complete or partial. Similarly, the effects of different types of policies falling under the "CFM" definition, as well as the format in which we evaluate the effects (net or gross), are also relevant. Excessively aggregated analyses might contribute to the confusion in the literature as they can lead to biases in the assessment of the CFMs. These biases can be positive or negative. The positive bias can occur with an analysis on aggregate flows that leads policy practitioners to think that the CFMs' insulation is present for every type of investment (e.g., FDI when it's not the case). Conversely, a negative bias may arise if insulation exists at the gross flows level, but the effects cancel each other out in such a way that the effect on net flows appears to be negligible.

This heterogeneity of the CFMs' insulation properties that we find, is not a trivial consideration for policy design. In fact, this can align with other results of the literature such as Benigno et al. (2016), which explain how in some cases the capital controls are substitutable with other policies, while in others, they become a relevant part of the policy mix. At the same time, it is consistent with empirical exercises looking for a better delimitation of the effect of policy, such as Coman and Lloyd (2022) or Richter et al. (2019) when analyzing the case of macroprudential policies.

6 Contractionary and Expansionary Monetary Regimes

As a final exercise, we examine whether these effects vary depending on the type of monetary policy actions, specifically we verify whether the insulation property of CFMs differs during periods of monetary expansions (or expansionary shocks) compared to periods of monetary contractions. Up to this point, the foreign shock remains the only factor whose effects have not been disentangled. This analysis focuses on portfolio equity flows, as the insulation property of the CFM measures is most pronounced for these investments.[27]

To start, we construct modified policy instruments for separate estimations along the lines of Jordà, Singh, and Taylor (2020) as follows:

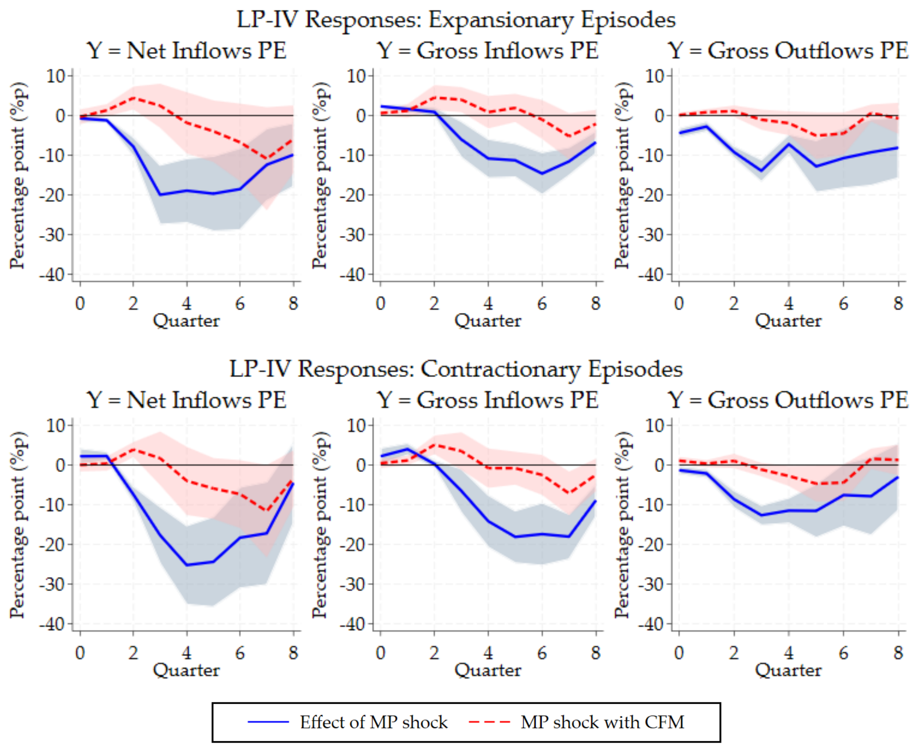
$$z_t^{expansion} = \begin{cases} 0 & \text{if } z_t > 0 \text{ or } \Delta USMP_t > 0 \\ z_t & \text{otherwise} \end{cases}, \qquad z_t^{contraction} = \begin{cases} 0 & \text{if } z_t < 0 \text{ or } \Delta USMP_t < 0 \\ z_t & \text{otherwise} \end{cases}$$

where z_t is our original instrument in the baseline estimations that we constructed in similar lines to Gertler and Karadi (2015), and $USMP_t$ is the Fed rate or the US policy rate. The idea here is that the instrument $z_t^{expansion}$ will only recover shocks in expansionary episodes (and the opposite with $z_t^{contraction}$), that is, when the monetary conditions loosen—and will set to zero the shocks otherwise, such as during interest rate hikes. These cycle-phase specific effects are of interest as they allow us to consider a policymaker that has a stricter policy stance towards potential retrenchments in times of interest rate increases in the foreign rates, while showing more leniency during better economic conditions.

Our findings in this alternative estimation are shown in Figure 12. As expected, the retrenchment effects of the foreign shocks are stronger during contractionary episodes (higher perceived rates abroad). In all cases, be it for net or gross flows, the effect is stronger than under looser monetary conditions. Additionally, the effects are sizable and have the expected signs (lower inflows, higher outflows) under both types of monetary shocks.

[27]Note that we are in either case estimating the effect of a positive US monetary policy shock except that we are restricting the policy instrument to consider only expansionary or contractionary periods.

Figure 12: LP-IV IRFs for Portfolio Equity flows (PE) in different types of US monetary policy episodes



Note: IRFs of portfolio equity flows in response to a 1% US monetary policy shock. The vertical axes measure the percentage change in capital flows as a share of GDP. The solid lines show the response of the flows to the shock, and the dashed lines depict the response when CFMs are implemented. Left panel: response of net flows; center panel: response of gross inflows; right panel: response of gross outflows. These plots show estimations of the effects in contractionary and expansionary monetary policies where in each case the monetary shock instrument is modified as in Jordà et al. (2020).

However, the insulation effect of CFMs is weaker during contractionary episodes, which represents additional challenges for policy design, as it is precisely in those conditions where the mitigation effects from capital controls can become more valuable. Another perspective, nonetheless, is that during times where capital retrenchments are more likely, the CFMs have a relatively harder time insulating an economy, even if such effect is present.

7 Robustness Checks

To verify the robustness of our estimations, we compare the results with several alternative specifications. In virtually every alternative specification the results are qualitatively analogous to those in our baseline. The plots for these exercises are provided in the Appendix B.

No domestic interest rates: Based on the premise that the monetary policy response of domestic countries to that of the US can be summarized in the interest rate differential, one would say that including the domestic rates as a control is proper. This inclusion, which we do in our baseline, has the cost of a non-trivial data loss of observations. Conversely, by excluding domestic interest rates we can increase the number of observations from 403 to 1,538 and the number of economies considered from 13 to 23.[28] Thus, in the first alternative specification, we re-estimate our baseline equation but with the domestic interest rates variable excluded.

The result of this first alternative specification is illustrated in Figure 18, and the outcomes are consistent with the results in Section 4, i.e., the mitigation effects of the CFMs on the impacts of foreign monetary policy shocks are present. However, the results are less significant for some horizons although similar lessons still apply.

Specifically, we can see the mitigating effects are present with the alternative specification. The response of both gross inflows and outflows to the shocks is still dampened in the presence of CFMs. Since the impact on gross inflows and outflows also offset each other, the mitigation effect of the CFMs is not clearly seen for the net flows in the first year after the foreign policy shock (the left panel in Figure 18). On the other hand, it is noticeable that the direction of net capital flows is different from the baseline results in Section 4, while those of gross inflows and outflows are quite similar. This adds to the evidence that it is more difficult to evaluate the effectiveness of CFMs on capital flows when using net rather than gross flows, but also is indicative of the relevance of including domestic policy controls, as we cannot rule out that domestic monetary responses to the external shock may affect the flows as well.

No GFC time dummy: We consider a model with no global financial crisis (GFC) dummy variables. In the baseline specifications in Section 4, time dummies are incorporated to consider possible structural breaks during and after the GFC. As shown in Figure 19, the results are similar, i.e., the mitigation effects a still present; however; they are more clearly visible and significant relative to the baseline. Similarly, the pure interaction coefficient shows the same marginal effects. More significant mitigation effects in the absence of controls for the GFC can be explained by the fact that global retrenchment of assets was exacerbated during that episode as explained by Broner, Didier, Erce, and Schmukler (2013). In that sense, the inclusion of the dummy in our baseline allows for a more conservative gauging of the mitigation effect of the control measures.

More lags for controls: We change the number of periods in the lagged controls. The estimation is analogous to the baseline, except that now includes lagged controls for six quarters instead of four. The results are presented in Figure 20 and do not reflect meaningful changes relative to our baseline. Especially, the LP-IV results in the baseline and the alternative specifications are closely aligned in terms of both direction and magnitude.

Inclusion of other countries: Our baseline sample includes countries that report the implemen-

[28] We provide the list of 23 economies in this alternative specification in the Appendix A.

tation of CFMs to the IMF taxonomy database 2019. The resulting list of countries comprises emerging economies in most cases; however, a salient exception is Canada, an advanced economy and a member of the G7. To make our conclusions applicable to emerging economies we removed it from the dataset. However, we can include it in an auxiliary estimation. In such estimation (shown in Figure 21 in the Appendix B), we obtain similar results, mainly for the later horizons. However, for the initial periods, the estimates now incorporate a much higher volatility which lowers the significance of the results. The latter outcome may be due to the lower similarity of this country with the rest of the economies included in our base sample.

Exclusion of China, India, or BRICs economies: We also examine the impact of excluding China and India separately (Figure 22). When China is excluded, the results remain largely unchanged. However, when India is excluded, the results show stronger effect towards inward capital flows movement, while the direction for the mitigation effect remains unchanged. This means that the mitigation effect of CFMs in India is less strong than in other economies. To further investigate whether our findings are primarily driven by specific large emerging markets, we repeat the analysis by excluding all BRICs economies in our extended sample countries without domestic interest rates (Figure 23, upper panel) and compare the results to those obtained when restricting the sample to BRICs only (middle panel) and to the full sample (lower panel). In that case, the insulation effects remain broadly consistent across the different samples, suggesting that our baseline findings are not disproportionately influenced by BRICs alone. This provides further evidence that CFMs contribute to mitigating the transmission of global monetary policy shocks beyond the specific characteristics of BRICs economies.

Macroprudential policies: Given macroprudential policies may also influence capital flows (e.g., Coman and Lloyd, 2022), we incorporate it as a control in our estimations. Specifically, we include the change in the cumulative (four-quarter) macroprudential policy stance (measured based on an aggregation of the prudential toolkit reported in Alam et al., 2024) (IMF-iMaPP) as an additional regressor. The results are largely analogous (as shown in Figure 24).

Other robustness checks: We conduct additional robustness checks to verify the stability of our results. First, we include a global monetary policy rate as an additional control to account for broader global financial conditions. This variable is constructed as the first principal component of the policy rates of major central banks (BOE, FED, BoJ, ECB). We confirm that our findings remain unchanged (Figure 25). Second, we distinguish between tax-based and non-tax-based CFMs, finding that the insulation effect is more pronounced for quantity-based measures (Figure 26). Finally, we estimate a pooled model without country-fixed effects, yielding similar results but with slightly stronger insulation (Figure 27), suggesting that fixed effects capture relevant country-specific factors. Across these exercises, the results remain consistent with our baseline findings.

8 Conclusions

We assess the capacity of capital flows measures (CFMs) in insulating against major external shocks—namely, US monetary policy shocks—with an emphasis on the effects on gross capital flows relative to those on net flows. We focus on the case of CFMs implemented in emerging market economies (EMEs) which have employed these policies during most of the last two decades. Our results suggest CFMs can be effective in mitigating the effect of US monetary shocks on these countries. Furthermore, the insulation features of these policies differ considerably across each type of capital flows. The results are consistent with the literature on net capital flows that usually focuses on the direct effect of CFM instruments; however, we contribute to this literature with estimations of an alternative indirect mitigation effect on both net and gross capital flows, as well as by gauging the effects of controls that target specific types of financial flows.

Despite the complexities in measuring these effects on net flows, we obtained a dampening effect of the CFMs on the fragility of these flows to external shocks. We note the difficulty of perceiving this effect for net flows emerges due to both the increased importance of gross outflows in recent years coupled with the increase in the correlation between inflows and outflows (e.g., Davis and Van Wincoop, 2018). Since both gross inflows and outflows are protected by the CFMs, the effects offset each other in the net flows. On the other hand, the level of aggregation of the investment flows considered matters substantially for the assessment of the CFMs' insulation properties. The effects will not be homogeneous across all types of investments. Instead, they will be most pronounced in the riskiest and most volatile types of investment assets.

Without either sufficient disaggregation of the investment flows or a separate assessment of the effects on gross versus net flows, evaluations of the CFM policies' effects are prone to biases, which may help explain the lack of consensus in the literature regarding the insulation properties of the CFMs. These biases can go in either direction —that is towards overestimating the insulation features if they are assumed to be present for all flows, or leading to underestimations if the effects cancel out between gross flows.

Considering these implications when designing policy or responding to global policy innovations is paramount, as prescriptions based solely on net flows can result in systematic policy errors. Factors such as the specific intended flows of a policy and the risk profile of its associated investments should be taken into account when implementing these controls to insulate an economy from global shocks. Finally, it is noteworthy to highlight potential avenues for future research on the implications of CFMs. Specifically, once more comprehensive data becomes available, conducting analyses that incorporate the intensity and direction of CFMs, as well as disentangling announcement from implementation effects, would enhance the understanding of this policy toolkit. Additionally, exploring the role and effectiveness of these policies in crisis management, particularly during periods such as the COVID-19 lockdowns, could provide valuable insights into their insulation capabilities and overall impact.

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A Additional descriptive data

A.1 List of economies

Table 1: Economies included in the IMF 2019 Taxonomy of CFMs

Argentina	Australia	Barbados	Belarus	Bolivia	Brazil
Canada	CEMAC	China	Costa Rica	Cyprus	Dem. Rep. Congo
Ecuador	Georgia	Ghana	Greece	Hong Kong SAR China	Iceland
India	Indonesia	Kazakhstan	Korea	Liberia	Macao SAR China
Madagascar	Malaysia	New Zealand	Nigeria	North Macedonia	Peru
Russia	Seychelles	Singapore	Sri Lanka	Ukraine	Uzbekistan

Table 2: List of economies in the dataset

List of economies included in the dataset after dropping missing observations			
Number of economies	32	13	23
List of economies	Argentina, Australia, Barbados, Belarus, Bolivia, Brazil, Canada, China, Costa Rica, Republic of Congo, Ecuador, Georgia, Ghana, Hong Kong SAR, Iceland, India, Indonesia, Kazakhstan, Korea, Liberia, Macao SAR, Madagascar, Malaysia, New Zealand, Nigeria, North Macedonia, Peru, Russia, Singapore, Sri Lanka, Ukraine, Uzbekistan.	Australia, Brazil, China, Hong Kong, India, Indonesia, Korea, Malaysia, Nigeria, Peru, Russia, Singapore, Sri Lanka.	Argentina, Australia, Belarus, Bolivia, Brazil, China, Costa Rica, Ecuador, Georgia, Hong Kong SAR, Iceland, India, Indonesia, Kazakhstan, Korea, Malaysia, Nigeria, North Macedonia, Peru, Russia, Singapore, Sri Lanka, Ukraine.
N. Observations	2,432	403	1,538

Notes: We report in each group the list of countries with available data for a set of variables (the more covariates included as controls, the more restrictive the list). The first set only considers data on CFM interventions. The second is our baseline, where all controls are considered. A third group (23 economies) relaxes the inclusion of the domestic rates (as reported in a robustness exercise). We focus on emerging economies and thus remove Canada from either group —if included the observations increase to 476 and 1,538 respectively in the second and third column. Similarly, we remove four economies from the original CFM database, namely, CEMAC, Cyprus, Greece, and Seychelles, because they have too limited data or report no CFMs during our sample period.

A.2 Time series of CFMs implementation

Figure 13: CFMs implementation over time (by country groups). Top: All countries (32 economies); Bottom-left: 13 economies; Bottom-right: 23 economies

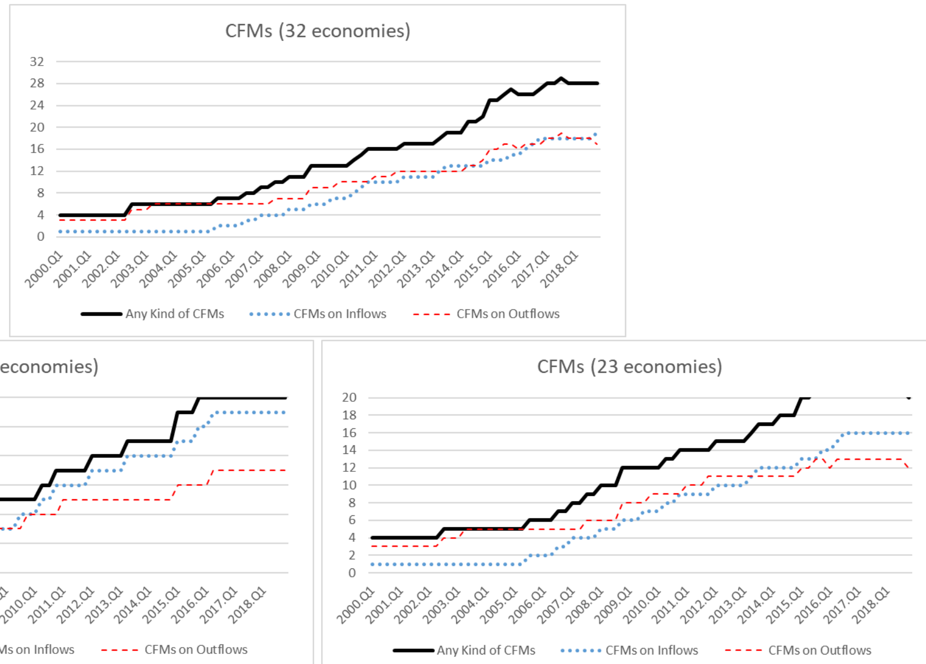
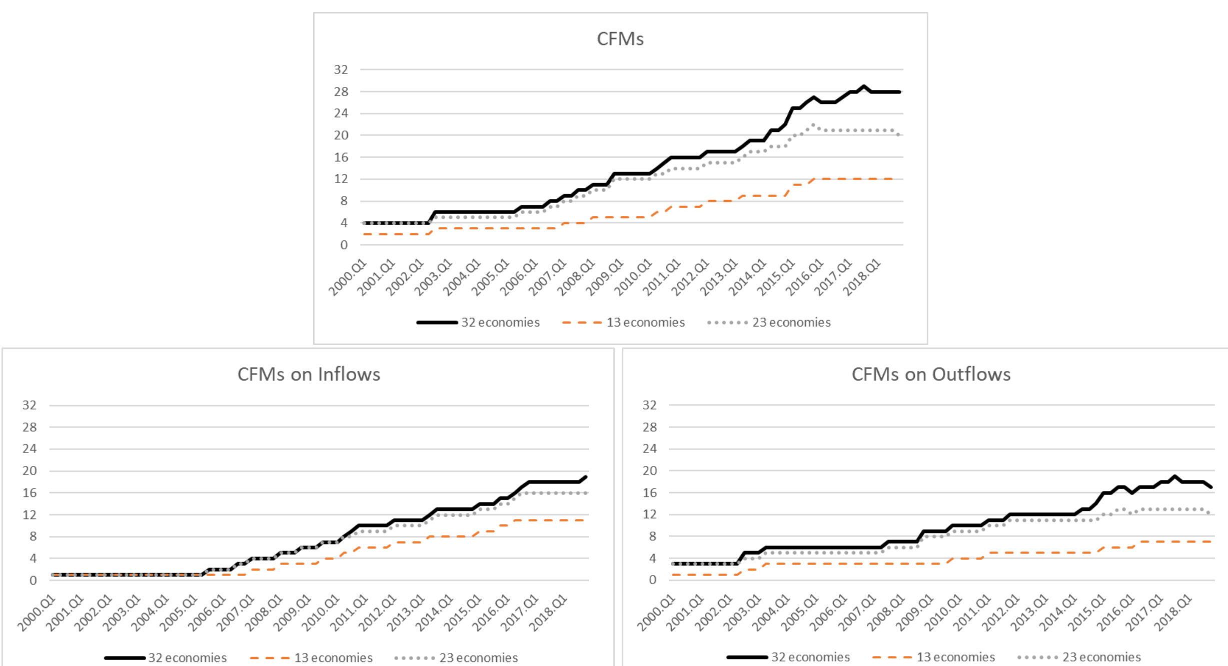


Figure 14: CFMs implementation over time (by type of policy tool). Top: All CFMs; Bottom-left: CFMs on Inflows; Bottom-right: CFMs on Outflows



A.3 Data description and sources

Table 3: Data description and sources

Name	Description	Sources
Dependent variables		
Capital flows		
Net (in)flows, Gross inflows and Gross outflows	Methodology by Cavallo, Izquierdo, and León (2017). They smoothed time series following Forbes and Warnock (2012) by aggregating series for 4 quarters (past three and current quarters), and then taking year-over-year differences. To consider the size of economy, capital flows to GDP ratio is used.	IMF IFS (BoP, BPM6) (downloaded on 5/11/2020)
Explanatory variables		
CFM dummy	1 if any kind of CFM is used during the period. Otherwise, 0.	IMF 2019 Taxonomy of CFMs
US Monetary Policy Rates	Effective Federal Funds Rate	FRED (downloaded on 2/18/2020)
Instrument	3-month-ahead Federal Funds Futures Rate	Jarociński and Karadi (2020) (including updates reported up to 2024)
Control variables		
VIX	The Chicago Board Options Exchange S&P 500 Volatility Index	GFDFinaeon (downloaded on 1/16/2020)
US Growth Rates	Industrial production (seasonally adjusted, constant USD)	WB GEM (downloaded on 1/6/2020)
Country-specific control variables		
Output Growth Rates	Industrial production (seasonally adjusted, constant USD)	WB GEM (downloaded on 1/6/2020)
Inflation	Consumer Price Index (2010 = 100)	IMF IFS (downloaded on 3/26/2020)
Exchange Rates	Nominal exchange rate (Price of 1 USD in terms of local currency, Average period)	IMF IFS (downloaded on 3/26/2020)
Domestic MP Rates	Domestic interest rates (3-month government bond rates) (as proxies)	Bloomberg
Others		
GFC dummy	Before/after the Global Financial Crisis (2008Q1)	FRED (NBER recession indicator)

A.4 Description of CFM database: Policy narratives and panel mapping

A.4.1 Data source

The capital flow management (CFM) measures used in this study are based on the IMF 2019 Taxonomy of Capital Flow Management Measures IMF (2019). This dataset provides a structured classification of CFMs applied across various countries, distinguishing between those targeting capital inflows and capital outflows. Each measure is accompanied by a narrative description, including the type of intervention, date of introduction, and key modifications.

A.4.2 Construction of CFM dummy variables

To translate the IMF's qualitative descriptions into a structured panel dataset, we introduce CFM dummy variables based on whether a measure is in place during a given period:

$CFM_{any} = 1$ if any CFM is implemented; otherwise, it is 0.

$CFM_{in} = 1$ if a CFM targeting capital inflows is implemented; otherwise, it is 0.

$CFM_{out} = 1$ if a CFM targeting capital outflows is implemented; otherwise, it is 0.

In cases where multiple CFMs are introduced simultaneously, we retain separate indicators (CFM_{in}, CFM_{out}) to distinguish between inflow- and outflow-targeted measures. However, we do not assign weights based on intensity, as there is no standardized method to quantify the relative restrictiveness of different interventions (e.g., Fernández et al., 2016).

While some studies (e.g., Pasricha et al., 2018) use $+1$ or -1 coding to differentiate between tightening and loosening, the IMF source descriptions often lack sufficient detail to systematically determine the policy direction—and, more importantly, their intensity. To ensure greater comparability, we focus on whether a measure was in place rather than attempting a subjective assessment of stringency.

A.4.3 Example of mapping data: China and India

To illustrate how CFMs were mapped into our dataset, we provide examples from China and India, both of which are included in most regressions used in this study. Table A presents selected policy interventions from the IMF taxonomy and their corresponding dummy variable assignments in our dataset. This approach ensures a systematic and replicable method for incorporating CFMs into the analysis by providing a structured representation of policy actions over time and across countries.

Table 4: Mapping CFMs to dataset: Selected examples in China and India

Country	Date	Type of CFM	Descriptions (quoted from IMF source)	Dataset mapping
China	2014 Q2	Limit on outflows	"For overseas direct investment (ODI) above US$300 million, the investor must submit a written project briefing to the National Development and Reform Commission (NDRC) before beginning substantive work overseas. ODI above US$1 billion was subject to approval by NDRC."	$CFM_{any} = 1$, $CFM_{in} = 0$, $CFM_{out} = 1$
China	2015 Q4	Reserve requirement on outflows	"Financial institutions buying foreign currency forward contracts and other derivative transactions that required the purchase of foreign currency against RMB on a future date on behalf of their clients were subject to a one-year 20% unremunerated reserve requirement."	$CFM_{any} = 1$, $CFM_{in} = 0$, $CFM_{out} = 1$
China	2016 Q1	Limit on inflows and outflows	"PBOC introduced a macroprudential assessment (MPA) framework for capital flows. PBOC monitors cross-border financial risk indicators under the MPA framework. When indicators hit certain levels, the PBOC adjusts various parameters to prevent risks."	$CFM_{any} = 1$, $CFM_{in} = 1$, $CFM_{out} = 1$
India	2000 Q2	Limit on inflows	"Limits on bank overseas foreign currency borrowings were introduced."	$CFM_{any} = 1$, $CFM_{in} = 1$, $CFM_{out} = 0$
India	2003 Q1	Limit on outflows	"The limit on overseas direct investment was initially set at 100% of the net worth of Indian entities under the automatic route."	$CFM_{any} = 1$, $CFM_{in} = 1$, $CFM_{out} = 1$
India	2015 Q3	Limit on inflows	"The Masala Bond scheme allowed corporates to issue rupee-denominated plain vanilla (masala) bonds in overseas markets with a minimum maturity of 5 years with end-use restrictions."	$CFM_{any} = 1$, $CFM_{in} = 1$, $CFM_{out} = 1$

Source: IMF 2019 Taxonomy of Capital Flow Management Measures (IMF, 2019)

B Additional results

B.1 Additional capital flows and CFM measures disaggregations

Figure 15: LP-IV IRFs for Risky and Safe capital flows: CFM measures on Inflows

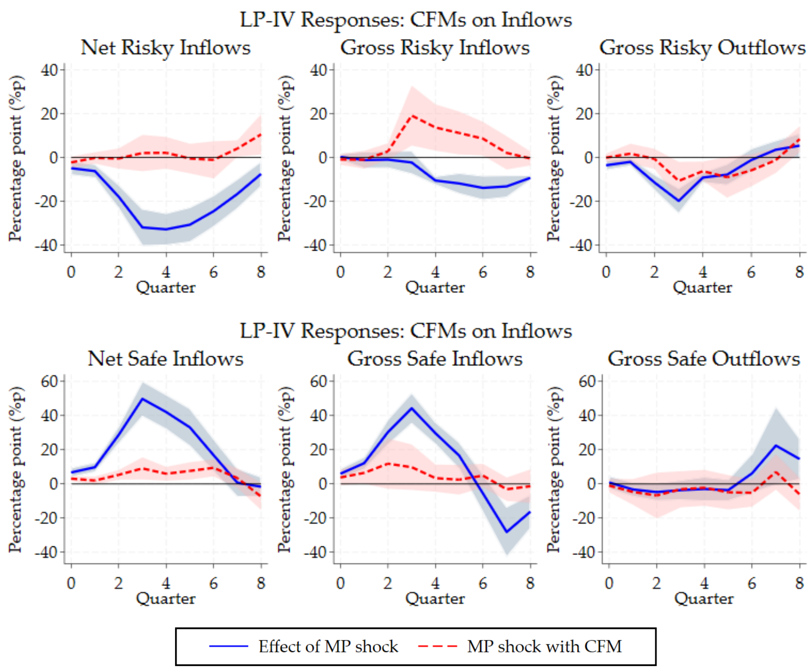


Figure 16: LP-IV IRFs for Risky and Safe capital flows: CFM measures on Outflows

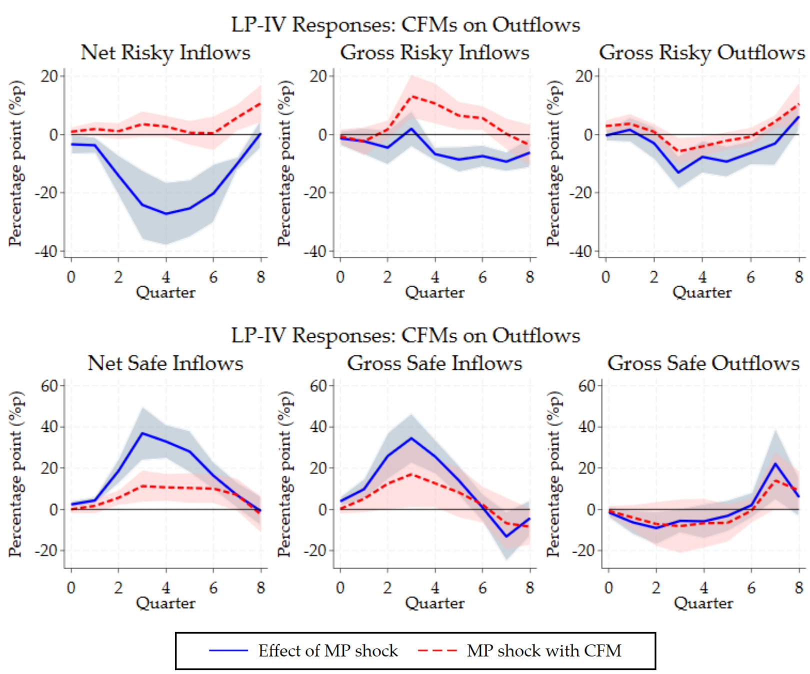
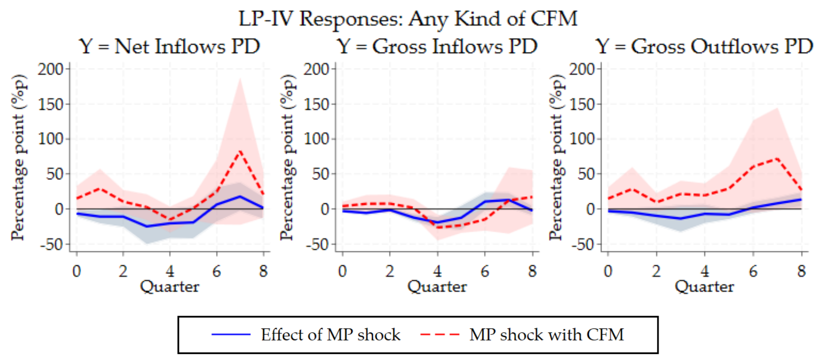


Figure 17: LP-IV IRFs for CFMs: Portfolio Debt flows (PD)



B.2 Results for robustness checks

Figure 18: LP-IV IRFs (Excluding Domestic Interest Rates)

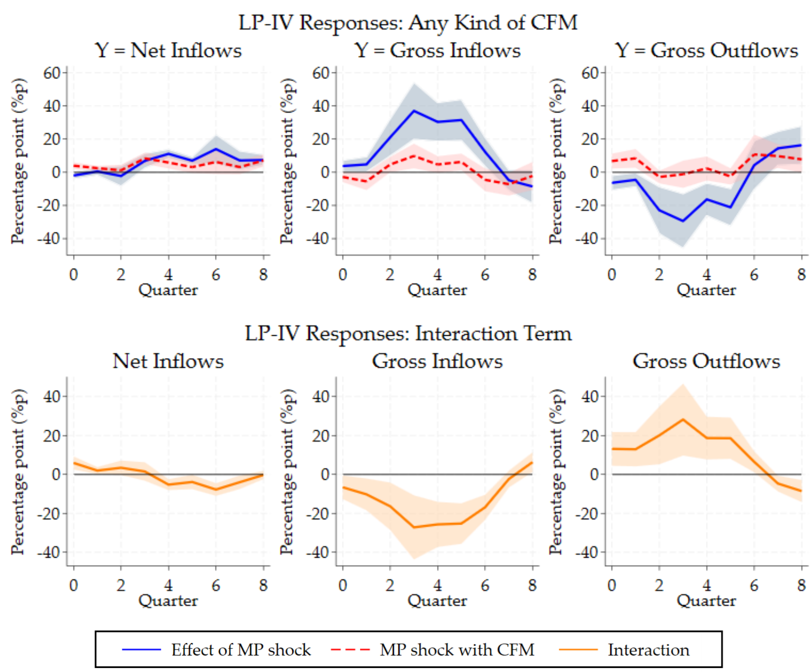


Figure 19: LP-IV IRFs (No GFC time dummy)

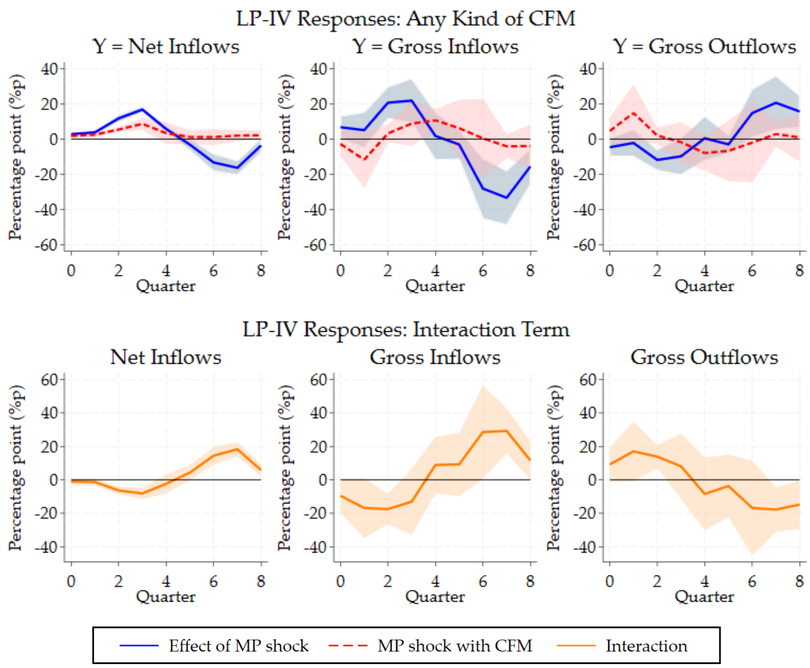


Figure 20: LP-IV IRFs (six-quarters lagged controls)

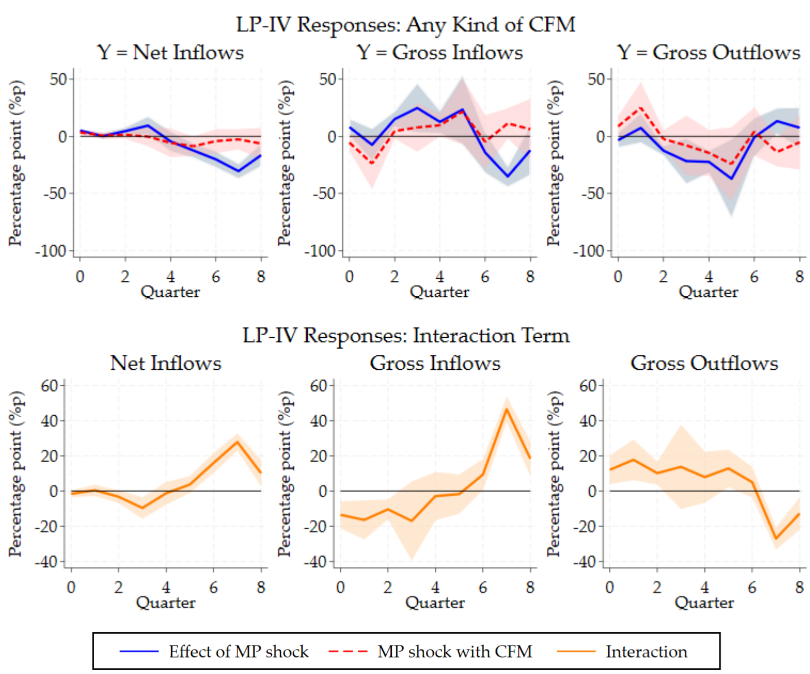


Figure 21: LP-IV IRFs (with Canada included)

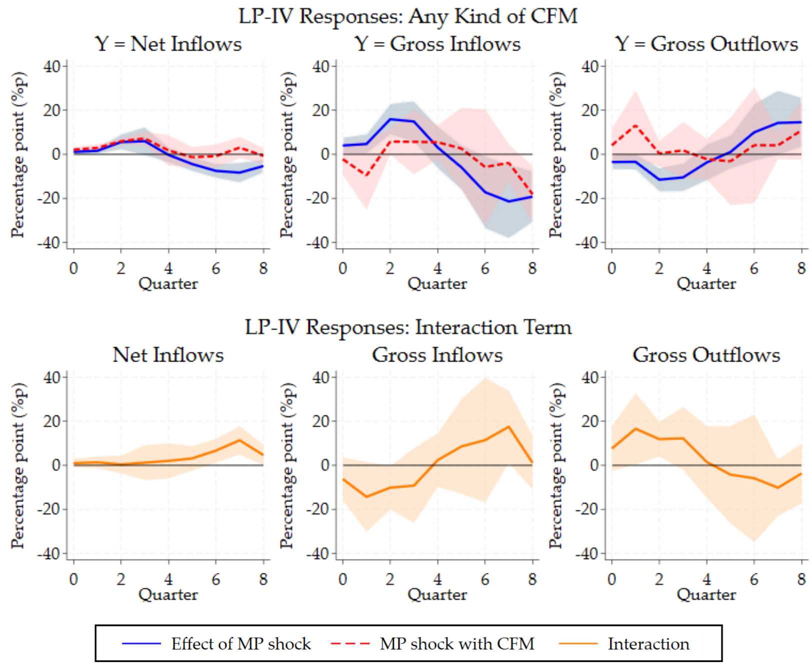


Figure 22: LP-IV IRFs for Portfolio Equity flows, excluding China (up) or India (down)

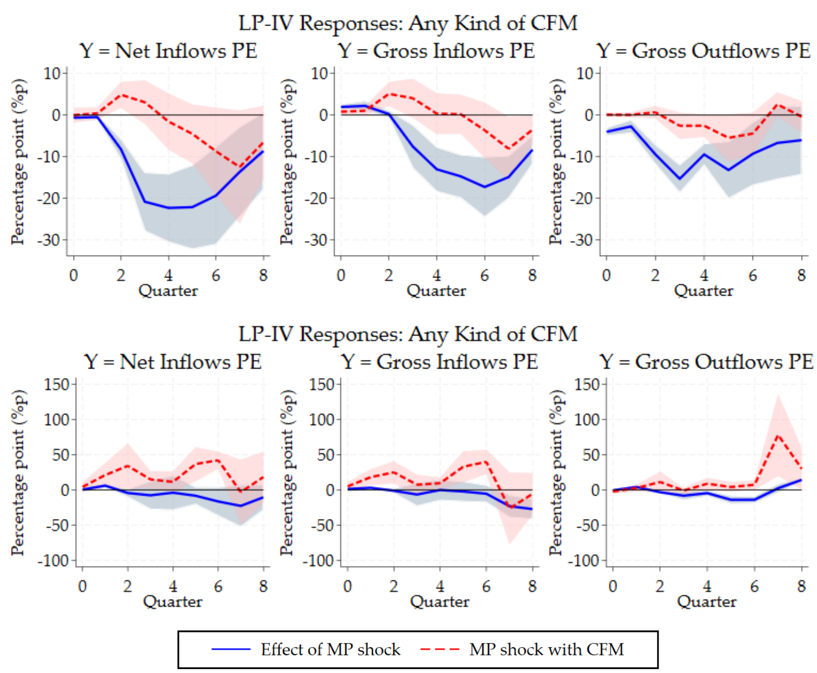


Figure 23: LP-IV IRFs for Risky capital flows, excluding BRICs economies (up), with BRICs only (middle), and with all economies (down) (excluding Domestic Interest Rates)

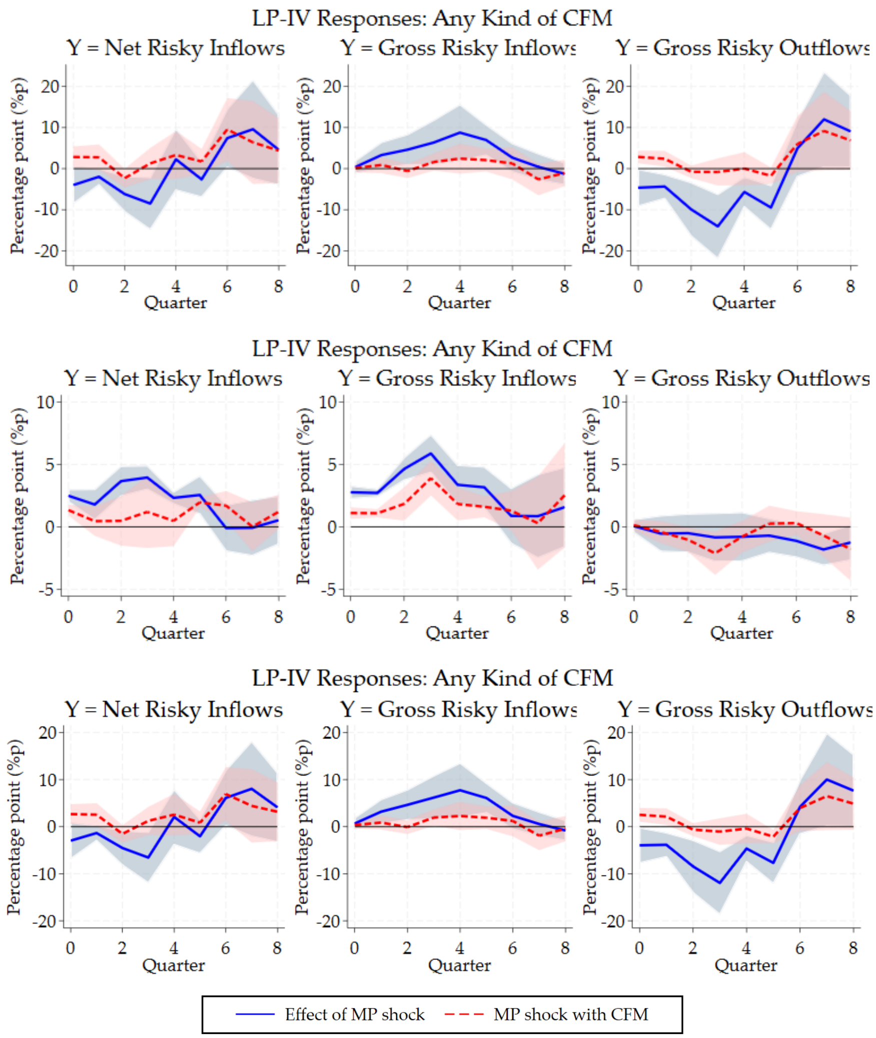


Figure 24: LP-IV IRFs for Risky capital flows (up) and Portfolio Equity flows (down) (including macroprudential measures)

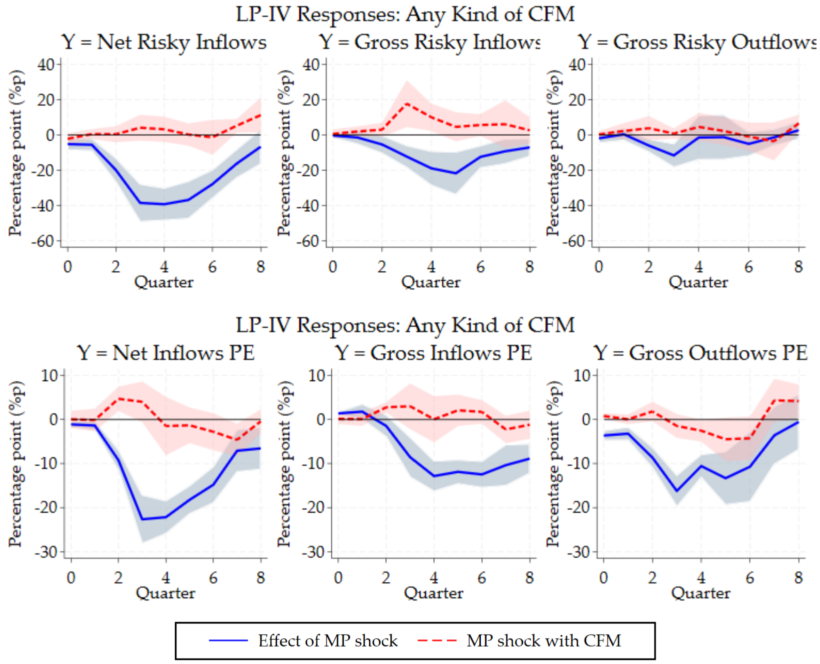


Figure 25: LP-IV IRFs for Risky capital flows (up) and Portfolio Equity flows (down) (including major global monetary policy rates)

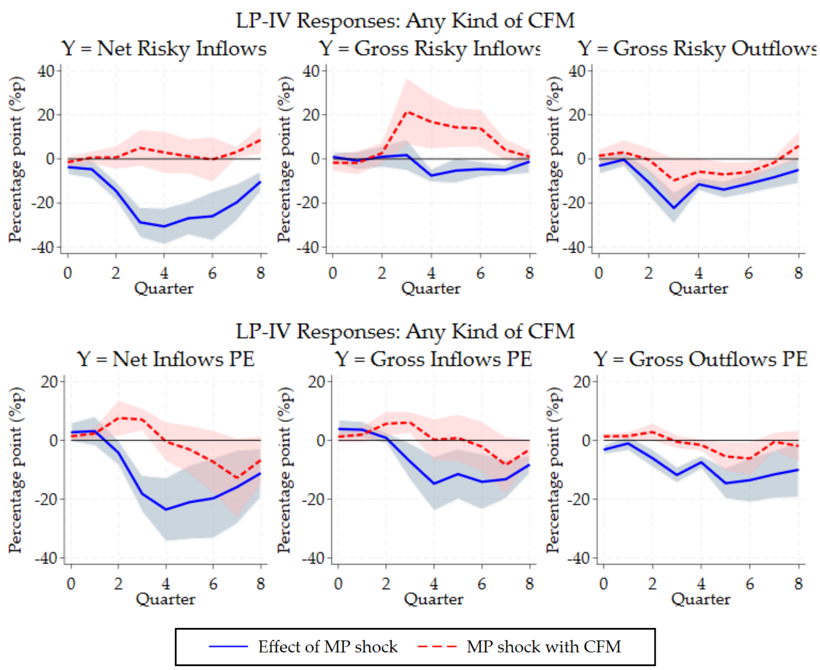


Figure 26: LP-IV IRFs for Portfolio Equity flows: Tax-based CFMs (up) and Non-Tax-based CFMs (down)

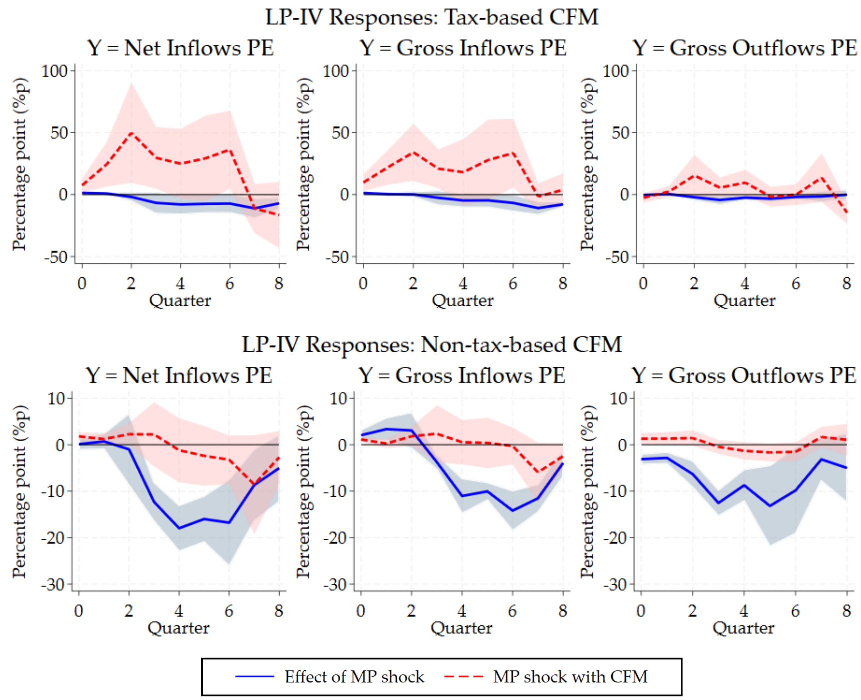


Figure 27: LP-IV IRFs for aggregated capital flows (up) and Portfolio Equity flows (down) (Pooled panel model without Fixed Effect assumption)

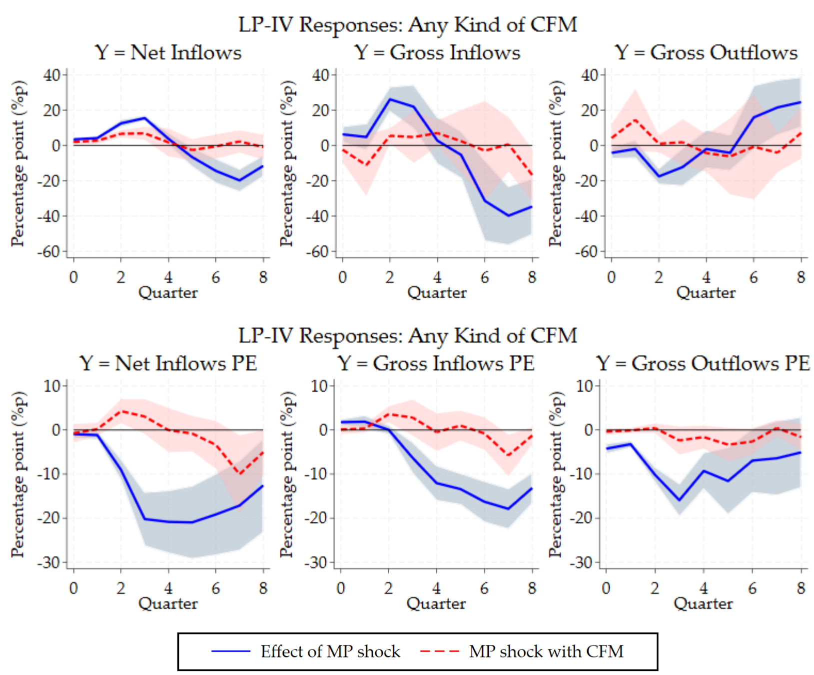


Figure 28: LP-IV IRFs to 1% in US MP Shock (with CFMs on Inflows and excluding Domestic Interest Rates)

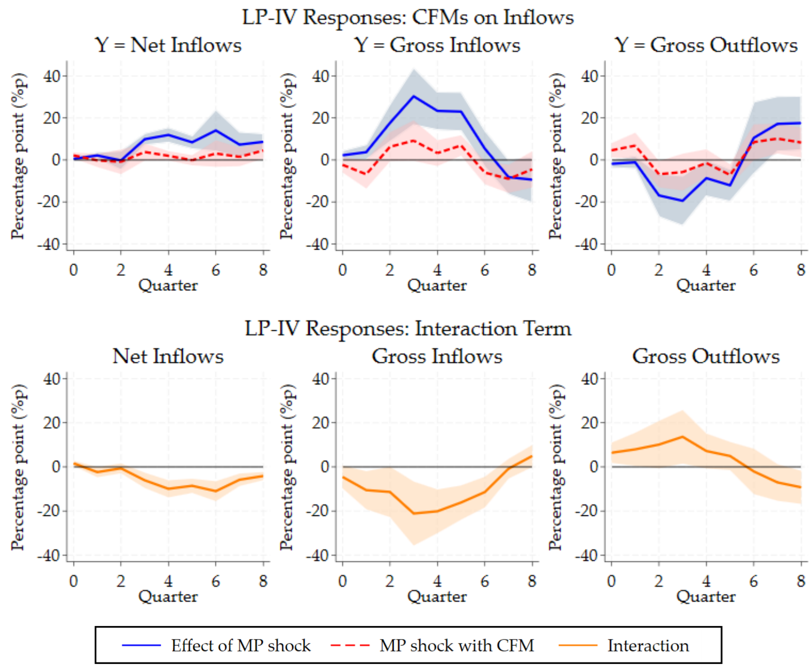


Figure 29: LP-IV IRFs to an Increase of 1% in US MP Shock (with CFMs on Outflows and Excluding Domestic Interest Rates)

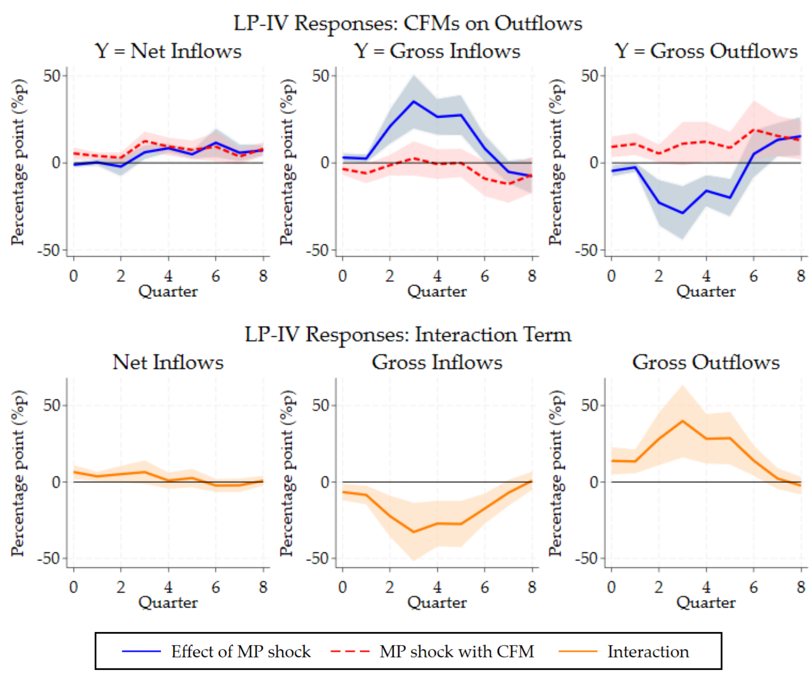


Figure 30: LP-IV IRFs to an Increase of 1% in US MP Shock (with CFMs on Inflows and No Time Dummy)

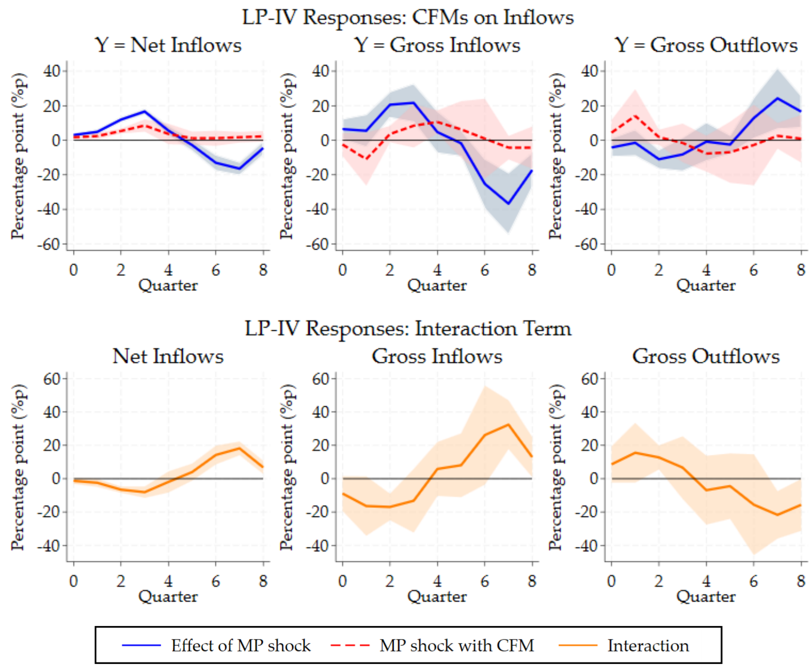


Figure 31: LP-IV IRFs to an Increase of 1% in US MP Shock (with CFMs on Outflows and No Time Dummy)

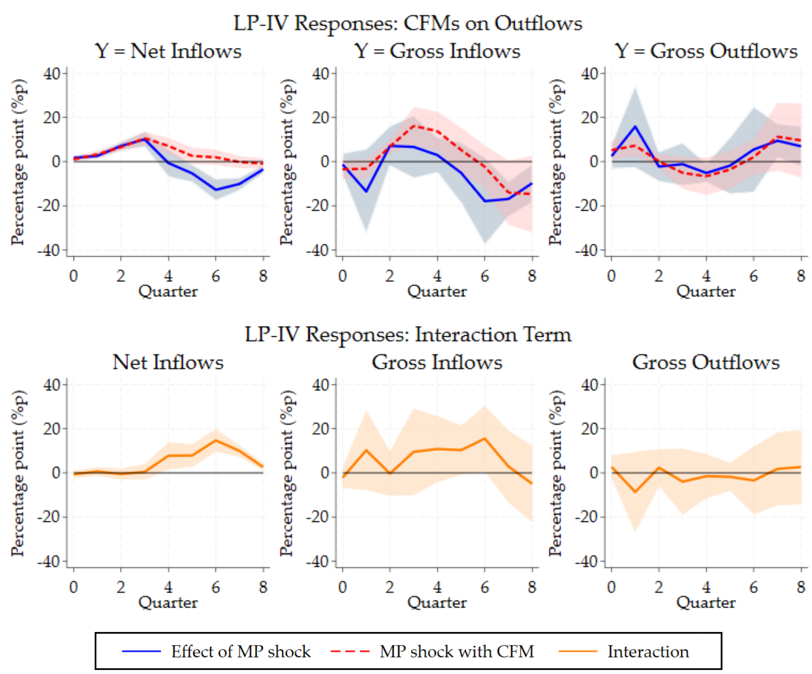


Figure 32: LP-IV IRFs to an Increase of 1% in US MP Shock (CFMs on Inflows and 6 Quarters Lagged Terms)

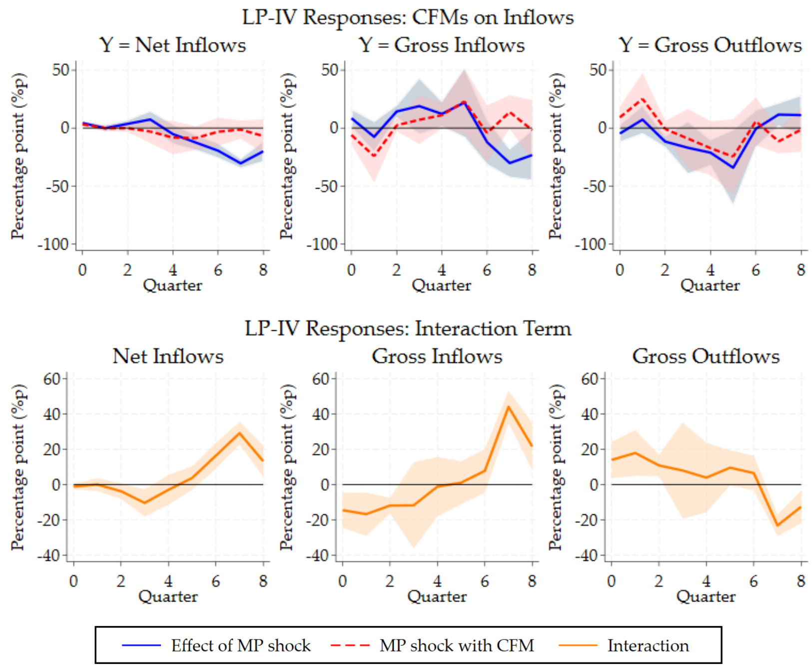


Figure 33: LP-IV IRFs to an Increase of 1% in US MP Shock (CFMs on Outflows and 6 Quarters Lagged Terms)