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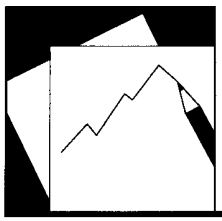

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Gross Private Capital Flows to Emerging Markets: Can the Global Financial Cycle Be Tamed?

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Gross Private Capital Flows to Emerging Markets: Can the Global Financial Cycle be Tamed?

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Abstract

This paper assesses empirically the key drivers of private capital flows to a large sample of emerging market economies in the last decade. It analyzes the effect of the global financial cycle, measured by the VIX, on capital flows and investigates the role of fundamentals and country characteristics in mitigating or amplifying its effect. Using interaction models, we find the effect of the VIX to be non-linear. For low levels of the VIX, capital flows are driven by fundamental factors. During periods of stress, the VIX becomes the dominant driver of capital flows while other determinants, with the exception of interest rate differentials, lose statistical significance. Our results also suggest that the effect of global financial conditions on gross private capital flows increases with the host country's level of financial sector development. Finally, our results imply that countries cannot fully insulate themselves from global financial shocks, unless creating a fragmented global financial system.

JEL Classification Numbers: F32, F38, G11

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I. INTRODUCTION

The global financial crisis and its aftermath have prompted a reconsideration of cross-border capital flows and the policies that affect them. The crisis has vividly demonstrated the extent to which cross-border capital flows tie economies together, and create interlinked financial systems. This has renewed the debate—both among policy makers and academics—on the drivers of capital flows and the appropriate policy responses.

Capital flows can raise policy challenges especially for emerging market economies. For these economies, both gross and net capital flows can be large compared to the size of their domestic markets. As a result, they can lead to substantial increases in leverage and sharp appreciation of the real exchange rate, both of which are found to be significant predictors of financial crises (Gourinchas and Obstfeld, 2012). Moreover, capital flows may complicate macroeconomic management, and come to undermine monetary policy independence, potentially even when exchange rates are flexible (Rey, 2013; Farhi and Werning, 2013).[2] In particular, large and volatile capital flows can create a tension between macroeconomic stabilization and financial stability.

For example, in small open economies, the prospect of large capital inflows could dissuade central banks from increasing interest rates, even if warranted by high inflation, owing to concerns about stoking further capital inflows, currency appreciation, and risk-taking behavior. In the face of capital outflows, this can play in reverse (IMF, 2013). Central banks may keep policy rates high or even hike rates despite a slowdown in growth in order to defend the currency and stop capital from flowing out. Such a policy has come to be known as the "interest rate defense" that has historically been adopted by emerging market central banks that are in "fear of floating" (Federico, Vegh, and Vuletin, 2012).

The empirical literature has traditionally grouped the determinants of capital flows into "push" and "pull" factors.[3] The push factors refer to determinants specific to source countries and the pull factors to those of recipient countries. More recently, the literature has begun to explore the role of global financial cycles in driving capital flows. Such cycles are characterized by common movements in gross capital flows, leverage, and asset prices across countries. It appears that the global financial cycle co-moves with the VIX, a measure of risk aversion and uncertainty (Miranda-Agrippino and Rey, 2012 and Rey, 2013). In turn, the VIX is found to be influenced by the monetary policy stance in the United States (U.S.), with an easing of U.S. monetary policy being associated with a lower VIX (Bekaert et al., 2012 and Rey, 2013). The intuition is that more accommodative U.S. monetary policy decreases market volatility, which

[2] It used to be thought that a flexible exchange rate regime allowed monetary policy independence, as opposed to a fixed exchange rate regime which, with an open capital account, imposed a constraint on monetary policy. These views are generally described as the impossible trinity or trilemma.

[3] See for instance Calvo, Leiderman, and Reinhart (1993 and 1996).

in turn affects financial variables, including investor leverage and capital flows into emerging markets (Adrian and Shin, 2010 and 2012; Bruno and Shin, 2012 and 2013).

A recent and related group of studies has analyzed the factors influencing the effect of global shocks on asset returns (Eichengreen and Gupta, 2014; IMF, 2014; Brandao-Marques, Gelos, and Melgar, 2013). For example, Eichengreen and Gupta, using data for the period April-August 2013, find that countries with larger markets experienced more pressure on the exchange rate and equity prices when talk turned to the U.S. Federal Reserve's tapering. Other studies find that domestic market liquidity can counter the effect of global shocks on asset returns.

Our study differs from the latter group of studies since we are examining the impact on gross private capital flows (quantities), rather than on exchange rates or asset returns (prices). We contribute to the literature on capital flows by not just investigating the determinants of gross private capital flows but also the interactions between changes in global financial conditions, as measured by the VIX, and other 'standard' determinants of capital flows in shaping the dynamics of cross-border flows.

The paper uses panel data techniques for a large sample of emerging market economies (and non-G4 advanced economies) using quarterly data for the period 2002–12. Using interaction models, the paper analyzes the effect of changes in the VIX on capital flows and investigates how recipient countries' characteristics mitigate or amplify its effect. In particular, the paper investigates whether the "interest rate defense" has been effective in stemming outflows and examines the extent to which the effects of global shocks have been tamed by capital controls.

A number of our results confirm the findings of the existing literature on capital flows. In line with recent empirical studies, we find that growth differentials with G4 countries and global financial conditions are key determinants of private capital flows into emerging market economies. Our results also suggest that interest rate differentials are an important determinant of capital flows, especially in recent years. A few other variables are found to affect private capital flows; capital flows are found to be larger in countries with higher levels of financial development and smaller in countries with higher sovereign risk.

In addition, our empirical analysis offers the following new insights that go beyond the results established in the existing related literature on the drivers of capital flows:

- The effect of the VIX on capital flows is conditional on the level of the VIX. When the VIX is high, changes in the VIX have a large marginal effect on capital flows. Conversely, when the VIX is low changes in the VIX do not have statistically significant effects on capital flows. This raises questions about the assumption of a linear effect that underpins most of the existing literature on capital flows.

- When the VIX is low, country-specific determinants are important drivers of capital flows. In normal times, countries with strong fundamentals (e.g., high growth

differential and low government debt) and high financial market development attract more capital flows.

- When the VIX is high, it becomes the main driver of capital flows to emerging markets and most of the other fundamental determinants (e.g., growth differentials and government debt) lose statistical significance. Interest rate differentials are the exception here though, as they seem to matter more during periods of stress.

- Financial development amplifies the effect of the VIX. For low levels of financial development the effect of the VIX is not statistically significant. It becomes significantly negative for high levels of financial development. Given the relatively low level of financial development in many emerging markets, it is reasonable to expect a continuing financial deepening in those countries. Therefore, as financial sectors develop the effect of global financial cycle is expected to increase.

- The effect of the VIX increases with the degree of capital mobility. That is, the effect of the VIX is larger in countries that have fully liberalized capital flows, and it decreases with the level of capital account restrictions. However, the VIX ceases to be a significant driver of capital flows only in countries that have a largely closed capital account. These results suggest that targeted temporary capital controls may not be effective in insulating countries from global financial cycles.

- High interest rate differentials seem to mitigate the effect of global financial cycles. The effect of the VIX decreases with an increase in the interest rate differential. The effect of the VIX becomes insignificant for very high levels of interest rate differentials.

The remainder of the paper is structured as follows. In Section II we describe our empirical strategy and data. Section III presents the main results. Section IV investigates additional questions: Has the relative importance of the determinants of flows changed since the global financial crisis? Are they different for different types of flows? Are the determinants of flows different for emerging markets when compared to advanced economies? Section V provides additional robustness checks. The last section concludes and provides some policy recommendations.

II. Methodology and Data

A. Empirical Strategy

Baseline model

To analyze the determinants of capital flows we use various panel data specifications. The baseline specification is:

$$CF_{it} = \alpha + \sum_{j=1}^{n} \beta_j X^j_{it-1} + \delta VIX_t + \mu_i + \nu_{it} \quad (1)$$

CF represents gross inflows, or their subcomponents, expressed as percentage of GDP. The subscript *i* denotes the i*th* country, the subscript *t* denotes the t'*th* quarter, v is the error term, and α, β_j and δ are parameters to be estimated. The VIX is a measure of investor risk aversion and X^j are country specific determinants of capital flows, as follows:

- **Growth differential**

We use the difference between the real GDP growth in country '*i*' and the weighted average GDP growth in the G4 countries (U.S., United Kingdom (U.K.), euro area, and Japan) to capture differences in growth prospects and long-term return differentials. The existing literature points to differences in growth prospects across countries as an important factor driving capital flows (IMF, 2013 and Ahmed and Zlate, 2013). Figure 1 (top) shows a strong unconditional correlation between capital inflows and growth differentials.

- **Interest rate differential**

We include the differential between domestic and foreign interest rates to capture short-term return differentials. This differential is determined by monetary policy action in both the G4 countries and emerging market economies and may affect the relative attractiveness of domestic versus foreign assets and, thus, capital flows. For instance, when G4 countries ease monetary policy, their interest rates will decline, prompting investors to rebalance their portfolios toward higher-yielding assets, resulting in capital flows into emerging markets (Powell, 2013).[4] By the same token, higher interest rates in emerging markets can attract capital inflows. Indeed, empirically, in the post-crisis period, the policy rate differentials reflect mainly changes in policy rates in emerging market countries. Figure 1 (middle) shows that the unconditional correlation between interest rate differentials and capital inflows is weak, suggesting the need to control for other factors. In particular, interest rate differentials were on a downward trend from 2002 to the onset of the global financial crisis, while capital flows to emerging markets were on an upward trend.

- **Real effective exchange rate**

Following Bruno and Shin (2013), we use the percentage change of the real effective exchange rate (REER) as a regressor in the capital flows equation. The rationale for including this variable is that a real appreciation strengthens borrower balance sheets, increasing their capacity to repay out of local income. This can in turn affect providers of funds through an international risk-taking channel. In the model presented in Bruno and Shin (2013), when the local currency

[4] Monetary policy also affects domestic demand, and the resulting indirect impact on capital flows through growth differentials may partially offset the direct effect.

appreciates and borrowers' balance sheets become stronger, the credit risk on local banks' loan book falls and the access to and reliance on foreign capital flows increase. There is a potential reverse causality, here though, since capital inflows would mechanically lead to appreciation. Therefore, as in Bruno and Shin (2013), the lag of the percentage change of REER is used in regressions.

- **Market capitalization**

We use the market capitalization of a country's stock market, in percent of GDP, as a proxy for financial market development.[5] The hypothesis to test is whether gross private capital flows are larger in countries with higher levels of financial development.

- **Public debt**

Government debt in percent of GDP is used to proxy for sovereign risk. It is well established that changes in government debt are an important driver of sovereign debt credit ratings (Afonso, Gomes, and Rother, 2011), and that sovereign risk in turn affects capital flows.[6] In particular, countries tend to lose access to private capital markets when the projected path of government debt to GDP is perceived as unsustainable and investors must fear the government will default on its debt. In contrast, countries with sustainable debt levels and high ratings tend to have continuous access to capital, even during recessions and crisis periods.

- **Capital flows restrictiveness index**

The impact of capital account restrictions on capital flows is assessed through an index capturing the level of restrictiveness. Greater capital flows liberalization is expected to be associated with higher capital flows, especially gross flows (Saadi Sedik and Sun, 2012). We use a de jure measure of restrictiveness based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. The index is an average of binary indicators of restrictiveness in 62 categories of capital transactions. The categories include all capital transactions, foreign exchange and domestic currency accounts of residents and nonresidents, regulatory measures related to the financial sector and repatriation and surrender requirements. This restrictiveness index can have a value between zero and one, and higher values represent more restricted cross-border capital flows. The index is highly correlated with other available de jure indices. For example, the correlation with the Chinn-Ito (2008) index is 0.86.

[5] We also used credit to the private sector (as a percentage of GDP) as an alternative measure for financial development. Both measures produce similar results. Eichengreen and Gupta (2014) also found that alternative measures of financial development are highly correlated across emerging market economies and produce similar results.

[6] We do not use credit ratings as a risk measure because time series data are not available for all countries in the sample over the entire period.

- **The VIX**

In line with the existing literature we use the VIX as a measure of investor risk appetite. The VIX measures the implied volatility of Standard & Poor's (S&P) 500 index options and indicates the market's expectation of stock market volatility over the next 30 day period.[7] It is commonly treated as a simple proxy for risk appetite and is included in most composite risk-appetite indicators (Illing and Aaron, 2005). Moreover, as mentioned, the recent empirical literature finds a close relationship between investors' perception of risk and global financial conditions. In line with this, Figure 1 (bottom) shows a very strong inverse correlation between capital inflows and the VIX. While the VIX is available at a higher frequency we use the average of the VIX over the quarter, thereby capturing more persistent changes in market volatility. Following the related literature we use the log of the VIX in the regressions (for example, Bruno and Shin, 2013).

To guard against biases from simultaneity or reverse causality, we use lagged values of the regressors with two exceptions: the capital flows restrictiveness index (which is available only on a yearly basis) and the VIX (assumed to be exogenous).[8] Appendix Table 2 presents the definition and sources of variables used in the regressions.

We present both country fixed effects (FE) and random effects (RE) regression results. The advantage of FE estimation is that this takes full account of unobserved heterogeneity among countries that may otherwise bias the coefficients on the variables included in the regression.[9] RE estimation treats this heterogeneity as random, that is, as uncorrelated with the included variables, potentially resulting in bias. However, RE estimation allows for more efficient estimation of those variables that do not move much through time and whose variation arises mainly from cross-sectional differences across countries. This includes growth differentials between emerging and G4 countries that may arise from their long-term growth potentials being different. Where such differences are more or less constant over time, but differ from country to country, they would be absorbed in the fixed effects and diminish the estimated importance of the growth differential variable (Ahmed and Zlate, 2013).

Interaction model

To assess whether and how the effect of the global financial cycle on capital flows is conditional on a country's characteristics, we use an interaction model, summarized as below:

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[7] As an alternative we also used the Credit Suisse Global Risk Appetite Index (GRAI) as a proxy for risk perceptions. See Section V.

[8] This is plausible since VIX is derived from U.S. option prices and should therefore be determined mainly by conditions in the G4 countries, rather than those in emerging markets. However, we also checked that the results are broadly similar when the lag of VIX is used as regressor.

[9] For example, the fixed effect takes account of all time-invariant country specific factors, including geography, climate, ethno-linguistic characteristics, and unchanging political and legal systems.

$$CF_{it} = \alpha + \sum_{j=1}^{n-1} \beta_j X^j_{it-1} + \delta' VIX_t + \beta'_k S_{it-1} + \lambda\{VIX_t \times S_{it-1}\} + \mu_i + \nu_{it} \quad (2)$$

Here, S is one of the X^j variables, and δ', β'_k and λ are the new parameters to be estimated.

With an interaction model, the interpretation of the coefficients from standard regression outputs is not straightforward (Friedrich, 1982, and Brambor, Clark, and Golder, 2006). The coefficient λ indicates whether there is a change in the relationship between an interaction variable (S) and the dependent variable (CF) with a one-unit change in the other interaction variable (VIX).[10] In addition, the standard error on that coefficient can be used to test whether the change in the slope is statistically significant. However, it is important to recognize that the coefficients on the constitutive terms (both on S and on the VIX) are conditional marginal effects. The new coefficient β'_k on S only captures the coefficient of S when the VIX is zero. Similarly, the new coefficient δ' on the VIX only captures the effect of the VIX when S is zero. This can create a problem in interpretation when S or the VIX do not actually attain a value of zero. Therefore, the coefficients on the constituent terms need to be interpreted with care.

Moreover, the traditional regression tables report only the standard error for the particular case when the value of the constituent variable is zero. This means that the only inference that can be drawn from a test using this standard error is whether the VIX has a significant effect on CF for the unique case in which S is zero. In addition it is not possible to infer from the significance of the coefficient on the interaction term (λ), whether the VIX has a statistically significant effect conditional on a particular and relevant value of S. It is possible, for instance, for the marginal effect of the VIX on capital flows to be significant for substantively relevant values of the modifying variable S even if the coefficient on the interaction term is insignificant.[11]

Establishing a fuller interpretation requires computing the marginal effects of each variable (VIX and S) on CF and their standard errors as functions of the conditional variables (S and VIX respectively). The marginal effects are given by the partial derivatives:

$$\frac{\partial CF_{it}}{\partial VIX_t} = \delta' + \lambda S_{it-1} \quad (3)$$

$$\frac{\partial CF_{it}}{\partial S_{it-1}} = \beta'_k + \lambda VIX_t \quad (4)$$

Inspection of these equations clarifies that, unlike for an additive model, which assumes that the VIX (as well as S) has a constant effect on CF, the interaction model implies that the effect of a change in VIX (S) on capital flows depends on the value of the conditioning variable S (VIX).

[10] The coefficient is symmetric, that is, it also indicates whether there is a change in the relationship between VIX and CF with a one-unit change in S.

[11] This is mainly due to the fact the covariance between the two coefficients could be negative (see equations 5 and 6).

The new standard errors of interest are:

$$se(\delta' + \lambda S_{it-1}) = \left[\text{var}(\delta') + S_{it-1}^2 \text{ var}(\lambda) + 2S_{it-1} \text{cov}(\delta', \lambda) \right]^{1/2} \quad (5)$$

$$se(\beta_k' + \lambda VIX_t) = \left[\text{var}(\beta_k') + VIX_t^2 \text{ var}(\lambda) + 2VIX_t \text{ cov}(\beta', \lambda) \right]^{1/2} \quad (6)$$

These equations show that, again in contrast to the additive model, the standard error of the marginal coefficients vary according to the level of the conditioning variable. They also show that the traditional regression outputs $se(\delta')$ and $se(\beta_k')$ in an interactive model are the conditional standard errors when S and VIX are, respectively, equal to zero.

This means that a full interpretation of an interaction model requires further analysis. Since the conditioning variables (S) in our regression are continuous, simple figures can be used to succinctly illustrate the marginal effect of the VIX and the corresponding standard errors (or confidence intervals) across a substantively meaningful range of the modifying variable S.

B. Data

The baseline panel includes quarterly data for 29 emerging market economies over the period 2002Q1 to 2012Q4. In Section IV we extend the sample to 1995Q1 and add six non-G4 advanced economies and three financial centers to study further questions. We selected countries based on data availability and classified them as emerging or advanced using the World Economic Outlook (WEO) 1994 report. Table 1 lists the countries along with their International Financial Statistics (IFS) and region code for each group, including the G4 countries, which represent an important source of capital flows into the emerging economies in our sample.

This paper focuses on gross capital flows originating from private non-residents, that is, changes in a country's liabilities to private non-residents and excluding official flows. As explained in De Gregorio (2013), the size and composition of these gross private inflows are important factors for financial stability.[12] Net flows, that include capital flows originating from residents are constrained by a balance sheet identity to be close to a country's current account deficit and are thus a reflection mainly of macroeconomic developments.[13]

[12] Gross flows are central to financial stability, since the form and volume that gross flows take have a direct impact on the vulnerability of the financial system. For instance, it has long been argued that foreign direct investment flows are more stable, while banking flows are more likely to be subject to sharp reversals (De Gregorio, 2013).The importance of gross inflows, and the need to distinguish them from net flows has also been emphasized by, for example, Ghosh and others (2012), Forbes and Wardock (2012) and Broner, Erce, and Schmukler (2013).

[13] Since net capital inflows are the counterpart of current account deficits, excessive net inflows may be an indication that the economy is running an unsustainable current account deficit. Gross inflows, by contrast are the response to portfolio allocation and reflect financial investment decisions. We do not attempt to model both gross

(continued…)

We exclude foreign direct investment (FDI) flows and focus on portfolio and other (mainly bank-related) bank flows, as these are more sensitive to time-varying factors, while FDIs are likely to be driven by other factors (e.g., tax incentives, Razin and Sadka, 2007) and are overall less likely to respond rapidly to changing financial conditions.

Data for capital flows—our dependent variable—are taken from the IMF's Balance of Payments Database (IFS). Table 2 describes all the explanatory variables used and indicates the sources. In order to take into account the relative returns with the G4 source countries (euro area, Japan, U.K., and U.S.), we use the differentials (EM-G4) for real GDP growth (RGDPD) and short-term interest rates (SIRD). The G4 aggregate variables are weighted by GDP. The summary statistics for each region studied are presented in Table 3.[14] Capital inflows have been much larger for advanced economies than for emerging market economies even though GDP growth has been lower on average. Also, emerging market economies can be seen to have adopted more capital controls than advanced economies in the period under consideration.

III. Regression Results

A. Baseline Regressions

We first present evidence for the baseline (additive) model using our core sample of 29 emerging markets over the period 2002Q1 to 2012Q4 (Table 4). The results indicate that gross private capital flows into emerging markets are strongly driven by growth differentials with G4 countries. Consistent with the recent literature, we also find that the VIX is a very important determinant of gross private capital flows. Indeed it is statistically significant at the one percent level in all regressions we run. Interest rate differentials emerge as a further important driver of capital flows, once other factors are controlled for.

A number of other variables are found to affect the direction of gross private capital flows. Gross private capital flows are weaker for countries at greater risk of default (as measured by government debt levels relative to GDP). Consistent with the finding by Bruno and Shin (2013), a higher real effective exchange rate is associated with higher gross inflows. Finally, we find that countries with less open capital accounts seem to receive less capital inflows, while countries at a greater level of financial development (measured by stock market capitalization) appear to receive more inflows, even if the effects on these two variables are not statistically significant in the baseline model.

The effects of key variables of interest are also economically significant. A one percentage point increase in real GDP growth differentials is associated with additional capital inflows ranging

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and net flows in this paper, since the determinants of resident outflows and hence net flows are likely to be quite different from those of gross inflows. See Ghosh and others (2012).

[14] Panel unit root tests for the variables used in our empirical models suggest that all series are stationary. In particular, we performed Im-Pesaran-Shin tests and Fisher-type tests. The results are available upon requests.

from 0.5 to 0.6 percent of GDP, depending on the specification.[15] The unconditional effect (direct and indirect) of growth differentials is even higher. The coefficient based on a regression that does not control for other variables, which includes only growth differentials and a constant, is close to one. A one percentage point increase in the interest rate differential, when statistically significant, is associated with additional inflows ranging from 0.10 to 0.13 percent of GDP.

B. Baseline Regressions with Non-linear Effects of the VIX

The results of the non-linear model that investigates how changes in global financial cycle interact with key countries' characteristics to attract gross private capital flows are reported in Table 5. Several findings are noteworthy:

The first is that the effect of the VIX on capital flows depends on the level of the VIX. The coefficient of the interaction variable is negative and statistically significant (Table 5, equation 6). This means that strength of the (negative) effect of the VIX on capital flows increases for higher levels of the VIX. As can be seen from Figure 2a, for very low levels of the VIX, the effect of the VIX on capital flows becomes insignificant. That is, for very low levels of the VIX marginal changes in the VIX do not affect the level of gross private capital flows into emerging markets. However, the effect of the VIX, in absolute terms, increases with the level of the VIX, so that for very high levels of the VIX, marginal changes in the VIX become key driver of these flows.

A second key finding is that the effect of the growth differential on gross private capital flows is conditional on the level of the VIX. The coefficient of the interaction term is negative and statistically significant (Table 5, equation 1). That is, as the VIX increases, the effect of growth differentials on capital flows diminishes. As can be seen from Figure 2b (right), when the VIX is very high, growth differentials no longer have a statistically significant effect on capital flows into emerging markets.

A third finding is that the interest rate differential is a stronger determinant of capital flows when the VIX is high. The coefficient of the interaction term is positive and statistically significant (Table 5, equation 2). This means that for high levels of the VIX the effect of interest rate differentials on capital flows increases (Figure 2c, right). In other words, during periods of financial stress, such as during the global financial crisis, those countries that are able to maintain high interest rate differentials attract relatively more capital inflows. It also suggests that a high interest rate differential may mitigate the (negative) effect of the VIX on capital flows. Indeed, Figure 2c (left) shows that the marginal effect of the VIX becomes insignificant for very high level of interest rate differentials.

[15] These results are broadly consistent with those of Ahmed and Zlate (2013).

We also examine the extent to which some of our other regressors condition the effect of the VIX on gross private capital flows (i.e., market capitalization, government debt, and restrictiveness).

We find that financial development—measured by market capitalization as a percentage of GDP—amplifies the effect of the VIX. The coefficient of the interaction term between the VIX and financial development is negative and significant (Table 5, equation 3). Figure 2d (left) suggests that for very low levels of financial development the effect of the VIX is insignificant, and that it becomes significantly negative for higher levels of financial development. These results are consistent with those of Eichengreen and Gupta (2014). Using data for exchange rates, foreign reserves and equity prices between April and August 2013, they found that countries with more developed markets experienced more pressure on the exchange rate, reserves and stock markets when talk turned to the U.S. Federal Reserve's tapering. This may indicate that it is easier to rebalance portfolios by withdrawing from relatively liquid markets. Moreover, Figure 2d (right) suggests that when the VIX is low the effect of market capitalization is positive and statistically significant, while for higher levels of the VIX the effect of market capitalization on capital flows becomes statistically insignificant.

The effect of government debt on gross private capital flows is conditional on the level of the VIX. The coefficient of the interaction term is positive and statistical significant (Table 5, equation 4). This suggests that when the VIX is high, the effect of low government debt in attracting capital inflows is diminished. For a sizable range of values of the VIX, the level of government debt is not significant in driving the direction of capital flows (Figure 2e, right). This suggests that investors do not discriminate between countries based on this information when market volatility is high.

The effect of capital account restrictions is also conditional on the VIX. The coefficient of the interaction term is positive and statistically significant (Table 5, equation 5). This suggests that the effect of VIX is bigger for countries that have fully liberalized capital flows and the effect decreases with the level of restrictions. However, as evident from Figure 2f (left) the effect of the VIX becomes not statistically significant only for countries that are largely closed, with long standing capital flow restrictions. This would suggest that targeted temporary measures may not be effective in taming the effect of global financial conditions.[16]

[16] We acknowledge that our measure of capital account restrictions is annual and therefore cannot capture the effects of temporary changes in capital flow management measures. However, the results are broadly consistent with evidence that examines such temporary changes. For instance, using weekly changes in capital controls from 2009 to 2011 for 60 countries, the study by Forbes, Fratscher, and Straub (2013) found that most incremental capital flow measures do not significantly affect capital flows, exchange rates or interest-differentials. Their results are consistent also with those by Klein and Shambaugh (2013), who found that in countries with fixed exchange rates, capital controls provide monetary autonomy when they are widely applied and long lasting, but not when they are temporary and narrowly targeted.

Overall, we find that when the VIX is low, marginal changes in the VIX do not have strong effects on gross private capital flows into emerging markets, and "fundamental" determinants, such as growth differentials, the level of government debt and market capitalization are the main drivers of capital flows. However, when the VIX is very high, as it was during the global financial crisis, it becomes the main driver of capital flows into those economies while the other determinants become less important. We interpret this result as suggesting that global investors shorten their investment horizon in times of global financial stress and, as a consequence, attach less weight to growth performance and other fundamentals in making their choices. For interest differentials the interaction with the VIX is different, however. In quiet times, when the VIX is low, short-term interest rate differentials do not seem to have a material effect on capital flows into emerging markets. However, we find that the effect of interest rate differentials gains importance when the VIX is high, again consistent with a shortening of investment horizons in such periods.

IV. Other Key Questions

A. Has the Relative Importance of the Determinants of Flows Changed since the Crisis?

We estimate the same baseline regressions for two sub-samples: before and after the global crisis. Following Ahmed and Zlate (2013) we date the start of the global crisis in 2008Q3 after Lehman Brothers declared bankruptcy. Table 6 presents the results. The table shows that the size of the VIX coefficient is much larger in the post-crisis period. This is consistent with our results from the interaction model: the effect of the VIX is higher for high level of the VIX. The results also suggest that the importance of growth differentials is largely unchanged, although the coefficient on growth differentials is somewhat lower for the second period. Moreover, since the crisis, public debt levels seem to matter less, suggesting that investors are less concerned about high government debt levels.[17]

B. Do Banking Flows Differ from Portfolio Flows?

We estimate all the regressions using *other inflows* (which capture mainly bank related inflows) instead of capital flows excluding FDI as dependent variable. The results are broadly similar to those for capital inflows excluding FDI. Two results are worth highlighting. First, the estimated coefficient on the VIX is lower when banking flows is the dependent variable. This does not mean, however, that the VIX has a lower effect on banking flows. Banking flows represent about two-thirds of capital flows excluding FDI. It is therefore expected that the coefficient on the VIX should be correspondingly lower. Second, bank related flows seem to be more sensitive to interest rate differentials. The coefficient on the interest differential is similar to the one for

[17] We also extended the sample to include observations from 1995Q1 onward. The results are broadly similar overall. However, interest rate differentials become statistically not significant in the baseline regression, suggesting again that capital flows have become more sensitive to interest rate differentials over the more recent past.

capital flows excluding only FDI, suggesting that the bulk of the effect of interest rate differentials originates from variation in bank related flows. This is consistent with the notion that banks are intermediaries who arbitrage differences in interest rates across countries. In particular, the financing cost of global banks tends to be closely tied to the policy rates chosen by the G4 central banks; and their investments can then exploit differentials between these funding costs and short-term interest rates prevailing in emerging markets (Bruno and Shin, 2013). We also estimated the interaction regressions (VIX with other determinants) as in the previous section. The results were broadly similar.[18]

C. Are Emerging Markets Different from Advanced Economies?

To shed light on this question we estimated the baseline regressions using a sample that included both emerging and non-G4 advanced economies (Table 8). We found that the results were broadly similar to those reported in Tables 4–7, with two main differences. The first is that the effect of financial development is stronger for the sample that includes the group of advanced countries. This supports the hypothesis that as countries develop financially, they become more globally integrated, thereby attracting more flows from abroad into the country. The second difference is that the coefficient of the VIX is larger for non-G4 advanced countries. Indeed, we find that the difference between the two coefficients is statistically significant. This result is interesting. While most of the attention has focused on the effects of capital flows on emerging markets, the effect of the global financial cycle appears to be larger for the non-G4 advanced economies in our sample.

Finally, we estimated the same set of regressions for a sample that includes also financial centers (Table 9). In this augmented sample the effects of both financial development and the VIX were even larger. This result is striking and consistent with the earlier interaction results. It suggests that as financial development progresses, the global financial cycle becomes a more important driver of gross capital flows.[19]

V. Robustness Checks

We conducted a number of further tests to check the robustness of our key conclusions.

First, we examined whether an alternative proxy for global risk appetite yields different results. As an alternative measure to the VIX we utilized as regressor the GRAI produced by Credit Suisse. Although the two measures have slightly different economic interpretations, we find that they are highly correlated (-72 percent). A baseline regression shows that higher risk aversion

[18] In addition, we estimated the regression using as dependent variable total private capital flows, including FDIs. The results were broadly similar to the results when excluding FDI. The main exception is that the coefficient on growth differentials is higher.

[19] We also estimated all the interaction regressions on the broader samples (including advanced economies and financial centers). The results are qualitatively similar to those run on the sample that includes only emerging market countries.

measured by GRAI reduces capital inflows to non-G4 countries. Moreover, we also find that this effect is non-linear. As risk aversion increases, the marginal effect of a change in risk aversion on capital inflows increases (Table 10).[20]

Second, we checked whether the results on interactions between risk aversion and market developments hold when we use a different measure of financial market development. In particular, instead of stock market capitalization as a percent of GDP we use private credit as a percent of GDP (CREDIT) as a measure of financial deepening. Again we find the correlation between these two alternative measures to be high (above 45 percent for the full sample of countries). The interaction between the VIX and financial development using CREDIT is also very similar to interaction effect with market capitalization: the effect of the VIX on capital flows is larger for countries with high CREDIT (Table 10).

VI. CONCLUSION

Our results on the main drivers of gross private capital flows into emerging markets suggest that there is little policymakers can to do tame the effects of the global financial cycle on gross private capital inflow. We find that in "normal times" growth differentials with the G4 economies along with other "fundamental" determinants are important drivers of capital flows into emerging markets. In these periods of low market volatility, marginal changes in the VIX do not appear to influence much the strength of capital flows into emerging economies, and country-specific pull factors, rather than global push factors, are the driving force.

In contrast, when the VIX is high (that is, in periods of global financial stress) the VIX becomes the dominant driver of capital flows to emerging markets, leading to indiscriminate outflows as the importance of fundamental factors, including growth differentials and levels of public debt, diminishes. The intuition is that when investors are panicked, their horizon shortens and they no longer care about long-term growth potentials in making their investment choices.

Countries can keep interest rates high, or even raise interest rates to stop capital from flowing out, and our results suggest that this works to some extent. Indeed, short-term interest rate differentials matter more in crisis times, when investors' horizons are short, than they do in normal times, when long term growth prospects are more important in determining the direction of capital flows. The problem is that, while the interest rate defense appears to work to stem the outflow, it may also be damaging the domestic economy.

Can countries insulate themselves from the effects of global financial conditions through the adoption of temporary capital controls? Our results suggest that incremental measures do not materially affect the force of the VIX in driving capital flows. This is consistent with the notion that capital finds its way around these types of restrictions. Only in countries whose capital account is effectively closed do we find that the effect of the VIX is mitigated. This suggests

[20] Since the GRAI increases with risk appetite, and thus has the opposite interpretation as the VIV, we use the negative of the GRAI in the regression,

that countries cannot fully insulate themselves from global financial shocks, unless by collectively creating a fragmented global financial system.

Will these policy dilemmas improve or worsen with time? Our results suggest that financial development increases the potency of the VIX in driving capital flows. As emerging market countries continue to develop their financial sectors, capital flows could therefore be increasingly influenced by external factors. This risks further increasing tensions between macroeconomic stabilization and financial stability, and could undermine monetary policy independence.

What options do emerging markets have? Emerging markets should focus on increasing the resilience of their financial system to the ebb and flow of global financial conditions including through the adoption of macroprudential measures (IMF, 2013; Forbes, Fratzscher, and Straub, 2013). Other policy buffers may also help in increasing resilience. This can include ensuring adequate foreign exchange reserves cover as well as the creation of fiscal buffers that can help countries ride out the financial storms caused by large and volatile capital flows.

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Table 1. Sample of Countries

Emerging Markets (EM)			*Advanced Economies (AE)*			*Financial Centers (FC)*			*G4*		
IFS Code	Country	Region	IFS Code	Country	Region	IFS Code	Country	Region	IFS Code	Country	Region
213	Argentina	WHD	193	Australia	APD	532	Hong Kong	APD	111	United States	WHD
223	Brazil	WHD	156	Canada	WHD	576	Singapore	APD	112	United Kingdom	EUR
918	Bulgaria	EUR	128	Denmark	EUR	146	Switzerland	EUR	158	Japan	APD
228	Chile	WHD	196	New Zealand	APD					Euro Area	
924	China	APD	142	Norway	EUR				122	Austria	EUR
233	Colombia	WHD	144	Sweden	EUR				124	Belgium	EUR
960	Croatia	EUR							132	France	EUR
935	Czech Rep	EUR							134	Germany	EUR
944	Hungary	EUR							136	Italy	EUR
534	India	APD							137	Luxembourg	EUR
536	Indonesia	APD							138	Netherlands	EUR
436	Israel	EUR							172	Finland	EUR
439	Jordan	MCD							174	Greece	EUR
916	Kazakhstan	MCD							178	Ireland	EUR
542	Korea	APD							181	Malta	EUR
941	Latvia	EUR							182	Portugal	EUR
946	Lithuania	EUR							184	Spain	EUR
548	Malaysia	APD							423	Cyprus	EUR
273	Mexico	WHD							936	Slovak Rep	EUR
293	Peru	WHD							939	Estonia	EUR
566	Philippines	APD							961	Slovenia	EUR
964	Poland	EUR									
968	Romania	EUR									
922	Russia	EUR									
942	Serbia	EUR									
199	South Africa	AFR									
578	Thailand	APD									
186	Turkey	EUR									
926	Ukraine	EUR									

Source: WEO

Note: Countries were selected based on data availability. We used WEO 1994 publication to divide between emerging markets (EM) and advanced economies (AE).

Table 2. Variables

Variable Name	Unit	Description	Source(s)
Capital Flows			
Inflows	percent of GDP	Liabilities of Reporting Country	
FDI	percent of GDP	FDI Liabilities of Reporting Country	IFS
Portfolio	percent of GDP	Portfolio Equity and Debt Liabilities of Reporting Country	IFS
Other	percent of GDP	Bank and Other Liabilities of Reporting Country	IFS
RGDPD	percent	Real GDP per capita growth differential with G4	WEO
MCAP	percent of GDP	Stock Market Capitalization: proxies liquidity	Datastream
GDEBT	percent of GDP	General Government Debt	GCS
SIRD	percent	Short Term Interest Rate differential with G4	WEO, IFS
VIX	Logarithm	Log of S&P500 Implied Volatility Index	Haver
REER	percent	Real Effective Exchange Rate, q-q percent change	Haver
CAPCON	Index	Capital Transactions Restrictiveness Index	IMF

Sources: IFS, WEO, Datastream, GCS, Haver.

Note: G4 aggregates are weighted by GDP.

Table 3. Summary Statistics

Variables	Mean	SD	Min	Max	Obs.
Emerging Markets					
Capital Inflows	6.96	11.34	-67.63	99.34	*N* = 1082; *n* = 29
Inflows (excl. FDI)	2.96	7.88	-44.27	48.67	*N* = 1082; *n* = 29
Bank and Other Inflows	1.94	7.04	-45.00	48.97	*N* = 1076; *n* = 29
RGDPD	2.69	3.63	-16.03	18.62	*N* = 1082; *n* = 29
SIRD	4.97	5.56	-2.42	65.78	*N* = 1082; *n* = 29
MCAP	36.74	27.58	0.42	135.94	*N* = 1082; *n* = 29
GDEBT	37.21	22.04	1.44	141.32	*N* = 1082; *n* = 29
REER	0.35	4.18	-44.86	27.30	*N* = 1082; *n* = 29
CAPCON	0.43	0.26	0.02	0.95	*N* = 1082; *n* = 29
VIX	3.00	0.37	2.40	4.07	*N* = 1082; *n* = 29
Advanced Economies					
Capital Inflows	7.71	16.16	-52.31	65.02	*N = 264; n = 6*
Inflows (excl. FDI)	4.88	15.63	-50.27	55.76	*N = 264; n = 6*
Bank and Other Inflows	2.90	12.28	-37.88	41.28	*N = 264; n = 6*
RGDPD	0.26	1.50	-4.94	5.23	*N = 264; n = 6*
SIRD	1.82	1.66	-1.32	6.98	*N = 264; n = 6*
MCAP	65.76	26.39	18.12	121.00	*N = 264; n = 6*
GDEBT	40.64	22.20	10.49	79.56	*N = 264; n = 6*
REER	0.61	3.14	-18.58	10.95	*N = 264; n = 6*
CAPCON	0.12	0.07	0.03	0.25	*N = 264; n = 6*
VIX	3.00	0.37	2.40	4.07	*N = 264; n = 6*
Financial Centers					
Capital Inflows	33.68	60.00	-112.45	223.55	*N* = 120; *n* = 3
Inflows (excl. FDI)	16.89	56.90	-118.77	213.50	*N* = 120; *n* = 4
Bank and Other Inflows	18.04	52.49	-115.90	215.50	*N* = 120; *n* = 5
RGDPD	2.12	3.18	-5.38	14.83	*N* = 120; *n* = 3
SIRD	0.06	1.18	-2.11	3.14	*N* = 120; *n* = 3
MCAP	288.59	171.13	96.61	747.08	*N* = 120; *n* = 3
GDEBT	41.30	47.62	0.00	113.19	*N* = 120; *n* = 3
REER	-0.12	1.52	-3.67	4.46	*N* = 120; *n* = 3
CAPCON	0.11	0.06	0.04	0.23	*N* = 120; *n* = 3
VIX	3.00	0.37	2.40	4.07	*N* = 120; *n* = 3

Sources: IFS, WEO, Datastream, GCS, Haver.

Table 4. Baseline Regressions

Gross Inflows excl. FDI (as percent of GDP)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Only Emerging (EM)					*Only Emerging (EM)*			
		RANDOM EFFECTS					FIXED EFFECTS			
VARIABLES		2002Q1–2012Q4					2002Q1–2012Q4			
L.RGDPD	0.56***	0.56***	0.55***	0.47***	0.48***	0.59**	0.59***	0.58***	0.48***	0.48***
	(0.21)	(0.18)	(0.18)	(0.17)	(0.17)	(0.22)	(0.18)	(0.19)	(0.17)	(0.17)
L.SIRD	-0.01	0.07	0.07	0.11**	0.11**	-0.01	0.07	0.08	0.13*	0.12**
	(0.05)	(0.06)	(0.06)	(0.05)	(0.06)	(0.07)	(0.07)	(0.08)	(0.06)	(0.06)
L.REER			0.08*	0.08*	0.08*			0.08*	0.08*	0.08*
			(0.04)	(0.04)	(0.04)			(0.04)	(0.04)	(0.04)
L.MCAP				0.02	0.02				0.04	0.04
				(0.02)	(0.02)				(0.02)	(0.02)
L.GDEBT				-0.07**	-0.07**				-0.09	-0.09
				(0.04)	(0.04)				(0.06)	(0.06)
CAPCON					-2.15					-1.04
					(2.82)					(4.65)
VIX		-6.24***	-6.16***	-6.59***	-6.64***		-6.26***	-6.19***	-6.75***	-6.77***
		(0.98)	(0.98)	(1.02)	(1.06)		(0.96)	(0.96)	(1.05)	(1.07)
Constant	1.67***	20.10***	19.86***	22.98***	24.09***	1.42*	19.82***	19.58***	23.21***	23.78***
	(0.54)	(2.85)	(2.85)	(4.13)	(4.83)	(0.75)	(2.61)	(2.59)	(4.96)	(5.94)
R^2	0.0463	0.127	0.129	0.135	0.140	0.068	0.126	0.128	0.122	0.126
Observations	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088
N	29	29	29	29	29	29	29	29	29	29

Sources: IFS, WEO, Datastream, GCS, Haver.

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 5. Baseline Regressions with the VIX Interactions

Gross Inflows excl. FDI (as percent of GDP)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			Only Emerging (EM)						*Only Emerging (EM)*			
			RANDOM EFFECTS						FIXED EFFECTS			
VARIABLES			2002Q1–2012Q4						2002Q1–2012Q4			
L.RGDPD	2.27***	0.47***	0.50***	0.47***	0.47***	0.52***	2.16**	0.46***	0.50***	0.47***	0.46***	0.52***
	(0.88)	(0.17)	(0.17)	(0.16)	(0.16)	(0.17)	(0.81)	(0.16)	(0.17)	(0.16)	(0.16)	(0.17)
L.SIRD	0.11**	-0.90*	0.11*	0.09*	0.11**	0.11*	0.12**	-0.88*	0.12*	0.09*	0.12**	0.12**
	(0.05)	(0.48)	(0.06)	(0.04)	(0.05)	(0.06)	(0.05)	(0.49)	(0.06)	(0.05)	(0.06)	(0.06)
L.REER	-4.63***	-8.14***	-4.09**	-9.48***	-9.85***	24.95**	-4.93***	-8.23***	-4.17**	-9.63***	-9.85***	25.64**
	(1.13)	(1.45)	(1.98)	(2.03)	(2.29)	(11.76)	(1.21)	(1.44)	(2.00)	(1.97)	(2.21)	(11.61)
L.MCAP	0.10**	0.10**	0.08*	0.09**	0.08*	0.07	0.10**	0.10**	0.08*	0.09**	0.08*	0.07
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
L.GDEBT	0.02	0.02	0.23**	0.02	0.02	0.02	0.04	0.03	0.25**	0.04*	0.04	0.04
	(0.02)	(0.02)	(0.10)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.11)	(0.02)	(0.02)	(0.02)
CAPCON	-0.07**	-0.08**	-0.07*	-0.32**	-0.07**	-0.08**	-0.09*	-0.09	-0.09	-0.33**	-0.09	-0.09
	(0.03)	(0.04)	(0.04)	(0.13)	(0.04)	(0.04)	(0.05)	(0.06)	(0.06)	(0.13)	(0.06)	(0.06)
VIX	-2.15	-1.90	-2.06	-1.95	-24.10**	-1.77	-0.74	-0.77	-0.55	-0.68	-21.84*	0.16
	(2.62)	(2.74)	(2.90)	(2.74)	(12.13)	(2.92)	(4.57)	(4.47)	(4.65)	(4.44)	(11.44)	(4.83)
L.RGDPD*VIX	-0.57**						-0.54**					
	(0.24)						(0.23)					
L.SIRD*VIX		0.32**						0.31*				
		(0.16)						(0.16)				
L.MCAP*VIX			-0.07**						-0.07**			
			(0.03)						(0.03)			
L.GDEBT*VIX				0.08**						0.08*		
				(0.04)						(0.04)		
CAPCON*VIX					7.32**						7.06*	
					(3.68)						(3.54)	
VIX*VIX						-5.05***						-5.17**
						(1.91)						(1.89)
Constant	17.74***	28.94***	16.22**	32.61***	33.74***	-24.80	18.05***	28.70***	15.56*	32.19***	32.84***	-26.69
	(4.38)	(5.92)	(8.01)	(7.28)	(8.34)	(18.89)	(6.03)	(6.57)	(9.11)	(7.35)	(8.46)	(18.74)
R^2	0.155	0.146	0.146	0.147	0.150	0.151	0.137	0.132	0.130	0.131	0.192	0.200
Observations	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088
N	29	29	29	29	29	29	29	29	29	29	29	29

Sources: IFS, WEO, Datastream, GCS, Haver.

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 6. Baseline Regression: Before and After Crisis

Gross Inflows excl. FDI (as percent of GDP) VARIABLES	(1)	(2)	(5)	(6)
	Emerging Markets		*Emerging Markets*	
	RANDOM EFFECTS		FIXED EFFECTS	
	Pre-Crisis	*Since Crisis*	*Pre-Crisis*	*Since Crisis*
L.RGDPD	0.37*	0.12*	0.26	0.18**
	(0.20)	(0.06)	(0.17)	(0.08)
L.SIRD	0.04	0.25	0.03	0.32
	(0.05)	(0.17)	(0.06)	(0.33)
L.REER	0.02	0.19***	0.02	0.19***
	(0.03)	(0.06)	(0.03)	(0.07)
L.MCAP	0.05***	0.00	0.08***	0.02
	(0.02)	(0.01)	(0.02)	(0.02)
L.GDEBT	-0.04*	-0.01	0.01	-0.09
	(0.03)	(0.04)	(0.01)	(0.11)
CAPCON	-2.30	2.26	4.44	-12.83
	(3.59)	(1.88)	(4.40)	(14.06)
VIX	-2.91***	-7.61***	-2.62**	-8.24***
	(1.01)	(1.52)	(0.94)	(1.43)
Constant	12.43***	23.67***	5.81	33.76***
	(4.11)	(4.25)	(3.61)	(7.90)
R^2	0.154	0.142	0.08	0.15
Observations	580	508	580	508
N	26	29	26	29

Sources: IFS, WEO, Datastream, GCS, Haver.

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 7. Regressions with Bank and Other Flows as Dependent Variable

Bank and Other Flows (as percent of GDP)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Only Emerging (EM)					*Only Emerging (EM)*			
		RANDOM EFFECTS					FIXED EFFECTS			
VARIABLES		2002Q1–2012Q4					2002Q1–2012Q4			
L.RGDPD	0.59***	0.59***	0.58***	0.52***	0.53***	0.62***	0.62***	0.61***	0.53***	0.53***
	(0.20)	(0.19)	(0.19)	(0.17)	(0.17)	(0.20)	(0.19)	(0.19)	(0.17)	(0.17)
L.SIRD	0.05	0.08	0.08	0.11**	0.12**	0.05	0.09	0.09	0.13**	0.13**
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)	(0.06)	(0.05)
L.REER			0.04	0.04	0.04			0.04	0.04	0.05
			(0.03)	(0.03)	(0.03)			(0.03)	(0.03)	(0.03)
L.MCAP				0.03*	0.03*				0.05*	0.05*
				(0.02)	(0.02)				(0.03)	(0.03)
L.GDEBT				-0.05	-0.05				-0.06	-0.06
				(0.05)	(0.05)				(0.08)	(0.08)
CAPCON					-3.09					-0.33
					(2.73)					(4.47)
VIX		-2.57***	-2.53***	-2.87***	-2.95***		-2.58***	-2.54**	-2.98***	-2.99**
		(0.92)	(0.93)	(1.06)	(1.10)		(0.92)	(0.93)	(1.08)	(1.13)
Constant	0.24	7.83***	7.70***	9.63**	11.19**	0.01	7.58***	7.46***	9.24	9.42
	(0.49)	(2.60)	(2.62)	(4.68)	(5.47)	(0.70)	(2.40)	(2.41)	(5.73)	(7.05)
R^2	0.0603	0.0778	0.0785	0.0800	0.0967	0.0603	0.0774	0.0781	0.126	0.126
Observations	1,076	1,076	1,076	1,076	1,076	1,076	1,076	1,076	1,076	1,076
N	29	29	29	29	29	29	29	29	29	29

Sources: IFS, WEO, Datastream, GCS, Haver.

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8. Larger Sample Emerging and Advanced (Excluding Financial Centers)

Gross Inflows excl. FDI (as percent of GDP)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		EM and AE (excl. FC)					*EM and AE (excl. FC)*			
		RANDOM EFFECTS					FIXED EFFECTS			
VARIABLES		2002Q1–2012Q4					2002Q1–2012Q4			
L.RGDPD	0.49**	0.50***	0.49***	0.41**	0.43**	0.54**	0.56***	0.54***	0.43**	0.43**
	(0.22)	(0.18)	(0.18)	(0.17)	(0.18)	(0.22)	(0.18)	(0.18)	(0.17)	(0.17)
L.SIRD	-0.06	0.05	0.05	0.10*	0.11*	-0.05	0.06	0.07	0.12*	0.12*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)	(0.07)	(0.08)	(0.06)	(0.06)
L.REER			0.10**	0.11**	0.11**			0.10**	0.11**	0.11**
			(0.05)	(0.05)	(0.05)			(0.05)	(0.05)	(0.05)
L.MCAP				0.03**	0.03**				0.05*	0.05*
				(0.01)	(0.01)				(0.03)	(0.03)
L.GDEBT				-0.08**	-0.08**				-0.09	-0.09
				(0.03)	(0.03)				(0.06)	(0.06)
CAPCON					-3.31					-1.47
					(2.69)					(4.56)
VIX		-7.34***	-7.23***	-7.62***	-7.70***		-7.38***	-7.27***	-7.75***	-7.77***
		(1.18)	(1.18)	(1.23)	(1.24)		(1.17)	(1.16)	(1.21)	(1.24)
Constant	2.60***	24.22***	23.88***	26.47***	28.05***	2.37***	23.97***	23.66***	26.14***	26.85***
	(0.82)	(3.51)	(3.48)	(4.50)	(4.98)	(0.65)	(3.39)	(3.36)	(4.93)	(5.82)
R^2	0.0128	0.0805	0.0829	0.0910	0.101	0.033	0.117	0.119	0.0825	0.135
Observations	1,352	1,352	1,352	1,352	1,352	1,352	1,352	1,352	1,352	1,352
N	35	35	35	35	35	35	35	35	35	35

Sources: IFS, WEO, Datastream, GCS, Haver.

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 9. Emerging, Advanced, and Financial Centers

Gross Inflows excl. FDI (as percent of GDP)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Full Sample					*Full Sample*		
			RANDOM EFFECTS					FIXED EFFECTS		
VARIABLES			2002Q1–-2012Q4					2002Q1–2012Q4		
L.RGDPD	0.67**	0.66***	0.66***	0.66***	0.72***	0.84***	0.83***	0.83***	0.75***	0.76***
	(0.27)	(0.23)	(0.24)	(0.23)	(0.24)	(0.28)	(0.25)	(0.25)	(0.22)	(0.22)
L.SIRD	-0.10	0.03	0.03	0.11	0.15	0.02	0.18	0.18	0.21	0.20
	(0.09)	(0.08)	(0.08)	(0.08)	(0.09)	(0.11)	(0.13)	(0.13)	(0.15)	(0.14)
L.REER			-0.00	0.02	0.02			0.00	0.01	0.02
			(0.08)	(0.07)	(0.07)			(0.07)	(0.08)	(0.08)
L.MCAP				0.05***	0.04***				0.07***	0.07***
				(0.01)	(0.01)				(0.02)	(0.02)
L.GDEBT				0.02	0.02				0.01	0.01
				(0.05)	(0.05)				(0.14)	(0.14)
CAPCON					-4.80					-2.14
					(3.01)					(5.71)
VIX		-10.85***	-10.85***	-11.02***	-11.12***		-11.01***	-11.01***	-11.35***	-11.38***
		(2.29)	(2.33)	(2.34)	(2.34)		(2.31)	(2.35)	(2.44)	(2.46)
Constant	3.38***	35.51***	35.51***	32.19***	34.27***	2.54***	34.96***	34.96***	31.04***	31.95***
	(0.95)	(7.11)	(7.25)	(6.19)	(6.55)	(0.93)	(6.37)	(6.48)	(8.85)	(9.97)
R^2	0.0113	0.0518	0.0518	0.0817	0.0867	0.018	0.0463	0.0463	0.0756	0.0777
Observations	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472
N	38	38	38	38	38	38	38	38	38	38

Sources*:* IFS, WEO, Datastream, GCS, Haver.

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

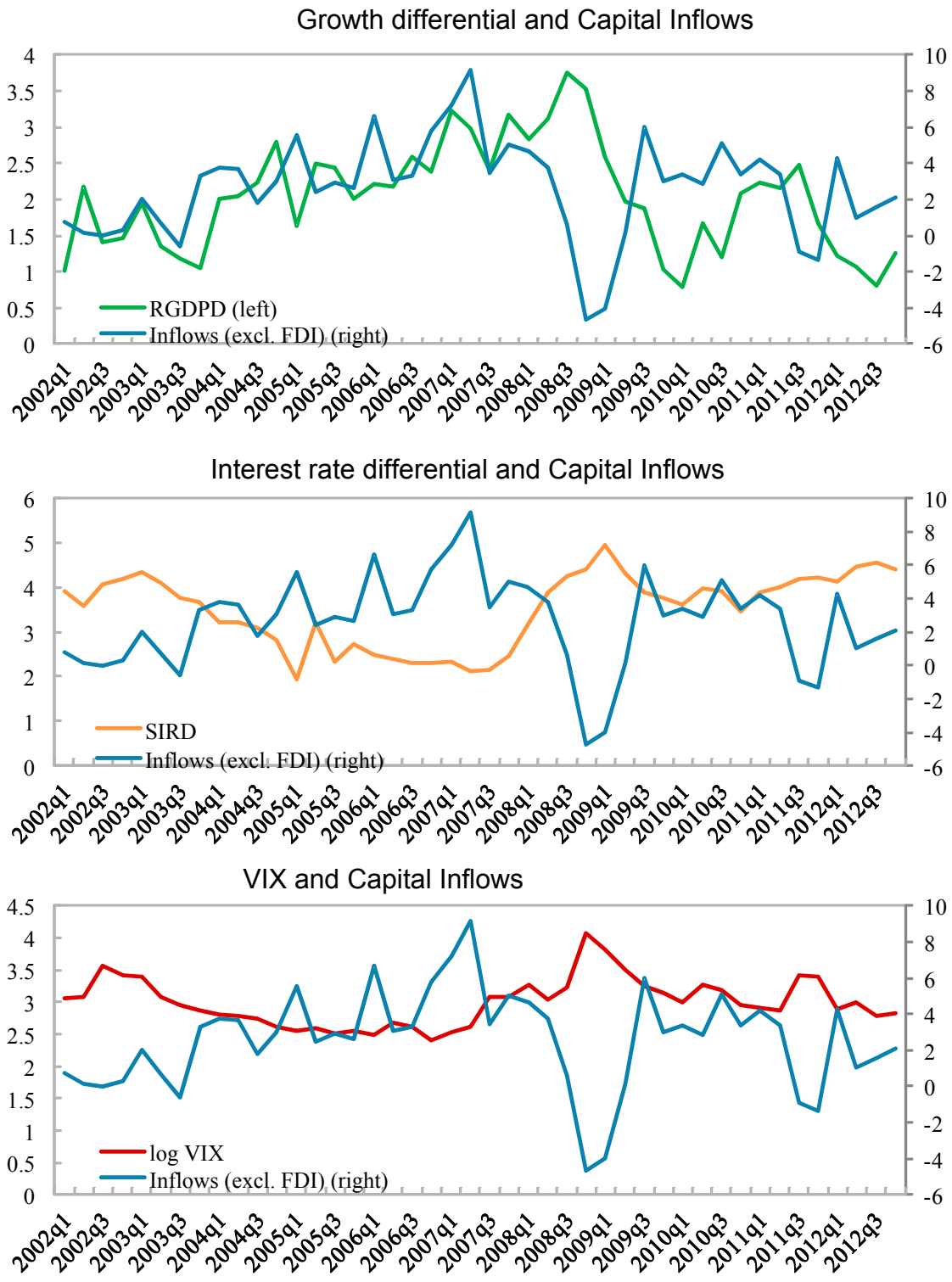
Table 10. Robustness Tests

Gross Inflows excl. FDI (as percent of GDP)	(1)	(2)	(3)	(4)
	Only Emerging (EM)		*Only Emerging (EM)*	
	RANDOM	FIXED	RANDOM	FIXED
VARIABLES	2002Q1-2012Q4		2002Q1-2012Q4	
L.RGDPD	0.57***	0.56***	0.50***	0.50***
	(0.20)	(0.20)	(0.16)	(0.16)
L.SIRD	0.10	0.11	0.06	0.07
	(0.06)	(0.07)	(0.05)	(0.05)
L.REER	0.05	0.06	0.06*	0.06
	(0.05)	(0.05)	(0.04)	(0.04)
L.GDEBT	-0.06*	-0.07	-0.07*	-0.09
	(0.04)	(0.05)	(0.04)	(0.06)
CAPCON	-1.59	1.07	-3.24	-3.29
	(3.03)	(4.97)	(2.63)	(3.74)
L.MCAP	0.03*	0.05**		
	(0.02)	(0.03)		
GRAI	-0.89***	-0.91***		
	(0.14)	(0.14)		
GRAI*GRAI	-0.13***	-0.13***		
	(0.03)	(0.03)		
L.CREDIT			0.25***	0.25***
			(0.07)	(0.07)
VIX			-1.44	-1.52
			(1.31)	(1.42)
L.CREDIT*VIX			-0.09***	-0.09***
			(0.02)	(0.02)
Constant	3.56	1.67	10.91**	12.06**
	(2.24)	(3.54)	(4.93)	(5.43)
R^2	0.139	0.191	0.174	0.167
Observations	1,088	1,088	1,043	1,043
N	29	29	28	28

Sources: IFS, WEO, Datastream, GCS, Haver, Credit Suisse

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variable GRAI was multiplied by -1 for these regressions to make the coefficients comparable to those for the VIX.

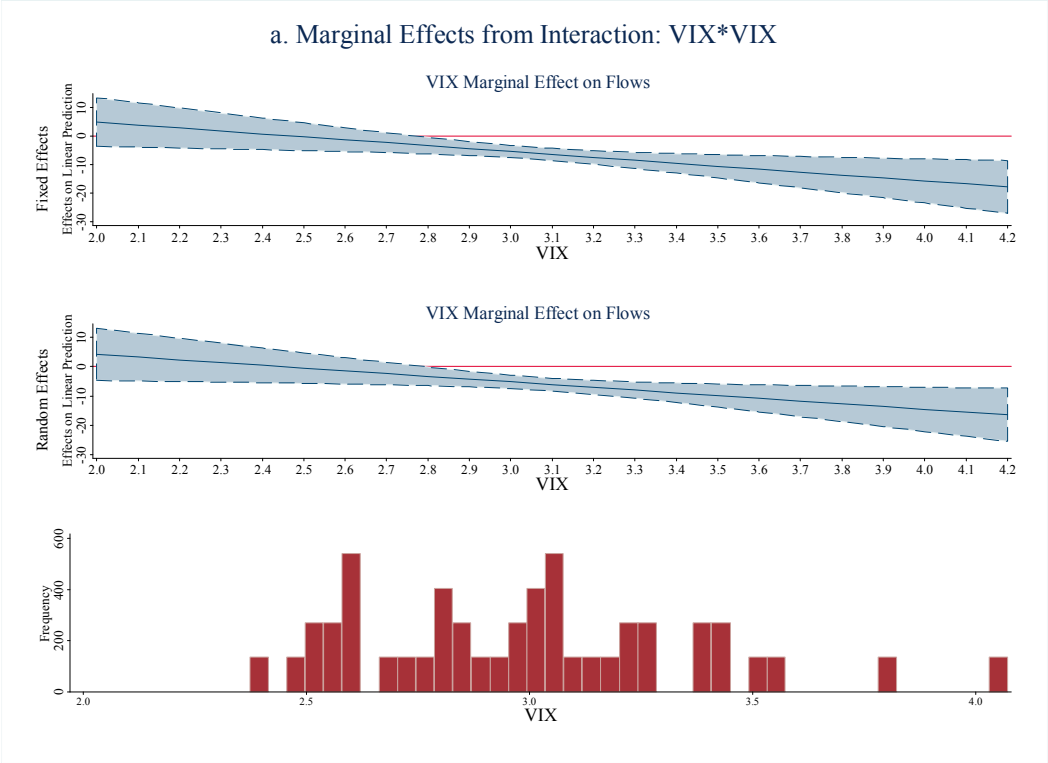
Figure 1. Stylized Facts



Sources: WEO, IFS, Haver Anayltics.

Note: Variables shown are Gross Inflows excluding FDI (as percent of GDP), real GDP per capital growth rate differential (RGDPD), short-term interest rate differential (SIRD), Log VIX(VIX).

Figure 2. Marginal Effect Plots



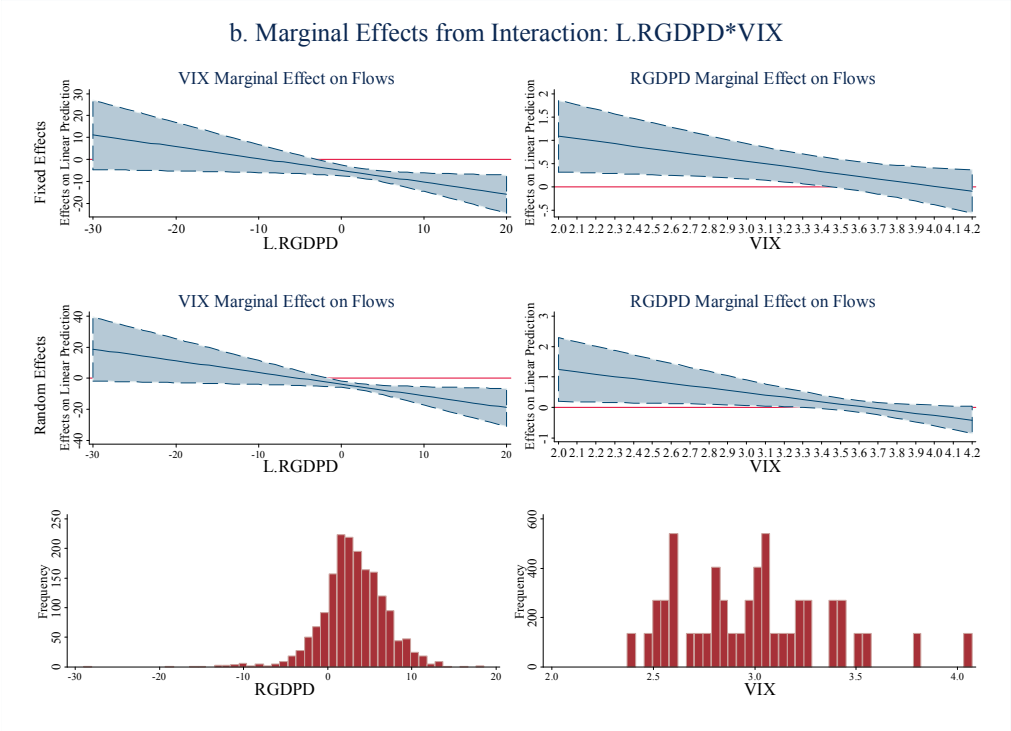
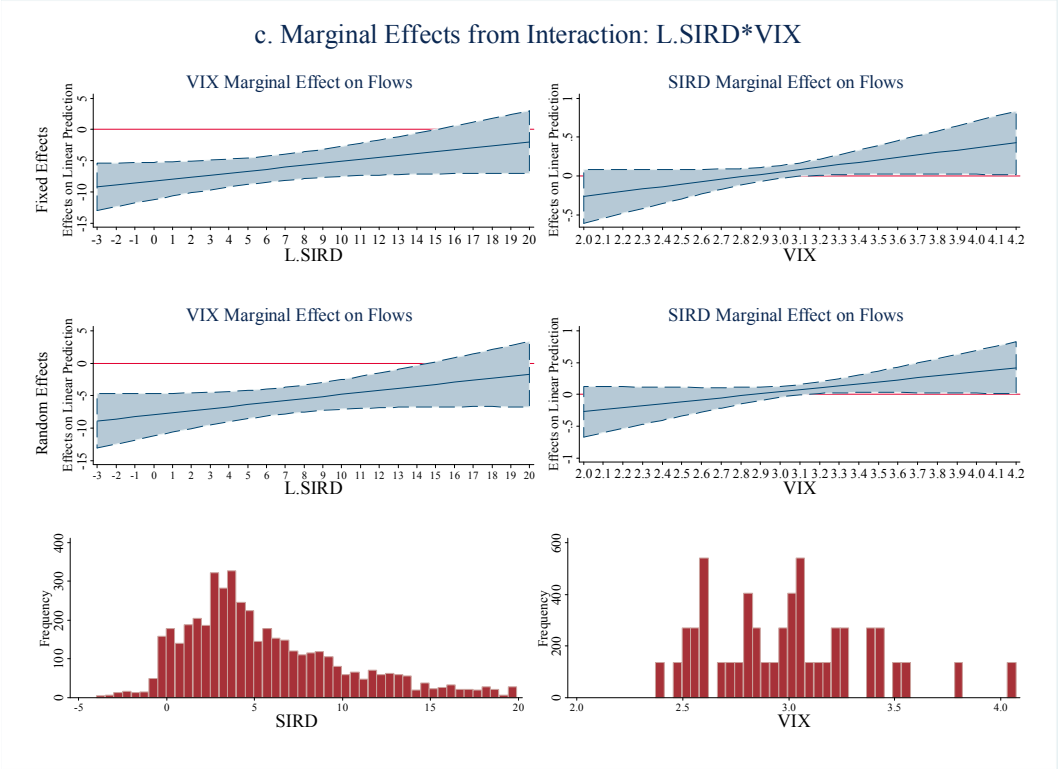


Figure 2. Marginal Effect Plots (continued)



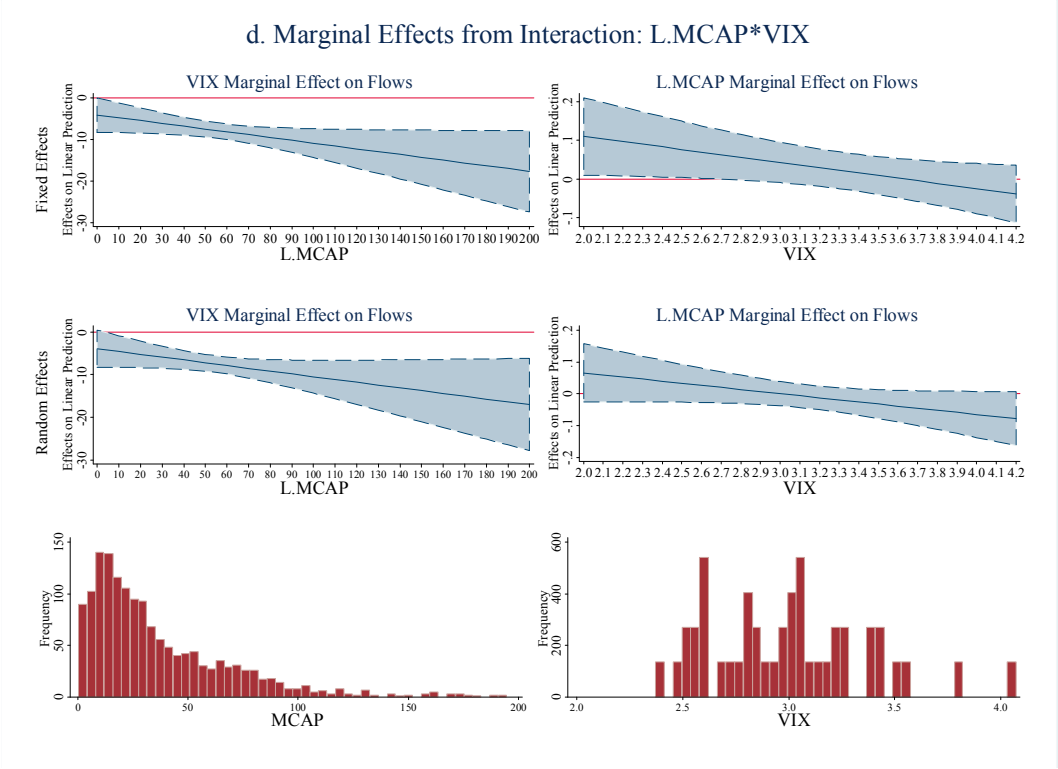
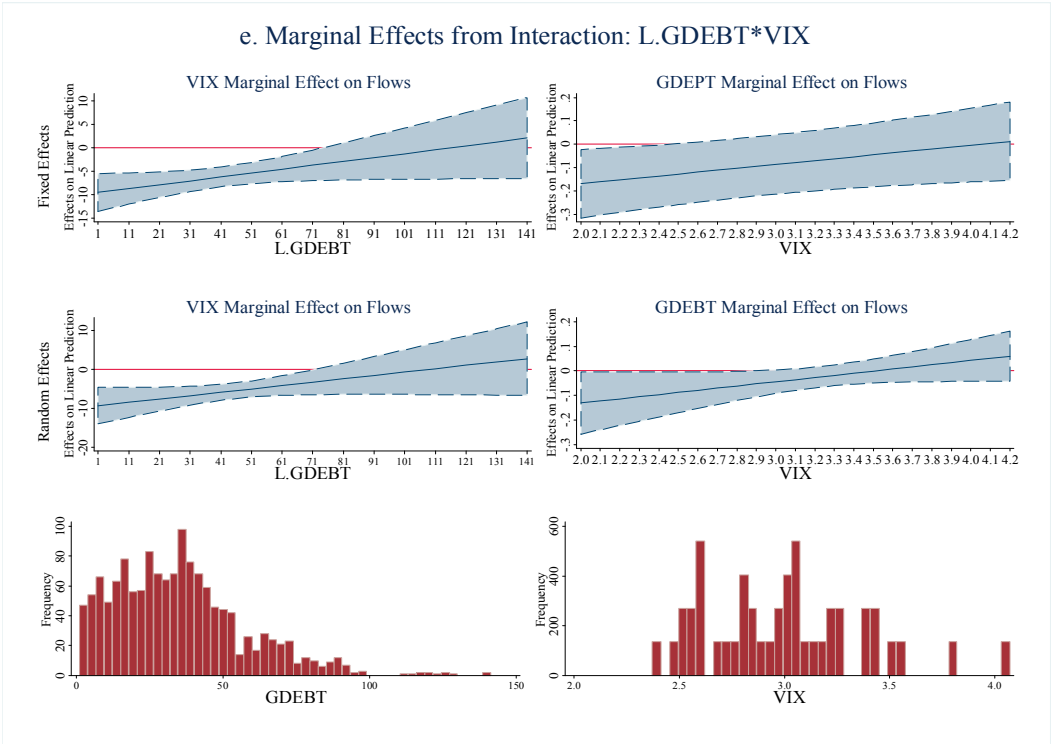
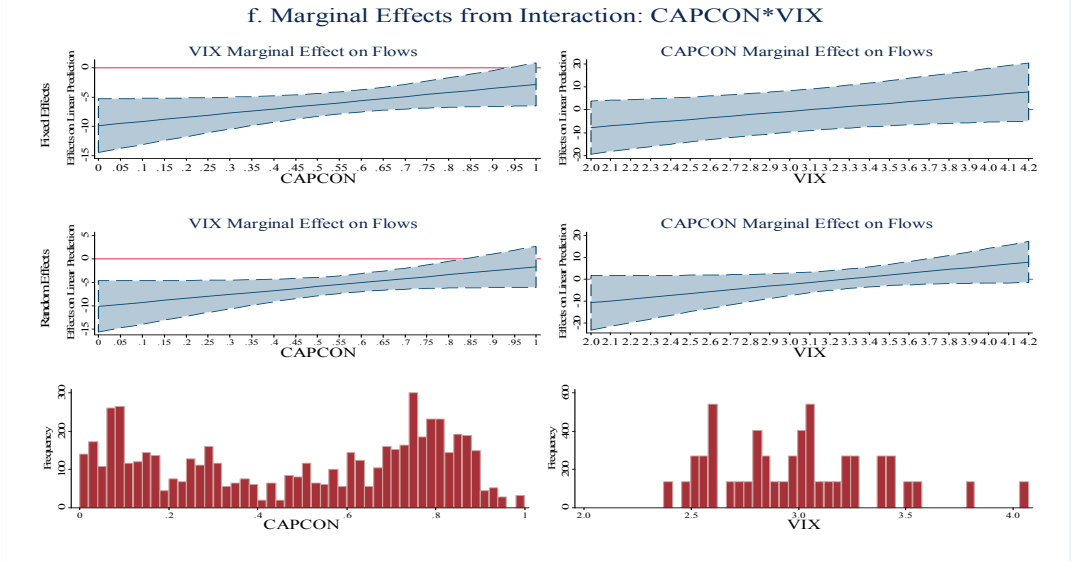


Figure 2. Marginal Effect Plots (concluded)





Source: IMF Staff.

Note: Figure 2 shows marginal effects of VIX on capital inflows conditional on: VIX itself (Figure 2a), growth differential (Figure 2b, left), interest rate differential (Figure 2c, left), market capitalization (Figure 2d, left), government debt (Figure 2e, left), and capital flows restrictiveness index (Figure 2f, left). Conditional confidence intervals (95 percent) are also reported (shaded area). The parameters are based on panel regressions reported in Table 5. For each variable, the results for both fixed effect (first line) and random effect (second line) are presented, together with the frequency distribution for each variable (third line). The right sides of Figure 2b-f report marginal effects of each of the above variables on capital inflows conditional on VIX.