WP/17/130

# IMF Working Paper

## A Tie That Binds: Revisiting the Trilemma in Emerging Market Economies

by Maurice Obstfeld, Jonathan D. Ostry, and Mahvash S. Qureshi



INTERNATIONAL MONETARY FUND

 WP/17/130

**IMF Working Paper**

Research Department

# A Tie That Binds: Revisiting the Trilemma in Emerging Market Economies[†]

**Prepared by Maurice Obstfeld, Jonathan D. Ostry, and Mahvash S. Qureshi**

June 2017



**Abstract**

This paper examines the claim that exchange rate regimes are of little salience in the transmission of global financial conditions to domestic financial and macroeconomic conditions by focusing on a sample of about 40 emerging market countries over 1986–2013. Our findings show that exchange rate regimes *do* matter. Countries with fixed exchange rate regimes are more likely to experience financial vulnerabilities—faster domestic credit and house price growth, and increases in bank leverage—than those with relatively flexible regimes. The transmission of global financial shocks is likewise magnified under fixed exchange rate regimes relative to more flexible (though not necessarily fully flexible) regimes. We attribute this to both reduced monetary policy autonomy and a greater sensitivity of capital flows to changes in global conditions under fixed rate regimes.

JEL Classification Numbers: F31, F36, F41

Keywords: trilemma, global financial cycle, capital flows, emerging market economies

Authors' E-Mail Addresses: mobstfeld@imf.org; jostry@imf.org; mqureshi@imf.org

[†] We would like to thank Eugenio Cerutti, Atish R. Ghosh, Jun Il Kim, and Hui Tong for useful comments and suggestions. We are very grateful to Naotaka Sugawara for assistance with data processing, and to Manzoor Gill for excellent research assistance.

Contents



Tables



Figures

## I. INTRODUCTION

The unprecedented monetary easing in major advanced countries in the aftermath of the global financial crisis, and the ensuing volatility in capital flows to emerging market economies (EMEs), has rekindled debate on cross-border financial spillovers, and the ability of EMEs to insulate themselves from global financial shocks. The conventional policy advice in the face of such shocks has been to embrace exchange rate flexibility; yet EME policy makers—even in countries with flexible exchange rate regimes—have expressed concerns about the ability of floating rates to protect their economies from unwelcome cross-border spillovers. Rajan (2014), for example, argues, that "exchange rate flexibility in recipient countries [in the face of such spillovers] sometimes exacerbates booms rather than equilibrates."[1] Indeed, in recent years, there appears to be a strong correlation between cross-border flows and domestic financial conditions in EMEs, including those with floating exchange rates (Figure 1). But does this mean that the exchange rate regime has lost its relevance in financially integrated economies? This is the question we investigate here.

The salience of the exchange rate regime in the open economy context has been established by the "trilemma"—which postulates that countries face a trade-off among the objectives of exchange rate stability, free capital mobility, and independent monetary policy (Mundell, 1963; Obstfeld and Taylor, 1998). If a country chooses exchange rate stability and free capital mobility, it must give up monetary policy autonomy; conversely, an independent monetary policy in the presence of free capital flows is possible through exchange rate flexibility. Throughout history, countries have attempted to navigate the trilemma by choosing different policy configurations. During the gold standard, for example, exchange rate stability and free capital mobility were maintained at the expense of monetary policy independence. The Bretton Woods era was characterized by exchange rate stability and monetary autonomy, with restricted capital mobility—while the period afterward has seen a trend toward free capital mobility, monetary policy autonomy, and exchange rate flexibility.

The remarkable rise in cross-border capital flows over the past few decades, and the frequent boom-bust cycles in capital flows, have however put the trilemma to the test—and doubts have been raised about the ability of countries with flexible exchange rates to insulate their financial conditions from changes in key-currency financial centers. Consequently, a burgeoning literature has emerged that examines whether floating exchange rates assure monetary policy autonomy in financially-open economies, with the evidence generally suggesting that it does: short-term interest rates tend to be less correlated with the base country interest rates under flexible exchange rates than under fixed rates, with the contrast greatest when the capital account is more open.[2] Nevertheless, some recent studies argue that

[1] Concerns pertaining to exchange rate flexibility are neither new, nor peculiar to EMEs. In the late 1970s, e.g., Volcker (1978) remarked that "freely floating exchange rates, instead of delivering on the promise of more autonomy for domestic monetary or other policies, can greatly complicate domestic economic management." These concerns echo the academic literature, which suggests that the presence of noise traders creates undesirable exchange rate volatility under floating exchange rates (e.g., Jeanne and Rose, 1999).

[2] See, e.g., Borenzstein et al. (2001); Frankel et al. (2004); Shambaugh (2004); Obstfeld et al. (2005); Miniane and Rogers (2007); Bluedorn and Bowdler (2010); Klein and Shambaugh (2015); Goldberg (2013); Obstfeld (2014); Aizenman et al. (2015); Georgiadis and Mehl (2015); Ricci and Shi (2016); Caceres et al. (2016); and Bekaert and Mehl (2017). By contrast,

the capacity of central banks to set policy rates under flexible exchange rate regimes does not ensure their ability to influence domestic monetary and financial conditions. Rey (2015, 2016), for example, contends that there exists a "global financial cycle" in which gross capital flows, banking sector leverage, domestic credit, and prices of risky assets co-move positively across countries *regardless* of the exchange rate regime. Further, these variables are strongly negatively related to measures of global market volatility and risk aversion (such as the VIX index), which in turn are strongly influenced by U.S. monetary policy—thus implying that it is the financing conditions in the major source countries, not domestic policy rates, that effectively determine domestic financial conditions (Passari and Rey, 2015).[3]

Indeed, there are several reasons why the effectiveness of domestic monetary policy in mitigating external financial shocks may be limited in financially integrated economies. Borrowers, for example, may be able to substitute between domestic and external financing sources, limiting the impact of changes in domestic interest rates on credit and asset price dynamics. Moreover, even if short-term rates can be set independently, long-term rates tend to be strongly influenced by global forces (Goodhart and Turner, 2014; Obstfeld, 2014), and these may exert a more powerful influence on domestic real variables than short-term rates. Another transmission mechanism could be the flexible exchange rate itself which, instead of acting as a shock absorber, could amplify the boom-bust cycle through leverage dynamics.[4]

In this paper, we revisit the claim that exchange rate regimes are of little significance in the transmission of global financial conditions to domestic financial conditions by systematically analyzing the response of a range of domestic financial variables—credit, prices of risky assets (housing and equities), and banking system leverage—to global financial conditions (proxied by the VXO index) across exchange rate regimes in 43 EMEs.[5] Since financial conditions in EMEs are strongly associated with cross-border capital flows, we also investigate if the sensitivity of private capital flows to global financial shocks varies across exchange rate regimes. Within flows, we differentiate between net and "gross" capital flows—considering both liability flows (nonresident net domestic asset acquisitions) and asset flows (resident net foreign asset acquisitions), while also distinguishing among the types of flow (foreign direct investment; portfolio; other investment). Moreover, given that changes in capital flows and financial conditions may have a direct bearing on macroeconomic activity, we supplement our analysis by considering the role of the exchange

---

Hofmann and Takats (2015) find weak evidence that exchange rate flexibility strengthens monetary autonomy in the face of international monetary shocks. Similarly, Edwards (2015) finds that monetary policy changes in the United States have a strong effect on policy rates in Latin American countries with floating exchange rates (Chile, Colombia, and Mexico).

[3] The idea that there exists a global financial cycle, where global factors—especially, U.S. monetary policy and investor risk appetite—influence cross-border capital flows is not new (see, e.g., Calvo et al., 1993; Fernandez-Arias, 1996; Reinhart and Reinhart, 2008; Ghosh et al., 2014). Rey, however, argues that cross-border financial spillovers are *similar* for fixed and flexible exchange rate countries—implying the irrelevance of the exchange rate regime, and a two-way tradeoff between capital mobility and monetary autonomy (a policy "dilemma" rather than a trilemma).

[4] For instance, domestic currency appreciation in the face of lax financial conditions abroad can raise asset and collateral values, creating a procyclical effect on credit and asset markets. Gertler and Karadi (2011), and Bruno and Shin (2015a) outline different mechanisms through which this leverage process could be self-reinforcing.

[5] Several studies establish that the VIX index is a strong indicator of global financial conditions, with lower values indicating greater tolerance for risk-taking and increases in leverage (Bruno and Shin, 2015b; Rey, 2015; Miranda-Agrippino and Rey, 2015). We use the VXO index—the precursor of the VIX index—to maximize data coverage (the VXO index is available from 1986 onward, while the VIX is available from 1990 onward). Correlation between the two series is 0.99, and the results reported in the paper remain very similar if the VIX index is used instead.

rate regime in affecting domestic real variables (such as output) in the face of changing global financial conditions.

For our analysis, we use the usual aggregate exchange rate regime categorization (fixed, intermediate, and float) together with a finer classification that distinguishes within these broad buckets. Our empirical analysis focuses squarely on EMEs, rather than on advanced economies (AEs) or a pooled sample (though we cross-check our results for the EMEs against these other samples below). The reasons are two-fold. First, the EMEs are of inherent interest because many of the policy debates concerning the transmission of global financial shocks from the center to the periphery relate to the experience of EMEs; a related point is that several AEs experience the global financial cycle asymmetrically to EMEs given their tendency to receive safe-haven flows during risk-off periods. Second, the hypothesis being investigated is the extent to which exchange rate regime variation affects the transmission: for the data to speak on this issue, there needs to be genuine cross-country variation in regimes. Since the vast majority of AEs classified as fixed exchange rate regimes are in the Eurozone, this is problematic given that these countries' currencies float internationally. For both reasons, inferences and policy implications drawn from a sample comprising AEs could be misleading.[6]

Our findings, based on quarterly data over 1986–2013, show that exchange rate regimes *do* matter. Fixed exchange rate countries are more prone to experience financial vulnerabilities such as rapid domestic credit and house price growth, and increases in bank leverage. Notably, while domestic financial conditions respond to global financial conditions across all exchange rate regimes, the response is magnified under fixed exchange rate regimes as compared to more flexible regimes. Thus, a one standard deviation increase in the VXO index implies about a 1 percentage point larger reduction in quarterly domestic credit growth, and about 2 percentage points larger reduction in real house price growth, in fixed exchange rate regimes relative to floats in our sample. Banking system leverage is also more sensitive to changes in the VXO index in fixed rate regimes relative to floats, but we find no systematic difference in the response of stock returns to the VXO index across regimes.

The generally greater sensitivity of domestic financial conditions to global financial shocks under fixed exchange rate regimes may reflect the differential constraints imposed on monetary policy, and there is also evidence that capital flows react more to the VXO index in fixed rate regimes than in flexible regimes. This holds both for net flows and for liability flows, suggesting that foreign investors are more prone to herding behavior during risk on and off episodes when the equilibrating role of the exchange rate is constrained by an inflexible regime.

Looking at the finer exchange rate regime classification, it is apparent that the differential impact of global financial shocks on domestic financial variables and capital flows is greatest for relatively rigid regimes (hard pegs, single currency pegs, and in some cases basket pegs). Other, more flexible, intermediate regimes (bands, crawls, and managed floats) are generally statistically not much different from free floats. This result suggests that it is not necessary to

[6] A further question that may be asked is whether the findings for EMEs differ from those for AEs because of the greater extent of global financial integration in the latter group. We confirm below that this is not the case.

operate at the floating rate vertex of the trilemma to reap the benefits of exchange rate flexibility. Rather, in the face of cross-border monetary spillovers, countries can reap much of the insulation benefit of flexibility without adopting a pure-market determination of the exchange rate; this may be normatively salient to the degree that policy makers have multiple targets that are more easily achieved with managed than with pure floats.[7]

Finally, we also find that the lower sensitivity of domestic financial variables to global financial conditions under flexible exchange rate regimes translates into reduced sensitivity in the macroeconomic outcomes that may be of ultimate concern to policy makers. Thus, flexible exchange rates act as an effective buffer for the real economy—at least partially insulating financially-integrated economies from large real GDP growth declines in the presence of external financial shocks. Nevertheless, to the extent that the insulation is not perfect in practice, policy makers might need to invoke other tools (beyond exchange rate flexibility) to achieve their goals for macro-financial stability in the face of volatile flows (Ostry et al., 2010, 2012; Obstfeld, 2014; Rey, 2015).

Our paper contributes to the existing literature in several respects. First, existing studies mostly test the empirical validity of the trilemma by focusing on policy interest rates, paying little attention to whether the monetary autonomy afforded by flexible exchange rates actually helps to insulate the domestic economy from global financial shocks. By contrast, we systematically analyze the role of the exchange rate regime in influencing the transmission of global financial conditions to domestic financial *and* macroeconomic outcomes.[8] Second, in addition to the usual aggregate (three-way) exchange rate regime categorization, we consider a finer classification that helps to shed light on the differing insulation properties of a broad spectrum of regimes. The results suggest that it is generally the rigid regimes (hard and single currency pegs) where insulation properties are lacking; managed floating regimes, by contrast, engender insulation properties largely similar to pure floats, and thus may present a viable option to achieve policy autonomy with limited exchange rate volatility.[9] Third, while studies have analyzed the sensitivity of exchange rate regimes to global financial shocks in advanced economies (or comingled advanced and emerging markets; e.g., Rey, 2016; Passari and Rey, 2015), our analysis focuses squarely on EMEs. As mentioned above, this helps to identify the effect of the regime given the greater genuine cross-country variation in regimes in EMEs than among AEs, and their greater likelihood to experience boom-bust cycles in flows as global financial conditions change. It turns out that the results obtained from recent studies for advanced economies implying the irrelevance of the exchange rate regime cannot be generalized.

---

[7] Ostry (2014), for instance, notes in his commentary on Obstfeld (2014) that "benign neglect" of the exchange rate may not be a desirable option for EMEs because of balance sheet effects or overvaluation concerns. Exchange rate flexibility is thus important—and our finding of a significant difference between fixed and managed to pure floats reflects this—but may not be enough when policy makers have multiple targets.

[8] Our paper is thus also related to the voluminous literature investigating the "neutrality" of the nominal exchange rate regime, which has produced mixed findings on the relevance of the regime for macroeconomic outcomes such as trade, output, and inflation (e.g., Baxter and Stockman, 1989; Rogoff et al., 2004; Ghosh et al., 2010; Rose, 2011).

[9] Since the economic traits of "managed floats" (where the central bank intervenes in the currency market without targeting a specific parity) tend to be quite similar to those of pure floats, they are often considered together as a floating regime from the perspective of the trilemma (see, e.g., Fischer, 2001).

The remainder of this paper is structured as follows. Section II outlines the data used in the analysis, and lays out some stylized facts characterizing the link between global financial conditions and domestic financial conditions in EMEs. Section III discusses the estimation methodology, and presents empirical evidence on the sensitivity of financial and macroeconomic outcomes to global financial shocks across exchange rate regimes. Section IV presents the robustness analysis of our main empirical results. Section V concludes.

## II. STYLIZED FACTS

To examine whether the transmission of global financing conditions to emerging market economies differs by the exchange rate regime, we obtain quarterly data for 43 EMEs over 1986–2013 from several sources.[10] For macroeconomic and financial variables, we rely mainly on the IMF's International Financial Statistics and World Economic Outlook databases, Bloomberg, and Haver Analytics (see appendix for details). For exchange rate regimes, we use the de facto exchange rate regime classification from Ghosh et al. (2015) that is based on the IMF's exchange rate regime classification, and—compared to other available de facto classifications (e.g., Reinhart and Rogoff, 2004; Shambaugh, 2004; Levy-Yeyati and Sturzenegger, 2005)—has the advantage of providing wider and more recent cross-country coverage. Importantly, for our purposes, this classification also makes a clearer distinction among hard pegs, conventional pegs, and other types of soft pegs that allow some exchange rate flexibility.[11] In the robustness analysis, however, we also consider other exchange rate regime classifications such as the Reinhart and Rogoff, and the IMF's de jure classifications.

A snapshot of exchange rate regimes in EMEs shows a rich diversity—in 2013, for instance, about 26 percent of the countries in the sample have a fixed exchange rate regime (i.e., a hard peg or conventional peg to a single anchor currency), 63 percent are intermediate regimes (basket pegs, horizontal bands, crawling arrangements, or managed floats), and the remaining are identified as free floats (Figure 2[a]). Within intermediate regimes, the vast majority consist of managed floats, while the proportion of other regimes, especially basket pegs and horizontal bands, has been declining over time. Overall the trend toward "hollowing out of the middle"—countries abandoning single currency or other soft pegs (mostly in favor of free floats)—that emerged in the aftermath of the Asian financial crisis appears to have reversed around 2004, with EMEs increasingly adopting managed floats (Figure 2[b]).

Looking at the behavior of capital flows over the sample period, their rise and fall appears to be tightly correlated with global factors (Figure 3[a], [b]). Thus, net capital flows to EMEs surge when U.S. interest rates and global risk aversion (proxied by the VXO index) are low, and recede when they are high. Much of this negative correlation is the result of liability flows, rather than asset flows. In fact, for the latter, the raw correlation with both U.S. interest rates and the VXO index is positive, indicating that residents tend to invest abroad

[10] Our sample comprises countries included currently (or until recently) in the IMF's Vulnerability Exercise for Emerging Markets for which quarterly data is available (excluding offshore financial centers). Sample composition varies across estimations depending on data availability. See Tables A1-A2 in the appendix for data details.

[11] See Ghosh et al. (2010, 2015) for a detailed discussion of the IMF's de facto exchange rate regime classification, and its advantages over other commonly used classifications.

when global financial conditions are favorable, but retrench when conditions tighten (Figure 3[c]). The behavior of residents thus seems to act as a dampening force for net flows in the face of global financial shocks.

The strong correlation of global factors and capital flows in turns translates into a strong correlation between global factors and domestic financial variables. Thus, domestic private sector credit, house prices, and equity returns in EMEs generally move in tandem with net capital flows—rising as flows surge, and falling when they decrease (Figure 4[a], [b])—but are negatively correlated with global investor risk appetite (Figure 4[c], [d]).

While these observations are consistent with those documented in earlier studies (e.g., Claessens, et al., 2011; Passari and Rey, 2015), a key question is whether the co-movement between global investor risk appetite, capital flows, and domestic financial variables differs by the exchange rate regime. Figure 5 suggests that it does. The (unconditional) negative correlation between the VXO and net capital flows, domestic credit growth, asset prices (house and stocks), and leverage growth (proxied by the change in loan-to-deposit ratio) is negative across regimes, but it tends to be higher (in absolute terms) for fixed exchange rate regimes as compared to intermediate regimes and free floats (Figure 5[a]). Notably, the negative association of real GDP growth with the VXO is also stronger in fixed exchange rate regimes, suggesting that such regimes are more prone to economic boom-bust cycles, perhaps because they are subject to more limited policy autonomy and face external adjustment difficulties.

A similar pattern emerges looking at the correlation between capital flows and domestic financial and macroeconomic conditions in EMEs (Figure 5[b]). Capital flows (both net and liability flows) are positively correlated with financial variables (except for stock prices) and real GDP growth across regimes, but the correlation is generally higher for fixed exchange rate regimes than for the other regimes—suggesting that capital flows are a more potent transmission channel of global conditions in pegs as compared to flexible regimes in EMEs.

Interestingly, these findings do not seem to hold for advanced economies, and no discernible pattern appears from the correlations between the VXO index, capital flows, and financial variables across exchange rate regimes in these economies (Figure 6[a]). Some variables (net capital flows, leverage growth) are positively correlated with the VXO index in less flexible exchange rate regimes, while others (such as house price growth, stock returns, and real GDP growth) are negatively correlated. Similarly, while credit growth, house price growth, and the change in bank leverage are positively correlated with net flows in AEs, the association is not necessarily stronger for fixed exchange rate regimes as compared to other regimes (Figure 6[b]). (In fact, real and financial variables appear to co-move strongly with liability flows under flexible regimes in advanced economies.)

That the correlations show no systematic difference across exchange rate regimes in AEs may reflect the difficulty of interpreting the regimes data in this group of countries. A first issue is that the vast majority of AEs classified as having a fixed exchange rate regime in the data are Eurozone countries, whose joint currency floats internationally, affording the

European Central Bank monetary autonomy in the sense of the trilemma.[12] Moreover, the euro behaves as a "safe haven" currency (unlike EME currencies), with the demand for euro-denominated assets generally rising with global risk aversion (indeed the correlation between the VXO and net flows is positive for fixed rate regimes in advanced countries; Figure 6). These issues pose deep challenges for testing the relevance of the exchange rate regime in advanced countries as global financial conditions change.

In sum, the preliminary statistics presented in this section suggest that capital flows and domestic financial variables (notably, credit, risky asset prices, and bank leverage) tend to co-move across countries in response to global financial conditions—but the relationship differs according to the exchange rate regime. EMEs with a fixed exchange rate regime are more sensitive to global financial shocks than economies with flexible rate regimes—with a sharper decline in net (and nonresident) flows, domestic credit, house prices, and real GDP growth in response to an impulse to global risk aversion. These bivariate correlations, which are markedly different from those in AEs, are however only suggestive given that we have thus far not controlled for other factors that affect domestic macro-financial conditions, and which may be correlated with the exchange rate regime. In what follows, we examine the characteristics of financial cycles in EMEs more formally through regression analysis.

## III. Does the Exchange Rate Regime Matter?

To examine whether the transmission of the global financial cycle to emerging market economies is affected by their exchange rate regime, we draw on the existing literature and estimate the following specification:

$$f_{i,t} = \beta_0 + \beta_1 Fixed_{it} + \beta_2 Int_{it} + \beta_3 VXO_t + \beta_4 Fixed_{it} \times VXO_t + \beta_5 Int_{it} \times VXO_t + \sum_k \lambda_k z_{it,k} + \mu_i + \varepsilon_{it} \quad (1)$$

where $f_{i,t}$ is a financial variable (domestic credit growth; house price growth; stock market return; change in loan-to-deposit ratio) in country $i$ at time $t$; *Fixed* and *Int* are dummy variables for fixed and intermediate exchange rate regimes, respectively (float is the reference category); *VXO* is the VXO index (in logs), which is our proxy for global financial shocks; $z$ is a set of relevant (global and domestic) control variables; $\mu$ captures country-fixed effects; and $\varepsilon$ is the random error term. All variables are at the quarterly frequency, except for the exchange rate regime variables, which are available at annual frequency.

The use of the VXO index as a proxy for global financial conditions in (1) is motivated by the findings of several recent studies (e.g., Ghosh et al., 2014; Ahmed and Zlate, 2014; Bruno and Shin, 2015b; Miranda-Agrippino and Rey, 2015), who show that cross-border capital flows, bank leverage, and risky asset prices across countries are strongly negatively associated with measures of global market volatility and risk aversion (such as the VIX index).[13] For exchange rate regimes, while we lump rigid pegs in *Fixed,* and relatively more

[12] In fact, the IMF started to classify the Eurozone countries as having a floating exchange rate regime from 2008. In our dataset, about 55 percent of the advanced economies are classified as having a fixed exchange rate regime in 2013—of those only one (Hong Kong Special Administrative Region) is a non-Eurozone economy.

[13] Shin (2016) argues that in recent years, especially since 2014, dollar appreciation has been a better barometer of risk appetite and leverage thank the VIX. Our sample, however, ends in the year 2013.

(but not fully) flexible regimes in *Int*, we also consider the disaggregated classification to examine individually the responsiveness of different regime categories to the VXO. If financial conditions in EMEs are affected by global financial conditions (regardless of the exchange rate regime), then $\beta_3$ in (1) would be statistically significant. To the extent that the exchange rate regime matters in the transmission of global conditions, the coefficient on the interaction terms ($\beta_4$ or $\beta_5$) would also be statistically significant.[14]

We estimate (1) on quarterly data using ordinary least squares for our sample of countries, and cluster the standard errors at the country level to address the possibility of serial correlation in the error term.[15] As exchange rate regimes are slow-moving variables that generally do not respond to short-run fluctuations in macroeconomic activity, this helps to mitigate potential simultaneity concerns in our estimations. To further attenuate endogeneity concerns, we drop the financial crisis observations (as identified by Laeven and Valencia, 2013) from the estimations when the exchange rate regime may have switched in response to domestic financial and economic developments (endogeneity concerns are further addressed in the robustness analysis below).[16] For other domestic control variables, we lag them sufficiently to mitigate potential endogeneity concerns. Moreover—since the question of whether flexible exchange rates provide insulation from global conditions (in the context of the "trilemma") is relevant for financially open economies—we include in the estimations at least partially open countries (defined as those country observations where capital account openness, as measured by the Quinn and Toyoda (2008) index, is above the 25$^{th}$ percentile for the sample).[17]

While (1) gives us an estimate of the effect of the VXO index, there is a possibility that the coefficient may be capturing the effect of other global factors (such as commodity prices) that are highly correlated with the VXO index. We, therefore, also estimate (1) by including quarter-year ($\eta_t$) effects to control for global factors more generally:

$$f_{i,t} = \beta_0 + \beta_1 Fixed_{it} + \beta_2 Int_{it} + \beta_3 VXO_t + \beta_4 Fixed_{it} \times VXO_t + \beta_5 Int_{it} \times VXO_t + \sum_k \lambda_k z_{it,k} + \mu_i + \eta_t + \varepsilon_{it} \quad (2)$$

The inclusion of quarter-year effects in (2) implies that $\beta_3$ will not be estimated separately, but we will obtain estimates for $\beta_4$ and $\beta_5$. Equation (2) constitutes our preferred specification, and we estimate variants of it in the analysis below.[18]

---

[14] With interaction terms, the marginal effect of *VXO* on *f* in (1) for fixed exchange rate regimes (*Fixed*=1) is given by $df / dVXO = \beta_3 + \beta_4$, and its standard error is $\hat{\sigma}_{df/dVXO} = \sqrt{\text{var}(\hat{\beta}_3) + \text{var}(\hat{\beta}_4) + 2\,\text{cov}(\hat{\beta}_3, \hat{\beta}_4)}$. Similarly, for intermediate regimes (*Int*=1), the marginal effect of *VXO* is $df / dVXO = \beta_3 + \beta_5$, and its standard error is $\hat{\sigma}_{df/dVXO} = \sqrt{\text{var}(\hat{\beta}_3) + \text{var}(\hat{\beta}_5) + 2\,\text{cov}(\hat{\beta}_3, \hat{\beta}_5)}$.

[15] To account for possible cross-sectional and temporal dependence in the error term, we also compute the Driscoll-Kraay standard errors, but that makes no significant difference to the results.

[16] Retaining the crisis observations in the estimations, however, does not impact the results in any significant way.

[17] In the robustness analysis below, we also restrict the sample to fully open EMEs only; as discussed, while the sample size drops considerably, our findings strongly hold. Thus, it is not the case that a lower degree of financial integration in EMEs is responsible for our findings on the salience of the exchange rate regime among EMEs as compared to advanced economies.

[18] The inclusion of quarter-year effects may not eliminate the concern that the VXO in the *interaction* term is capturing the effect of other global factors (Balli and Sørensen, 2013). We address this concern in the robustness analysis below.

## A. Domestic Financial Conditions

We begin by examining the impact of global financial conditions on domestic credit growth in EMEs. The results reported in Table 1 (col. [1]) show that controlling for relevant domestic and common factors—such as (lagged) quarterly real GDP growth, the private sector credit to GDP ratio, country-specific effects, a time trend, and a dummy variable for the global financial crisis to capture the extraordinary size of the shock (and corresponding potential policy responses)—credit growth is strongly negatively related to the VXO index (with the coefficient statistically significant at the 1 percent level). Thus, a one standard deviation increase in the VXO (in log terms) lowers credit growth by about 0.6 percentage points (against mean quarterly domestic credit growth rate of 2 percent for the full sample).[19]

Countries with fixed exchange rate regimes have, on average, about 3 percentage points higher credit growth than those with floating regimes, and about 2 percentage points higher credit growth than those with intermediate regimes—a result that is consistent with earlier studies that also report significantly higher credit growth under pegs (e.g., Mendoza and Terrones, 2008; Magud et al., 2014; Ghosh et al., 2015).[20] Among other factors, real GDP growth stimulates credit growth, while a higher credit to GDP ratio (a proxy for financial development) implies lower credit growth, pointing to convergence in financial development. The coefficient on the dummy variable for the global financial crisis is positive and statistically significant reflecting the steps taken by governments during the crisis to stimulate lending and maintain domestic economic activity.[21]

Including the interaction terms between the exchange rate regime and the VXO in col. [2], the coefficient on the interaction term with the fixed exchange rate regime ($\beta_4$) is negative and statistically significant (p-value=0.06), while that on the interaction with the intermediate regime ($\beta_5$) is positive but small and wholly statistically insignificant. A one standard deviation shock to the VXO thus implies about 1 percentage point lower real credit growth in fixed regimes as compared to more flexible regimes (the average quarterly credit growth in fixed and floating regimes is about 2 and 1 percent, respectively).[22] That intermediate regimes are, on average, significantly less affected than fixed regimes may reflect the less binding constraints imposed on monetary policy in such regimes. This result holds when we include the U.S. real interest rate (T-bill rate or shadow federal funds rate), along with its interaction terms with fixed and intermediate exchange rate regimes in the specification

[19] The mean and standard deviation of the (log) VXO index is about 3 and 0.4, respectively, in our sample. A one standard deviation shock to it is of about the same magnitude as at the time of the U.S. sovereign debt downgrade in 2011Q3/Q4.

[20] There are several reasons why credit expansion may be higher under fixed regimes than under floats. The implicit exchange rate guarantee in the peg can encourage nonresident deposits and excessive foreign borrowing by domestic entities (especially in the presence of a favorable interest rate differential for foreign currency borrowing), and contribute to credit and asset price booms. Unsterilized foreign exchange intervention to maintain the peg may also increase credit expansion.

[21] Ghosh et al. (2017), e.g., find that policy rates were, on average, lowered in EMEs during the global financial crisis.

[22] Using the formulae given in footnote 10, the marginal effect of VXO on credit growth for fixed exchange rate regimes is statistically significant at the 1 percent level, while that for intermediate regimes is insignificant.

(cols. [3]-[4]). The coefficient on U.S. interest rates, as well as on the interaction terms, is however statistically insignificant.[23]

These results hold when we include quarter-year effects to control for other global factors that may impact domestic credit growth (the coefficient on the interaction term between fixed regimes and the VXO now turns statistically significant at the 5 percent level; col. [5]). In this case, however, the VXO drops from the equation because of perfect collinearity with the quarter-year dummy variables. Estimating (2) over a shorter time period (2000–13), and including additional control variables such as (lagged) net capital flows (in percent of GDP) and the central bank policy rate in the model also do not change the results in a significant way (cols. [6]-[7]). The results, however, show that capital inflows are followed by higher credit growth, while monetary policy tightening is followed by lower credit growth.[24]

Considering the disaggregated exchange rate regime classification, it is clear that the negative reaction of credit growth to the VXO index is higher for both hard pegs and conventional single currency pegs—which forego monetary policy autonomy by more rigidly pegging their exchange rates (see appendix, Table A3; cols. [1]-[2]). For other types of soft pegs (basket pegs, bands, and crawling arrangements), as well as for managed floats, the coefficient on the regime variable and the interaction term with the VXO is either strongly positive or statistically insignificant, implying no meaningful difference as compared to free floats. This result provides some validation to the notion that, empirically at least, there is little meaningful statistical difference between the insulation benefit/cost across a range of flexible regimes, but a sizable such difference between the harder end and the rest.[25]

It is important to note, however, that these results do not hold if we also include advanced economies in the sample—in which case there is no statistically significant difference in the transmission of global financial shocks across fixed, intermediate, and floating exchange rate regimes (Table A4, cols. [1]-[2]). The effect of the VXO index is also weaker in the pooled sample (in fact, it is wholly statistically insignificant if we consider advanced economies only; col. [3]). These results are consistent with the findings of Passari and Rey (2015), who do not find any systematic difference in the response of credit growth to global risk aversion across exchange rate regimes in a sample combining advanced economies and EMEs. The morphing of trilemma into dilemma in their narrative would not seem to hold for an EME-based sample of countries, but seems instead to be driven by a group of advanced countries with quite different characteristics (including the presence of safe-haven effects). There is also the issue highlighted earlier pertaining to the challenges involved in assessing the

[23] The shadow fed funds rate is from Krippner (2013), who characterizes the term structure of US interest rates in the zero lower bound environment after the global financial crisis. The real US interest rate (both the linear and nonlinear terms) remains statistically insignificant even when the VXO variables are *not* included in the model. Consistent with existing studies (Bruno and Shin, 2015b; Miranda-Agrippino and Rey, 2015), this suggests that VIX/VXO is a much stronger proxy for the "global financial cycle." (While U.S. monetary policy is a significant driver of VIX, shocks to the Fed funds rate explain about 4-30 percent of the variance of the VIX depending on the specification of the model; Rey, 2015.)

[24] The sample size drops in col. [7] because of lack of data availability for domestic policy rates (especially for earlier years). Further estimations by type of capital flow show that domestic credit growth is primarily driven by other investment liability (predominantly cross-border bank) flows.

[25] Within the disaggregated regime classification, the results for basket pegs and horizontal bands need to be interpreted with caution as they constitute a relatively small proportion (4 percent and 3 percent, respectively) of the sample.

exchange rate regime for the eurozone countries. Indeed, if we exclude the eurozone countries from the pooled sample, our findings are very much in line with those reported in Table 1: fixed exchange rate countries experience larger declines in credit growth relative to more flexible regimes when global risk aversion rises (Table A4; cols. [5]-[6]).[26]

Turning to other financial variables, our results show that the exchange rate regime matters significantly for house price movements in EMEs (Table 2). On average, countries with fixed exchange rate regimes experience faster growth in real house prices than where intermediate regimes or floats are in place. Moreover, the sensitivity of house prices to changes in the VXO is greater under fixed exchange rates—with a one standard deviation increase in the VXO implying 1½-2 percentage points larger reduction in quarterly real house price growth in fixed rate regimes relative to floats (cols. [2]-[7]). For intermediate regimes, the coefficient on the interaction term with the VXO is positive (implying a smaller reduction in house price growth compared to other regimes when the VXO rises), but it loses statistical significance when quarter-year effects are included (cols. [5]-[7]). These results are reinforced when we look at the disaggregated regime classification, which shows that the sensitivity of house price growth to the VXO index is higher for hard and single currency pegs (but not intermediate regimes) compared to floats (Table A3; cols. [3]-[4]).

Among other factors, house prices in EMEs do not appear to respond strongly to changes in U.S. interest rates (Table 2, cols. [3]-[4]), but are positively associated with real GDP growth, and domestic credit growth. Controlling for these factors, however, they are not systematically related to net capital flows (col. [7]).[27] Including the (lagged) central bank policy rate, we find a positive association between monetary policy tightening and changes in house prices (col. [7]). While this result may seem counterintuitive, it probably reflects the fact that booms in house prices are typically preceded by a period of easy monetary policy, but then rising inflationary pressures lead central banks to tighten monetary policy before house prices peak (Ahearne et al., 2005).[28]

For stock market returns, the exchange rate regime does not seem to matter much (Table 3). Real equity returns in EMEs are strongly negatively related to the VXO index, as well as to U.S. real interest rates, but there is no significant difference in the sensitivity of equity returns to the VXO index across exchange rate regimes (cols. [2]-[4]). (There is some evidence that intermediate regimes experience a smaller reduction in stock returns as compared to other regimes when the VXO index rises, but it turns statistically insignificant when quarter-year effects are included in the model; cols. [5]-[7]). A possible reason why stock prices in fixed exchange rate regimes do not react more to the VXO index than in other regimes is that they are not significantly associated with domestic credit growth—which, as shown in Table 1, is particularly sensitive to VXO movements in fixed exchange rate regimes. (By contrast, house prices are strongly affected by domestic credit growth, and hence also tend to react more to the VXO in fixed rate regimes; Table 2.) In fact, equity

[26] The results for the pooled or advanced economy sample do not change significantly if we control for the degree of capital account openness, or institutional quality across countries.

[27] The coefficient on capital flows is significantly positive when output and credit growth are not included in the regression—suggesting that much of the impact of flows on house price growth comes through these factors.

[28] The results remain very similar if we consider changes in the price-to-rent ratio instead of real house price growth.

returns in EMEs are strongly linked to portfolio inflows (Table 3; col. [7])—which, as shown below, co-move with the VXO, but are not significantly affected by the exchange rate regime. Overall, equity returns in EMEs dropped significantly during the global financial crisis, a result that is consistent with existing studies showing contagion across equity markets during the crisis (e.g., Bekaert et al., 2014).

Finally, looking at financial system leverage (loan-to-deposit ratio), the results reported in Table 4 show that fixed exchange rate regimes, on average, experience faster leverage growth than other regimes. De-leveraging in the face of a negative global financial shock, however, is also greater in fixed exchange rate regimes compared to more flexible regimes. Thus, a one standard deviation increase in the VXO index implies a decrease in leverage growth by about 1 percentage point in fixed rate regimes compared to floats (cols. [4]-[7]). For intermediate regimes, the results show no statistically significant difference from floats for the full sample (cols. [2]-[5]), but there is some evidence of greater deleveraging in these regimes in response to global financial shocks during the more recent time period (2000–13; col. [6]). Among other factors, higher output growth, larger capital flows, and lower policy interest rates accelerate leverage growth by lowering the cost of borrowing, while a higher loan-to-deposit ratio implies a smaller increase in leverage. On average, leverage increased in EMEs during the global financial crisis, presumably because of a decline in bank deposits.

Our findings thus show that financial variables in emerging markets are affected by global financial conditions, and exchange rate regimes *do* alter the sensitivity of domestic financial variables (especially, of domestic credit, house prices, and bank leverage) to global financial shocks. Fixed exchange rate regimes are systematically impacted more by changes in global market volatility and investor risk aversion than flexible exchange rate regimes.

### B. Capital Flows

A key channel through which global financial conditions are transmitted to financially-open emerging markets is cross-border capital flows. Figure 3 shows that private flows to EMEs are tightly correlated with global factors, but is there reason to believe that this pattern differs by the exchange rate regime? The results reported in Table 5 show that it does: while EMEs with fixed and intermediate regimes attract more net flows (in percent of GDP) than floats, they also react more when the global financial cycle turns (cols. [2]-[6]). A one standard deviation shock to the VXO index thus implies about 2 percent and ½ percent of GDP lower net flows in fixed and intermediate regimes, respectively, as compared to floats (against mean quarterly net flows of about 4 percent of GDP in fixed and intermediate regimes).

This result holds when we include the U.S. real interest rate in the specification, though the coefficient on U.S. interest rate, as well as on its interaction terms with the fixed and intermediate exchange rate regimes, is statistically insignificant (cols. [3]-[4]). Considering quarter-year effects and estimating the model over a shorter period (2000–13) in cols. [5] and [6]), respectively, do not affect the results much either. Among other factors, countries with higher real GDP growth and stronger institutional quality attract more net flows, while more

financially-developed economies tend to receive less flows (in percent of GDP).[29] On average, net financial flows fell across countries during the global financial crisis.

While the larger net private flows (positive or negative) under fixed exchange rate regimes might be expected—since the exchange rate does not adjust to reduce the incentive for capital to flow—the results presented below suggest that more is at play. In particular, we find that liability (nonresident) flows differ markedly across exchange rate regimes, whereas asset flows do not. Thus, foreign investors are more likely to invest in pegged regimes than in more flexible rate regimes; but they are also more skittish under such regimes when global risk aversion rises (Table 6, cols. [2]-[6]). Looking at the disaggregated exchange rate regime classification suggests that the differential impact of global financial conditions on liability flows exists for hard pegs, single currency pegs, and basket pegs (Table A5; cols. [1]-[4]). These relatively rigid exchange rate regimes, on average, experience larger inflows (presumably because of low currency risk), but also more pronounced fluctuations in capital flows with changes in global investor sentiment than flexible regimes.

Across the different types of liability flows, we find that both portfolio and other investment (mainly cross-border bank) flows react strongly to the VXO—dropping sharply as global risk aversion rises, and vice versa—but foreign direct investment (FDI) flows remain stable (Table 7). The sensitivity of portfolio flows to the VXO is, however, not affected by the exchange rate regime (col. [4]-[6])—and perhaps it is for this reason that we do not find stock prices to be differentially affected by the exchange rate regime (in Table 3), as they are strongly affected by portfolio flows. By contrast, the decline in both FDI and other investment liability flows to EMEs is larger in fixed exchange rate regimes, as compared to intermediate regimes or floats.

For asset (domestic resident-driven) flows, fixed exchange rate regimes are not particularly more prone to receiving large inflows—although there is some evidence that intermediate regimes may attract more asset flows than floats (Table 8). Notably, the impact of the VXO on asset flows is strongly positive, suggesting that residents retrench from abroad when global risk aversion rises (Table 8; cols. [1]-[4]).[30] The retrenchment, however, is smaller for intermediate regimes than for other regimes (as indicated by the significantly negative coefficient on the interaction term between intermediate regimes and the VXO index).

These findings reinforce those of earlier studies, which show that cross-border capital flows to EMEs respond strongly to global market volatility and investor risk aversion (e.g., Bruno and Shin, 2015b; Ghosh et al., 2014; Ahmed and Zlate, 2014). In addition, they establish that there are systematic differences across exchange rate regimes, with liability flows to fixed regimes responding much more strongly to global financial shocks than to flexible regimes.

[29] These findings are in line with those of recent studies (e.g., Ghosh et al., 2014; Ahmed and Zlate, 2014), which also show that fast growing and institutionally strong EMEs attract more inflows. To mitigate endogeneity concerns in the estimations, domestic variables (year-on-year real GDP growth, institutional quality, credit to GDP ratio) are lagged by two quarters.

[30] Much of this retrenchment appears to in the category of "other investment"; presumably capturing the unwinding of cross-border positions by banks in the face of large financial shocks.

### C. Effects on the Real Economy

Evidently, financial conditions in EMEs react strongly to the global financial cycle, with the exchange rate regime playing an important role in determining the degree to which global shocks are transmitted. But does this have any macroeconomic relevance? Is output also affected more under fixed exchange rates when global financial conditions change?

To examine the macroeconomic relevance of exchange rate regimes, we estimate (2) using quarterly real GDP growth rate as the dependent variable. Controlling for relevant factors—such as (lagged) institutional quality, the level of financial development, real GDP per capita, net capital flows, country-specific effects, a time trend, and a dummy for the global financial crisis—the results reported in Table 9 (cols. [1]-[3]) show that the real output growth rate in EMEs declines as the VXO rises, with a one standard deviation shock to the VXO implying a 0.2 percentage point decline in the growth rate (against a mean quarterly growth rate of 1 percent across exchange rate regimes). The decline in output is, however, double for fixed exchange rate regimes compared to both intermediate regimes and floats—with a one standard deviation shock to the VXO lowering the growth rate by about 0.4 percentage points in fixed regimes relative to the rest. These results hold if we consider year-on-year real output growth rates, or the volatility of quarterly growth rates (defined as the 3 or 5-quarter rolling standard deviation of real GDP growth rates), where we find that fixed rate regimes experience significantly greater output volatility than floats when VXO rises.

Our findings thus suggest that the insulation properties afforded by flexible exchange rates can materially reduce the costs to EMEs from global financial shocks.[31] Nevertheless, the significantly negative coefficient on the VXO and the U.S. real interest rate in Table 9 (cols. [1]-[2]) also suggests that the insulation is not perfect—global financial conditions still get transmitted to domestic macroeconomic conditions even under flexible exchange rates, underscoring the utility of complementary elements of the policy toolkit to achieve macro-financial goals (Ostry et al., 2010, 2011, 2012; Obstfeld, 2014; Rey, 2015).

## IV. Sensitivity Analysis

To check the robustness of our estimates reported above, we conduct a range of sensitivity tests with alternative econometric specifications, samples, and exchange rate regime classifications, and by addressing relevant endogeneity concerns.

### Alternative specifications and samples

In the estimations reported in Tables 1-4, we include several relevant domestic and global variables, country-fixed effects, and time effects to control for factors that may influence domestic financial conditions, but may also be correlated with the VXO index and the exchange rate regimes. Here we consider some additional control variables such as the overall level of capital account openness, changes in reserve requirements (to proxy for changes in macroprudential policy), institutional quality, and change in the (log) VXO index.

[31] These results are similar to those of di Giovanni and Shambaugh (2008), who show that interest rate independence allows flexible exchange rate countries to experience smaller contractionary effects of higher foreign interest rates than pegs.

Table 10 shows that our results are generally robust to the inclusion of these additional variables. Thus, for example, including the Quinn and Toyoda (2008) capital account openness index, the coefficient on the interaction term between the fixed exchange rate regime and the VXO remains negative and statistically significant in the credit, house price, and leverage growth regressions (cols. [1], [6], [16]), but is insignificant in the equity return regression (col. [11]). Controlling for changes in reserve requirements (or institutional quality) does not affect the results either—though a tightening of reserve requirements appears to dampen credit growth and stock price increases (cols. [2], [12]). Finally, including the change in the (log) VXO, along with its interaction with fixed and intermediate regimes, does not affect the results much for the VXO index in levels. The only exception is the domestic credit growth regression, where the coefficient on the interaction term with fixed exchange rate regimes turns marginally statistically insignificant (p-value=0.11; col. [3]). (The change in the (log) VXO itself does not come out to be a statistically important factor in any of the specifications; cols. [3], [8], [13], [18].)[32]

Our results are also robust to different sample compositions such as restricting the sample to major EMEs (and considering the countries covered in Passari and Rey, 2015), or to restricting the sample to fully open EMEs (as identified by the maximum value of the Quinn-Toyoda measure of capital account openness).[33] In the latter case, our sample size drops by two-thirds of the original sample (comprising 22 countries), yet the results remain largely similar—fixed regimes experience a larger decline relative to other regimes in credit, house price, and leverage growth as the VXO rises (Table 10, cols. [4], [9], [14], [19]). This attenuates concerns that the results for the full sample are perhaps driven by floating regimes with some form of capital account restrictions in place. (This also confirms that, in comparison to advanced economies, the results for EMEs are not driven by differential financial integration across these two samples.)

Moreover, the results are robust to the exclusion of extreme observations (defined as those in the bottom and top 0.25$^{th}$ percentile of the distribution of domestic financial variables) in the data. Removing these outliers, we find no dramatic change in the results for real domestic credit, house price, and stock price growth regressions (Table 10; cols. [5],[10],[15]), though the coefficient on the interaction term between fixed exchange rate regimes and the VXO loses statistical significance (p-value=0.23) in the leverage growth regression (col. [20]).[34]

**Other classifications**

The overall picture that emerges from the results obtained above is that less flexible exchange rate regimes are more prone to financial vulnerabilities than floats. At the same

[32] In addition, we examine if the VXO has asymmetric effects across exchange rate regimes such that increases in the index have a different effect from decreases in the index; or increases in the index above the mean have a different impact than increases when the index is below the mean, but do not find any strong evidence of asymmetric effects.

[33] The EMEs included in the Passari and Rey (2015) sample are Argentina, Belarus, Bolivia, Brazil, Bulgaria, China, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Ecuador, Hungary, Indonesia, Korea, Latvia, Lithuania, Malaysia, Mexico, Poland, Romania, Russia, Serbia, Slovak Republic, South Africa, Thailand, and Turkey.

[34] In the estimations, we use the three-quarter centered moving average of the quarterly financial and real variables to reduce noise; the results are, however, robust to using the four-quarter moving average instead.

time, they are also more sensitive to global financial conditions than floats—with the decline (increase) in domestic credit, house prices, and leverage being more pronounced in fixed exchange rate regimes when global risk aversion rises (falls). In broad terms, a similar picture is obtained using alternative exchange rate regime classifications. With Reinhart and Rogoff's (RR) de facto classification, e.g., where lower numbers correspond to more rigid exchange rate regimes and higher numbers up to 4 indicate floating regimes, we find that hard pegs as well as conventional pegs (coarse classification 1) are more likely to experience rapid credit, house price, and leverage growth (Table 11, cols. [1], [4], [10]). But these regimes are also more likely to experience a sharper reversal in domestic conditions when global sentiment changes (as indicated by the significantly negative coefficient on the interaction term between RR's coarse classification 1 and the VXO). Other flexible regimes (coarse classifications 2 and 3) are generally at least as insulated from global financial shocks as pure floats.[35] Similar results are obtained using the de jure—or officially announced—exchange rate regime classification compiled by the IMF (cols. [2], [5]). The main difference is for the leverage variable, where using the de jure classification, we do not find a significantly different effect of fixed or intermediate exchange rate regimes (col. [11]).[36]

**Endogeneity**

An important concern with any empirical analysis of performance under alternative exchange rate regimes is the possibility of regime endogeneity. In our analysis, there are two possible sources of endogeneity: omitted variables and reverse causality.

*Omitted Variables*

To address the concern of omitted variables, we include in our benchmark specification a range of time-varying domestic variables, country-fixed effects, and time effects that may be correlated with the financial variables, as well as with the exchange rate regime and the VXO. Despite this, there may be a concern that the inclusion of these terms in linear form would not prevent the interaction terms from spuriously picking up the effect of possibly correlated variables (Balli and Sørensen, 2013). To address this issue, we follow two approaches. First, we include in the estimations interaction terms between the exchange rate regime variables and several domestic and global variables (such as institutional quality; credit to GDP; capital account openness; commodity prices). This, however, does not change the earlier results in a significant way. Second, we orthogonalize the exchange rate regime variables, as well as the VXO index, with respect to other possibly correlated regressors, and include these orthogonalized variables in the estimation in both linear and interaction forms.[37]

[35] We use RR's updated monthly de facto classification available up to 2010 to compute the quarterly classification (taking the three-month average). The coarse classification ranges from 1-6, but we exclude categories 5 and 6 that correspond to freely falling currencies and dual markets with missing data on parallel markets, respectively. Although RR's classification considers pre-announced pegs as a rigid regime (coarse classification 1), some of the pre-announced pegs (such as Latvia in 2005–09, Lithuania in 2004–06 and 2009–10, El Salvador in 1986–88) are not classified as such. For consistency, we consider these cases in coarse category 1.

[36] The less pronounced economic differences across regimes in the de jure classification as compared to the de facto classification could at least partly be attributed to the fact that many de jure *floats* are de facto *fixed* exchange rate regimes.

[37] Specifically, we regress the fixed and intermediate exchange rate regime variables on real GDP growth, net capital flows to GDP, domestic credit to GDP, institutional quality, the capital account openness index, country-specific effects, and

The results for this exercise, reported in Table 11 (cols. [3], [6], [9], [12]), are quite similar to those above, except for the house price growth regression, where the coefficient on the interaction term between fixed regimes and VXO while staying about the same in magnitude, turns statistically insignificant (p-value=0.16).

*Simultaneity*

The concern of reverse causality between the exchange rate regime and domestic financial variables—is less pertinent here as regimes tend to be persistent while financial variables (especially at a quarterly frequency) are quite volatile.[38] Nevertheless, in all estimations reported above, we dropped observations pertaining to financial crisis years (when a switch in the exchange rate regime may have occurred because of changes in domestic financial or economic conditions). Results do not change if we exclude *all* (and not only the crisis) years in which an exchange rate regime switch happened.

To further address reverse causality concerns, we consider in our sample only those countries for which no exchange rate regime switch happened over the sample period. Since only a handful of countries have not switched exchange rate regimes even once over the entire sample period, we consider a shorter time horizon of 2005–13 for this purpose. As is evident from the results reported in Table 11, although the sample size drops considerably in this case, our findings remain quite robust.[39]

## V. CONCLUSION

The notion that the exchange rate regime is of little salience in the transmission of global monetary and financial shocks to emerging market economies, if true, would represent a fundamental break with longstanding academic thinking and policy advice to these countries. Recent research, drawing on the transmission of shocks across advanced countries, contends that global financial integration has progressed to such an extent that, even if the exchange rate regime could potentially act as a brake on the extent of cross-border transmission, as a practical and empirical matter, it is small beer. In such a world, the choice of exchange rate regime does not provide effective insulation against global financial shocks, and domestic financial variables behave to a first approximation similarly across different exchange rate regimes in the face of foreign shocks.

Emerging markets, however, generally have little power to affect global financial conditions and generally are more prone than advanced economies to experiencing boom-bust cycles in

---

quarter-year effects; and the VXO index on U.S. real short-term interest rates and commodity prices. Using the residuals obtained from these regressions, we create the interaction terms and estimate (2), and bootstrap the standard errors.

[38] It should be noted that for reverse causality to drive our findings that less flexible regimes are more prone to financial vulnerabilities and more sensitive to the global financial cycle, it would have to be the case that countries switch toward *less* flexible regimes when such vulnerabilities build up. As noted in Ghosh et al. (2015), however, it is empirically difficult to find evidence that underlying macroeconomic and financial conditions prompt switches in the exchange rate regime in any direction (either toward more or less flexibility).

[39] We do not consider reverse causality between domestic financial conditions in EMEs and the VXO index to be a major concern in our estimations as EMEs had limited influence on the VXO over the sample period. This is also confirmed by a regression of the VXO index on EME country-specific financial variables, where we find the coefficients on these variables to be close to zero and wholly statistically insignificant.

capital flows with changes in the external environment. This paper, therefore, focuses specifically on the transmission of global financial shocks to EMEs. These countries have a richer diversity of exchange rate regimes, and policy advice on the choice of exchange rate regime is a live issue in comparison to advanced economies (the vast majority of which either float or are in the eurozone).

Our findings suggest that the exchange rate regime indeed *does* exert statistically and economically significant effects on the nature of the transmission of global financial shocks to domestic financial variables in EMEs. In particular, exchange rate flexibility successfully dampens the magnitude of the cross-border transmission to domestic credit growth, real estate prices, and financial sector leverage. Moreover, it is the most inflexible regimes that are responsible for this finding: regimes toward the flexible end of the spectrum (bands, crawls, managed floats) are largely similar to pure floats from an insulation perspective.

A key reason why domestic financial variables respond differentially to global financial shocks relates to the behavior of private capital flows. Global investor risk aversion shocks are transmitted more strongly through cross-border flows when the recipient countries have relatively inflexible exchange rate regimes than when they have more flexible regimes. This result is driven mainly by liability flows, and within such flows by other investment (mainly banking) flows and to some extent foreign direct investment. Portfolio flows, which are highly sensitive to global financial shocks, are not materially affected by the flexibility of the exchange rate regime.

Our findings, moreover, seem to be macroeconomically relevant. Reflecting the differential impact of global financial shocks on different domestic financial variables, the impulse from global financial shocks to domestic economic growth is likewise differentially affected across exchange rate regimes (with stronger transmission, the more inflexible the regime). The impact is economically sizable, with output almost twice as sensitive in the case of fixed exchange rate regimes compared to both intermediates and floats.

Arguing for irrelevance of the exchange rate regime in the face of global financial shocks is thus not consistent with the empirical evidence for emerging market economies. While in today's integrated world, exchange rate flexibility does not provide perfect insulation, the choice of exchange rate regime—alongside choices for other elements of the policy toolkit (including capital controls and macroprudential policy)—remains an important lever for managing domestic financial and macroeconomic outcomes in the face of volatile global financial conditions.

**References**

Ahearne, A., J. Ammer, B. Doyle, L. Kole, and R. Martin, 2005, "House Prices and Monetary Policy: A Cross-Country Study," International Finance Discussion Papers No. 841 (Washington, D.C.: Board of Governors of the Federal Reserve System).

Ahmed, S., and A. Zlate, 2014, "Capital Flows to Emerging Market Economies: A Brave New World?" *Journal of International Money and Finance*, 48(PB): 221-248.

Aizenman, J., M. Chinn, and H. Ito, 2015, "Monetary Policy Spillovers and the Trilemma in the New Normal: Periphery Country Sensitivity to Core Country Conditions," NBER Working Papers 21128 (Cambridge, MA: National Bureau of Economic Research).

Balli, H., and B. Sorensen, 2013, "Interaction Effects in Econometrics," *Empirical Economics*, 45(1): 583-603.

Baxter, M., and A. Stockman, 1989, "Business Cycles and the Exchange-Rate Regime: Some International Evidence," *Journal of Monetary Economics*, 23(3): 377-400.

Bekaert, G., M. Ehrmann, M. Fratzscher, and A. Mehl, 2014, "The Global Crisis and Equity Market Contagion," *The Journal of Finance*, 69(6): 2597-2649.

Bekaert, G., and A. Mehl, 2017, "On the Global Financial Market Integration 'Swoosh' and the Trilemma," NBER Working Paper 23124 (Cambridge, MA: NBER).

Bluedorn, J., and C. Bowdler, 2010, "The Empirics of International Monetary Transmission: Identification and the Impossible Trinity," *Journal of Money, Credit and Banking*, 42(4): 679-713.

Borensztein, E., J. Zettelmeyer, and T. Philippon, 2001, "Monetary Independence in Emerging Markets: Does the Exchange Rate Regime Make a Difference?" IMF Working Paper WP/10/11 (Washington DC: International Monetary Fund).

Bruno, V., and H. Shin, 2015a, "Capital Flows and the Risk-Taking Channel of Monetary Policy," *Journal of Monetary Economics*, 71(April): 119-132.

Bruno, V., and H. Shin, 2015b, "Cross-Border Banking and Global Liquidity," *Review of Economic Studies*, 82(2): 535-564.

Caceres, C., Y. Carriere-Swallow, and B. Gruss, 2016, "Global Financial Conditions and Monetary Policy Autonomy," IMF Working Paper WP/16/108.

Calvo, G., and C. Reinhart, 2002, "Fear of Floating," *Quarterly Journal of Economics*, 117(2): 379-408.

Calvo, G., L. Leiderman, and C. Reinhart, 1993, "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors," *IMF Staff Papers*, 40(1): 108-151.

Claessens, S., A. Kose, and M. Terrones, 2011, "Financial Cycles: What? How? When?" *NBER International Seminar on Macroeconomics*, 7(1): 303-344.

di Giovanni, J., and J. Shambaugh, 2008, "The Impact of Foreign Interest rates on the Economy: The Role of the Exchange Rate Regime," *Journal of International Economics*, 74(2): 341-361.

Edwards, S. (2015), "Monetary Policy Independence under Flexible Exchange Rates: An Illusion?" *World Economy*, 38(5): 773-787.
Fernandez-Arias, E., 1996, "The New Wave of Private Capital Inflows: Push or Pull?" *Journal of Development Economics*, 38(2): 389-418.

Fischer, S., 2001, "Exchange Rate Regimes: Is the Bipolar View Correct?" Remarks made at the American Economic Association Meeting, New Orleans, January 6.

Frankel, J., S. Schmukler, and L. Serven, Luis, 2004, "Global Transmission of Interest Rates: Monetary Independence and Currency Regime," *Journal of International Money and Finance*, 23(5): 701-733.

Georgiadis, G., and A. Mehl, 2015, "Trilemma, Not Dilemma: Financial Globalisation and Monetary Policy Effectiveness," Globalization and Monetary Policy Institute Working Paper 222 (Dallas: Federal Reserve Bank of Dallas).

Gertler, M., and P. Karadi, 2011, "A Model of Unconventional Monetary Policy," *Journal of Monetary Economics*, 58(January): 17-34.

Ghosh, A., J. Ostry, and C. Tsangarides, 2010, "Exchange Rate Regimes and the Stability of the International Monetary System," IMF Occasional Paper 270 (Washington D.C.: IMF).

Ghosh, A., J. Ostry, and M. Qureshi, 2015, "Exchange Rate Management and Crisis Susceptibility: A Reassessment," *IMF Economic Review,* 63(1): 238-276.

Ghosh, A., J. Ostry, and M. Qureshi, 2017, "Managing the Tide: How Do Emerging Markets Respond to Capital Flows?" IMF Working Paper, forthcoming.

Ghosh, A., M. Qureshi, J. Kim, J. Zalduendo, 2014, "Surges," *Journal of International Economics*, 92(2): 266-285.

Goldberg, L., 2013, "*Banking Globalization*, *Transmission, and Monetary Policy Autonomy*," NBER Working Paper 19497 (Cambridge, MA: National Bureau of Economic Research).

Goodhart, C., and P. Turner, 2014, "Rate Rise Pattern is Different This Time," *Financial Times*, April 2, 2014 (https://www.ft.com/content/2e28e3fc-b984-11e3-b74f-00144feabdc0).

Hofmann, B., and E. Takatas, 2015, "International Monetary Spillovers," *BIS Quarterly Review*, September: 105-118.

Jeanne, O., and A. Rose, 2002, "Noise Trading and Exchange Rate Regimes," *Quarterly Journal of Economics*, 117 (2): 537-569.

Klein, M., and J. Shambaugh, 2015, "Rounding the Corners of the Policy Trilemma: Sources of Monetary Policy Autonomy," *American Economic Journal: Macroeconomics*, 7(4): 33-66.

Krippner, L., 2013, "Measuring the Stance of Monetary Policy in Zero Lower Bound Environments," *Economics Letters*, 118(1): 135–138.

Laeven, L., and F. Valencia, 2013, "Systemic Banking Crises Database," *IMF Economic Review*, 61(2): 225-270.

Levy-Yeyati, E., and F. Sturzenegger, 2005, "Classifying Exchange Rate Regimes: Deeds vs. Words," *European Economic Review*, 49(6), 1603-1635.

Magud, N., C. Reinhart, and E.Vesperoni, 2014, "Capital Inflows, Exchange Rate Flexibility and Credit Booms," *Review of Development Economics*, 18(3): 415-430.

Miniane, J., and J. Rogers, 2007, "Capital Controls and the International Transmission of U.S. Monetary Shocks," *Journal of Money, Credit and Banking*, 39(5): 1003-1035.

Miranda-Agrippino, S., and H. Rey, 2015, "World Asset Markets and the Global Financial Cycle," NBER Working Paper 21722 (Cambridge, MA: NBER).

Mundell, R., 1963, "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," *The Canadian Journal of Economics and Political Science*, 29(4): 475-485.

Obstfeld, M., 2014, "Trilemmas and Trade-offs: Living with Financial Globalization," Paper presented at the *Inaugural Asian Monetary Policy Forum*, Singapore, May 2014 (http://abfer.org/docs/ampf/2014/Trilemmas_ampf-paper.pdf).

Obstfeld, M., J. Shambaugh, and A. Taylor, 2005, "The Trilemma in History: Tradeoffs among Exchange Rates, Monetary Policies, and Capital Mobility," *Review of Economics and Statistics*, 87(3): 423-438.

Obstfeld, M., and A. Taylor, 1998, "The Great Depression as a Watershed: International Capital Mobility Over the Long Run," in M. Bordo, C. Goldin, and E. White (eds.), *The Defining Moment: The Great Depression and the American Economy in the Twentieth Century*, 353–402 (Chicago: University of Chicago Press).

Ostry, J., 2014, "Comment on Trilemmas and Tradeoffs by Maurice Obstfeld," Remarks made at the *Inaugural Asian Monetary Policy Forum*, Singapore, May 2014 (http://abfer.org/docs/ampf/2014/AMPFDiscussion-discussant-jonathan.pdf).

Ostry, J., A. Ghosh, K. Habermeier, M. Chamon, M. Qureshi, and D. Reinhardt, 2010, "Capital Inflows: The Role of Controls," IMF Staff Position Notes 2010/04 (Washington D.C.: International Monetary Fund).

Ostry, J., A. Ghosh, M. Chamon, and M. Qureshi, 2011, "Capital Controls: When and Why?" *IMF Economic Review*, 59(3): 562-580.

Ostry, J., A. Ghosh, M. Chamon, and M. Qureshi, 2012, "Tools for Managing Financial Stability Risks," *Journal of International Economics*, 88(2): 407-421.

Passari, E., and H. Rey, 2015, "Financial Flows and the International Monetary System," *Economic Journal*, 125(584): 675–698.

Quinn, D., and A. Toyoda, 2008, "Does Capital Account Liberalization Lead to Economic Growth?" *Review of Financial Studies*, 21(3):1403-1449.

Rajan, R., 2014, "Competitive Monetary Easing: Is It Yesterday Once More?" Remarks made at the Brooking Institution, Washington DC, April 10, 2014 (https://rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=886).

Reinhart, C., and K. Rogoff, 2004, "The Modern History of Exchange Rate Arrangements: A Reinterpretation," *Quarterly Journal of Economics*, 119(1): 1-48.

Reinhart, C., and V. Reinhart, 2008, "Capital Flow Bonanzas: An Encompassing View of the Past and Present," NBER Working Paper 14321 (Cambridge, MA: NBER).

Rey, H., 2015, "Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence," NBER Working Paper 21162 (Cambridge, MA: NBER).

Rey, H., 2016, "International Channels of Transmission of Monetary Policy and the Mundellian Trilemma," *IMF Economic Review*, 64(1): 6-35.

Ricci, L., and W. Shi, 2016, "Trilemma or Dilemma: Inspecting the Heterogeneous Response of Local Currency Interest Rates to Foreign Rates," IMF Working Paper No. 16/75.

Rogoff, K., A. Husain, A. Mody, R. Brooks, and N. Oomes, 2004, "Evolution and Performance of Exchange Rate Regimes," IMF Occasional Paper 229 (Washington D.C.: International Monetary Fund).

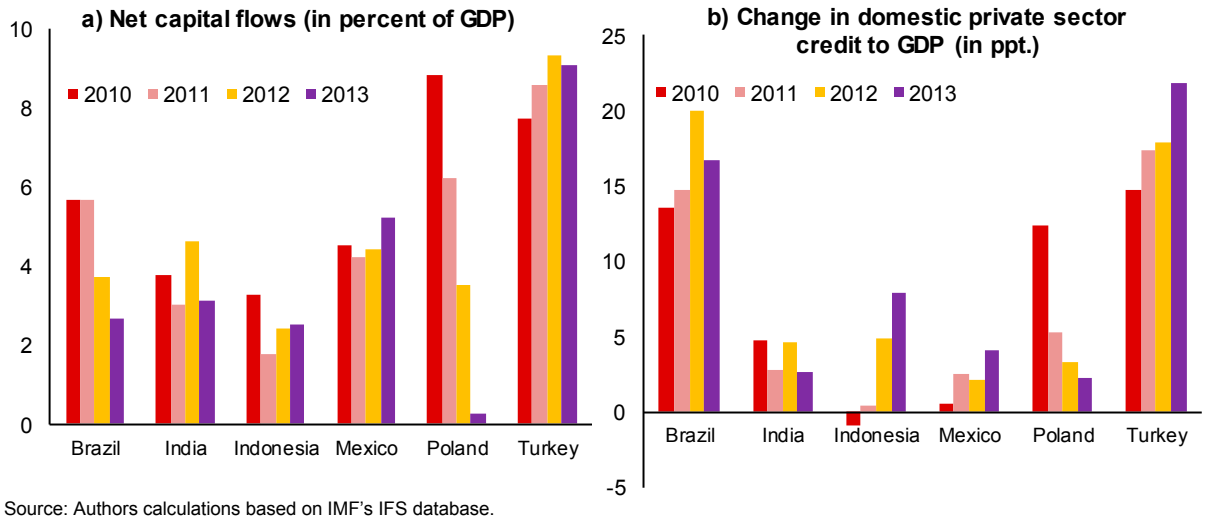
Rose, A., 2011, "Exchange Rate Regimes in the Modern Era: Fixed, Floating, and Flaky," *Journal of Economic Literature*, 49(3): 652-72.

Shambaugh, J., 2004, "The Effect of Fixed Exchange Rates on Monetary Policy," *The Quarterly Journal of Economics*, 119(1): 301-352.s

Shin, H., 2016, "The Bank/Capital Markets Nexus Goes Global," Remarks made at the London School of Economics and Political Science, November 15, 2016 (http://www.bis.org/speeches/sp161115.pdf).

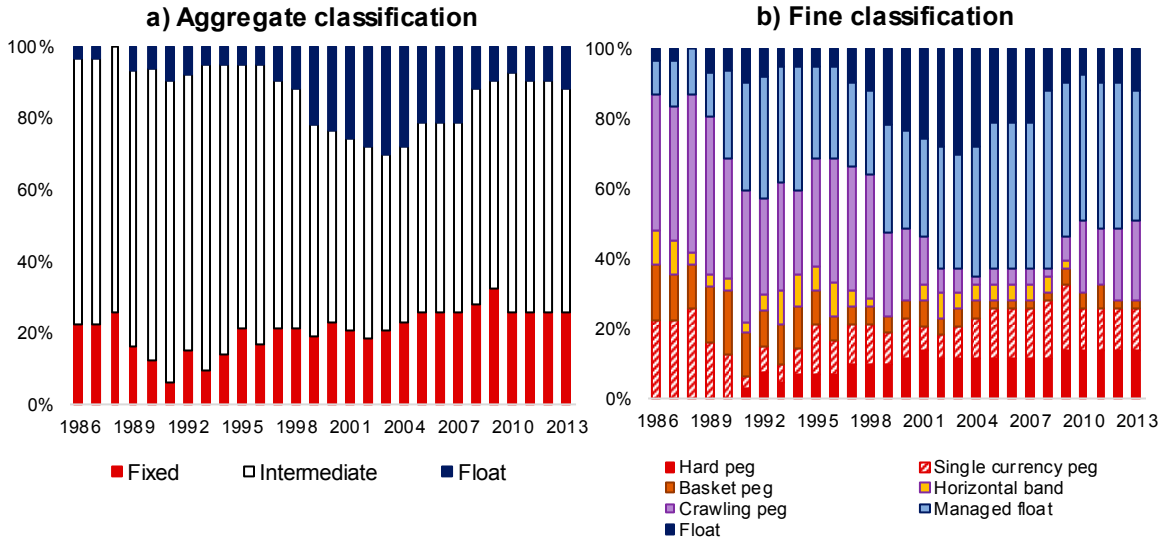
Volcker, P., 1978, "The Political Economy of the Dollar," Federal Reserve Bank of New York Quarterly Review, Winter (1978-79): 1-12.

**Figure 1. Net Capital Flows and Domestic Credit in EMEs, 2010–13**



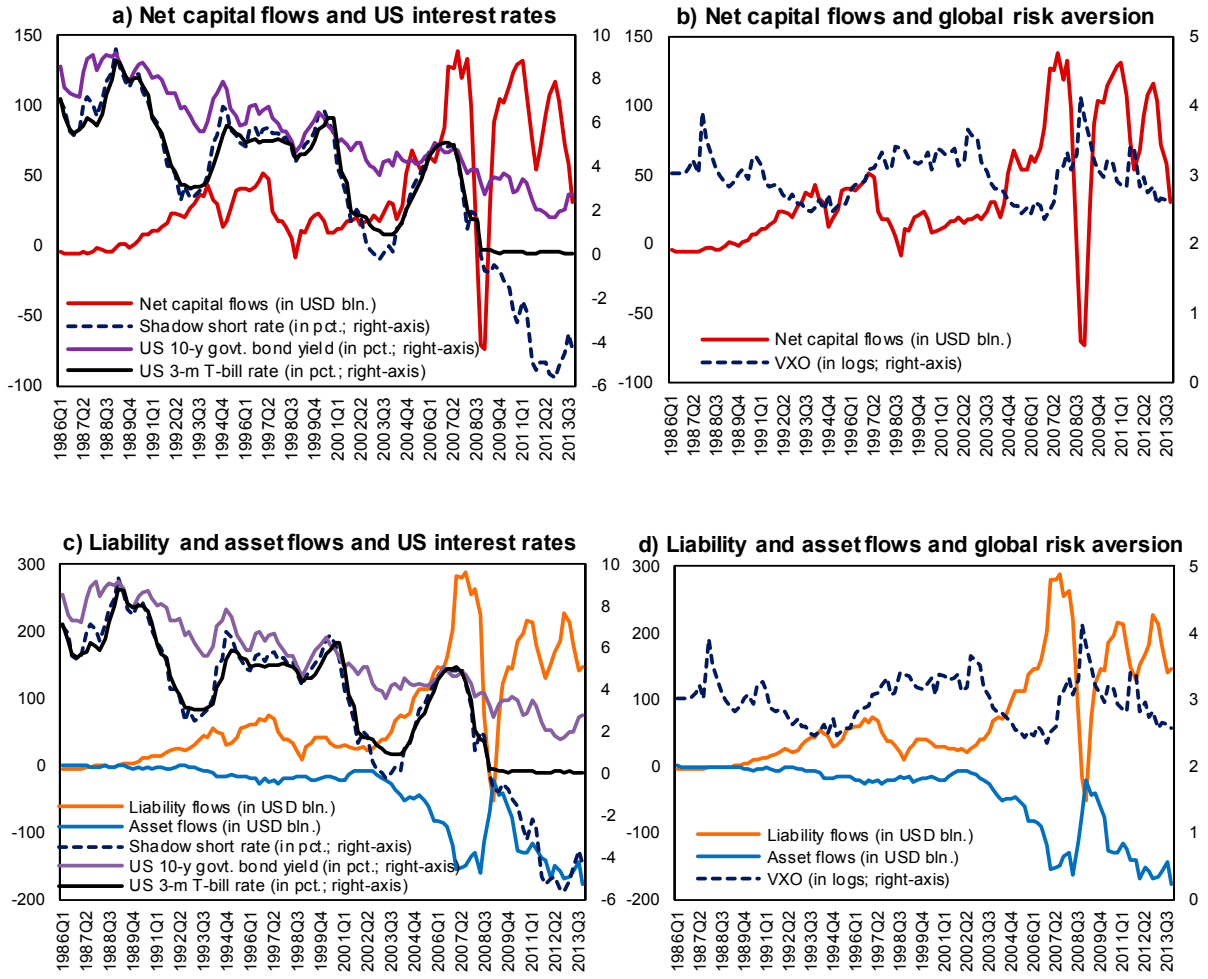

Source: Authors calculations based on IMF's IFS database.
Notes: Net capital flows exclude other investment liabilities of the general government and reserve assets. Change in domestic credit to GDP ratio is 3-year cumulative change.

**Figure 2. De Facto Exchange Rate Regimes in EMEs, 1986–2013**



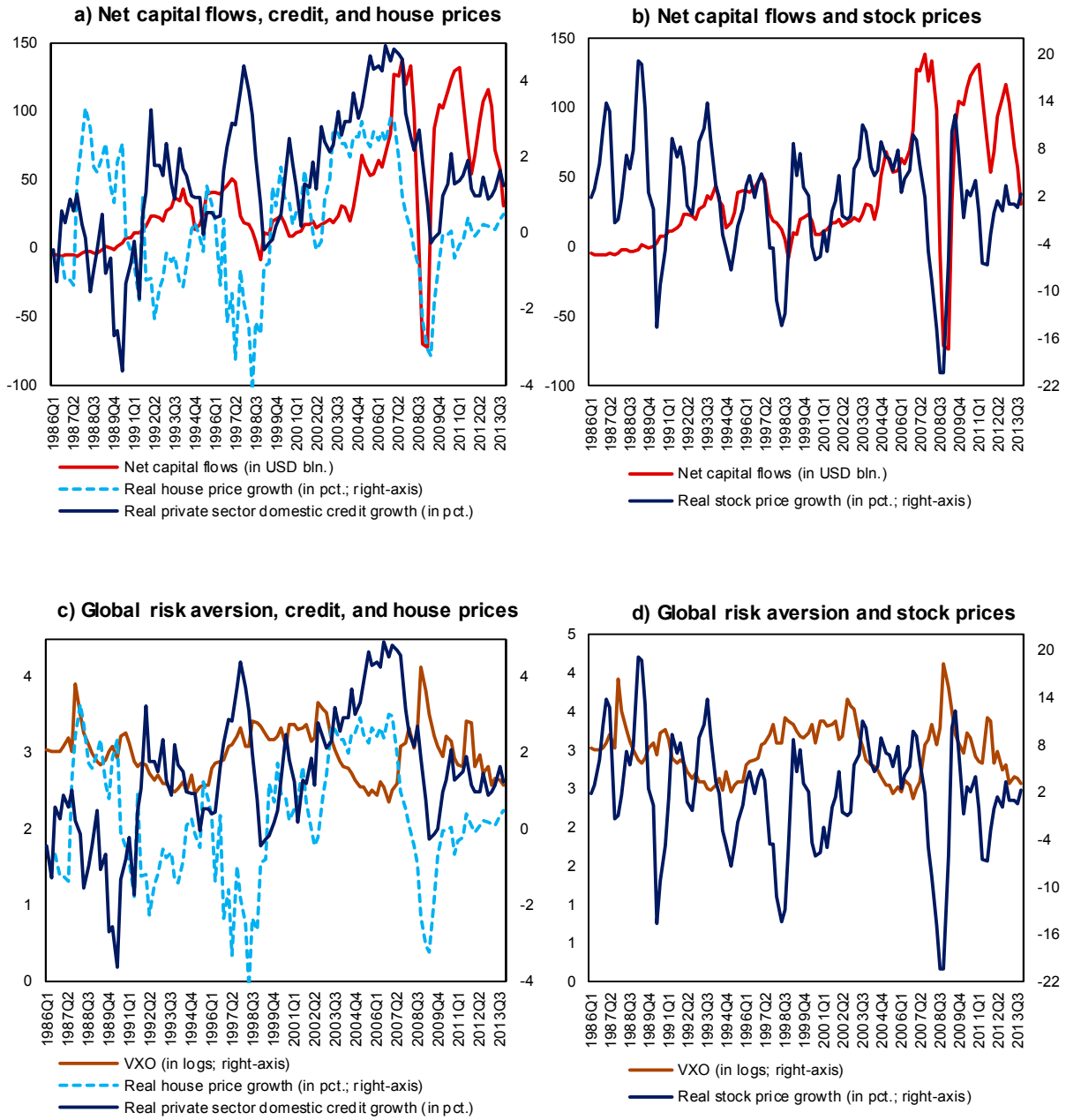

Source: Ghosh, Ostry, and Qureshi (2015).

**Figure 3. Global Factors and Capital Flows to EMEs, 1986Q1–2013Q4**



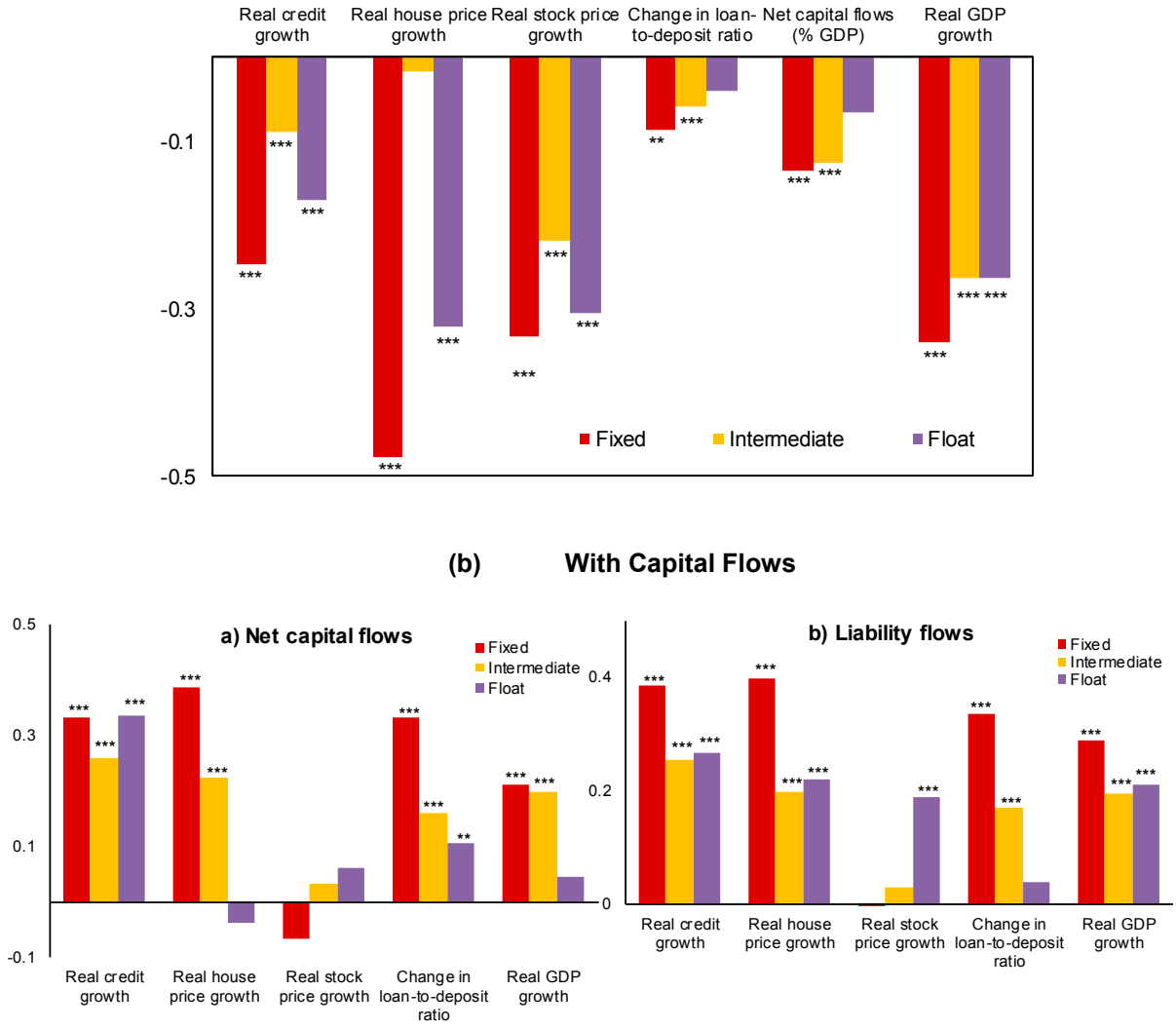

Sources: IFS database, Bloomberg, and Krippner (2013).
Notes: Figures present three quarter moving average of flows. Net capital flows exclude other investment liabilities of the general government and reserve assets. Flows are presented in BPM5 terms with positive (negative) numbers indicating inflows (outflows).

## Figure 4. Global Risk Aversion, Capital Flows and Financial Variables in EMEs



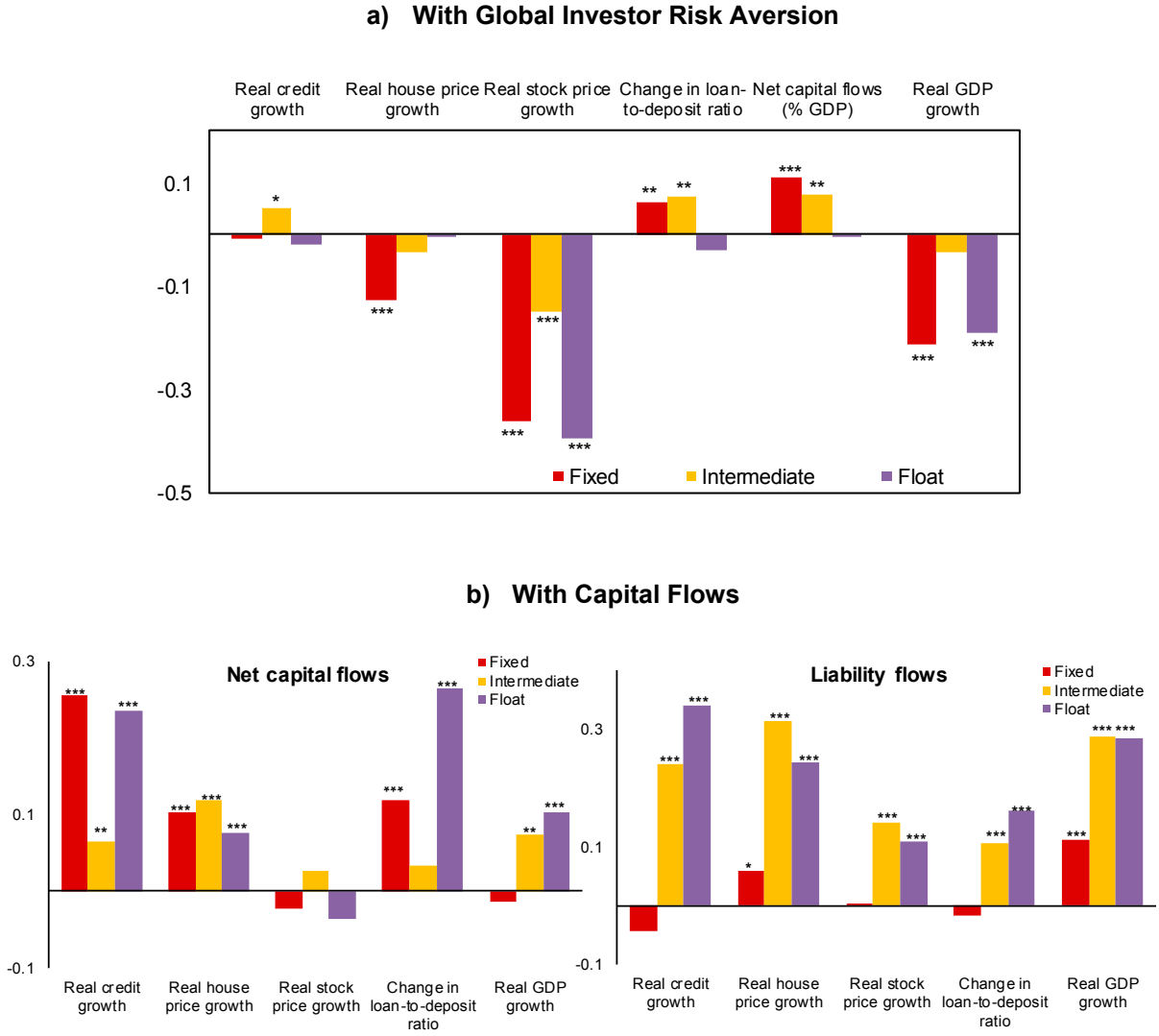

Sources: Authors' calculations based on IFS database, and Bloomberg.
Notes: Three-quarter moving average of net capital flows, real domestic credit growth, real house price growth, and real stock price growth is presented. Net capital flows exclude other investment liabilities of the general government and reserve assets. Flows are presented in BPM5 terms with positive (negative) numbers indicating inflows (outflows).

**Figure 5. Correlation of Financial and Macroeconomic Variables in EMEs**




Source: Authors' calculations.
Note: Panel [a] shows the unconditional correlation across countries between the (log) VXO index and three-quarter moving average of real domestic private sector credit growth, real house price growth, real stock price growth, change in loan-to-deposit ratio, net capital flows to GDP, and real GDP growth. Panel [b] shows the unconditional correlation between three-quarter moving average of net and liability flows, and real domestic private sector credit growth, real house price growth, real stock price growth, change in loan-to-deposit ratio, net capital flows to GDP, and real GDP growth. *,**, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

**Figure 6. Correlation of Financial and Macroeconomic Variables in Advanced Countries**




Source: Authors' calculations.
Note: Panel [a] shows the unconditional correlation across countries between the (log) VXO index and three-quarter moving average of real domestic private sector credit growth, real house price growth, real stock price growth, change in loan-to-deposit ratio, net capital flows to GDP, and real GDP growth. Panel [b] shows unconditional correlation between three-quarter moving average of net and liability flows, and real domestic private sector credit growth, real house price growth, real stock price growth, change in loan-to-deposit ratio, net capital flows to GDP, and real GDP growth. The sample comprises Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. Including the United States in the sample has no significant impact on the correlations. *,**, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

**Table 1. Real Domestic Credit Growth in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 | 1986-2013 |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Fixed regime | 3.007*** | 8.942*** | 8.822*** | 9.345*** | 10.089*** | 10.061*** | 9.222** |
| | (1.011) | (3.149) | (3.165) | (3.151) | (3.086) | (3.440) | (4.095) |
| Intermediate regime | 1.141 | 0.436 | 0.529 | 0.894 | 1.650 | 3.714* | 2.001 |
| | (0.726) | (2.131) | (2.132) | (2.197) | (2.270) | (2.024) | (2.347) |
| Log (VXO) | -1.542*** | -1.241* | -1.228* | -1.136* | | | |
| | (0.490) | (0.655) | (0.643) | (0.672) | | | |
| Fixed x log (VXO) | | -1.981* | -1.942* | -2.091** | -2.312** | -2.543** | -3.069** |
| | | (1.003) | (1.002) | (1.002) | (0.988) | (1.068) | (1.237) |
| Intermediate x log (VXO) | | 0.237 | 0.204 | 0.111 | -0.087 | -0.921 | -0.743 |
| | | (0.726) | (0.723) | (0.743) | (0.768) | (0.628) | (0.726) |
| Lagged real GDP growth | 1.006*** | 0.994*** | 0.994*** | 0.976*** | 0.871*** | 0.723*** | 0.720*** |
| | (0.164) | (0.163) | (0.164) | (0.166) | (0.174) | (0.263) | (0.244) |
| Lagged private credit/GDP | -0.090*** | -0.091*** | -0.092*** | -0.090*** | -0.085*** | -0.145*** | -0.109*** |
| | (0.013) | (0.013) | (0.014) | (0.014) | (0.013) | (0.018) | (0.020) |
| Real US T-bill rate | | | 0.036 | | | | |
| | | | (0.079) | | | | |
| Fixed x real US T-bill rate | | | -0.103 | | | | |
| | | | (0.173) | | | | |
| Intermediate x real US T-bill rate | | | 0.021 | | | | |
| | | | (0.076) | | | | |
| Real shadow federal funds | | | | -0.002 | | | |
| | | | | (0.072) | | | |
| Fixed x real shadow rate | | | | 0.073 | | | |
| | | | | (0.129) | | | |
| Intermediate x real shadow rate | | | | 0.077 | | | |
| | | | | (0.063) | | | |
| Lagged net capital flows/GDP | | | | | | | 0.050*** |
| | | | | | | | (0.017) |
| Lagged central bank policy rate | | | | | | | -0.238** |
| | | | | | | | (0.113) |
| Linear trend | 0.016 | 0.015 | 0.017* | 0.022* | | | |
| | (0.010) | (0.010) | (0.010) | (0.012) | | | |
| Global financial crisis | 1.619*** | 1.714*** | 1.674*** | 1.523** | | | |
| | (0.552) | (0.553) | (0.571) | (0.578) | | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes | Yes |
| Observations | 2,555 | 2,555 | 2,555 | 2,555 | 2,555 | 1,844 | 1,598 |
| Adjusted R2 | 0.235 | 0.240 | 0.240 | 0.240 | 0.253 | 0.434 | 0.421 |
| No. of countries | 43 | 43 | 43 | 43 | 43 | 42 | 35 |

Note: Dependent variable is three-quarter moving average of quarterly real domestic private sector credit growth rate (in percent). Fixed exchange rate regime is a binary variable (=1for hard and single currency pegs). Intermediate regime is a binary variable (=1for basket pegs, horizontal bands, crawling pegs, and managed float exchange rate arrangements). Reference category is independent floats. All domestic control variables are lagged two periods to mitigate endogeneity concerns. Real GDP growth rate is the three-quarter moving average of quarterly real GDP growth rate. Global financial crisis is a binary variable equal to one for 2008Q4 and 2009Q1 Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 2. Real House Price Growth in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 | 1986-2013 |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Fixed regime | -0.797 | 10.690** | 10.652** | 10.942** | 15.126*** | 13.960*** | 18.053*** |
| | (1.486) | (5.131) | (5.030) | (4.827) | (3.887) | (3.687) | (3.653) |
| Intermediate regime | -0.943 | -7.926*** | -7.987*** | -7.949*** | -4.717 | -5.078 | -3.378 |
| | (0.856) | (2.772) | (2.779) | (2.810) | (3.918) | (3.665) | (3.515) |
| Log (VXO) | -0.933 | -1.346* | -1.376* | -1.328* | | | |
| | (0.753) | (0.768) | (0.758) | (0.772) | | | |
| Fixed regime x log (VXO) | | -3.815** | -3.794** | -3.871** | -4.488*** | -4.436*** | -5.519*** |
| | | (1.653) | (1.624) | (1.578) | (1.206) | (1.151) | (1.338) |
| Intermediate regime x log (VXO) | | 2.293** | 2.318** | 2.277** | 1.758 | 1.830 | 1.260 |
| | | (0.869) | (0.871) | (0.875) | (1.205) | (1.141) | (1.076) |
| Lagged real GDP growth | 0.890*** | 0.813*** | 0.806*** | 0.795*** | 0.807*** | 0.890*** | 0.934*** |
| | (0.190) | (0.157) | (0.168) | (0.166) | (0.204) | (0.220) | (0.272) |
| Lagged domestic credit growth | 0.124*** | 0.111*** | 0.112*** | 0.110*** | 0.082** | 0.172*** | 0.138* |
| | (0.041) | (0.038) | (0.037) | (0.038) | (0.033) | (0.044) | (0.070) |
| Real US T-bill rate | | | 0.113 | | | | |
| | | | (0.086) | | | | |
| Fixed regime x real T-bill rate | | | -0.097 | | | | |
| | | | (0.141) | | | | |
| Intermediate regime x real T-bill rate | | | -0.122 | | | | |
| | | | (0.110) | | | | |
| Real shadow federal funds rate | | | | 0.127* | | | |
| | | | | (0.067) | | | |
| Fixed x real shadow rate | | | | -0.064 | | | |
| | | | | (0.100) | | | |
| Intermediate x real shadow rate | | | | -0.133 | | | |
| | | | | (0.088) | | | |
| Lagged net capital flows/GDP | | | | | | | 0.011 |
| | | | | | | | (0.018) |
| Lagged central bank policy rate | | | | | | | 0.078*** |
| | | | | | | | (0.023) |
| Linear trend | -0.008 | -0.010 | -0.010 | -0.008 | | | |
| | (0.014) | (0.013) | (0.014) | (0.016) | | | |
| Global financial crisis | -1.546** | -1.645** | -1.660** | -1.716** | | | |
| | (0.698) | (0.758) | (0.768) | (0.805) | | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes | Yes |
| Observations | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 | 950 | 849 |
| Adjusted R2 | 0.226 | 0.293 | 0.293 | 0.295 | 0.367 | 0.416 | 0.408 |
| No. of countries | 25 | 25 | 25 | 25 | 25 | 25 | 22 |

Note: Dependent variable is three-quarter moving average of quarterly real house price growth rate (in percent). All domestic control variables are lagged two periods to mitigate endogeneity concerns. Domestic growth rate is (three-quarter moving average) quarterly real domestic private sector growth rate. See notes for Table 1and appendix for description of other variables. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 3. Real Stock Returns in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 | 1986-2013 |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Fixed regime | 1.887 | 2.678 | 1.743 | 0.479 | 5.917 | 3.375 | 5.730 |
| | (2.962) | (6.720) | (6.311) | (6.194) | (7.279) | (8.031) | (9.727) |
| Intermediate regime | -0.270 | -11.609** | -12.818** | -14.529** | -1.086 | -2.721 | -0.234 |
| | (0.982) | (5.395) | (5.485) | (5.735) | (5.971) | (6.253) | (5.669) |
| Log (VXO) | -6.469*** | -8.583*** | -8.886*** | -9.376*** | | | |
| | (0.937) | (1.171) | (1.171) | (1.219) | | | |
| Fixed x log (VXO) | | -0.281 | -0.026 | 0.325 | -1.012 | -0.839 | -1.175 |
| | | (2.420) | (2.351) | (2.329) | (2.610) | (2.698) | (3.272) |
| Intermediate x log (VXO) | | 3.744** | 4.145** | 4.536** | 1.003 | 1.686 | 0.873 |
| | | (1.791) | (1.798) | (1.869) | (1.901) | (1.997) | (1.813) |
| Lagged real GDP growth | -1.170*** | -1.182*** | -1.047*** | -1.081*** | -0.174 | -0.580** | -0.751** |
| | (0.380) | (0.387) | (0.382) | (0.397) | (0.250) | (0.241) | (0.299) |
| Lagged domestic credit growth | 0.106 | 0.087 | 0.089 | 0.108 | 0.038 | 0.017 | -0.005 |
| | (0.086) | (0.088) | (0.088) | (0.095) | (0.082) | (0.107) | (0.131) |
| Real US T-bill rate | | | -0.804*** | | | | |
| | | | (0.193) | | | | |
| Fixed x real T-bill rate | | | -0.012 | | | | |
| | | | (0.350) | | | | |
| Intermediate x real T-bill rate | | | -0.087 | | | | |
| | | | (0.250) | | | | |
| Real shadow federal funds rate | | | | -0.554*** | | | |
| | | | | (0.155) | | | |
| Fixed x real shadow rate | | | | 0.075 | | | |
| | | | | (0.263) | | | |
| Intermediate x real shadow rate | | | | -0.033 | | | |
| | | | | (0.210) | | | |
| Lagged portfolio liability flows/GDP | | | | | | | 0.065** |
| | | | | | | | (0.025) |
| Lagged central bank policy rate | | | | | | | 0.021 |
| | | | | | | | (0.122) |
| Linear trend | -6.469*** | -8.583*** | -8.886*** | -9.376*** | | | |
| | (0.937) | (1.171) | (1.171) | (1.219) | | | |
| Global financial crisis | -0.035*** | -0.039*** | -0.088*** | -0.102*** | | | |
| | (0.012) | (0.012) | (0.012) | (0.015) | | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes | Yes |
| Observations | 2,011 | 2,011 | 2,011 | 2,011 | 2,011 | 1,531 | 1,412 |
| Adjusted R2 | 0.112 | 0.115 | 0.154 | 0.138 | 0.437 | 0.512 | 0.518 |
| No. of countries | 37 | 37 | 37 | 37 | 37 | 36 | 32 |

Note: Dependent variable is three-quarter moving average of quarterly real stock price growth rate (in percent). See notes of Table 2 and appendix for description of other variables. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 4. Change in Loan-to-Deposit (LTD) Ratio in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 | 1986-2013 |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Fixed regime | 2.405* | 5.845** | 5.816** | 6.195*** | 6.540*** | 6.436** | 3.631 |
| | (1.343) | (2.219) | (2.259) | (2.253) | (2.102) | (2.472) | (2.428) |
| Intermediate regime | 0.640 | 2.240 | 2.293 | 2.637 | 3.201 | 3.591 | 2.960 |
| | (0.537) | (2.176) | (2.142) | (2.092) | (1.978) | (2.392) | (2.215) |
| Log (VXO) | -0.468 | 0.092 | 0.092 | 0.182 | | | |
| | (0.507) | (0.548) | (0.535) | (0.557) | | | |
| Fixed x log (VXO) | | -1.142 | -1.130 | -1.238* | -1.477** | -1.567** | -1.478* |
| | | (0.709) | (0.700) | (0.692) | (0.697) | (0.683) | (0.885) |
| Intermediate x log (VXO) | | -0.526 | -0.542 | -0.637 | -0.924 | -1.259* | -1.366** |
| | | (0.704) | (0.694) | (0.687) | (0.666) | (0.695) | (0.630) |
| Lagged real GDP growth | 0.482*** | 0.481*** | 0.477*** | 0.463*** | 0.361** | 0.328 | 0.304 |
| | (0.152) | (0.152) | (0.152) | (0.150) | (0.146) | (0.204) | (0.202) |
| Lagged LTD ratio | -0.060*** | -0.060*** | -0.061*** | -0.060*** | -0.060*** | -0.084*** | -0.058*** |
| | (0.012) | (0.012) | (0.013) | (0.013) | (0.012) | (0.020) | (0.017) |
| Real US T-bill rate | | | 0.059 | | | | |
| | | | (0.093) | | | | |
| Fixed regime x real T-bill rate | | | -0.056 | | | | |
| | | | (0.144) | | | | |
| Intermediate x real T-bill rate | | | -0.010 | | | | |
| | | | (0.090) | | | | |
| Real shadow federal funds rate | | | | 0.038 | | | |
| | | | | (0.075) | | | |
| Fixed x real shadow rate | | | | 0.034 | | | |
| | | | | (0.118) | | | |
| Intermediate x real shadow rate | | | | 0.029 | | | |
| | | | | (0.071) | | | |
| Lagged net capital flows/GDP | | | | | | | 0.055*** |
| | | | | | | | (0.019) |
| Lagged central bank policy rate | | | | | | | -0.131*** |
| | | | | | | | (0.040) |
| Linear trend | 0.005 | 0.005 | 0.007 | 0.012 | | | |
| | (0.008) | (0.008) | (0.008) | (0.010) | | | |
| Global financial crisis | 1.142 | 1.212* | 1.163 | 1.025 | | | |
| | (0.701) | (0.710) | (0.721) | (0.731) | | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes | Yes |
| Observations | 2,561 | 2,561 | 2,561 | 2,561 | 2,561 | 1,844 | 1,598 |
| Adjusted R2 | 0.169 | 0.169 | 0.169 | 0.170 | 0.218 | 0.275 | 0.295 |
| No. of countries | 43 | 43 | 43 | 43 | 43 | 42 | 35 |

Note: Dependent variable is three-quarter moving average of change in loan-to-deposit (LTD) ratio. Lagged LTD ratio is two-quarter lagged LTD ratio. See notes of Table 2 and appendix for description of other variables. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 5. Net Capital Flows in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Fixed regime | 0.457 | 14.612** | 15.148** | 16.122** | 15.222** | 16.862*** |
| | (1.482) | (5.999) | (6.059) | (6.212) | (6.178) | (6.138) |
| Intermediate regime | 1.488** | 6.799* | 6.743* | 7.397* | 7.679** | 10.094*** |
| | (0.550) | (3.561) | (3.646) | (3.762) | (3.528) | (3.585) |
| Log (VXO) | -1.432** | 0.588 | 0.601 | 0.774 | | |
| | (0.571) | (0.816) | (0.831) | (0.855) | | |
| Fixed x log (VXO) | | -4.698** | -4.891** | -5.046*** | -4.795** | -4.780** |
| | | (1.813) | (1.834) | (1.836) | (1.863) | (1.793) |
| Intermediate x log (VXO) | | -1.742 | -1.732 | -1.904 | -1.869 | -2.508** |
| | | (1.123) | (1.152) | (1.179) | (1.154) | (1.197) |
| Lagged real GDP growth | 0.396*** | 0.386*** | 0.383*** | 0.378*** | 0.361*** | 0.427** |
| | (0.095) | (0.092) | (0.091) | (0.091) | (0.098) | (0.161) |
| Lagged institutional quality | 19.579*** | 20.419*** | 19.705*** | 17.465*** | 13.716** | 24.141** |
| | (4.930) | (4.904) | (4.803) | (4.757) | (5.749) | (9.555) |
| Lagged domestic credit/GDP | -0.042** | -0.045** | -0.042** | -0.038* | -0.044* | -0.094*** |
| | (0.020) | (0.021) | (0.020) | (0.020) | (0.023) | (0.026) |
| Real US T-bill rate | | | -0.068 | | | |
| | | | (0.069) | | | |
| Fixed x real T-bill rate | | | 0.343 | | | |
| | | | (0.247) | | | |
| Intermediate x real T-bill rate | | | 0.034 | | | |
| | | | (0.095) | | | |
| Real shadow federal funds rate | | | | -0.016 | | |
| | | | | (0.068) | | |
| Fixed x real shadow rate | | | | 0.410 | | |
| | | | | (0.246) | | |
| Intermediate x real shadow rate | | | | 0.113 | | |
| | | | | (0.094) | | |
| Linear trend | 0.001 | 0.001 | 0.001 | 0.015 | | |
| | (0.015) | (0.015) | (0.016) | (0.019) | | |
| Global financial crisis | -2.196** | -1.877* | -1.898** | -2.312** | | |
| | (0.919) | (0.955) | (0.936) | (0.896) | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes |
| Observations | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 1,625 |
| Adjusted R2 | 0.362 | 0.370 | 0.373 | 0.381 | 0.404 | 0.450 |
| No. of countries | 38 | 38 | 38 | 38 | 38 | 38 |

Note: Dependent variable is three-quarter moving average of quarterly net capital flows (in percent of GDP). All domestic control variables are lagged two-periods to mitigate endogeneity concerns. Real GDP growth rate is year-on-year GDP growth. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 6. Liability Flows in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Fixed regime | 1.047 | 14.560** | 15.282** | 16.632** | 17.855** | 18.243** |
| | (1.322) | (6.249) | (6.332) | (6.581) | (7.080) | (7.308) |
| Intermediate regime | 0.230 | -1.895 | -1.665 | -0.483 | 2.970 | 3.499 |
| | (0.644) | (3.282) | (3.448) | (3.784) | (4.385) | (5.239) |
| Log (VXO) | -3.550*** | -2.864*** | -2.764*** | -2.477*** | | |
| | (0.804) | (0.761) | (0.740) | (0.785) | | |
| Fixed x log (VXO) | | -4.498** | -4.764** | -4.983** | -5.157** | -4.660* |
| | | (2.071) | (2.103) | (2.115) | (2.254) | (2.301) |
| Intermediate x log (VXO) | | 0.721 | 0.622 | 0.342 | -0.386 | -0.385 |
| | | (1.057) | (1.125) | (1.197) | (1.329) | (1.535) |
| Lagged real GDP growth | 0.459*** | 0.443*** | 0.438*** | 0.431*** | 0.377*** | 0.459** |
| | (0.110) | (0.106) | (0.104) | (0.105) | (0.108) | (0.176) |
| Lagged institutional quality | 23.532*** | 24.768*** | 23.775*** | 20.170*** | 15.277** | 29.990*** |
| | (4.956) | (4.779) | (4.728) | (4.590) | (5.687) | (9.658) |
| Lagged domestic credit/GDP | -0.030 | -0.031 | -0.027 | -0.021 | -0.021 | -0.047 |
| | (0.020) | (0.019) | (0.020) | (0.021) | (0.022) | (0.028) |
| Real US T-bill rate | | | -0.122 | | | |
| | | | (0.126) | | | |
| Fixed x real US T-bill rate | | | 0.461* | | | |
| | | | (0.269) | | | |
| Intermediate x real US T-bill rate | | | 0.187 | | | |
| | | | (0.197) | | | |
| Real shadow federal funds rate | | | | 0.002 | | |
| | | | | (0.103) | | |
| Fixed x real shadow rate | | | | 0.537** | | |
| | | | | (0.255) | | |
| Intermediate x real shadow rate | | | | 0.231 | | |
| | | | | (0.170) | | |
| Linear trend | -0.008 | -0.011 | -0.007 | 0.016 | | |
| | (0.014) | (0.014) | (0.014) | (0.016) | | |
| Global financial crisis | -2.971** | -2.789** | -2.907** | -3.608*** | | |
| | (1.170) | (1.232) | (1.184) | (1.098) | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes |
| Observations | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 1,625 |
| Adjusted R2 | 0.363 | 0.373 | 0.376 | 0.388 | 0.431 | 0.463 |
| No. of countries | 38 | 38 | 38 | 38 | 38 | 38 |

Note: Dependent variable is three-quarter moving average of quarterly liability flows (in percent of GDP). All domestic control variables are lagged two-periods to mitigate endogeneity concerns. Real GDP growth rate is year-on-year GDP growth. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 7. Asset Flows in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Fixed regime | -0.590 | 0.052 | -0.134 | -0.510 | -2.633 | -1.381 |
| | (0.752) | (3.701) | (3.630) | (3.649) | (4.032) | (4.522) |
| Intermediate regime | 1.259* | 8.694*** | 8.408*** | 7.880** | 4.709 | 6.594* |
| | (0.632) | (2.627) | (2.779) | (3.040) | (3.423) | (3.755) |
| Log (VXO) | 2.118*** | 3.453*** | 3.365*** | 3.251*** | | |
| | (0.464) | (0.534) | (0.510) | (0.553) | | |
| Fixed regime x log (VXO) | | -0.200 | -0.127 | -0.064 | 0.361 | -0.120 |
| | | (1.238) | (1.211) | (1.223) | (1.311) | (1.356) |
| Intermediate regime x log (VXO) | | -2.463*** | -2.354** | -2.246** | -1.483 | -2.123* |
| | | (0.832) | (0.885) | (0.945) | (1.032) | (1.054) |
| Lagged real GDP growth | -0.063* | -0.057 | -0.055 | -0.053 | -0.016 | -0.032 |
| | (0.035) | (0.035) | (0.034) | (0.035) | (0.033) | (0.045) |
| Lagged institutional quality | -3.953 | -4.349 | -4.071 | -2.705 | -1.561 | -5.849 |
| | (2.980) | (2.853) | (2.754) | (2.569) | (2.718) | (5.464) |
| Lagged domestic credit/GDP | -0.012 | -0.015 | -0.015 | -0.017 | -0.023 | -0.047* |
| | (0.021) | (0.021) | (0.021) | (0.020) | (0.023) | (0.025) |
| Real US T-bill rate | | | 0.054 | | | |
| | | | (0.101) | | | |
| Fixed x real US T-bill rate | | | -0.118 | | | |
| | | | (0.129) | | | |
| Intermediate x real US T-bill rate | | | -0.152 | | | |
| | | | (0.149) | | | |
| Real shadow federal funds rate | | | | -0.019 | | |
| | | | | (0.084) | | |
| Fixed x real shadow rate | | | | -0.127 | | |
| | | | | (0.100) | | |
| Intermediate x real shadow rate | | | | -0.118 | | |
| | | | | (0.122) | | |
| Linear trend | 0.009 | 0.012 | 0.008 | -0.001 | | |
| | (0.013) | (0.013) | (0.013) | (0.015) | | |
| Global financial crisis | 0.776 | 0.912 | 1.009 | 1.296* | | |
| | (0.829) | (0.826) | (0.784) | (0.734) | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | No | Yes | Yes |
| Observations | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 1,625 |
| Adjusted R2 | 0.259 | 0.266 | 0.266 | 0.270 | 0.290 | 0.314 |
| No. of countries | 38 | 38 | 38 | 38 | 38 | 38 |

Note: Dependent variable is three-quarter moving average of quarterly net capital flows (in percent of GDP). All domestic control variables are lagged two-periods to mitigate endogeneity concerns. Real GDP growth rate is year-on-year GDP growth. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

## Table 8. FDI, Portfolio, and Other Investment Liability Flows in EMEs, 1986Q1–2013Q4

| | FDI liability flows | | | | Portfolio liability flows | | | | Other investment liab. flows | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Fixed regime | 6.197* | 6.348* | 7.081* | 8.761** | 1.909 | 1.768 | 1.371 | 0.458 | 8.580 | 9.359* | 10.483* | 11.060* |
| | (3.409) | (3.423) | (3.599) | (4.123) | (2.653) | (2.578) | (2.482) | (2.502) | (5.155) | (5.245) | (5.513) | (5.771) |
| Intermediate regime | 0.811 | 1.033 | 1.791 | 4.416 | 1.322 | 1.293 | 0.933 | -0.666 | -1.516 | -1.561 | -0.842 | 1.984 |
| | (1.891) | (2.046) | (2.211) | (2.694) | (1.607) | (1.685) | (1.734) | (1.965) | (2.437) | (2.391) | (2.495) | (3.020) |
| Log (VXO) | -0.023 | 0.025 | 0.232 | | -0.837** | -0.833** | -0.949** | | -1.259** | -1.229** | -1.041* | |
| | (0.325) | (0.329) | (0.349) | | (0.379) | (0.403) | (0.400) | | (0.551) | (0.538) | (0.558) | |
| Fixed x log (VXO) | -2.155* | -2.202* | -2.362* | -2.673* | -0.302 | -0.263 | -0.182 | 0.031 | -2.796 | -3.077* | -3.233* | -3.386* |
| | (1.136) | (1.145) | (1.177) | (1.322) | (0.900) | (0.871) | (0.863) | (0.888) | (1.726) | (1.774) | (1.788) | (1.877) |
| Intermediate x log (VXO) | -0.196 | -0.267 | -0.458 | -1.007 | -0.348 | -0.347 | -0.243 | 0.113 | 0.481 | 0.481 | 0.297 | -0.372 |
| | (0.663) | (0.722) | (0.746) | (0.886) | (0.503) | (0.533) | (0.539) | (0.598) | (0.747) | (0.734) | (0.763) | (0.896) |
| Lagged real GDP growth | 0.114*** | 0.111*** | 0.108** | 0.050 | 0.009 | 0.012 | 0.013 | 0.062* | 0.314*** | 0.310*** | 0.304*** | 0.251*** |
| | (0.042) | (0.041) | (0.040) | (0.040) | (0.031) | (0.032) | (0.031) | (0.036) | (0.081) | (0.079) | (0.080) | (0.079) |
| Lagged institutional quality | 5.210*** | 4.608** | 2.455 | 1.586 | 5.075** | 5.633*** | 6.865*** | 5.870** | 13.622*** | 12.593*** | 9.861*** | 7.875* |
| | (1.828) | (1.737) | (1.551) | (3.102) | (1.910) | (2.009) | (2.065) | (2.457) | (4.173) | (3.934) | (3.601) | (4.094) |
| Lagged domestic credit/GDP | 0.002 | 0.002 | 0.006 | 0.012 | -0.005 | -0.006 | -0.008 | -0.011 | -0.018 | -0.013 | -0.008 | -0.014 |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.009) | (0.009) | (0.009) | (0.009) | (0.016) | (0.015) | (0.016) | (0.018) |
| Real US T-bill rate | | 0.091*** | | | | -0.108 | | | | -0.108* | | |
| | | (0.032) | | | | (0.080) | | | | (0.058) | | |
| Fixed x real US T-bill rate | | 0.042 | | | | -0.037 | | | | 0.500** | | |
| | | (0.085) | | | | (0.121) | | | | (0.222) | | |
| Intermediate x real US T-bill rate | | 0.028 | | | | 0.059 | | | | 0.070 | | |
| | | (0.102) | | | | (0.092) | | | | (0.071) | | |
| Real shadow federal funds rate | | | 0.125** | | | | -0.140** | | | | 0.002 | |
| | | | (0.052) | | | | (0.065) | | | | (0.055) | |
| Fixed x real shadow rate | | | 0.137 | | | | -0.040 | | | | 0.501** | |
| | | | (0.097) | | | | (0.097) | | | | (0.231) | |
| Intermediate x real shadow rate | | | 0.044 | | | | 0.069 | | | | 0.107 | |
| | | | (0.092) | | | | (0.074) | | | | (0.072) | |
| Linear trend | 0.005 | 0.012* | 0.024*** | | 0.014*** | 0.010* | 0.004 | | -0.019* | -0.018* | -0.002 | |
| | (0.005) | (0.006) | (0.008) | | (0.005) | (0.005) | (0.005) | | (0.010) | (0.011) | (0.011) | |
| Global financial crisis | 0.514 | 0.361 | -0.049 | | -1.642*** | -1.550*** | -1.329*** | | -1.179 | -1.217 | -1.715** | |
| | (0.545) | (0.487) | (0.406) | | (0.406) | (0.404) | (0.409) | | (0.766) | (0.757) | (0.711) | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | Yes | No | No | No | Yes | No | No | No | Yes |
| Observations | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 |
| Adjusted R2 | 0.325 | 0.329 | 0.340 | 0.366 | 0.184 | 0.189 | 0.199 | 0.219 | 0.317 | 0.329 | 0.349 | 0.384 |
| No. of countries | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |

Note: Dependent variable is three-quarter moving average of quarterly FDI liability flows (in pct. of GDP) in cols. [1]-[4]; portfolio liability flows (in pct. of GDP) in cols. [5]-[8]; and other investment liability flows (in pct. of GDP) in cols. [9]-[12]. Domestic factors are lagged two-periods to mitigate endogeneity concerns. Real GDP growth rate is year-on-year growth. Sample comprises country-year observations above the 25th sample percentile of the Quinn-Toyoda capital account openness index, and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table 9. Real GDP Growth in EMEs, 1986Q1–2013Q4**

| | 1986-2013 | 1986-2013 | 1986-2013 | 1986-2013 | 2000-13 |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Fixed regime | 2.521** | 2.511** | 2.518** | 2.879*** | 2.564** |
| | (1.011) | (0.998) | (0.980) | (1.019) | (1.050) |
| Intermediate regime | 0.406 | 0.294 | 0.253 | 0.895 | 0.693 |
| | (0.477) | (0.461) | (0.471) | (0.541) | (0.462) |
| Log (VXO) | -0.459*** | -0.479*** | -0.492*** | | |
| | (0.101) | (0.101) | (0.102) | | |
| Fixed x log (VXO) | -0.756** | -0.756** | -0.753** | -0.856** | -0.758** |
| | (0.320) | (0.317) | (0.312) | (0.333) | (0.337) |
| Intermediate x log (VXO) | -0.158 | -0.122 | -0.117 | -0.291 | -0.189 |
| | (0.157) | (0.151) | (0.153) | (0.186) | (0.163) |
| Real US T-bill rate | | -0.034* | | | |
| | | (0.019) | | | |
| Fixed x real T-bill rate | | 0.020 | | | |
| | | (0.027) | | | |
| Intermediate x real T-bill rate | | -0.015 | | | |
| | | (0.025) | | | |
| Real shadow federal funds rate | | | -0.011 | | |
| | | | (0.020) | | |
| Fixed x real shadow rate | | | 0.011 | | |
| | | | (0.026) | | |
| Intermediate x real shadow rate | | | -0.014 | | |
| | | | (0.026) | | |
| Lagged net capital flows/GDP | 0.013*** | 0.014*** | 0.014*** | 0.010** | 0.008* |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| Lagged institutional quality | 0.654 | 0.741 | 0.775 | 0.930 | 1.183 |
| | (0.908) | (0.919) | (0.944) | (1.098) | (1.899) |
| Lagged private credit/GDP | -0.018*** | -0.018*** | -0.018*** | -0.017*** | -0.023*** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| Lagged real GDP per capita | -1.947*** | -1.872*** | -1.920*** | -2.022*** | -1.541* |
| | (0.609) | (0.587) | (0.585) | (0.611) | (0.840) |
| Linear trend | 0.014** | 0.011** | 0.011** | | |
| | (0.005) | (0.005) | (0.005) | | |
| Global financial crisis | -1.462*** | -1.419*** | -1.411*** | | |
| | (0.249) | (0.248) | (0.244) | | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | No | No | Yes | Yes |
| Observations | 2,121 | 2,121 | 2,121 | 2,121 | 1,635 |
| Adjusted R2 | 0.345 | 0.351 | 0.347 | 0.421 | 0.497 |
| No. of countries | 38 | 38 | 38 | 38 | 38 |

Note: Dependent variable is three-quarter moving average of quarterly (seasonally adjusted) real GDP growth rate (in percent). Net capital flows (in pct. of GDP), institutional quality index, real GDP per capita (in logs), and domestic private credit (in pct. of GDP) are lagged two periods. See notes of Table 1for description of other variables. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

## Table 10. Robustness Analysis: Alternate Specifications

| | Real credit growth | | | | | Real house price growth | | | | | Real stock price growth | | | | | Change in LTD ratio | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KA | ΔRR | ΔVXO | Open | Outlier | KA | ΔRR | ΔVXO | Open | Outlier | KA | ΔRR | ΔVXO | Open | Outlier | KA | ΔRR | ΔVXO | Open | Outlier |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) |
| Fixed regime | 8.929*** | 9.787** | 7.650** | 8.923 | 7.961** | 15.500*** | 23.541*** | 16.027*** | 15.796*** | 12.970*** | 7.941 | 3.038 | 7.860 | 23.163** | 6.755 | 6.054*** | 5.692*** | 5.874** | 6.971 | 4.220** |
| | (3.147) | (4.208) | (3.443) | (5.352) | (3.255) | (3.810) | (3.778) | (4.092) | (3.916) | (3.858) | (6.990) | (8.138) | (7.254) | (10.892 | (6.819) | (1.956) | (1.988) | (2.290) | (4.497) | (1.957) |
| Intermediate regime | 2.470 | 3.116 | 2.640 | 0.215 | 2.575 | -3.165 | -2.728 | -4.601 | 0.071 | -3.443 | 1.799 | 7.923 | 2.999 | 20.633* | 0.546 | 4.352** | 5.279** | 4.997** | 3.222 | 3.835** |
| | (2.262) | (2.534) | (2.505) | (3.633) | (2.252) | (3.455) | (3.321) | (4.063) | (4.409) | (3.689) | (5.034) | (5.976) | (5.141) | (9.766) | (4.705) | (1.950) | (2.085) | (2.031) | (4.491) | (1.873) |
| Fixed x log (VXO) | -2.108** | -2.714* | -1.785 | -2.311* | -1.865* | -4.770*** | -7.096*** | -4.885*** | -6.223*** | -3.890*** | -1.657 | -0.560 | -1.707 | -5.339 | -1.583 | -1.313* | -1.712* | -1.330* | -1.996* | -0.776 |
| | (1.001) | (1.411) | (1.093) | (1.287) | (1.035) | (1.199) | (1.809) | (1.332) | (1.591) | (1.062) | (2.466) | (3.105) | (2.599) | (3.402) | (2.452) | (0.701) | (0.947) | (0.783) | (1.094) | (0.639) |
| Intermediate x log (VXO) | -0.457 | -0.757 | -0.602 | 0.383 | -0.576 | 1.221 | 1.081 | 1.727 | -0.775 | 1.347 | 0.336 | -1.604 | -0.119 | -4.408 | 0.618 | -1.446** | -1.826** | -1.730** | -1.007 | -1.279** |
| | (0.750) | (0.810) | (0.836) | (0.722) | (0.748) | (1.045) | (1.213) | (1.262) | (1.708) | (1.124) | (1.610) | (1.886) | (1.654) | (2.927) | (1.532) | (0.596) | (0.608) | (0.656) | (1.047) | (0.585) |
| Lagged KA openness | 0.048*** | | | | | -0.020 | | | | | 0.024 | | | | | 0.036** | | | | |
| | (0.017) | | | | | (0.022) | | | | | (0.026) | | | | | (0.015) | | | | |
| Lagged Δ RR | | -0.123* | | | | | 0.029 | | | | | -0.495** | | | | | -0.050 | | | |
| | | (0.067) | | | | | (0.079) | | | | | (0.137) | | | | | (0.050) | | | |
| Fixed x Δ Log (VXO) | | | -0.007 | | | | | 0.009 | | | | | 0.013 | | | | | 0.008 | | |
| | | | (0.009) | | | | | (0.013) | | | | | (0.024) | | | | | (0.009) | | |
| Intermediate x Δ Log (VXO) | | | 0.003 | | | | | -0.017* | | | | | 0.024 | | | | | 0.011 | | |
| | | | (0.009) | | | | | (0.010) | | | | | (0.017) | | | | | (0.008) | | |
| Lagged real GDP growth | 0.999*** | 1.094*** | 0.989*** | 0.351 | 0.996*** | 0.809*** | 0.837*** | 0.784*** | 1.220*** | 0.746*** | -0.365 | -0.429* | -0.385 | -0.654* | -0.429* | 0.347** | 0.476** | 0.328** | 0.233 | 0.440*** |
| | (0.165) | (0.214) | (0.168) | (0.312) | (0.167) | (0.214) | (0.287) | (0.204) | (0.230) | (0.192) | (0.263) | (0.247) | (0.262) | (0.309) | (0.248) | (0.153) | (0.199) | (0.155) | (0.236) | (0.130) |
| Lagged net capital flows/GDP | 0.079*** | 0.076*** | 0.083*** | 0.058** | 0.068*** | 0.002 | 0.002 | 0.001 | -0.012 | -0.002 | -0.115** | -0.097* | -0.115** | -0.121* | -0.112** | 0.079*** | 0.075** | 0.082*** | 0.073** | 0.075*** |
| | (0.023) | (0.023) | (0.024) | (0.024) | (0.019) | (0.026) | (0.020) | (0.026) | (0.027) | (0.026) | (0.048) | (0.050) | (0.047) | (0.063) | (0.047) | (0.021) | (0.028) | (0.022) | (0.026) | (0.020) |
| Lagged private credit/GDP | -0.092*** | -0.097** | -0.085*** | -0.120*** | -0.081*** | | | | | | | | | | | | | | | |
| | (0.015) | (0.021) | (0.014) | (0.032) | (0.013) | | | | | | | | | | | | | | | |
| Lagged credit growth | | | | | | 0.082* | 0.069 | 0.079* | 0.186* | 0.073* | 0.076 | 0.046 | 0.085 | 0.238 | 0.043 | | | | | |
| | | | | | | (0.041) | (0.045) | (0.039) | (0.086) | (0.038) | (0.096) | (0.113) | (0.096) | (0.180) | (0.103) | | | | | |
| Lagged LTD ratio | | | | | | | | | | | | | | | | -0.069** | -0.060** | -0.068*** | -0.055*** | -0.054*** |
| | | | | | | | | | | | | | | | | (0.014) | (0.017) | (0.014) | (0.018) | (0.009) |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 2,167 | 1,370 | 2,164 | 837 | 2,163 | 1,030 | 550 | 1,030 | 376 | 1,025 | 1,772 | 1,135 | 1,770 | 678 | 1,769 | 2,167 | 1,370 | 2,164 | 837 | 2,161 |
| Adjusted R2 | 0.328 | 0.356 | 0.317 | 0.486 | 0.348 | 0.377 | 0.393 | 0.379 | 0.528 | 0.350 | 0.498 | 0.615 | 0.498 | 0.555 | 0.505 | 0.290 | 0.440 | 0.283 | 0.331 | 0.274 |
| No. of countries | 39 | 29 | 39 | 22 | 39 | 24 | 18 | 24 | 11 | 24 | 33 | 24 | 33 | 17 | 33 | 39 | 29 | 39 | 22 | 39 |

Note: Dependent variable is 3-quarter moving avg. of quarterly real domestic private sector credit growth rate (in pct.) in cols. [1]-[5], real house price growth in cols. [6]-[10], real stock price growth in cols. [11]-[15], and change in LTD ratio in cols. [16]-[20]. All domestic control variables are lagged two periods to mitigate endogeneity concerns. KA is Quinn-Toyoda capital account openness index; Open is fully open EMEs as identified by Quinn-Toyoda index (index=100); ΔRR is change in average reserve requirement; Outliers excludes values of the dependent variable in the top and bottom 0.25th percentiles; ΔLog(VXO) is log difference of the VXO index. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

## Table 11. Robustness Analysis: Further Checks

| | Real credit growth | | | | Real house price growth | | | | Real stock price growth | | | | Change in LTD ratio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RR[a/] | DJ[b/] | Endog.[c/] | Endog.[d/] | RR[a/] | DJ[b/] | Endog.[c/] | Endog.[d/] | RR[a/] | DJ[b/] | Endog.[c/] | Endog.[d/] | RR[a/] | DJ[b/] | Endog.[c/] | Endog.[d/] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| Fixed regime | | 5.429* | 13.598** | | | 11.470*** | 16.385 | | | 5.822 | 11.039 | | | 2.482 | 10.335** | |
| | | (3.043) | (5.407) | | | (3.340) | (10.783) | | | (7.855) | (13.425) | | | (1.816) | (5.139) | |
| Intermediate regime | | -1.221 | 4.435 | | | -6.065* | -4.426 | | | 0.359 | -4.108 | | | 0.751 | 7.640*** | |
| | | (2.017) | (3.108) | | | (3.404) | (3.242) | | | (5.740) | (6.430) | | | (1.706) | (2.589) | |
| Fixed x log (VXO) | | -1.647* | -3.250** | -2.331** | | -4.941*** | -4.205 | -4.059*** | | -1.800 | -2.338 | -7.745 | | -0.654 | -2.495* | -1.175 |
| | | (0.986) | (1.566) | (0.837) | | (1.246) | (3.011) | (1.104) | | (2.847) | (3.836) | (4.481) | | (0.636) | (1.442) | (0.858) |
| Intermediate x log (VXO) | | 0.428 | -1.061 | -1.212 | | 1.695 | 1.330 | 2.418** | | -0.004 | 1.936 | -2.161 | | -0.137 | -2.240** | -0.876 |
| | | (0.596) | (0.879) | (0.826) | | (1.102) | (0.925) | (0.841) | | (1.774) | (1.834) | (3.527) | | (0.565) | (0.729) | (0.526) |
| RR coarse classification 1 | 5.310* | | | | 25.569*** | | | | 3.880 | | | | 6.861*** | | | |
| | (2.692) | | | | (3.415) | | | | (6.316) | | | | (1.887) | | | |
| RR coarse classification 2 | -2.462 | | | | 11.962*** | | | | 5.652 | | | | 2.723 | | | |
| | (2.743) | | | | (3.763) | | | | (6.136) | | | | (1.911) | | | |
| RR coarse classification 3 | -2.005 | | | | | | | | -1.168 | | | | 3.645** | | | |
| | (2.051) | | | | | | | | (3.707) | | | | (1.514) | | | |
| RR coarse 1 x log (VXO) | -1.568* | | | | -2.337* | | | | -0.716 | | | | -1.735*** | | | |
| | (0.838) | | | | (1.283) | | | | (2.224) | | | | (0.598) | | | |
| RR coarse 2 x log (VXO) | 0.684 | | | | 2.134* | | | | -0.705 | | | | -0.826 | | | |
| | (0.691) | | | | (1.236) | | | | (2.031) | | | | (0.507) | | | |
| RR coarse 3 x log (VXO) | 0.455 | | | | 5.967*** | | | | 1.468 | | | | -1.432*** | | | |
| | (0.619) | | | | (0.499) | | | | (1.147) | | | | (0.459) | | | |
| Lagged real GDP growth | 0.755*** | 1.009*** | 1.001*** | 0.368 | 0.754*** | 0.806*** | 0.993*** | 0.836** | -0.278 | -0.325 | -0.272 | -0.544 | 0.173 | 0.326* | 0.252* | 0.127 |
| | (0.204) | (0.167) | (0.186) | (0.258) | (0.211) | (0.208) | (0.207) | (0.323) | (0.229) | (0.252) | (0.292) | (0.428) | (0.179) | (0.165) | (0.136) | (0.119) |
| Lagged net flows/GDP | 0.062* | 0.087*** | 0.082*** | 0.079*** | -0.001 | 0.006 | -0.008 | -0.027 | -0.108* | -0.106** | -0.104*** | -0.164*** | 0.060*** | 0.079*** | 0.078*** | 0.089*** |
| | (0.033) | (0.025) | (0.017) | (0.258) | (0.030) | (0.025) | (0.018) | (0.323) | (0.055) | (0.045) | (0.038) | (0.428) | (0.021) | (0.023) | (0.017) | (0.119) |
| Lagged credit/GDP | -0.078** | -0.084** | -0.091*** | -0.125*** | | | | | | | | | | | | |
| | (0.021) | (0.014) | (0.009) | (0.035) | | | | | | | | | | | | |
| Lagged credit growth | | | | | 0.052 | 0.086** | 0.097** | 0.345** | -0.033 | 0.096 | 0.074 | -0.468*** | | | | |
| | | | | | (0.040) | (0.039) | (0.047) | (0.110) | (0.129) | (0.094) | (0.069) | (0.105) | | | | |
| Lagged LTD ratio | | | | | | | | | | | | | -0.060*** | -0.064*** | -0.077*** | -0.063*** |
| | | | | | | | | | | | | | (0.015) | (0.014) | (0.008) | (0.018) |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,687 | 2,167 | 2,099 | 548 | 773 | 1,030 | 1,023 | 334 | 1,378 | 1,772 | 1,762 | 503 | 1,687 | 2,167 | 2,099 | 548 |
| Adjusted R2 | 0.336 | 0.310 | 0.322 | 0.613 | 0.418 | 0.381 | 0.316 | 0.503 | 0.514 | 0.492 | 0.499 | 0.689 | 0.297 | 0.271 | 0.297 | 0.445 |
| No. of countries | 37 | 39 | 38 | 18 | 24 | 24 | 24 | 11 | 32 | 33 | 33 | 17 | 37 | 39 | 38 | 18 |

Note: Dependent variable is 3-quarter moving avg. of quarterly real private sector credit growth rate (in pct.) in cols. [1]-[4], real house price growth in cols. [5]-[8], real stock price growth in cols. [9]-[12], and change in LTD ratio in cols. [13]-[16]. Constant is included in cols. [1]-[16]. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

a/ Reinhart and Rogoff's coarse exchange rate regime classification (1=No separate legal tender, pre-announced peg/currency board/horizontal band narrower than or equal to +/-2pct, de facto peg; 2=Pre-announced crawling peg/crawling band narrower than or equal to +/-2pct., de facto crawling peg, de facto crawling band narrower than or equal to +/-2pct.; 3=Pre-announced crawling band wider than or equal to +/-2pct., de facto crawling band narrower than or equal to +/-5pct., moving band narrower than or equal to +/-2pct., managed floating; 4=freely floating.

b/ De jure exchange rate regime classification based on Ghosh et al. (2015).

c/ The regime variables are residuals obtained from a regression of regimes on lagged real GDP growth, net capital flows to GDP, domestic fredit to GDP, institutional quality, the capital account openness index, and country and quarter-year fixed effects. the VXO index is residuals ontained from a regression on real US short-term interest rates and log of commodity prices. Bootstrapped standard errors are reported.

d/ Sample comprises years 2005-13, and countries for which the exchange rate regime did not switch during this period.

# Appendix

**Table A1. List of countries in the sample**

| **EMEs** | Dominican Rep. | Jordan | Romania | **Advanced** | Hong Kong SAR | Portugal |
|---|---|---|---|---|---|---|
| Argentina | Ecuador | Kazakhstan | Russia | Australia | Iceland | Singapore |
| Belarus | Egypt | Korea, Rep. | Serbia | Austria | Ireland | Slovenia |
| Brazil | El Salvador | Latvia | Slovak Rep. | Belgium | Israel | Spain |
| Bulgaria | Estonia | Lithuania | South Africa | Canada | Italy | Sweden |
| Chile | Georgia | Malaysia | Sri Lanka | Cyprus | Japan | Switzerland |
| China | Guatemala | Mexico | Thailand | Denmark | Luxembourg | United Kingdom |
| Colombia | Hungary | Morocco | Tunisia | Finland | Malta | |
| Costa Rica | India | Peru | Turkey | France | Netherlands | |
| Croatia | Indonesia | Philippines | Uruguay | Germany | New Zealand | |
| Czech Rep. | Jamaica | Poland | Venezuela | Greece | Norway | |

**Table A2. Variable description and data sources**

| **Variables** | **Description** | **Source** |
|---|---|---|
| Capital account openness | Index (high=liberalized, low=closed) | Quinn and Toyoda (2008) |
| Capital flows | In USD billions (BPM5 presentation). Net financial flows exclude financing items and other investment liabilities of general government, i.e., the difference between IFS series codes "..4995W.9" and "..4753ZB9." Liability flows and other investment liability flows also exclude other investment liabilities of the general government | IMF's IFS database |
| Capital flows/GDP | In percent. Capital flows scaled by (1/4)*annual GDP. Variable smoothed by taking 3-quarter moving average | Authors' calculations |
| Consumer price index (CPI) | Index | IMF's INS database |
| Domestic private sector credit | In local currency (LC) | IMF's IFS database |
| Exchange rate regime | De facto, de jure | Ghosh et al. (2015); Reinhart and Rogoff (2004) updated data from http://personal.lse.ac.uk/ilzetzki/index.htm/Data.htm |
| GDP current/constant prices | In billions of USD (or LC). Seasonally adjusted observations for quarterly data | IMF's WEO and IFS databases; Haver analytics |
| Real GDP growth | Quarter-on-quarter percentage change in real GDP. Variable smoothed by taking three-quarter moving average | Authors' calculations |
| Global financial crisis (GFC) | Binary variable equal to 1 for 2008Q4/2009Q1, 0 otherwise | Authors' calculations |
| House prices | Index (in real terms) | IMF's Macrofinancial Unit database |
| Real house price growth | Quarter-on-quarter percentage change in real house price. Variable smoothed by taking three-quarter moving average | Authors' calculations |
| Institutional quality | Index (average of ICRG's 12 political risk components) | Political Risk Group |
| Loan to deposit (LTD) ratio | In percent | IMF's IFS database |
| Change in LTD ratio | In percentage points. Variable smoothed by taking three-quarter moving average | Authors' calculations |
| Policy rate | Policy rate or discount rate (in percent) | IMF's IFS database |
| Reserve requirements | Average of reserve requirements on local currency demand, saving, and term deposits (in percent) | Authors' calculations based on data from Federico et al. (2014)[1] |
| Shadow federal funds rate | In percent. In real terms computed as [(1+nominal interest rate)/(1+expected inflation)]-1, where expected inflation is one-period ahead inflation | Authors' calculations based on Krippner (2013) and IMF's WEO database |
| Stock prices (in real terms) | Stock price index deflated by quarterly CPI | Bloomberg and authors' calculations |
| Real stock price growth | Quarter-on-quarter percentage change in real stock prices. Variable smoothed by taking three-quarter moving average | Authors' calculations |
| U.S. interest rate | U.S. 3-month Treasury bill rate, and 10-year government bond yield (in percent) | IMF's IFS database and Bloomberg |
| U.S. interest rate (in real terms) | In percent. Computed as [(1+nominal interest rate)/(1+expected inflation)]-1, where expected inflation is one-period ahead inflation | Authors' calculations |
| VXO/VIX index | Chicago Board Options Exchange Market Volatility Index | Bloomberg |

1/ Federico, P., C. Vegh, and G. Vuletin, 2014, "Reserve Requirement Policy over the Business Cycle," NBER Working Paper 20612.

**Table A3. Financial Conditions and Disaggregated Exchange Rate Regimes, 1986Q1–2013Q4**

| | Credit growth | Credit growth | House price growth | House price growth | Stock price growth | Stock price growth | Change in LTD ratio | Change in LTD ratio | Real GDP growth | Real GDP growth |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Hard peg | 6.983** | 8.086** | 6.596 | 10.086*** | 12.977 | 15.020* | 4.930** | 5.843*** | 2.651** | 3.001** |
| | (3.358) | (3.250) | (5.323) | (3.431) | (8.108) | (8.205) | (2.170) | (2.107) | (1.206) | (1.255) |
| Conventional peg | 13.619*** | 15.773*** | 22.126** | 28.241*** | -10.069 | -7.537 | 7.188** | 8.595*** | 2.136 | 2.479 |
| | (4.648) | (4.730) | (9.480) | (8.737) | (6.191) | (8.349) | (3.095) | (2.864) | (1.623) | (1.702) |
| Basket peg | -10.688 | -8.135 | -3.887 | 5.342 | -41.854*** | -17.026* | 0.201 | 1.366 | 1.212 | 1.714 |
| | (6.984) | (6.957) | (3.897) | (8.380) | (10.893) | (9.983) | (8.814) | (8.542) | (2.049) | (2.016) |
| Horizontal band | -5.286 | -4.862 | -7.925 | -7.782 | -9.996 | -6.514 | 1.250 | 2.000 | 0.851 | 1.096 |
| | (3.677) | (3.684) | (6.816) | (5.718) | (8.444) | (10.238) | (4.393) | (3.476) | (0.952) | (1.141) |
| Crawling peg | 0.758 | 1.824 | -9.628* | -1.197 | -18.378** | 0.065 | 1.555 | 2.487 | 0.905 | 1.592* |
| | (3.976) | (4.708) | (5.387) | (8.577) | (6.866) | (6.161) | (5.755) | (5.915) | (0.846) | (0.864) |
| Managed float | 2.195 | 3.983 | -7.818*** | -4.211 | -7.090 | -0.098 | 3.115 | 4.363* | -0.049 | 0.484 |
| | (2.343) | (2.599) | (2.597) | (4.092) | (7.037) | (7.152) | (2.034) | (2.176) | (0.509) | (0.614) |
| Log (VXO) | -1.195* | | -1.359* | | -8.752*** | | 0.197 | | -0.456*** | |
| | (0.656) | | (0.778) | | (1.141) | | (0.536) | | (0.107) | |
| Hard peg x log (VXO) | -1.609 | -1.946* | -3.224* | -4.042*** | -3.080 | -3.917 | -1.388* | -1.650** | -0.842** | -0.927** |
| | (1.128) | (1.093) | (1.720) | (1.082) | (2.498) | (2.825) | (0.821) | (0.781) | (0.391) | (0.405) |
| Conventional peg x log (VXO) | -3.130** | -3.660** | -6.986* | -7.758** | 3.543 | 3.343 | -1.129 | -1.657** | -0.584 | -0.703 |
| | (1.482) | (1.475) | (3.395) | (2.996) | (2.813) | (3.300) | (0.830) | (0.812) | (0.515) | (0.551) |
| Basket peg x log (VXO) | 4.958** | 4.420* | 0.827 | -0.936 | 13.279*** | 5.983* | 0.733 | 0.455 | -0.290 | -0.469 |
| | (2.322) | (2.338) | (1.387) | (3.027) | (3.735) | (3.479) | (2.531) | (2.452) | (0.686) | (0.664) |
| Horizontal band x log (VXO) | 2.514** | 2.287** | 2.444 | 2.497 | 3.372 | 2.905 | 0.093 | -0.302 | -0.136 | -0.251 |
| | (0.980) | (0.918) | (2.253) | (1.863) | (2.449) | (3.886) | (1.435) | (1.051) | (0.272) | (0.335) |
| Crawling peg x log (VXO) | 0.363 | 0.264 | 2.951 | 0.945 | 5.665** | 0.382 | -0.007 | -0.322 | -0.384 | -0.580* |
| | (1.330) | (1.548) | (1.926) | (2.989) | (2.473) | (2.119) | (1.963) | (2.026) | (0.269) | (0.288) |
| Managed float x log (VXO) | -0.464 | -0.964 | 2.221** | 1.611 | 2.401 | 0.731 | -0.943 | -1.387* | 0.014 | -0.145 |
| | (0.794) | (0.862) | (0.825) | (1.240) | (2.273) | (2.282) | (0.693) | (0.752) | (0.168) | (0.208) |
| Lagged real GDP growth | 0.995*** | 0.862*** | 0.797*** | 0.802*** | -1.156*** | -0.136 | 0.486*** | 0.353** | | |
| | (0.160) | (0.169) | (0.152) | (0.203) | (0.413) | (0.247) | (0.146) | (0.141) | | |
| Lagged private credit/GDP | -0.091*** | -0.085*** | | | | | | | -0.018*** | -0.018*** |
| | (0.012) | (0.011) | | | | | | | (0.004) | (0.004) |
| Lagged real credit sector growth | | | 0.099** | 0.060 | 0.070 | 0.036 | | | | |
| | | | (0.039) | (0.041) | (0.083) | (0.081) | | | | |
| Lagged LTD ratio | | | | | | | -0.062*** | -0.061*** | | |
| | | | | | | | (0.013) | (0.012) | | |
| Lagged real GDP per capita | | | | | | | | | -1.857*** | -1.925*** |
| | | | | | | | | | (0.630) | (0.616) |
| Lagged net capital fllows/GDP | | | | | | | | | 0.013*** | 0.010** |
| | | | | | | | | | (0.005) | (0.004) |
| Lagged institutional quality | | | | | | | | | 0.542 | 1.035 |
| | | | | | | | | | (0.861) | (0.939) |
| Linear trend | 0.023* | | -0.005 | | -0.051*** | | 0.015* | | 0.013** | |
| | (0.011) | | (0.017) | | (0.015) | | (0.008) | | (0.006) | |
| Global financial crisis | 2.070*** | | -1.521* | | -7.594*** | | 1.345** | | -1.561*** | |
| | (0.516) | | (0.814) | | (1.641) | | (0.640) | | (0.241) | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 2,555 | 2,555 | 1,090 | 1,090 | 2,011 | 2,011 | 2,561 | 2,561 | 2,121 | 2,121 |
| Adjusted R2 | 0.256 | 0.276 | 0.302 | 0.384 | 0.122 | 0.440 | 0.182 | 0.229 | 0.354 | 0.426 |
| No. of countries | 43 | 43 | 25 | 25 | 37 | 37 | 43 | 43 | 38 | 38 |

Note: See notes for Tables 1-4, and Table 9 for variable descriptions. Constant is included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

**Table A4. Domestic Credit Growth and Exchange Rate Regimes in Advanced Economies, 1986Q1–2013Q4**

| | Advanced and EMEs | Advanced and EMEs | Advanced economies | Advanced economies | Advanced & EMEs (excl. Eurozone) | Advanced & EMEs (excl. Eurozone) |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Fixed regime | 3.767* | 4.287** | 1.646 | 0.566 | 6.597** | 7.852*** |
| | (2.000) | (1.961) | (2.024) | (1.830) | (2.606) | (2.490) |
| Intermediate regime | -0.531 | 0.803 | -2.955 | -2.020 | -0.618 | 0.756 |
| | (1.657) | (1.561) | (2.282) | (2.425) | (1.810) | (1.673) |
| Log (VXO) | -0.930** | | -0.373 | | -0.997** | |
| | (0.458) | | (0.538) | | (0.485) | |
| Fixed x log (VXO) | -0.591 | -0.739 | -0.189 | 0.068 | -1.478* | -1.819** |
| | (0.605) | (0.593) | (0.602) | (0.589) | (0.805) | (0.770) |
| Intermediate x log (VXO) | 0.481 | 0.137 | 1.168 | 0.849 | 0.475 | 0.142 |
| | (0.540) | (0.551) | (0.722) | (0.853) | (0.583) | (0.579) |
| Lagged real GDP growth | 0.971*** | 0.885*** | 0.639*** | 0.444*** | 1.022*** | 0.920*** |
| | (0.121) | (0.134) | (0.139) | (0.151) | (0.131) | (0.138) |
| Lagged private credit/GDP | -0.025*** | -0.023*** | -0.018*** | -0.017*** | -0.028*** | -0.025*** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.009) | (0.008) |
| Linear trend | 0.002 | | 0.001 | | 0.003 | |
| | (0.006) | | (0.007) | | (0.007) | |
| Global financial crisis | 1.202*** | | 1.088* | | 1.311*** | |
| | (0.377) | | (0.545) | | (0.457) | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | No | Yes | No | Yes | No | Yes |
| Observations | 4,916 | 4,916 | 2,296 | 2,296 | 3,876 | 3,876 |
| Adjusted R2 | 0.197 | 0.217 | 0.171 | 0.217 | 0.190 | 0.205 |
| No. of countries | 71 | 71 | 27 | 27 | 59 | 59 |

Note: Dependent variable is three-quarter moving average of quarterly real domestic private sector credit growth rate (in percent). See notes of Table 1for description of other variables. Sample comprises comprises EMEs and advanced economies (Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, China, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom) in cols. [1]-[2]; only advanced economies in cols. [3]-[4]; and EMEs and advanced economies exlcuding the initial Eurozone member countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The United States is not included in the advanced economy samples but including it has no significant impact on the results. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

## Table A5. Capital Flows and Disaggregated Exchange Rate Regimes, 1986Q1–2013Q4

| | Net capital flows | | Liability flows | | Asset flows | | FDI liability flows | | Portfolio liability flows | | Other investment liab. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Hard peg | 8.255** | 8.844** | 11.934* | 14.375* | -3.679 | -5.532 | 4.675 | 6.652 | 1.418 | -0.004 | 7.643 | 9.675 |
| | (3.862) | (3.840) | (6.816) | (7.483) | (5.612) | (5.990) | (4.190) | (4.607) | (3.740) | (3.387) | (5.596) | (6.106) |
| Conventional peg | 23.328* | 25.044* | 19.991 | 25.268* | 3.337 | -0.224 | 8.291 | 12.307* | 3.277 | 1.522 | 10.918 | 14.417 |
| | (13.577) | (14.335) | (12.493) | (13.979) | (3.331) | (3.270) | (6.330) | (6.882) | (2.452) | (2.437) | (10.290) | (11.503) |
| Basket peg | 29.745*** | 33.701*** | 20.860** | 30.277*** | 8.885 | 3.424 | -3.892 | 3.220 | 2.124 | 0.356 | 22.425*** | 26.649*** |
| | (8.264) | (7.896) | (8.240) | (8.972) | (10.332) | (9.803) | (4.554) | (4.487) | (3.406) | (3.210) | (6.844) | (8.071) |
| Horizontal band | 8.968 | 9.487 | 10.383 | 12.267 | -1.416 | -2.780 | 11.261 | 11.729 | 1.849 | 2.189 | 1.954 | 3.073 |
| | (8.997) | (8.348) | (25.856) | (24.166) | (17.249) | (16.200) | (12.702) | (11.904) | (4.628) | (5.484) | (10.181) | (8.395) |
| Crawling peg | 5.910 | 5.841 | -7.809 | -1.118 | 13.719*** | 6.959* | -1.614 | 4.814 | 2.456 | -1.460 | -5.996* | -1.808 |
| | (5.461) | (6.088) | (5.225) | (5.904) | (3.393) | (3.778) | (2.105) | (2.919) | (2.761) | (2.431) | (3.258) | (4.008) |
| Managed float | 5.939 | 8.296** | -3.475 | 1.554 | 9.415*** | 6.742** | -0.128 | 3.080 | 0.969 | -0.842 | -2.075 | 1.813 |
| | (3.686) | (3.840) | (2.787) | (3.561) | (2.128) | (2.485) | (1.580) | (2.185) | (1.717) | (2.110) | (2.954) | (3.312) |
| Log (VXO) | 0.622 | | -2.911*** | | 3.533*** | | -0.079 | | -0.812** | | -1.284** | |
| | (0.835) | | (0.765) | | (0.535) | | (0.330) | | (0.390) | | (0.540) | |
| Hard peg x log (VXO) | -3.367*** | -3.479*** | -3.681 | -4.165* | 0.314 | 0.686 | -1.682 | -2.052 | -0.093 | 0.211 | -2.597 | -3.081 |
| | (1.118) | (1.090) | (2.205) | (2.278) | (1.778) | (1.844) | (1.300) | (1.376) | (1.317) | (1.280) | (1.855) | (1.984) |
| Conv. peg x log (VXO) | -7.254* | -7.611* | -5.992 | -7.137 | -1.262 | -0.474 | -2.801 | -3.695 | -0.725 | -0.302 | -3.321 | -4.186 |
| | (4.204) | (4.315) | (4.089) | (4.385) | (1.018) | (0.979) | (2.087) | (2.195) | (0.727) | (0.725) | (3.465) | (3.764) |
| Basket peg x log (VXO) | -8.875*** | -9.865*** | -6.242** | -8.426*** | -2.632 | -1.439 | 0.918 | -0.738 | -0.426 | -0.099 | -6.623*** | -7.549*** |
| | (2.802) | (2.738) | (2.613) | (2.761) | (2.941) | (2.715) | (1.515) | (1.413) | (1.145) | (1.038) | (2.075) | (2.418) |
| Horizontal band x log (VXO) | -2.658 | -3.218 | -0.851 | -1.662 | -1.808 | -1.555 | -2.607 | -2.657 | -0.542 | -0.775 | 0.786 | 0.236 |
| | (2.483) | (2.178) | (6.767) | (6.121) | (4.437) | (4.133) | (2.793) | (2.599) | (0.946) | (1.180) | (3.620) | (2.951) |
| Crawling peg x log (VXO) | -1.584 | -1.059 | 2.431 | 1.083 | -4.015*** | -2.142* | 0.460 | -1.088 | -0.652 | 0.380 | 1.755* | 0.887 |
| | (1.741) | (1.987) | (1.687) | (1.909) | (1.109) | (1.195) | (0.702) | (0.913) | (0.823) | (0.690) | (1.023) | (1.278) |
| Managed float x log (VXO) | -1.389 | -2.058 | 1.372 | 0.056 | -2.761*** | -2.114*** | 0.188 | -0.575 | -0.262 | 0.167 | 0.765 | -0.317 |
| | (1.152) | (1.246) | (0.848) | (1.106) | (0.643) | (0.771) | (0.583) | (0.774) | (0.557) | (0.659) | (0.899) | (0.979) |
| Lagged real GDP growth | 0.372*** | 0.351*** | 0.398*** | 0.345*** | -0.026 | 0.006 | 0.102** | 0.042 | 0.009 | 0.060 | 0.282*** | 0.229*** |
| | (0.093) | (0.095) | (0.103) | (0.105) | (0.032) | (0.043) | (0.039) | (0.044) | (0.031) | (0.036) | (0.080) | (0.075) |
| Lagged institutional quality | 19.688*** | 11.534* | 24.977*** | 14.927** | -5.288 | -3.393 | 6.282*** | 2.116 | 4.736** | 5.931** | 13.227*** | 7.351* |
| | (5.125) | (6.012) | (4.963) | (5.853) | (3.146) | (3.251) | (2.101) | (3.201) | (2.057) | (2.548) | (3.929) | (3.751) |
| Lagged credit/GDP | -0.056** | -0.055** | -0.037* | -0.033 | -0.018 | -0.022 | 0.003 | 0.010 | -0.005 | -0.011 | -0.024 | -0.023 |
| | (0.021) | (0.023) | (0.022) | (0.024) | (0.021) | (0.024) | (0.013) | (0.014) | (0.010) | (0.010) | (0.016) | (0.018) |
| Linear trend | 0.006 | | -0.010 | | 0.016 | | 0.001 | | 0.017** | | -0.017* | |
| | (0.015) | | (0.016) | | (0.014) | | (0.007) | | (0.007) | | (0.010) | |
| Global financial crisis | -1.959* | | -3.043** | | 1.083 | | 0.374 | | -1.659*** | | -1.306* | |
| | (1.003) | | (1.212) | | (0.741) | | (0.542) | | (0.411) | | (0.704) | |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter-year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 | 2,093 |
| Adjusted R2 | 0.378 | 0.413 | 0.392 | 0.443 | 0.311 | 0.330 | 0.339 | 0.373 | 0.182 | 0.217 | 0.340 | 0.397 |
| No. of countries | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |

Note: Dependent variable is three-quarter moving average of quarterly net capital flows (in pct. of GDP) in cols. [1]-[2], liability flows (in pct. of GDP) in cols. [3]-[4], asset flows (in pct. of GDP) in cols. [5]-[6], FDI liability flows (in pct. of GDP) in cols. [7]-[8], portfolio liability flows (in pct. of GDP) in cols. [9]-[10], and other investment liability flows (in pct. of GDP) in cols. [11]-[12]. All domestic control variables are lagged two-periods to mitigate endogeneity concerns. Real GDP growth rate is year-on-year GDP growth. Sample comprises open countries (i.e., those above the 25th sample percentile of the Quinn-Toyoda capital account openness index) and non-financial crisis years. Constant is included in all specifications. Clustered standard errors (by country) are reported in parentheses. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.