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CAPITAL INFLOWS TO EMERGING COUNTRIES AND THEIR SENSITIVITY TO THE GLOBAL FINANCIAL CYCLE

by Ines Buono*, Flavia Corneli* and Enrica Di Stefano*

Abstract

We study how the effect of global and domestic factors on capital flows towards emerging economies has changed in the last 25 years. We find that both the global financial crisis and the so-called 'taper tantrum' event, when investors perceived the end of the US Federal Reserve's unconventional monetary policy, triggered changes in the sensitivity of capital inflows to their main drivers. In particular, we provide evidence that during the period between the global financial crisis and the taper tantrum, international investors devoted less attention to domestic factors. Nevertheless, the taper tantrum marked the beginning of a new phase, characterized by increased sensitivity to both global factors and domestic vulnerabilities.

JEL Classification: F21, F32, F42.
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Contents

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1 Introduction

Since the early 1990s emerging economies (EMEs) increased substantially their financial integration with the rest of the world. This contributed to boost domestic growth rates but, at the same time, exposed domestic financial systems to larger pressures and, in some cases, countries did not succeed in managing episodes of excessive volatility in capital flows. This is not surprising. Rey (2015) shows that financial integration can reduce monetary policy space and therefore the ability of local authorities to deal with spillovers from global risks. More recently, Adrian *et al.* (2019) documented that financial integration is associated to greater exposure to global risk appetite. In EMEs those problems are likely to be more severe because a miminum level of domestic financial development has been proven to be a pre-condition for taking advantage of financial integration (Coeurdacier *et al.*, 2019; Corneli, 2017; Mendoza *et al.*, 2009). Since the global financial crisis (GFC), episodes of financial instability in EMEs were often accompained by periods of heightened volatility of capital flows (as documented by Pagliari and Hannan, 2017). Focusing on the gross inflows of foreign direct investment (FDI), debt and equity portfolio investment (PFI) and other investment (OI), we document that FDI volatility has remained broadly unchanged (see also Hoggarth *et al.*, 2016) while the volatility of PFI and OI increased sharply in May 2013, after the episode of the Taper Tantrum (TT) when markets reacted to an un-anticipated end of the US unconventional monetary policy.[1]. The goal of our analysis is to empirically investigate if the increased volatility in PFI and OI, in particular at the time of the TT, has also been accompanied by changes in the sensitivity of EME capital inflows to their main drivers.

The drivers of capital flows can be grouped into two categories: pull and push factors. The first group includes countries' domestic characteristics such as growth rate, inflation, government deficit, etc., that may affect the performance of the economy, the redditivity of financial investments and, therefore, their attractiveness for foreign investors; pull factors are either controlled by the authorities or are the result of past domestic policies. The second group, the so-called push factors, includes the components of the global financial cycle (risky assets return, leverage of financial institutions, risk aversion, uncertainty, risk premia) and its drivers, in particular the US montary policy (as found in Miranda-

[1]In May 2013, the speech of the then Federal Reserve Chairman, B. Bernanke, suggesting that the unconventional monetary policies could start to be phased out, generated a shock to global markets, which resulted in large capital outflows from EMEs.

Agrippino and Rey, 2015); those variables cannot be controlled by the country's authorities and they have an impact on a global scale.

While there is a broad consensus in the literature on the list of variables to be included among the pull or push factors (see Koepke, 2019; and Hannan, 2018, for extensive reviews), positions diverge on which drivers are more important in shaping the size and direction of international capital flows. Moreover, there is also a lack of understanding on whether the relation between capital flows and their drivers should be considered linear and time-invariant (see Cerutti *et al.*, 2019, on this issue). This paper contributes to this debate.

As a preliminary step, we test and select the most important pull and push factors driving the behavior of PFI (bond and equity) and OI flows. Like most works in this literature, our empirical model is not derived from a theoretical framework of the determinants of international capital movements. However, we chose our explanatory variables in line with the existing empirical literature and with several important theoretical results. Among the latter, in portfolio theory Caballero and Simsek (2017, 2018) model how liquidity shocks force global investors to retrench from riskier assets, while Jotikasthira *et al.* (2012) study agents' investment in global funds and how their choices depend on pull and push factors. Moving to contributions that analyze international bank lending, Bruno and Shin (2015), Cetorelli and Goldberg (2012) and Miranda-Agrippino and Rey (2015) show the importance of global banks in transmitting financial conditions to the rest of the world. Krogstrup and Tille (2018) include the role of the pull factors, and in particular currency mismatches in external assets/liabilities, in affecting the allocation of banks' funding and their interaction with global conditions.

As a main contribution, we empirically test whether and in which direction the sensitivity of PFI and OI inflows to the selected drivers has changed over time, in particular after the GFC and after the TT. The existence of a break at the time of the GFC has already been documented in the literature. Shim and Shin (2018) analyze how international banking flows to EMEs are shaped by financial stress in lender countries and show that this relation persistently changed after the GFC (Gauvin *et al.*, 2014, find a concurrent break for portfolio bond and equity flows, as well). Ahmed *et al.* (2017) analyze net private inflows into EMEs and they also find a significant change after the GFC. Finally, Goldberg and Krogstrup (2018) construct an international capital flow pressure index for several countries and study how the impact of the VIX varies over time, they

also recognize a break at the time of the GFC. Turning to the TT, most of the empirical work focused on the immediate market reactions, without looking at longer horizons and without testing for structural changes.[2] Avdjiev *et al.* (2017) are a notable exeption closer to our analysis. They look at the impact of common factors on international bank lending and bond issuance, and focus on the GFC break. However, they also recognize that the TT could have persistently changed market reactions. They compare the results of an econometric analysis ending in the first quarter of 2013 with those from a sample extended through 2015. According to their results, which rely on a smaller set of observations compared to ours, the inclusion of the post-TT period decreases the sensitivity of international bank lending and international debt securities to the US monetary policy and the VIX. However, their analysis focuses only on push factors and do not consider pull factors. Chari *et al.* (2017) test for two structural breaks, the GFC and the TT. They restrict the time-break investigation on one specific push factor and on a smaller set of capital flows, namely the impact of what they identify as US monetary policy shocks on US portfolio investments towards EMEs.

Summing up, there exists an extensive literature comparing international capital movements before and after the GFC but limited attention has been devoted to assess whether the TT episode had some impact on the sensitivity of capital flows to push and pull factors. To our knowledge, no studies have focused so far on the components of the financial account balance and considered the changing sensitivity of all relevant push and pull factors. This paper fills this gap by empirically testing such hypothesis using a common set of data and econometric specification for both events.

We use IMF and national sources data on quarterly PFI (bond and equity) and OI inflows to the 27 largest emerging economies from 1995 through 2017.[3] Our results show that both the GFC and the TT persistently changed the sensitivity of EMEs' capital inflows to push as well as to pull factors. The results confirm, consistently with the existing literature, that the GFC changed the impact of push and pull factors on capital inflows, but we furthermore show that also the TT episode induced a permanent change in the sensitivity of capital flows to the global financial cycle and to countries' domestic

[2]See in this regards the works of Aizenman *et al.* (2014), Eichengreen and Gupta (2015), Sahay *et al.* (2014) and Ahmed *et al.* (2017).

[3]Other works use higher frequency data to study the impact of financial shocks as well as monetary policy actions. Among others, Fratzscher (2012), Fratzscher *et al.* (2016) and Lo Duca (2012) employs EPFR daily or weekly portfolio flows. Cenedese and Elard (2018) study portfolio allocation by individual mutual funds and find that funds' managers allocation.

vulnerabilities. For the TT, we exclude that our results could be driven by the severity of the episode, as the change in sensitivity is preserved even when we exclude the turmoil quarters and move the time dummy forward to the third quarter of 2014, at the beginning of the Fed normalization. We believe that this is an important result, as failing to recognize changes that have occurred over time in the relation between capital flows and pull and push factors could lead to wrong policy prescriptions. As a final remark, we conjecture why the TT could have changed the sensitivity of capital flows to their main drivers. Following the empirical analysis of Chari *et al.* (2017), we concur that the period of the US unconventional monetary policy changed the transmission of the monetary policy shocks to the rest of the world. This is moreover consistent with Caballero and Kamber (2019), who show that unconventional monetary policies fueled search-for-yield investment by global investors and reduced the magnitude of their response to risk-off episodes. Bosed on those findings, we postulate that, starting from May 2013, the perceived beginning of the US monetary policy normalization abruptly ended this mitigating effect, reawakening the sensitivity of investors to the global financial cycle as well as to domestic vulnerabilities. This leads us to conclude that the US monetary policy, as one of the main drivers of the global financial cycle, can have an impact on how global investors take their decisions, that is on the sensitivity of capital flows to push and pull factors.

The reminder of the paper is organized as follows. The next section presents the main stylized facts and provides a description of the dataset; the econometric analysis and the robustness exercises are presented in sections 3 and 4. The last section provides some conclusive remarks.

2 Data and stylized facts

In this section we explore EMEs exposure to international capital movements, *i.e.* their financial integration, by using both stock and flow measures.[4] While data on stocks, being less volatile, are often considered more appropriate for measuring longer term trends, we will consider here also data on flows. The latter are also informative because they are available at higher frequencies and can therefore be used to look at a country's external

[4]According to the existing literature (see Quinn *et al.*, 2011), financial integration measures can be broadly grouped into: *de jure* measures, which use the information on legal restrictions on capital account transactions by residents and non-residents, and *de facto* measures, which rely on the information about actual flows and price convergence. The latter can then exploit either on stock or flow data.

stability. In fact, reversals of capital flows were proven to have caused financial crises in several episodes.

Following Lane and Milesi-Ferretti (2017) our stock measure is the countries' International Investment Position (IIP), *i.e.* portfolios of external assets and liabilities. Fig. 1 shows the IIP of selected advanced and emerging countries during the period 1995-2017; while in advanced economies the increase of assets and liabilities stocks has been roughly balanced, in emerging markets, liabilities have been persistently larger, suggesting that these countries have been, on average, net receivers of international flows. Within the liability side, while the share of emerging economies' FDI has been steadily increasing during the selected period, the share of OI has been declining and PFI liabilities have been increasing, with both types of flows recording sharp adjustments at the time of the GFC (Fig. 2).

Moving to flow data, in the 10 years preceding the GFC, both PFI and OI inflows to EMEs were more than twice the corresponding outflows, on average;[5] after the crisis, inflows have continued to overcome outflows by 70%, on average. In terms of composition, OI inflows seem to have shrunk since the GFC, after having been predominant in the years immediately before that event (Fig. 3). After the GFC, PFI and OI inflows have also become more volatile.[6] Specifically, we observe a significant increase of the volatility of flows when comparing the period 2010-2012 with the period 2013-2017. In fact, the volatility of inflows increased by 40%, for PFI equity, by 80% for PFI debt, and by 380%, for OI (Tab. 1). While the period of lower variability corresponds to the years in which there was a wide and increasing use of unconventional monetary policies and decreasing US Treasury long-term rates, at the time of the TT there was a sharp increase in the US long term rates, *i.e.* the 10 Years TIPS (Treasury Inflation-Indexed Security) yields (Fig. 3a). This evidence provide an indirect measure of the beginning of a new phase, which is in line with Caballero and Kamber (2019). These authors find that the period of US uncoventional monetary policy was characterized by low long-term Treasury rates, and this in turn helped mitigate the impact of risk-off episodes. Therefore, following their results, the jump at the time of the TT and steadly higher levels of long-term Treasury rates could therefore signal the beginning of a new phase. We explore the last conjecture

[5]The same holds for foreign direct investment, but don't show their pattern because in this paper we focus on the drivers of portfolio and other investment flows.

[6]Consistently with Pagliari and Hannan (2017), we find that FDI flows display, instead, a lower and more stable volatility.

extensively with the econometric analysis presented in the next section.

Our dependent variables are the share over GDP of PFI debt inflows (PFI debt), PFI equity inflows (PFI equity) and OI inflows (OI), as reported by the International Monetary Fund in the International Financial Statistics for 184 quarters from 1995Q1 to 2017Q4. In particular, we look at gross inflows, *i.e.* acquisition of claims by non-residents. We don't consider net flows but only gross figures. Gross flows, as opposed to net flows, provide a better picture of the actual exposure of a country to international markets. They have a higher volatility (Broto *at al.*, 2011; Broner *et al.*, 2013) which makes them more relevant when assessing financial stability issues; moreover, they are directly affected by specific types of extreme episodes such as sudden stops, capital flights or surges, and retrenchments (Forbes and Warnock, 2012). Moreover, rather than looking at the financial account balance, defined at the sum of FDI, PFI and OI, we separately look at its components. This choice is because each of them behave differently as they reflect different investment choices (Cerutti *et al.*, 2015). PFI and OI, for instance, are more likely to be driven by speculative motive and to have a shorter duration relative to FDI; they are also more volatile, as investors can easily redirect their exposures in assets and bonds towards other countries. Here we focus on PFI (both bonds and equity) and on OI, which mostly comprise bank loans.

The explanatory variables include selected push and pull factors found to be relevant by the existing literature (details of countries included in the analysis and summary statistics are provided in Tables 2-4). Specifically push factors are: the VIX index; an indicator of US monetary policy stance (following Avdjiev *et al.*, 2017, we use the effective US Federal Funds target rate prior to Q4 2008 then the Wu-Xia estimates of the shadow Federal Funds rate, for the period up to Q4 2015); the PPP-weighted real GDP growth rate of the four major advanced economies (US, Japan, UK and Germany); the yield of a zero-coupon 10-year TIPS; the broker-dealer leverage. Pull factors include: the domestic real growth rate; the International Country Risk Guide (ICRG) composite risk rating; General government net lending/borrowing in % of GDP; stock market capitalization. The selected explanatory variables are pairwise significantly uncorrelated, with the only exception of the pair 'US Federal Funds rate'-'10-year Treasury bond yield' which display a higher, although not perfect, correlation (0.9). Figure 4 shows the evolution of the pull and push factors used in the analysis through time.

3 Empirical analysis

As described in the previous section, we analyze non-resident capital inflows from Q1 1995 to Q4 2017 in an unbalanced panel of 27 emerging economies.

In order to analyze how the sensitivity of those flows to pull and push factors changes over time, we follow two approaches. After the estimation of the main regression over the full sample, we interact the explanatory variables with two dummies that capture, respectively, the period between GFC and the TT (or, alternatively, in a robustness check, the period between the GFC and the starting of FED monetary policy normalization) and the period after the TT (or the period after the FED monetary policy normalization). Finally, we perform rolling windows analysis to show how coefficients evolve over time without imposing any ex-ante time breaks.

The estimated reduced-form of the basic model is as follows:

$$Flow_{c,t} = \sum_{j=1}^{J} \alpha_j Push_t^j + \sum_{k=1}^{K} \beta_k^i Pull_{c,t-1}^k + \delta_c + \phi t + u_{c,t} \tag{1}$$

where $Flow$ can be PFI debt, PFI equity and OI flows (each of them in percent of GDP) directed to country c in period t; J push factors and K pull factors are described above.[7] See also Graph 4 and Tables 2, 3 and 4. Regressions also include country fixed effects δ_c that take into account all unobserved heterogeneity at the country level and a time trend, t. We follow Caballero and Kamber (2019) and exclude observations from 2008Q2 to 2009Q1 in order to limit the effects of the heights of the financial turmoil.[8]

The interaction analysis is obtained defining two dummies - P1 which is 1 in the period between 2009Q2 and 2013Q2 and 0 otherwise and P2 which is 1 starting from 2013Q3 on and 0 otherwise - and interacting each explanatory variable under analysis with those dummies, including P1 and P2 as well. The interaction analysis is carried out interacting our selected explanatory variables with those dummies.[9] For instance, considering the

[7] In line with the literature, main pull factors are lagged to address their endogeneity.

[8] All the variables are stationary according to the Im-Pesaran-Shins (IPS) and a Fisher-type test. There is no evidence of cross-sectional correlation according to the Pesarans (2004) test. In order to choose between a dynamic or a static model we verified that the coefficients on the lagged dependent variables, when used as explanatory variables, are far from unity (0.05 on PFI debt, 0.3 on both PFI equity and OI). Moreover, according to the Wooldridges test, residuals are not auto-correlated for PFI total, PFI debt and OI and auto-correlated only for PFI equity. Nevertheless, for the sake of comparability of the results both among different types of capital flows and with the existing literature, we use a static model for all the flow types. Results are confirmed if we run the regression without fixed effects and without the trend.

[9] We also perform separated regressions interacting each explanatory variables one at a time, as done by

interacion of the VIX (the first push factor included in the model), the regression looks like:

$$\begin{aligned} Flow_{c,t} = \sum_{j=2}^{J} \alpha_j Push_t^j + \sum_{k=1}^{K} \beta_k^i Pull_{c,t-1}^k + \alpha_1 VIX_t + \\ + \alpha_{11} VIX_t * P1 + \alpha_{12} VIX_t * P2 + \gamma_1 P1 + \gamma_2 P2 + \delta_c + \phi t + u_{c,t} \end{aligned} \tag{2}$$

Thus the coefficient α_1 captures the effect of the VIX in the period before the GFC while α_{11} and α_{12} capture the additional effect of the VIX on the flow in the period between the GFC and the TT and after the TT, respectively. This analysis is carried contemporaneously on all our main explanatory variables as reported in table 5.

3.1 Main results

Our main results are presented in Tables 5 and 6. Moreover, in figure 5 we provide a graphical summary of the main results of the interaction analysis.

Table 5 summarizes the main contributors in the linear analysis, obtained by using a large number of pull and push factors as considered in the literature and described in the previous paragraph, but reporting only the ones that are significant in the linear or in the interaction analysis.[10] As already mentioned, the regressions are performed excluding the GFC period.[11] As a general result, both PFI (debt and equity) and OI are correlated with both push and pull factors.

In particular, among the push factors, three components of the global financial cycle appear to have some significant relation with capital inflows: the VIX as a measure of risk aversion, the leverage as a measure of the willingness or ability of financial institutions to increase their investments, and the adjusted measure of the Federal Funds rate, as a measure of effective short-term interest rate as well as a proxy for the Federal Reserve policy. Consistently with other results in the literature (e.g. McQuade and Schmitz, 2019), the Federal Funds Rate is generally not significant, at least in the linear specification, once we include the VIX in our regressions. However, we keep this result to be able to compare it with the next step of our estimation. PFI (debt and equity) are both strongly correlated with the VIX: as already found in other studies, an increase in risk aversion discurages

Chari *et al.* (2017), and our main results do not change.

[10] In line with the literature (e.g. Ahmed and Zlate, 2014; Avdjiev et al., 2017), though the variables are statistically significant, the R^2 is moderate (even if fixed effects are included in all regressions).

[11] The regressions over the entire period provide similar results and no change in key messages.

investment in EMEs' risky assets. OI are instead not significantly affected by the VIX while they strongly correlate with the leverage. As mentioned, an increase in broker-dealer (among which there are several banks) leverage makes those intermediaries more inclined to lend abroad.

Moving to the pull factors, the coefficients have the expected sign when statistically significant. Our results show for the PFI debt the importance of emerging countries' government net borrowing, a measure of country's riskiness and reliability. OI are instead affected by country's past growth. This is a standard pull factor, employed in the literature. It gives a measure of country's outlook, which makes the economy and its assets attractive to foreign investors. PFI equity are not significantly correlated with pull factors in the linear regression, but this result masks a very different one in the non-linear analysis.

We now move to the interaction analysis in order to test our hypothesis that two events, the GFC and the TT, changed the relation of capital inflows to push and pull factors. Again, we run a full regression and interact the main variables (also reported in table 5) with the two dummies for the period between GFC and TT (variable P1) and from the TT onward (variable P2). The main results are shown in Table 6.

We start by looking at the first column, where the dependent variable is PFI debt. The most important result of this regression is the changing impact of risk aversion, proxied by the VIX, on PFI debt inflows. While significantly correlated along the entire sample, the VIX becomes more and more important, that is the sensitivity of PFI debt flows to risk aversion significantly increases after the GFC and again after the TT. In fact, the role of the global financial cycle (represented by the VIX) becomes increasingly important, almost doubling its correlation with the PFI debt after the GFC (from -0.057 to -0.13) and more than tripling it after the TT (to -0.28). The leverage of financial institutions also represents a boost to PFI debt along the entire sample, with no significant changes through time.

Moving to the pull factors, the most robust explanatory variable, government net borrowing, has a negative and significant impact on PFI debt: investors discriminate among destination countries depending on the government choices. Moreover, while significant for the entire sample, the coefficient more than doubles after the TT, implying that investors become much more sensitive to government net borrowing after the TT, again

showing that the TT represents a turning point in the investors' attitute.

The second column of Table 6 shows the results of the interaction analysis for PFI equity. First of all, while always significant the coefficient of the VIX does not seem to change along the sample (we obtain a slight different picture in the rolling-windows analysis below). The leverage instead has a very different behavior, since its sign changes over time. Before the GFC higher leverage holds back equity flows to EMEs, a result that seems at odds with existing evidence that an increase in leverage, as a proxy for rising risk appetite, boosts risky investment (Adrian and Shin, 2010). In this case the effect of leverage is to reduce the impact of the global financial cycle, as measured by the VIX. The important result is the large and positive coefficient in the period between the GFC and the TT. At the time of indiscriminated investments (see e.g. Fratzscher, 2012) fueled by advanced economies' monetary easing, investors with increasing leverage were also increasing their exposure to the EMEs' equity markets. After the TT this attitude ceased.

Again, as seen also in the PFI debt analysis, also for equity the real GDP growth has no significant impact on investors' choice, while government net borrowing significantly discurages purchases after the TT. This is in line with anecdotic evidence and with the findings of Sahay *et al.* (2014) and Ahmed *et al.* (2017) that after the TT countries with better fundamentals suffered less market pressures. However, our results point to a long lasting discriminatory attitude, not limited to the TT period. Later, in a robustness exercise we exclude the TT period from our last sub-sample and the results do not change.

Finally, the third column of Table 6 shows results for OI. Among the push factors, the leverage has a positive, significant and stable impact on OI flows along the entire sample. As already mentioned, the leverage is one of the components of the global financial cycle that boosts investment in risky assets. Interestingly, there is another push factor that affects OI flows only after the TT, the Federal Fund rate. According to our results, the US monetary policy tightening that followed the TT had the effect of discuraging loans toward EMEs, in line with Avdjiev and Hale (2019).

Moving to the pull factors, the past real GDP growth is a strong pull factor attracting OI flows. This is true for the entire sample but even more in the period between the GFC and the TT, where the coefficient more than doubled. In line with what found for PFI flows, the government net borrowing is an important explanatory variable also for

OI. But, as for equity, this is only true after the TT: government net borrowing, as a proxy for a country reliability, discurages investors after the TT, in the period of higher discriminatory attitude.

The coefficients reported in previous tables do not provide a measure of the importance of the main explanatory variables in explaining the different flows. Following Ahmed and Zlate (2014), we thus propose a simple exercise to gauge the economic importance of the VIX, the other push taken as a whole and the pull factors. For each of the three periods of our analysis, we plot the fitted values from the linear model with the predictions under the counterfactual that keeps a particular explanatory variable (or a group of them) constant at its initial value. The distance between the two lines signals how much the evolution of a given variable or group of variables contributes to our model's predictions.

As regards PFI debt, graph 6 shows that, while before the GFC the fitted and counterfactual lines are very close, between the GFC and the TT the VIX is the only economically important determinant of these flows. Keeping all the pull factors constant does not make a substantial difference in the full model fitted values; to a lesser extent, this is true also when keeping the other push factors constant. After the TT however, the graph shows a different pattern: not only does the global financial cycle prove to be economically significant, but also the pull factors become economically relevant.

Graph 7 shows a similar pattern for the PFI equity, where the VIX and the other push are more relevant in the period between GFC and TT as compared to the pre-GFC sample.

For OI, by contrast, Graph 8, unlike the regression analysis, shows a role for the VIX in the period between GFC and the TT and the importance of the other push in the post TT sample, in line with the findings for the Federal Fund rates.

As a final exercise we relax the choice of the breaks in the model and allow each pull and push coefficient, estimated over 5-year rolling windows to vary over time. Results for a selected number of regressors and dependent variables are reported in Graph 9.[12] The results for the VIX appear to be broadly in line with McQuade and Schmitz (2019) who perform their regression for US positions.

Panel (a) shows that VIX becomes significant in explaining PFI debt inflows after the crisis and its coefficient remains negative thereafter. Moreover it shows that also

[12] As before, also in this exercise we abstract from the period 2008Q2-2009Q1.

in some sub-periods at the beginning of the sample, the VIX enters negatively in the regressions. We show in the robustness checks that this result does not impair the main point of the paper; in fact, before the crisis, a negative VIX coefficient is related to extreme movements of the VIX (which could signal a non-linear relation before the GFC), while after the GFC and especially after the TT, the VIX coefficient is negative despite low levels of risk appetite.

Panel (b) shows the rolling-window coefficient of the government borrowing on PFI debt which, except for a short interval around 2010-2011, is significantly and increasingly negative only starting from 2013Q3, confirming the results that after the TT PFI debt becomes more sensitive to domestic vulnerability.

The effect of the VIX on PFI equity is depicted in panel (c). Here we see that the trend of the coefficient after the GFC resembles that of the coefficient for PFI debt. The magnitude is however almost halved. Moreover, for equity, there is no significance of the risk appetite before the outburst of the crisis. This could help us interpret the linear coefficient obtained in the model with interactions: the positive and constant VIX coefficient masks a strong instability before the GFC and a persistent negative and increasing impact after the GFC and again in the last part of our sample.

Panel (d) shows that for OI the variable that showed more action is the EMEs country GDP growth rate, therefore a pull factor. As found in the regression analysis, the role of this variable became important after the GFC, but has lost momentum after the TT.

4 Robustness

In this section we report a number of robustness exercises for the interaction analysis.

First, our dataset is highly unbalanced, since not all variables are available for our entire set of 27 countries. We thus construct a balanced sample, considering only the 12 countries for which we have all information.[13] Results for PFI debt, reported in column 2 of Table 7, confirm the previous analysis for the sample after the TT.

Second, our sample starts from 1995, but for a subset of 12 countries we have managed to collect data (except government net borrowing) starting from 1990.[14] Since during the

[13]Countries are Argentina, Brazil, Chile, Croatia, Hungary, Indonesia, Korea, Mexico, Philippines, Russia, Thailand and Venezuela.

[14]Countries are Argentina, Brazil, Chile, Hungary, Indonesia, Korea, Mexico, Peru, Philippines, South Africa, Thailand and Turkey.

nineties some of the countries in the sample experienced a crisis,[15] we replicate the analysis to show that the sensitivity of PFI debt to the VIX is not driven by that crisis and still reaches its highest value in the post TT period. Results are reported in column 3 of Table 7.

Third, as explained earlier we divide the time sample into three periods, with the third beginning after the TT episode. However, the TT does not coincide with the effective beginning of the US monetary policy normalization, which started with the announcement by the FED in September 2014, as also captured by the Wu-Xia adjusted federal fund represented in panel (a) of graph 4. Our main result that the TT represented break in investors attitude, rather than a one-off shock, is confirmed by the results in column 4 of Table 7, where we move forward to 2014Q3 the starting of our third phase.

Fourth, in column 5 we show that results hold when we replicate the analysis adding as controls other pull variables widely used in the literature. In particular, we consider the emerging country's policy rates, a measure of (lagged) trade openness of each emerging market (import plus export over total GDP), each country's nominal effective exchange rate and an indicator of reserves adequacy (the ARA metric constructed by the IMF).

The main results of this work relate to the role of VIX, which is a combined measure of risk appetite and global uncertainty and is also considered a measure of the evolution of the global financial cycle.[16] Several alternative measures of uncertainty have been recently proposed by the literature. In particular, one measure proposed by Baker *et al.* (2016) which is increasingly used by academics is the Economic Policy Uncertainty (EPU), a measure of policy-related economic uncertainty. The EPU is obtained as an index from three types of underlying components. One component quantifies newspaper coverage of policy-related economic uncertainty. A second component reflects the number of federal tax code provisions set to expire in future years. The third component uses disagreement among economic forecasters as a proxy for uncertainty. Figure 3c shows that although EPU and VIX were capturing uncertainty in a similar way in the first part of the sample, more recently they have diverged somewhat. More generally, the correlation between EPU and VIX in our dataset was high before the GFC (0.66), low between the GFC and the

[15]East Asian economies, in particular South Korea, Indonesia, Malaysia, Philippines. Thailand, Singapore. Hong Kong, China and Taiwan, were hit according to Corsetti *et al.* (1999).

[16]Datta *et al.* (2017) provide an overview of the VIX derivation and interpretation, together with other measures of global risk and uncertainty, while Cova and Natoli (2017) in their analysis disentangle the two components of the VIX, namely risk aversion and uncertainty.

TT (0.34) and almost zero in its aftermath (0.19).

In order to show that our analysis captures the role of VIX as a proxy for the global financial cycle we first replicate the analysis using the global EPU instead of the VIX (column 6), following Bhattarai *et al.* (2019). We find that although an increase in the EPU reduces the flows in the period before the GFC, the effect becomes null after the TT. In column 7 we insert both the VIX and the EPU and find that only the VIX explains financial flows; moreover its effect is increasing in time.

In table 8 we present some robustness analysis on the effect of government net borrowing on PFI debt. The increasing sensitivity of these flows to this pull factor is confirmed in the case of a balanced sample (column 2), when we use the FED normalization instead of the TT to split the time interval (column 3) and also when additional controls are included in the regression (column 4).[17]

As we show in the rolling windows analysis for PFI debt, the VIX appears to be significant also in the first part of the sample, but its significance is less stable. To shed light on this we replicate the rolling window analysis starting from 1990 for the subsample of countries for which we have information. Results for the VIX's 20-quarter rolling-window coefficient is reported in Graph 9a along with the corresponding mean value of the VIX over the same time-interval. The graph shows that, before the GFC, the VIX's coefficient was significantly different from zero for the period that goes from 1998Q1 to 2002Q3.[18] However, the graph also shows that, while before the GFC the significance of the VIX coefficient is associated to a growing and high level of the VIX itself,[19] after the GFC the VIX coefficient is negative and significant even when it is on a decreasing path (after 2013Q4). This finding is confirmed by the exercise reported in table 9, where we show results obtained splitting the sample into observations with VIX higher and lower than its median overall value (17.2), both for the period before and after the GFC. Results show that only after the GFC, by contrast, the coefficient of the VIX is significant independently of its level. In the period before the GFC instead the coefficient is not significant when the whole sample split is performed (although it is equal to -0.07 and significant when the all sample before the GFC is considered). This finding reinforces the

[17] We could not perform the robustness starting from 1990 since very few countries in our dataset have data on net borrowing previous to 1995.

[18] As in previous regression the dates on the graph refer to the end date of the 5-years window over which the regression is performed.

[19] The VIX has been persistently higher than its median value of 17.2 from 1996Q4 to 2003Q4.

conclusion that the role of the global financial cycle becomes firmly important after the GFC.

Graph 9b shows the same exercise for PFI equity. In this case, even for very high levels of VIX, the coefficient is not significant in any of the 5-year-window periods before the GFC. Instead, as already shown in the previous section, the coefficient is always negative and significant after the 2008.

Finally, we replicate the analysis excluding abrupt rise in the VIX with the aim to show that results on this important push factor are not dependent on extreme episodes. Results are reported in Table 10. In particular, we confirm that our results are not driven by risk-off episodes (Yuan devaluation and Brexit shock, 3Q2015 and 2Q2016, respectively), or by extreme values of VIX (below 1st and above 99th percentile, below 5th and above 95th percentile). By looking at PFI debt, we confirm that those flows become more sensitive over time and in particular after the TT. By looking at the PFI equity, while confirming the significance of the VIX along the entire sample.

5 Conclusions

The extensive literature on the determinants of capital inflows to EMEs has so far devoted little attention to the existence of time-varying investors' behavior. In this paper we fill this gap by studying how their sensitivity to push and pull factors changed over time. We find evidence that two structural breaks in the relationship between capital inflows and their drivers occurred in the recent past: after the GFC and at the time of the TT event. We use data on quarterly capital inflows to 27 major emerging countries over the last 20 years. We find that portfolio flows and other investment (mainly comprising banking flows) behave in a significantly different manner. This is not surprising. The exposure to global investors sharply increased after the GFC, especially for the PFI equity and debt components (as documented by the IMF, 2014). By contrast, reliance on foreign banks for credit decreased over the same period, also due to more stringent banking regulations (see BIS, 2019; Forbes *et al.*, 2017; Avdjiev *et al.*, 2017; and Ahnert *et al.*, 2018).

We find, in particular, that the sensitivity of PFI debt to the risk aversion, proxied by the VIX, increases after the GFC and even more after the TT. PFI equity are also affected by the VIX and in a more stable way after the GFC (as shown in the rollong-windows analysis). Moreover, PFI equity strongly react to changes in the leverage in the period

between the GFC and the TT, period in which the indiscriminated investment fueled large capital flows into EMEs. As already mentioned, OI behave in a different way, especially when considering push factors. While the VIX does not significantly correlate with OI, Federal Fund rates exert a strong and negative impact after the TT. Finally, moving to the country characteristics, we find that government net borrowing is an important pull factor, since it negatively and significantly correlates with all types of capital inflows after the TT.

The main contribution of our work is to show that the perceived end of the US unconventional monetary policy triggered the beginning of a new phase, characterized by an increased sensitivity of debt and equity inflows not only to the international risk appetite but also to countries' domestic vulnerabilities. Moreover, we find that these effects are also valid, although in a different form, for the OI component. We conjecture, following Caballero and Kamber (2019), that unconventional monetary policy and its unwinding could change the way international investors make their portfolio allocations, by changing their reaction to global and local shocks. However, a formal analysis is needed to understand the reasons behind investors' changing attitude. We leave this for future research.

Finally, our analysis is relevant from a policy perspective because failing to recognize time-variation in the relation of capital flows to push and pull factors could lead to misestimate the increasing weight of global conditions on international capital movements and contribute to wrong policy prescriptions. Moreover, as shown in recent contributions, abrupt swings in capital flows to EMEs, induced by sharp changes in risk aversion, could also have spillback effects on advanced economies through exchange rate movements.[20]

[20]Niepmann and Schmidt-Eisenlohr (2018) find that a flight from EMEs reduces domestic loans originated from the US banks, through the effect of a stronger dollar.

Tables

Table 1: Capital inflows volatility

Type of flow	Entire period	Between GFC and TT	After TT
Foreign direct investments (FDI)	2.7	2.3	2.4
Portfolio debt inflows (PFI debt)	3.2	1.7	3.1
Portfolio equity inflows (PFI equity)	4.3	3.2	4.4
Other investments (OI)	5.9	3.9	9.3

The table displays the coefficient of variation (standard deviation/mean). The entire period goes from 1995Q1 to 2017Q4; the period between the GFC and TT goes from 2009Q2 to 2013Q2; the period after TT goes from 2013Q3 to 2017Q4.

Table 2: Main variables and sources

Variable	Source	Description
Dependent variables:		
Portfolio debt flows	IFS	BoP, Liabilities, portfolio investment, debt (USD)
Portfolio equity flows	IFS	BoP, Liabilities, portfolio investment, equity (USD)
Other flows	IFS	BoP, Liabilities, other investment (USD)
GDP	WEO	Gross domestic product, current prices (USD)
Independent variables (push factors):		
VIX	CBOE	Expected volatility of S&P500 options (index, quarterly average)
Adj. Federal Funds rate	FED	Federal Funds Rate adjusted following Wu and Xia (2016) (%)
Treasury10y	FED	10Y Treasury Inflation-Indexed Security, constant maturity (%)
ADV real GDP growth rate	WEO	US, Japan, UK and Germany PPP-weighted real GDP growth (%)
Leverage	FED	Broker-dealer leverage, *i.e.* financial assets-to-equity ratio
Independent variables (pull factors):		
Real GDP growth rate	WEO	Domestic real GDP growth rate (%)
Country risk	ICRG	Composite risk rating (index 0-100)
Govt. net borrowing	WEO	General government net lending/borrowing (% of GDP)
High financial integration	ICRG	Dummy equal 1 if ICRG Financial Risk Rating higher than median
Stock market capitalization	WB	Total value of all listed shares in a stock market (% of GDP)
P1		Dummy equal 1 from 2009Q2 to 2013Q2 (included)
P2		Dummy equal 1 from 2013Q3 to end of sample
Legend:		
BoP: Balance of Payments		
CBOE: Chicago Board Options Exchange		
ICRG: International Country Risk Guide Database		
IFS: International Monetary Fund - International Financial Statistics		
FED: Board of Governors of the Federal Reserve System		
WB: World Bank - Global Financial Development Database		
WEO: International Monetary Fund - World Economic Outlook Database		

Table 3: Country list and data availability

Country	Year	Country	Year
Argentina	1993-2017	Malaysia	2002-2009
Brazil	1991-2017	Mexico	1990-2017
Bulgaria	1994-2012	Morocco	2003-2017
Chile	1991-2017	Peru	1991-2017
China	2005-2017	Philippine	1990-2017
Colombia	2005-2017	Poland	2000-2017
Croatia	1998-2017	Romania	1998-2011
Check Republic	1996-2012	Russia	1995-2017
Ecuador	2000-2012	South Africa	1990-2017
Egypt	2011-2013	Thailand	1993-2017
Hungary	1992-2017	Turkey	1990-2017
India	1997-2017	Ukraine	2000-2012
Indonesia	1990-2017	Venezuela	1994-2012
South Korea	1990-2017		

Table 4: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Portfolio debt flows over GDP	0.79	2.95	-20.09	18.43	1836
Portfolio equity flows over GDP	0.3	1.46	-16.15	10.49	1833
Other flows over GDP	1.04	4.73	-29.03	30.7	1836
VIX	20.37	7.97	10.3	58.32	1836
Adj. Federal Funds rate	1.83	2.73	-2.9	6.5	1836
Treasury10y	3.86	1.39	1.56	6.78	1836
ADV real GDP growth rate	2.07	1.62	-4.36	4.73	1836
Leverage	23.12	5.73	13.93	36.48	1836
Real GDP growth rate	3.78	4.15	-26.1	36.36	1836
ICRG	70.45	6.14	41.83	84.67	1836
Govt. net borrowing	-2.24	3.27	-14.57	7.94	1836
Financial integration	0.52	0.5	0.0	1.0	1836
Stock market capitalization	45.8	44.75	0.73	328.08	1836

Description and sources of the variables are reported in Table 2.

Table 5: Push and pull factors sensitivity over the entire sample

	PFI debt (1)	PFI equity (2)	Other flows (3)
Push factors			
VIX	-0.064***	-0.039***	-0.019
	(0.014)	(0.007)	(0.020)
Adj. Federal Funds rate	-0.057	-0.009	-0.096
	(0.053)	(0.026)	(0.076)
Leverage	0.036*	-0.010	0.127***
	(0.019)	(0.009)	(0.027)
Pull factors			
Real GDP growth rate(-1)	0.003	0.017	0.148***
	(0.022)	(0.011)	(0.031)
Gov. net borrowing(-1)	-0.241***	0.004	-0.058
	(0.032)	(0.016)	(0.046)
Observations	1736	1776	1791
R^2	0.057	0.041	0.138

The table refers to the specification 1 in the text. It excludes the interval 2008Q2-2009Q1. Dependent variables: PFI debt over GDP (column 1); PFI equity over GDP (column 2); OI over GDP (column 3). The regressions also include additional push and pull control variables (Treasury10y, ADV real GDP growth rate, ICRG, Financial integration, Stock market capitalization), country fixed effect and trend. The coefficients not reported in the table are available from the Authors upon request. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01.

Table 6: Interaction analysis

	(1) PFI debt	(2) PFI equity	(3) Other flows
VIX	-0.057***	-0.053***	-0.004
	(0.017)	(0.008)	(0.025)
VIX*P1	-0.072*	0.007	-0.079
	(0.043)	(0.022)	(0.063)
VIX*P2	-0.151**	-0.000	0.004
	(0.063)	(0.032)	(0.092)
Adj. Federal Funds rate	0.010	0.025	-0.058
	(0.072)	(0.035)	(0.103)
Adj. Federal Funds rate*P1	0.042	0.262	0.139
	(0.475)	(0.236)	(0.694)
Adj. Federal Funds rate*P2	0.006	0.018	-0.527*
	(0.222)	(0.110)	(0.320)
Leverage	0.085**	-0.030*	0.171***
	(0.036)	(0.018)	(0.052)
Leverage*P1	0.103	0.305*	0.099
	(0.329)	(0.164)	(0.483)
Leverage*P2	0.041	0.166	-0.691
	(0.317)	(0.158)	(0.460)
Real GDP growth rate(-1)	-0.001	0.014	0.125***
	(0.024)	(0.012)	(0.035)
Real GDP growth (-1)*P1	0.033	0.008	0.139**
	(0.044)	(0.021)	(0.062)
Real GDP growth (-1)*P2	0.035	-0.009	0.032
	(0.072)	(0.035)	(0.101)
Gov. net borrowing(-1)	-0.207***	0.017	-0.031
	(0.036)	(0.017)	(0.051)
Gov.net borrowing(-1)*P1	0.003	-0.016	-0.034
	(0.060)	(0.029)	(0.084)
Gov.net borrowing(-1)*P2	-0.254***	-0.065*	-0.336***
	(0.077)	(0.036)	(0.105)
Observations	1736	1776	1791
R^2	0.084	0.052	0.150

The table refers to the specification 2 in the text. The interaction is made with the main pull and push variables. The interval 2008Q2-2009Q1 is excluded. Dependent variables: PFI debt over GDP (column 1); PFI equity over GDP (column 2); OI over GDP (column 3). P1 is equal to 1 from 2009Q2 to 2013Q2, and 0 otherwise. P2 equal to 1 from 2013Q3 on, and 0 otherwise. The regressions also includes additional push and pull control variables (Treasury10y, ADV real GDP growth rate, ICRG, Financial integration, Stock market capitalization) as described in the text, P1 and P2 dummy, country fixed effect and trend. The coefficients not reported in the table are available from the Authors upon request. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01.

Table 7: Robustness analysis: PFI debt

	(1) Balanced	(2) From 1990	(3) FED norm.	(4) More controls	(5) EPU	(6) EPU vs VIX
VIX	-0.053**	-0.068***	-0.055***	-0.074***		-0.032
	(0.024)	(0.020)	(0.017)	(0.019)		(0.025)
VIX*P1	-0.060	-0.065	-0.046	-0.048		-0.097**
	(0.047)	(0.045)	(0.029)	(0.033)		(0.039)
VIX*P2	-0.167**	-0.155**	-0.144**	-0.155***		-0.178***
	(0.082)	(0.079)	(0.060)	(0.058)		(0.064)
EPU					-0.015***	-0.008
					(0.005)	(0.008)
EPU*P1					0.006	0.014
					(0.008)	(0.011)
EPU*P2					0.021	0.019
					(0.013)	(0.015)
Observations	985	1271	1741	1385	1741	1741
R^2	0.090	0.066	0.074	0.118	0.059	0.077

The results refer to the specification 2 in the text. All variables are included but only relevant coefficients are reported. Dependent variables: PFI debt over GDP. Column 1 reports results for a subset of countries for which the panel is balanced; column 2 reports results starting from the 1990 for a subset of countries (Gov.net borrow.(-1) is not included); column 3 reports results considering the FED normalization (instead of the TT episode) as the starting of the third period of time (thus period 2 ends in 2014Q2 and period 3 starts from 2014Q3); column 4 reports result for a regression that include further control variables; column 5 includes EPU instead of VIX; column 8 includes both VIX and EPU. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01.

Table 8: Robustness analysis: PFI debt (contd.)

	(1) Balanced	(2) FED norm.	(3) Other controls
Gov. net borrowing(-1)	-0.278***	-0.210**	-0.282***
	(0.044)	(0.035)	(0.044)
Gov.net borrowing(-1)*P1	0.103	-0.019	0.036
	(0.082)	(0.057)	(0.066)
Gov.net borrowing(-1)*P2	-0.210**	-0.215***	-0.175**
	(0.096)	(0.082)	(0.079)
Observations	985	1741	1385
R^2	0.092	0.074	0.117

The results refer to the specification 2 in the text. All variables are included but only relevant coefficients are reported. Dependent variable: PFI debt over GDP. Column 1 considers a subset of countries for which the panel is balanced; column 2 considers the FED normalization (instead of the TT episode) as the starting of the third period of time (thus period 2 ends in 2014Q2 and period 3 starts from 2014Q3); column 3 reports result for a regression that includes additional control variables. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01.

Table 9: Non-linearity: VIX higher and lower than the median

	Before the GFC		After the GFC	
	VIX below median	VIX above median	VIX below median	VIX above median
	(1)	(2)	(3)	(4)
VIX	-0.134	-0.045	-0.243*	-0.148***
	(0.128)	(0.038)	(0.144)	(0.055)
Observations	406	445	240	180
Other controls	YES	YES	YES	YES
Country F.E.	YES	YES	YES	YES
R^2	0.058	0.068	0.093	0.152

The results refer to the specification 1 in the text. Sample: subset for which main data are available from 1990 (as reported in Table 3). Column 1 (column 2) reports the results for the sample before the GFC and with VIX below (above) its overall median (= 17.17). Column 3 (column 4) reports the results for the sample after the GFC and with VIX below (above) its overall median. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01.

Table 10: Robustness analysis on VIX

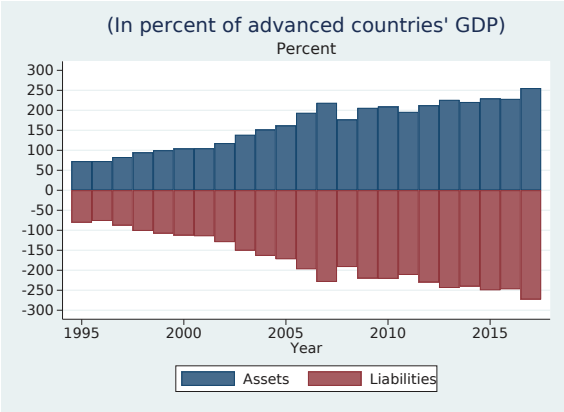
	(1) All sample	(2) w/o extreme episodes	(3) 1st and 99th	(4) 5th and 95th	(5) All sample	(6) w/o extreme episodes	(7) 1st and 99th	(8) 5th and 95th
					PFI Debt			
VIX	-0.064***	-0.062***	-0.065***	-0.050***	-0.057***	-0.056***	-0.058***	-0.052***
	(0.014)	(0.014)	(0.015)	(0.016)	(0.017)	(0.017)	(0.017)	(0.019)
VIX*P1					-0.072*	-0.073*	-0.096*	-0.075
					(0.043)	(0.043)	(0.057)	(0.060)
VIX*P2					-0.151**	-0.151**	-0.152**	-0.158**
					(0.063)	(0.071)	(0.064)	(0.072)
Observations	1736	1699	1685	1554	1736	1699	1685	1554
R^2	0.057	0.056	0.058	0.057	0.084	0.082	0.084	0.083
					PFI Equity			
VIX	-0.039***	-0.038***	-0.038***	-0.035***	-0.053***	-0.052***	-0.053***	-0.050***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)
VIX*P1					0.007	0.006	0.021	0.021
					(0.022)	(0.022)	(0.029)	(0.029)
VIX*P2					-0.000	0.014	0.000	0.012
					(0.032)	(0.036)	(0.032)	(0.035)
Observations	1776	1739	1725	1591	1776	1739	1725	1591
R^2	0.041	0.039	0.039	0.034	0.052	0.050	0.050	0.043

The results refer to the specifications 1 and 2 in the text, with the main pull and push factors interacted for the two sub-periods. All variables are included but only relevant coefficients are reported. Dependent variables: PFI debt over GDP in the first three rows and PFI equity over GDP in the other rows. Columns 1 and 5 show the results for the entire sample (as in the previous tables); columns 2 and 6 show the results omitting 2015Q3 and 2016Q2; columns 3 and 7 show the results omitting periods in which the variation of VIX has been below its 1st or above its 99th percentile; columns 4 and 8 show the results omitting periods in which the variation of VIX has been below the 5th or above the 95th percentile. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01.

Figures

Figure 1: International investment position by country group

(a) Advanced countries



(b) Emerging economies

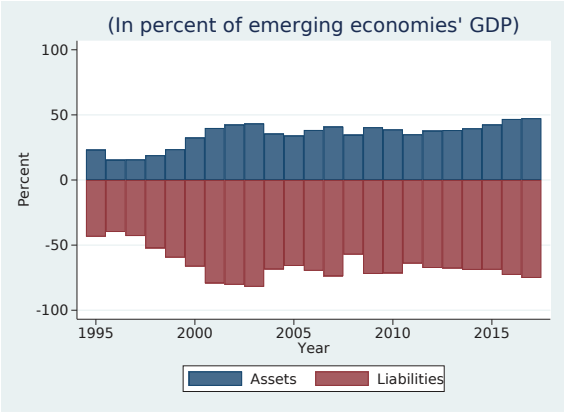


Figure 2: Emerging economies liabilities, by type

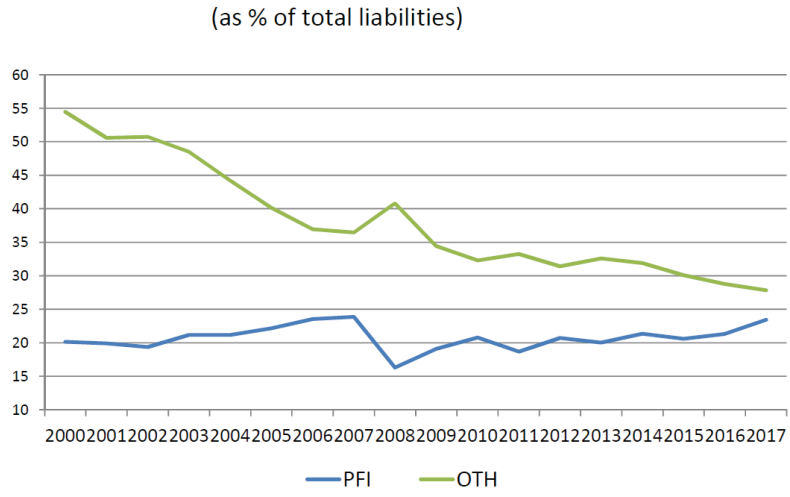


Figure 3: Emerging economies capital inflows, by type

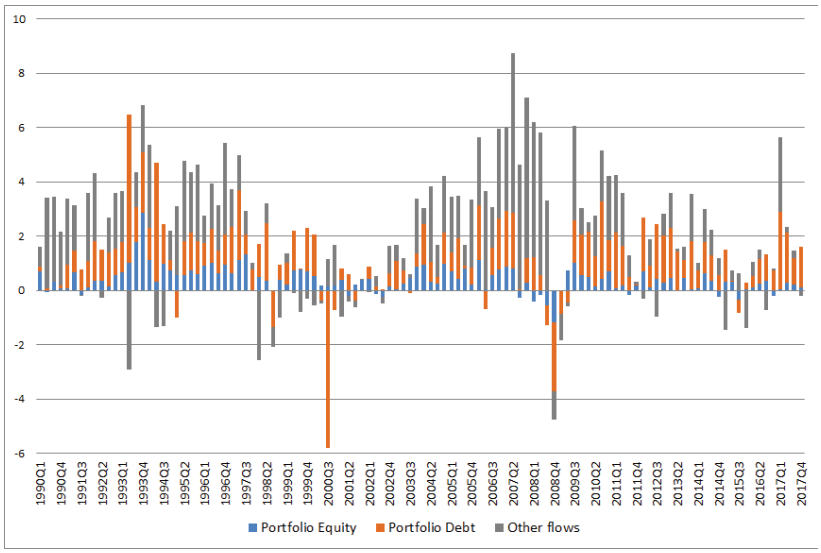
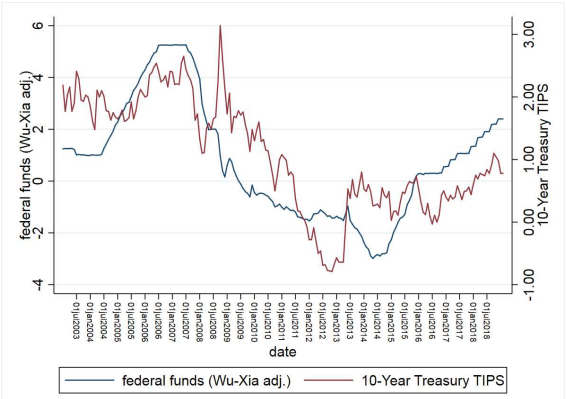
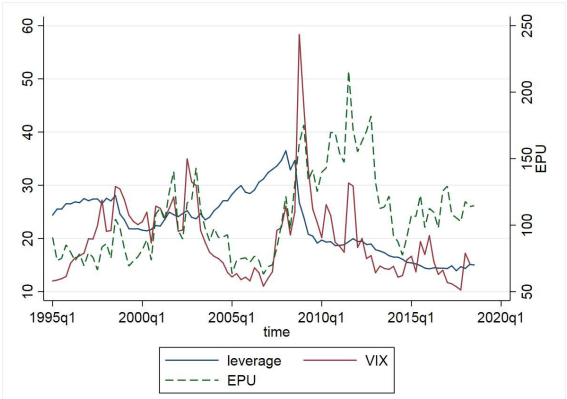


Figure 4: Descriptive analysis

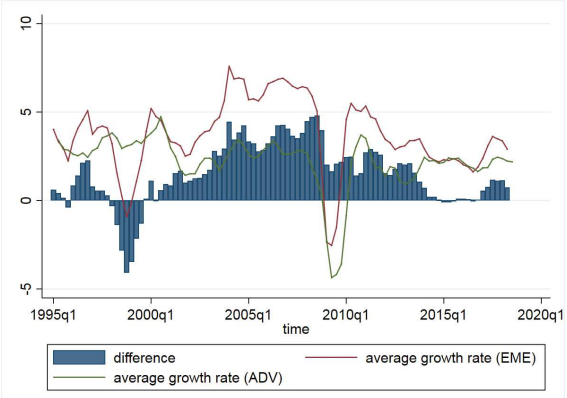
(a) US financial variables



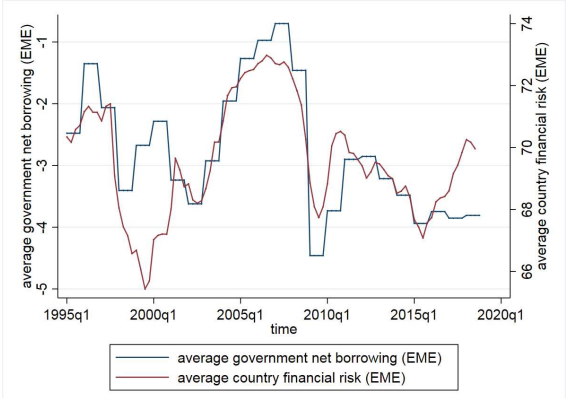
(b) Risk appetite



(c) GDP growth rates



(d) Other pull factors



Description and sources of the variables are reported in Table 2

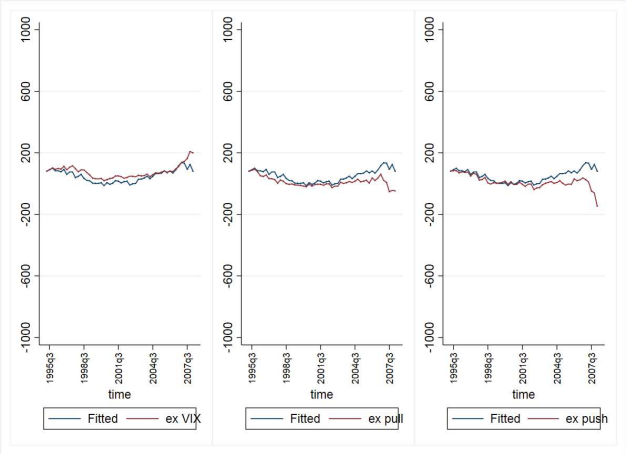
Figure 5: Summary of results

Explanatory variables	Dependent variable		
	PFI Debt		
	Before GFC	Btw GFC and TT	After TT
VIX	-	--	---
Adj. Federal Fund rate			
Leverage	+	+	+
Real GDP growth rate			
Gov. net borrowing	-	-	--
	PFI Equity		
	Before GFC	Btw GFC and TT	After TT
VIX	-	-	-
Adj. Federal Fund rate			
Leverage	-	+	-
Real GDP growth rate			
Gov. net borrowing			-
	OI		
	Before GFC	Btw GFC and TT	After TT
VIX			
Adj. Federal Fund rate			-
Leverage	+	+	+
Real GDP growth rate	+	++	+
Gov. net borrowing			-

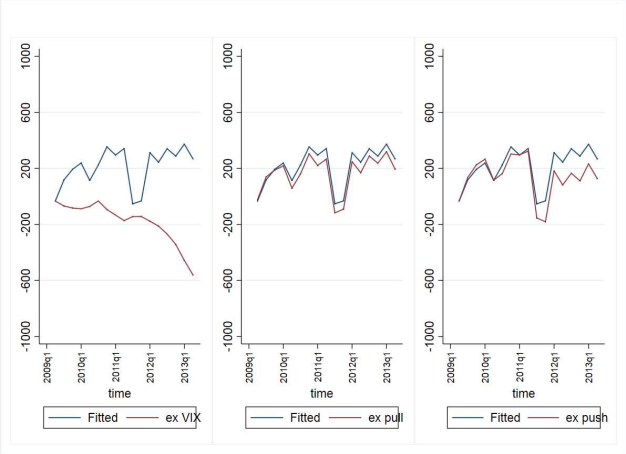
The figure graphically reports the results from the analysis with the interaction terms for all dependent variables (table 6). Colors and their shades indicate sign (also reported) and significance of the coefficients. In particular red stays for negative correlation, while green for positive; gray indicates no significance. Darker colors indicate higher magnitude of the coefficient.

Figure 6: Fitted versus counter-factual analysis for PFI Debt flows

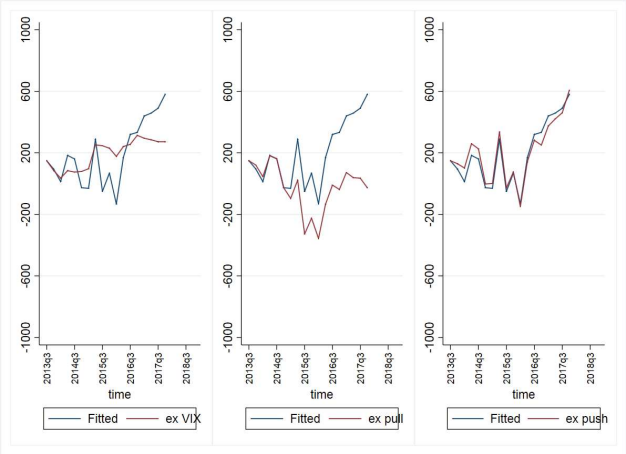
(a) before the GFC



(b) between the GFC and the TT



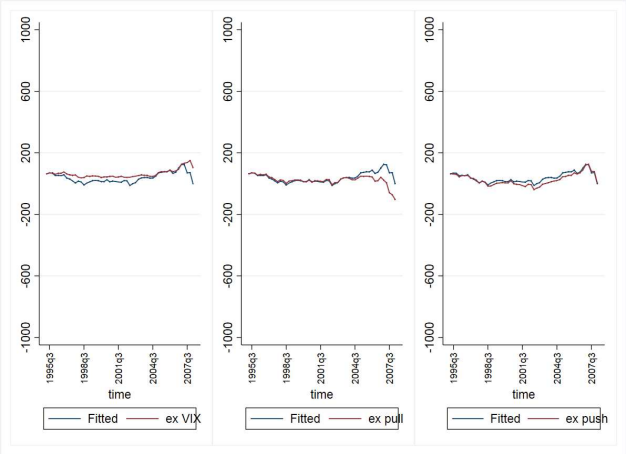
(c) after the TT



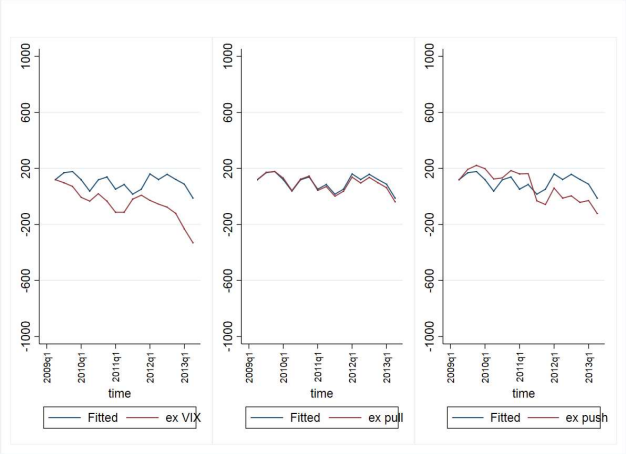
PFI debt, relative contribution from determinants. The fitted values and counterfactuals are based on regression 1 estimated for the periods 1995Q1-2008Q1 (panel a); 2009Q2-2013Q2 (panel b); 2013Q3-2017Q4 (panel c). The counterfactuals are the fitted values obtained under the assumption that the VIX (in the first graphs on the left), the group of the pull variables (in the graphs at the center) and the other push variables (in the graphs on the right) are kept constant at their initial values for each interval.

Figure 7: Fitted versus counter-factual analysis for PFI Equity flows

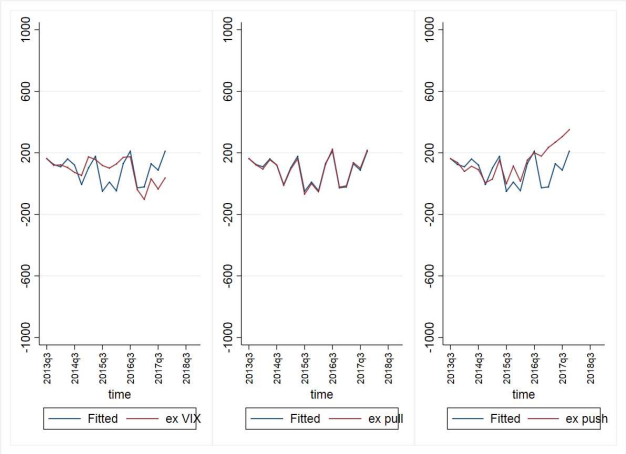
(a) before the GFC



(b) between the GFC and the TT



(c) after the TT

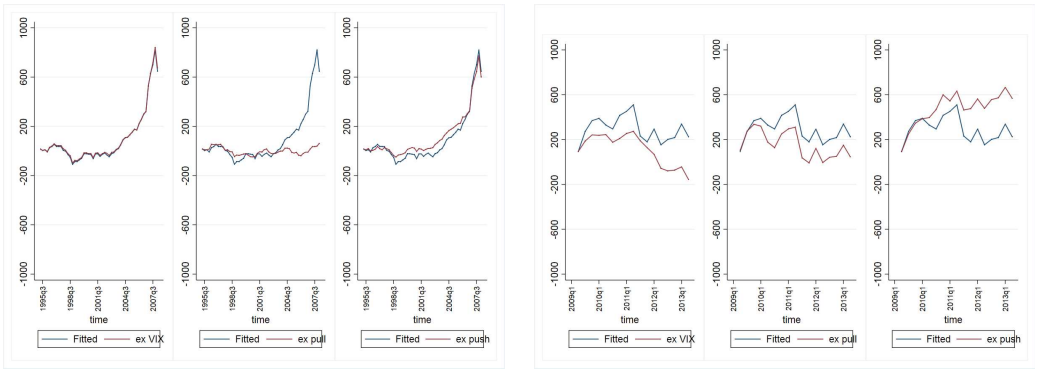


PFI equity, relative contribution from determinants. The fitted values and counterfactuals are based on regression 1 estimated for the periods 1995Q1-2008Q1 (panel a); 2009Q2-2013Q2 (panel b); 2013Q3-2017Q4 (panel c). The counterfactuals are the fitted values obtained under the assumption that the VIX (in the first graphs on the left), the group of the pull variables (in the graphs at the center) and the other push variables (in the graphs on the right) are kept constant at their initial values for each interval.

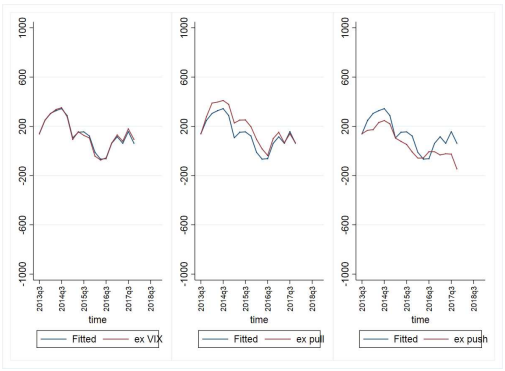
Figure 8: Fitted versus counter-factual analysis for Other flows

(a) before the GFC

(b) between the GFC and the TT



(c) after the TT

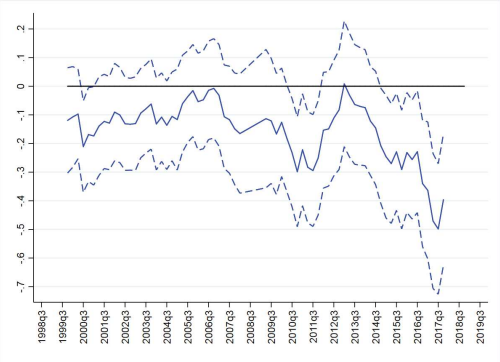


OI, relative contribution from determinants. The fitted values and counterfactuals are based on regression 1 estimated for the periods 1995Q1-2008Q1 (panel a); 2009Q2-2013Q2 (panel b); 2013Q3-2017Q4 (panel c). The counterfactuals are the fitted values obtained under the assumption that the VIX (in the first graphs on the left), the group of the pull variables (in the graphs at the center) and the other push variables (in the graphs on the right) are kept constant at their initial values for each interval.

Figure 9: Rolling windows analysis, n=20

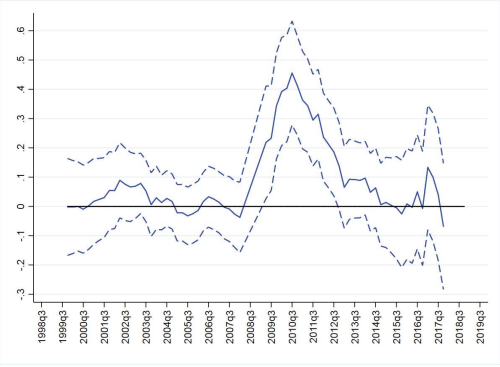
(a) VIX for PFI debt

(b) gov. net borrowing for PFI debt



(c) VIX for PFI equity

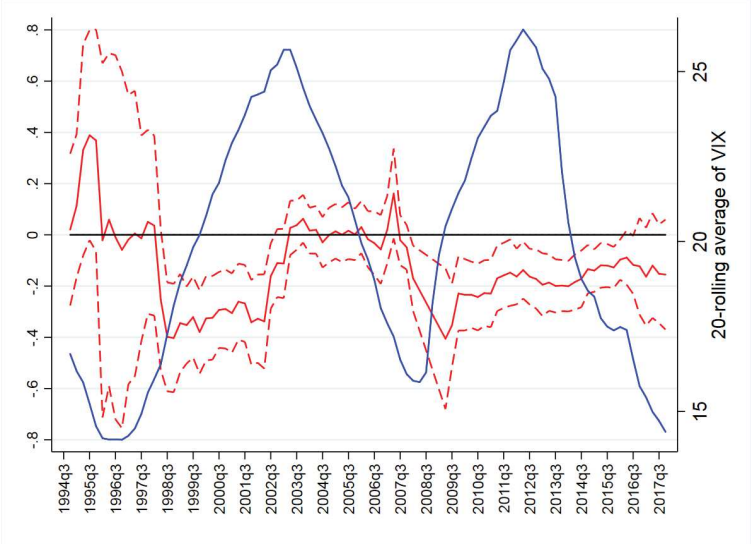
(d) country GDP growth for Other flows



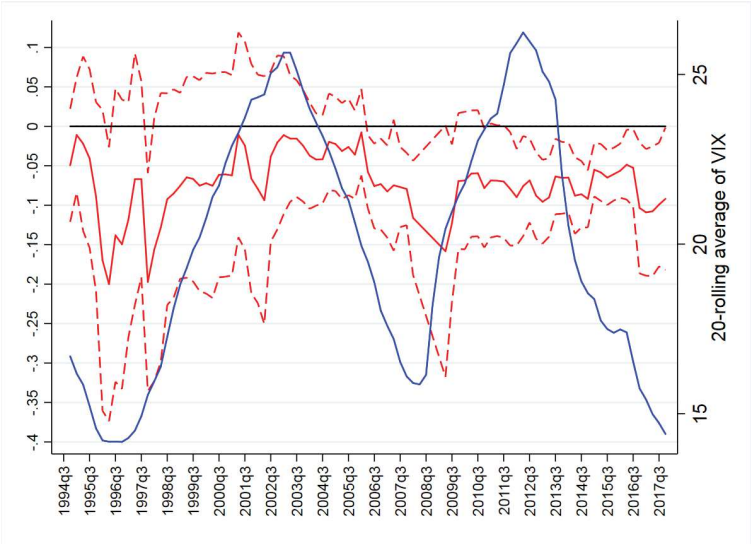
Coefficients from rolling windows version of regression 1 with 20 quarters windows.

Figure 10: Robustness 3. Coefficient of VIX for PFI debt and equity for a subset of countries starting from 1990: rolling windows (n=20)

(a) VIX for PFI debt



(b) VIX for PFI equity



Results from regression 1 performed with rolling 20-windows plotted against rolling 20-window average of VIX (VIX_{RW}, on dx axis). Sample: subset for which main data are available from 90. For each date both the regression coefficient and the VIX refer to the rolling window ending at that date.

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