

Global Research Unit Working Paper #2016-005

Exchange Market Pressure in OECD and Emerging Economies: Domestic vs. External Factors and Capital Flows in the Old and New Normal

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This paper was presented at the International Conference on the New Normal in the Post-Crisis Era in 2015.

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**Exchange Market Pressure in OECD and Emerging Economies:
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Abstract

We study the ways domestic and external global factors (such as risk appetite, global liquidity, U.S. monetary policy, and commodity prices) affected the exchange market pressure before and after the global financial crisis as well as the role of these factors during the Federal Reserve's tapering episode. Utilizing a comprehensive database on capital controls, we investigate whether control measures have a significant impact on mitigating exchange market pressure associated with capital flows [net and gross]. Using quarterly data over the 2000–2014 period and a dynamic panel model estimation, we find that external factors played a significant role in driving exchange market pressure for both OECD countries and emerging market countries, with a larger impact on the latter. While the effect of net capital flows on exchange market pressure is muted, short-term gross portfolio inflows and outflows comprise important factors that account for exchange market pressure. Short-term portfolio flows and long-term foreign direct investment flows have a significant impact on exchange market pressure for emerging market economies and no significant effect for OECD countries. Capital controls seem to significantly reduce the exchange market pressure although the economic size of this impact is highly dependent on the institutional quality.

Keywords: Exchange market pressure, capital flows, capital controls, tapering
JEL classification: F31, F38, G01

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1. Introduction

Over the last three decades, global financial integration has created major opportunities and challenges for policymakers in both advanced and emerging market economies. The financial integration trend, however, has faced several disruptive crises in emerging markets including the Mexican, the Russian, and the East Asian crises in the 1990s. The last and major disruption in financial markets, the global financial crisis (GFC), originated in the U.S. and was driven by problems in the subprime mortgage market as well as related securitization and investment activities across the globe. The highly accommodative monetary policies in advanced economies following the GFC—and more recently the policy actions and perspectives with regard to exiting from such accommodative policies—have created further challenges and instabilities particularly in emerging markets. The fact that global interest rates and asset prices have become increasingly correlated during the recent period of unconventional monetary policies has also magnified the challenges facing the worldwide financial system (Mohanty, 2014).

With increasing financial integration and resulting international spillovers, the identification and implications of channels of spillover have become important for appropriate policy designs and actions. Takats and Vela (2014), Mohanty (2014), and Caruana (2012) have distinguished and discussed five stylized spillover channels that include (i) the exchange rate, (ii) the policy interest rate, (iii) long-term interest rates, (iv) international bank lending, and (v) portfolio flows. Among these, the first and the most obvious channel of external economic conditions and domestic macroeconomic factors is the exchange rate—the focus of this paper.

The role of the exchange rate in the international spillovers depend on the exchange rate regime and related management policies. For instance, from 2010 to 2012, following the global financial crisis period, countries aiming at an export-led recovery opted to undertake devaluations/depreciations as a way to improve their competitiveness. A heated debate then ensued, dubbed the “Currency War.” In the aftermath of the GFC, the weaker parts of the Euro region experienced severe debt crises that raised concerns regarding the sustainability and stability of the Eurozone. The growing asymmetry between the expansionary policies of the FED and the deflationary trends in the Eurozone as well as the growing financial instability of Euro’s periphery have magnified the euro/dollar exchange rate volatility and contributed to the large euro depreciation during 2014–2015Q1.

Given the large fluctuations of key exchange rates and their importance as an international-spillover channel, understanding the role of domestic and external factors, international capital flows, and capital controls in determining the exchange market pressure have been understudied in recent years. This paper aims to fill this gap, analyzing the degree to which domestic factors and external global factors (risk appetite, global liquidity, U.S. monetary policy, commodity prices, and the like) have affected exchange market pressure before and after the GFC. Utilizing a recent comprehensive database on capital controls, we also explore whether net and gross capital flows and capital control measures have a significant impact on exchange market pressure. In addition, this research complements the studies on the transmission of U.S. tapering talk during 2013 to emerging market economics (Eichengreen and Gupta, 2014; Aizenman et al., 2014) by focusing on the exchange market pressure before and after the GFC.

Large fluctuations of the exchange rate are an important issue in policy considerations for countries concerned with the sustainability of external imbalances as well as for export-oriented economies. Exchange rate fluctuations may have a substantial effect on financial stability via numerous macro channels, including destabilizing balance sheet effects. Indeed, currency substitution and currency mismatches at the aggregate level have been linked with banking and debt crises in emerging markets (e.g., Chile in the 1980s and Mexico in the 1990s (BIS, 2008)). Capital flow composition has become more important for exchange rate fluctuations as short-term flows are more prone to sudden reversals (Ahmed and Zlate, 2014, and the references therein). During the GFC, unconventional monetary policies put forth by advanced economies' central banks led to large flows of capital into emerging economies and encouraged carry trade activities. The recent wave of capital outflows from emerging markets has been mainly in the form of portfolio investments - which includes equity and debt flows - as the uncertain international economic outlook has also impacted the flow of foreign direct investment (FDI) to emerging market economies (EME). Figures 1 and 2 show the total net capital flows as well as gross inflows and outflows of a sub-group of the OECD and emerging market countries.

Using a dynamic panel estimation and quarterly data for 50 OECD and emerging market countries from early 2000 to 2014Q3 period, we find that external factors (such as market risk appetite, market liquidity, and U.S. monetary policy actions) play a significant role in driving the exchange market pressure in both the OECD and emerging market countries, with a larger impact on the latter. We also find that capital flow composition is

important in driving the exchange market pressure. While the impact of net flows is muted, short-term gross portfolio inflows and outflows are important factors in determining the exchange market pressure. Capital controls seem to significantly reduce the exchange market pressure, yet the impact is largely dependent on the institutional quality.

The rest of this paper is organized as follows. The next section gives a brief literature review. Section 2 presents the data and methodology of the study. Section 3 presents the main results and extensions of the basic models, and Section 4 concludes.

2. Literature

The literature on exchange market pressure (EMP) goes back to Girton and Roper (1977), who introduced a monetary model of such pressure and applied it to the post-war Canadian dollar. Weymark (1995) then further formalized the model. She proposed a model-independent definition such as “exchange market pressure measures the total excess demand for a currency in international markets as the exchange rate change that would have been required to remove this excess demand in the absence of exchange market intervention, given the expectations generated by the exchange rate policy actually implemented” (p. 278). This definition implies a direct observable measure of the pressure in cases in which the domestic currency is freely floating. However, since intermediate exchange-rate regimes are adopted by most countries, counterfactual measures include other policy actions such as FX market interventions and interest rate adjustments to ward off the pressure on the exchange rate. Thus, EMP is often measured as a weighted sum of exchange rate depreciation and international reserve loss (including interest rate differentials in some cases) and is frequently applied to the analysis of emerging market currencies and crisis identification.

Despite an extensive literature on the topic, research on EMP during and after the GFC is limited. Rose and Spiegel (2009) and Frankel and Saravelos (2010) focused on the degree to which leading indicators of financial crises have been useful in assessing country vulnerability, while Aizenman et al. (2010) investigated the extent to which crises caused EMP in emerging markets.¹ These authors also addressed the question of whether absorption

¹ Another study that looks at EMP during the recent financial crisis is by Feldkircher et al. (2014) in which the authors examined whether pre-crisis leading indicators helped explain pressures on the exchange rate during the global financial crisis. They used a wide data set covering 149 countries and 58 indicators as well as a Bayesian model averaging approach to deal with model uncertainty. The research highlights the role of price stability as a major determinant of exchange rate pressures.

of the shock was mainly through exchange rate depreciation or the loss of international reserves. Similarly, Aizenman and Hutchison (2012) evaluated how the global financial crisis emanating from the U.S. moved into emerging markets by using EMP as one of the indicators. Controlling for a variety of factors associated with EMP, they found that emerging markets with higher total foreign liabilities (such as short- and long-term debt, equities, FDI, and derivative products) had greater exposure and were much more vulnerable in the financial crisis.² The current paper adds to the benchmark literature in several ways. First, it covers a large sample of countries, both OECD and emerging economies, before and after the global financial crisis. Second, it addresses the role of capital gross, net capital flows, and capital controls. Third, it examines the most recent tapering episode in which after the global financial crisis, tapering by the U.S. Federal Reserve Bank and the subsequent expectation of monetary policy normalization led to heightened turbulences in foreign exchange markets in emerging as well as in advanced economies.

The more direct link between the compositing of capital flows and nominal and real exchange rate movements has been recognized in the literature. Capital flows associated with the rebalancing of portfolios may initiate foreign-exchange order flows, which, in turn, induce exchange rate movements and potentially account for exchange rate movements at higher frequencies. Indeed, several recent empirical studies have found significant effects of portfolio flows on real exchange rates. For instance, Brooks et al. (2001) and Bakardzhieva et al. (2010) have reported that portfolio investment flows, foreign borrowing, and aid and income flows are found to significantly affect the real exchange rate, while flows related to foreign direct investment were not found to influence the real exchange rate significantly.

Combesa et al. (2012) also analyzed the impact of capital inflows on the real effective exchange rate for emerging and developing countries and show that both public and private inflows are associated with an appreciation of the real effective exchange rate. Among private inflows, portfolio investments display the biggest impact on appreciation. Jongwanich and Kohpaiboonb (2013) reached similar results. Additionally, addressing the nexus of the real exchange rate (RER) and capital inflows through a comparative analysis of emerging market economies in Asia and Latin America, Athukorala and Rajapatirana (2003) found that the

² Despite the remarkable buildup of international reserves by emerging markets before and during the financial crisis, the EME reaction was mainly through exchange rate depreciation rather than reserve loss in absorbing most of the exchange market pressure. This finding is in line with the view that at times of deflationary pressure, countries may opt for depreciation to gain competitiveness, as the downside risk of higher inflation is of lesser concern.

degree of appreciation in the RER associated with capital inflow is uniformly much higher in Latin American countries compared with their Asian counterparts despite the fact that the latter has experienced far greater foreign capital inflows relative to the size of their economies. While several studies provide evidence on the role of capital flows and the compositional effects on the exchange rate, the role of external (“push”) and domestic (“pull”) factors and capital controls in explaining the exchange market pressure before and after the global financial crisis has been under-investigated.³

3. Data and Methodology

We collect quarterly data on OECD and EME countries from 2000 Q1 through 2014 Q3. The list of countries is shown in Table A1 in the Appendix.⁴ Data on the foreign exchange rate, international reserves (minus gold), money market rates, population, GDP, CPI inflation, base money (or M1, if not available), trade balance, domestic credit, domestic stock market indices, portfolio, and FDI flows are obtained from the International Monetary Fund (IMF) International Financial Statistics (IFS) database. In cases in which the IFS database does not provide data on relevant range and frequency, we utilize national data sources. The IMF Quarterly External Debt Statistics (QEDS) database provides the gross short-term external debt data. The country-specific commodity terms of trade index is constructed following Ricci et al. (2008), Spatafora and Tytell (2009), and Aizenman et al. (2012), using data sources therein. For the U.S. market variables such as the TED spread, the VIX, U.S. bond yields, and federal fund rates, we mainly use data from the Federal Reserve Economic Data (FRED) provided by the Federal Reserve Bank of St. Louis.

We also use the most recent data set on capital controls by Fernandez et al. (2015). This data set includes capital control restrictions on both inflows and outflows of 10 asset categories for 100 countries over the 1995-2013 period based primarily on the analysis of the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Fernandez et al. (2010) argue that the new data set could offer a detailed analysis of capital

³ Eichengreen and Gupta (2014), Ahmed and Zlate (2014), Aizenman et al. (2014), and Fratzscher et al. (2013) looked at quantitative easing, the most recent tapering policies, and the effect on emerging financial markets.

⁴ Some of the countries in our sample are OECD members and also considered emerging market economies according to the Morgan Stanley Capital Index. As Table A1 lists, these countries include Poland, Turkey, and Korea, among others. In the case of country grouping overlap, we include them in the emerging market group, which gives us 22 OECD and 28 EME in the sample.

controls such as the co-movements of controls on different types of assets and inflows-outflows, “as well as the construction of aggregate measures of controls that are well targeted to the specific nature of the topic being studied. Variations of such aggregate measures across time serve as one indicator of the intensity of the application of restrictions on international capital movements” (p. 4). Since various channels of spillovers that include portfolio, international bank lending and other flows could potentially affect exchange rate fluctuations, a capital control index that covers various sources of international capital movement is needed to assess the impact on EMP.⁵ Thus, with this data set, we can investigate the impact of aggregate and disaggregate controls on capital inflows and outflows as well as on different asset categories. Capital controls could be particularly important in investigating EMP since one of the reasons for the imposition of capital controls is due to the concern over the impact of large exchange-rate movements. Since substantial appreciation or depreciation of the currency could have a detrimental impact on the real and financial economy, it is anticipated that various forms of capital controls could help offset the EMP.⁶

Another important variable is capital flows. As discussed in the literature review, capital flows could lead to significant fluctuations in asset prices. Furthermore, capital flows are another significant channel of international spillover and have been one of the most important elements of financial stability concerns particularly in emerging economies. A related debate over capital flows centers on the relevance of gross versus net flows. For instance, Borio and Disyatat (2011) and Broner et al. (2013) stress the importance of measuring gross rather than net cross-border financial positions in assessing systemic risks as well as the role of gross flows particularly during the recent financial crisis. This is partially due to a distinguishing feature of the recent period in which the rapid increase in gross flows does not always show up in the net capital flow statistics. On the other hand, the short-run dynamics of different

⁵ Recently, more granular data sets on capital controls have been constructed. For instance, Pasricha et al. (2015) complement IMF’s AREAER with data points regarding each change in a capital account regulation including policy changes and announcements using regulators’ websites and news sources. While this data set has a higher frequency regarding the timing of changes, it is only available for 18 EMEs. Another comprehensive data source in the context of macroprudential policies is due to a recent study by Bruno et al. (2015) in which an assessment of the effectiveness of macroprudential policies in 12 Asia-Pacific economies is provided. Using domestic macroprudential measures and capital controls, the study focuses on the impact of such policies on the banking sector and bond markets. The capital controls measure used in our study already includes these sub-categories.

⁶ For further discussion on the imposition of capital controls, see Dooley (1996) in which he argued that “capital controls are imposed for a number of reasons but all are based on the desire to insulate the domestic economy from some form of international capital flow.”

asset classes in net terms could be a more relevant measure for financial stress, which includes EMP (Aizenman et al., 2012). Against this background, we investigate both net and gross capital flows for exchange market pressure⁷ with disaggregation of long-term FDI flows and short-term portfolio flows.⁸

We estimate the following dynamic panel model for exchange market pressure:

$$emp_{it} = \beta_0 + \beta_1 emp_{it-1} + \beta_2 X_{it} + \beta_3 Y_{it} + \beta_4 Z_t + \mu_i + \varepsilon_{it}, \quad (1)$$

where emp_{it} is the exchange market pressure for country i at time t ; and X_{it} includes domestic factors such as change in real GDP per capita, CPI inflation, change in domestic credit/GDP, trade balance/GDP, short-term external debt/GDP, and stock market returns. Y_{it} includes capital flows (net or gross) as share of GDP, capital controls, and commodity terms of trade; Z_t includes external factors such as global liquidity indicators including the TED spread, the VIX, the change in effective federal funds rate, the slope of the U.S. yield curve (the difference between 10-year long term and 3-month short-term yields); and μ_i indicates country fixed effects.

Following the literature as discussed in Aizenman et al. (2012), we construct three alternative measures of EMP. The standard EMP measure is the difference between the percentage change in exchange rate and foreign exchange reserves, which is defined as:

$$emp_t = \frac{e_t - e_{t-1}}{e_{t-1}} - \frac{ir_t - ir_{t-1}}{ir_{t-1}}, \quad (2)$$

where e_t is exchange rates (local currency per U.S. dollar) and ir_t is the foreign exchange reserve (minus gold). Thus, the EMP measure here gives a quarterly relative change in exchange rate and foreign exchange reserves. We modify this measure by adding domestic and foreign interest-rate differentials aimed at shoring up the exchange rate pressure in addition to foreign exchange intervention when constructing the counterfactual (Klaassen and Jager, 2011):

⁷ Our net measure is constructed as the difference between, for instance, changes of FDI assets and liability. Thus, net capital flows indicate net outflows (inflows) when these changes are positive (negative). For the capital inflows and outflows, we use net assets and liability measures as indicators of outflows and inflows while treating, for instance, negative (positive) net asset (liability) as capital inflows (outflows). During the amassing of the sample in our paper, the IMF released the sixth edition of its Balance of Payments and International Investment Position Manual (BPM6) in 2009, replacing the fifth edition (BPM5). Thus, after 2005, we used capital flows data from BPM6, and merged with BPM5 from 2000 to 2004 accordingly.

⁸ While we are able to further disaggregate portfolio inflows into debt and equity flows, neither of these components were available for all of the countries in our sample. Therefore, we opted to use only aggregate portfolio flow measures in the empirical analysis.

$$emp_t = \frac{e_t - e_{t-1}}{e_{t-1}} - (i_t - i_t^*) - \frac{ir_t - ir_{t-1}}{ir_{t-1}}, \quad (3)$$

where i_t and i_t^* are the money market rate for home and base country (the U.S.).⁹ Another measure of EMP is the difference between exchange rate depreciation/appreciation and foreign exchange reserves deflated by base money and considered as the monetary model-based EMP, constructed as follows:

$$emp_t^{base} = \frac{e_t - e_{t-1}}{e_{t-1}} - (i_t - i_t^*) - \frac{ir_t - ir_{t-1}}{mb_{t-1}}, \quad (4)$$

where mb_{t-1} is the monetary base converted to the U.S. dollar. In cases in which the monetary base is not available, we use M1 as a monetary aggregate. Given that both measures above are unweighted, a third measure of EMP is constructed by a standardized difference between the exchange rate and foreign reserve changes and shown as:

$$emp_t^{standard} = \frac{\Delta e_t - \mu_e}{\sigma_e} - \frac{\nabla i_t - \mu_i}{\sigma_i} - \frac{\Delta ir_t - \mu_{ir}}{\sigma_{ir}}, \quad (5)$$

where Δe_t and Δir_t are the quarterly percentage in the exchange rate and international reserves, ∇i_t is interest rate differential, and μ and σ are the mean and standard deviation of respective variables. While monetary base or volatility are the most potential weighting schemes for foreign exchange reserves, other measures such as the FX market turnover could also be used to incorporate FX market transactions relative to FX reserves. For instance, Ehlers and Packer (2013) use a BIS triennial central bank survey to document growing FX market turnover in emerging markets with an increasing role of “other financial institutions” and offshore trading and find that the trading of emerging market currencies is positively related to the size of cross-border financial flows. Despite the broad time coverage (1998

⁹ Following the earlier work of Girton and Roper (1977) on EMP, all studies include the exchange rate change and change in reserves and at times scaled by narrow money supply. Regarding the use of the interest rate component, those studies differ as some leave out the interest rate, others include it by taking the first difference of the domestic rate, while the rest use the interest rate differential between the domestic and the reference country. Klaassen and Jager (2011) review these different approaches and offer a definition-consistent measure of exchange market pressure that includes the interest rate in the level form and relative to the interest rate chosen if the country had no exchange rate objective. From an operational point of view, they offer a simplified proposal of using nominal interest rate differentials between the home country and the reference country. In addition to using interest rates in level, another feature of the definition-consistent measure of Klaassen and Jager (2011) is that the interest rate differential term enters into the EMP with a negative sign, for which they argue that it is a consequence of using a flexible price monetary model. Thus, while we report the baseline and extended results for EMP estimations using the approach outlined above only, we have compared the complete results by not including interest rate components and by including it following, for instance, Eichengreen et al. (1996) for the robustness check. These alternatives are giving qualitatively similar results in terms of the role of domestic macro versus international market fundamentals in explaining the EMP. All estimation results are available from the authors upon request.

through 2013), the triennial frequency of such a data set is a natural limitation such that we are not able to use it as an alternate weighting scheme in the construction of the EMP measure.

Although we use these measures for the baseline estimations, we mainly use the first measure because it is easy to interpret. Figures 3a–3c give the cross-sectional average of the three measures of EMP with a breakdown of the OECD and emerging economies. All measures for both country groups indicate a slight downward trend prior to the GFC and a heightened volatility during and after the crisis.

As a final note, the external indicators of the VIX, the TED spread, and the local stock market return could be closely correlated and in a sub-period analysis, in particular, could lead to a problem of multicollinearity and thus bias in the estimated parameter. Therefore, we reduce this potential problem by orthogonalizing some of the variables. For instance, the VIX is regressed on the TED spread and the residual from this regression is used as a pure measure of risk. By the same approach, domestic equity returns are regressed on the S&P 500 returns and the residuals used as the measure of pure domestic returns (see Fratzscher, 2012, for the same approach).

For estimation methodology, we use the typical dynamic panel method to deal with the inconsistency in parameter estimates as well as to capture the dynamic adjustment and persistency of EMP. The actual change in exchange rates is known to exhibit weak serial correlation and even show random walk behavior. Hence, for floating exchange rates, the EMP is expected to be equal to a change in exchange rate and thus the pressure is not persistent. However, there could be regime-dependent persistence in the monetary model (see, for instance, Klaassen, 2012, for further theoretical discussion and an empirical test on the persistence of EMP). Therefore, to capture the persistence in EMP, the lagged value of the dependent variable is included as the right-hand-side variable. To remove the inconsistency in parameter estimates, we use the generalized method of moments (GMM) of Arellano and Bond (AB, 1991), which was later extended by Arellano and Bover (1995) and subsequently to system estimation by Blundell and Bond (1998).

Given the endogeneity problem introduced by the lagged dependent variable, further lags of the dependent variable are used as instruments. However, the AB estimation also allows treating other variables endogenously, such as capital flows, among the variables of interest. One potential problem in implementing the GMM estimation of the AB type is that

the number of instruments explodes with T . This implies that such instrument proliferation may over-fit the endogenous variable, which may introduce bias in estimates and weaken the power of the Hansen test. Roodman (2009a) discusses the potential pitfalls of instrument proliferation and suggests limiting the number to certain lags or collapsing the instruments by having separate moments for each lag (instead of a moment for each lag in a time period). We follow these guidelines to satisfy the condition of using the number of instruments equal to or less than the number of countries. Additionally, given the structure of our sample, we use a one-step GMM system in the estimations to lower the bias and improve efficiency. Along with the regression results, we report the diagnostic tests including the first- and second-order autocorrelation, the Hansen J-test statistic for over-identifying restrictions, and the Hansen C-test statistic (difference-in-Hansen test statistic) to validate the IV-style instruments.¹⁰

4. Empirical Results

Estimation results for model (1) with three alternative EMP measures are reported in Table 2 and in the following tables with various extensions and robustness tests. We take several venues in terms of reporting baseline results with complete samples of countries and time periods. We also provide a comparison across sub-groups of OECD versus emerging countries. Moreover, over the period of analysis, we observe large swings in the exchange rate driven by the global financial crisis, which was preceded by the relatively stable period of the Great Moderation, and a post-crisis period of valuation due to expansionary U.S. monetary policy that was coupled with a large flow of foreign capital into emerging economies. During the post-crisis period, a heated debate ensued over exchange rate fluctuations, which was later dubbed the Currency War in late 2010 when countries chose to competitively devalue as a way to move the economic recovery through their external balances. In the aftermath of the crisis, the Euro area was sliding into a severe debt crisis that raised concerns about the sustainability of the Eurozone and led to a fluctuation in dollar/euro rates as well as to other countries' currencies that had close trade ties or was anchored to the euro.

For emerging economies, the last phase of currency fluctuations was driven by scaling back asset purchases through a policy known as quantitative easing. The FED's tapering issues came to the fore in 2013 with a major debate among policymakers and market participants about an exit strategy from the massive monetary stimulus. A milestone for

¹⁰ All estimations are executed with `xtabond2` routine in STATA developed by Roodman (2009b).

financial markets around the world was on May 22, 2013, when then-Federal Reserve Chairman Bernanke raised the possibility of tapering in his Congressional testimony. The actual tapering process started on December 18, 2013, when the Fed decided at the FOMC meeting to taper its asset purchases by \$10 billion per month to \$75 billion as a gradual reduction over the following months. Therefore, we consider all of these episodes of policy changes and present a sub-period analysis with alternative market variables that are relevant to the exchange market pressure.

Table 2 reports our baseline estimation results for alternative EMP measures and a subsample of country groups by regressing them on a vector of domestic macro, financial variables, and external factors. Estimation results for the first measure of EMP are presented in specifications (1) to (3) for the full sample of countries, OECD, and emerging countries, respectively. The full sample results for the entire period indicate that a lower GDP per capital growth and a lower stock return as well as market risk and risk appetite with a higher Federal Reserve policy rate are all significantly associated with higher EMP. Comparing the OECD and emerging countries, in specifications (2) and (3), we observe that financial/market indicators—both domestic and external factors—have more important explanatory power for EME than the OECD sample. With regard to cross-border capital flows—one of the important channels of international transmission—both short-term portfolio flows and long-term FDI flows have a significant impact on exchange market pressure for EME and no significant effect for OECD countries. This marked difference between the coefficient of net capital flows for emerging versus OECD countries is indicative of the increasing role of financial integration of emerging economies during the Great Moderation and afterwards. At the same time, this result also highlights the importance of deep money and capital markets that lessen the consequences of surge and reversal in capital flows.

Estimation results for Table 2 show that along with highly significant financial indicators and capital flows, for other EMP measures, trade balance and domestic credit seem to have a marginally significant association for EME with market pressure. For instance, a negative trade balance coefficient indicates the net export of goods and services and implies lower EMP while a higher domestic credit GDP ratio, which is a proxy for looser monetary policy, is indicative of higher EMP for emerging economies (and a counter effect for OECD).

As discussed in the data section, besides the unweighted sum of exchange rate depreciation, interest rate differentials and a loss of foreign reserves, two other measures are also reported in the literature. Hence, we run our baseline model with both alternative

measures and show results in specifications (4) through (9) in Table 2. To a large extent, results are comparable to the first EMP measures in terms of persistence and the significance of macro/financial indicators as well as domestic versus external factors and country group comparison. Therefore, with both the base and standardized measures of EMP, we observe larger explanatory powers of financial domestic and external factors compared with macro and trade factors. For easy interpretation, coherence of results presentation, and related discussion, we choose to use the first EMP measure in the following sections.

4.1 Capital Inflows and Outflows, and Capital Controls

We provide further results on the role of capital flows and controls in Tables 3 and 4. First, given the differing role of net and gross flows during tranquil versus turbulent times, we break down net capital flows into inflows and outflows across two asset categories. Due to the high correlation between inflows and outflows, we present results for FDI and portfolio inflows and outflows in alternative specifications for the full sample and country groups. As discussed in the literature review section, Brooks et al. (2001) and Bakardzhieva et al. (2010), for example, found that portfolio investment flows, foreign borrowing, aid and income flows are generally found to significantly affect the (real) exchange rate, while flows related to foreign direct investment are not found to influence the (real) exchange rate significantly. Controlling for the same set of domestic and external trade and finance factors as in Table 2, the estimation results for EME give very similar results for EMP. In other words, both portfolio inflows and outflows have a significant association with EMP while FDI inflows and outflows are not found to have a significant effect. Therefore, compared with the results in Table 2, while both net FDI and portfolio flows have significant explanatory power, the direction of gross flows may yield different implications for EMP. Similarly, the direction of flows does not have significant explanatory power for OECD countries, which also becomes dominant when estimating the full sample of countries as in specifications (1) and (2).

Regarding the effectiveness of capital controls, we present baseline results for the full sample and country groups in specifications (1) through (3) in Table 4a. Due to a possible simultaneity issue of capital controls and flows, we include the aggregate capital controls index of Fernandez et al. (2015) in the first set of results.

We find significant evidence of an aggregate capital control measure in reducing EMP for OECD countries and no effect for the EME sample. The results are in contrast with a recent survey of the literature by Magud and Reinhart (2007) on the effectiveness of capital

controls in which they argue that studies to date “are not very informative regarding the effectiveness of controls in reducing the volume of capital flows and reducing real exchange rate pressures” (p. 650). Although the exchange rate pressure they refer to is not necessarily the same measure as EMP, for the OECD countries with minimal exchange market intervention and thus a change in foreign exchange reserves, EMP boils down to change in the exchange rate itself.

In specifications (4) to (6), we estimate the baseline model with net capital flows and controls and investigate whether capital controls have a significant effect controlling for capital flows. The aggregate capital control measure still stands significant for OECD countries with no effect for EME. These results are in line with Binici et al. (2010), who investigate the effectiveness of capital controls on capital inflows and “highlight certain asymmetries, namely, that capital controls appear more effective in advanced countries than in less developed and emerging-market economies. This may be associated with better institutional ability to enforce controls” (p. 681).

The novelty of the Fernandez et al. (2015) data set is that their capital control measures are disaggregated by asset class and by inflows/outflows for a large sample of countries through 2013. Hence, we utilize this data set to investigate whether any asymmetry exists in term of inflow and outflow controls. Table 4b offers these tests. For the full sample estimation, capital inflow and outflow controls have a similar impact in terms of size and significance on reducing EMP. With the country-group breakdown, while both inflow and outflow controls are statistically significant, inflow controls seem to have larger effect in reducing EMP for OECD countries while neither control has an effect on EME. In sum, despite a differential effect across country group and inflows and outflows, we are able to offer some evidence that capital controls are effective in reducing the EMP depending on the institutional quality of enforcing such measurements.

4.2 Sub-Period Analysis

We divide the complete sample into four sub-periods that are relevant for exchange market pressure and the determining factors. As discussed earlier, the first sub-period is the Great Moderation that is covered from 2000 through 2007Q1, the global financial crisis over 2007Q2–2009Q2, the post-crisis period of 2009Q3–2013Q1, and finally the tapering period that became highly relevant for the world capital market starting in 2013Q2. Sub-period results are presented in Table 5a–5c. The full sample results including OECD and EMEs in

Table 5a indicate that before the crisis, some of the macroeconomic variables such as GDP per capita growth and inflation had explanatory power for the EMP, however, the financial and external indicators began to play a more dominant role during the crisis and in the aftermath.

The sub-period analysis for OECD and EME countries in Tables 5b and 5c reveals more marked differences. For instance, the explanatory power of factors included in the model for the OECD countries, in general, seems to have more power during the crisis period, which is probably due to a larger variation in the exchange market pressure as well as other factors. Compared with the EME, the inflation rate significantly affects the EMP except during the crisis period. Since the inflation rate during the crisis in most of the OECD countries stayed very low and there was a lack of concern for the monetary policy decisions, markets did not pay much attention to inflation developments. However, in other periods, current and expected inflation could be an important indicator for the monetary policy stance and thus important in deriving the interest rate differential and ultimately, exchange rate movements. In this regard, Feldkircher et al. (2014) highlight the role of price stability as a major determinant of exchange rate pressure in their extensive study of EMP that covered the post-crisis period through 2011.

Table 5c indicates the increasing role of financial and external indicators during and after the global financial crisis for EME compared with the Great Moderation period. As the earlier discussion and Figures 1–2 show, capital reversals and surges became the main source of international spillover for EME. Therefore, domestic and external financial factors such as domestic equity returns, the VIX, the TED spread, and the slope of the U.S. yield curve are all consistently significant during and after the crisis.¹¹ In addition, the magnitudes of the portfolio inflow and outflow coefficients during and after the crisis are larger than the pre-crisis period, which indicates the increasing role of EME financial integration with the world financial markets.

¹¹ Note that for a complete period analysis, we have included the U.S. federal fund rate. During and after the crisis, the effective federal fund rate approached the zero lower bound and quarterly changes were negligible. The yield curve slope, on the other hand, has shown some variations and is considered to have captured the market expectation regarding economic activity and future monetary policy actions. Therefore, for the sub-period analysis, we consider the yield curve slope as a policy indicator for the U.S.

4.3 Tapering Period and Emerging Market Economies

The last sub-period of our analysis that became particularly important for the financial markets, especially in EME, is the tapering period that came to the fore in 2013. The concerns over the impact of scaling back security purchases heightened on May 22, 2013, when Chairman Bernanke raised the possibility of tapering in his Congressional testimony. Since the impact of tapering was largely observed in EME, in addition to comparing the sub-periods in Table 5, we offer more evidence on how financial factors affect the EMP in Table 6. The tapering sub-period is relatively short because our sample ends in the third quarter of 2014. Therefore, the financial factors including the VIX, the TED spread, and the yield curve are closely correlated, which leads to a multicollinearity problem. This explains why we include macroeconomic factors and capital inflows and outflows in the Table 5 baseline specifications but show other financial variables individually. When we compare financial factors between the crisis and the post-crisis period, a more significant and larger effect on EMP exists during the tapering. This effect implies that emerging market currencies became more sensitive to the Federal Reserve policy actions, which was coupled with capital reversal from EME with the expectation of less carry trade activity. As the transmission channel of policy expectation was short-term capital outflows, Table 6b indicates a larger and significant coefficient of portfolio outflows, which is consistent across all specifications.¹²

5. Conclusions

The debate regarding the importance of exchange rate adjustment in the post-global financial crisis era is not over. Rey (2013) concluded that the economic center's monetary policy influences other countries' national monetary policies mostly through capital flows, credit growth, and bank leverages, making the types of exchange rate regimes of the non-center countries irrelevant. Accordingly, all of the peripheral countries are sensitive to a "global financial cycle" irrespective of their exchange rate regimes. Therefore, the "trilemma" is reduced to an "irreconcilable duo" of monetary independence and capital mobility. Consequently, restricting capital mobility may be the only way for non-center countries to retain monetary autonomy. However, news about the irrelevance of exchange rate changes may have been overstated. Gourinchas and Rey (2014) noted that valuation effects, which are

¹² We investigated the effectiveness of capital controls on the exchange market pressure for the tapering period. However, since the capital control data is only available for 2013 and repeats across quarters, we could not find any significant evidence of the effectiveness of capital controls in a small sample of cross-sectional regressions over each quarter.

capital gains and losses on gross external assets and liabilities (including exchange rate changes), account for an important and increasing part of the dynamics of countries' net foreign asset positions.

Our paper suggests that there may be no simple solutions for emerging market economies' exposure to policies and market pressures propagated from the core. While capital controls may mitigate the exposure, the efficacy of this mitigation depends on the quality of institutions and may be greater for OECD countries than for more vulnerable EME. Our results are also in line with Aizenman et al. (2015), who find that the arrangement of open macro policies such as the exchange rate regime and financial openness has a direct influence on the sensitivity of the center economies. We leave studying the impact of exchange market adjustment and capital controls on economic performance to future research.

Acknowledgments

We thank Frank Packer and the participants at the CityU-DNB-JIMF Conference on the New Normal in the Post-Crisis Era for very helpful suggestions on an earlier draft of this paper.

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Figure 1a: Net Capital Flows to Eemerging Market Economies
(Billion USD)

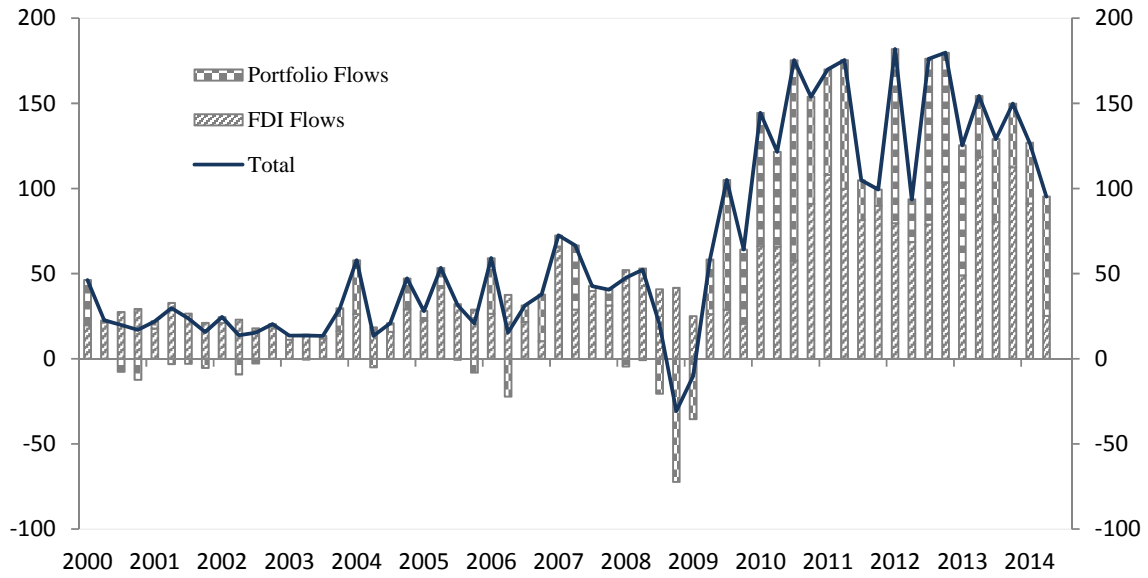


Figure 1b: Net Capital Flows to OECD Countries
(Billion USD)

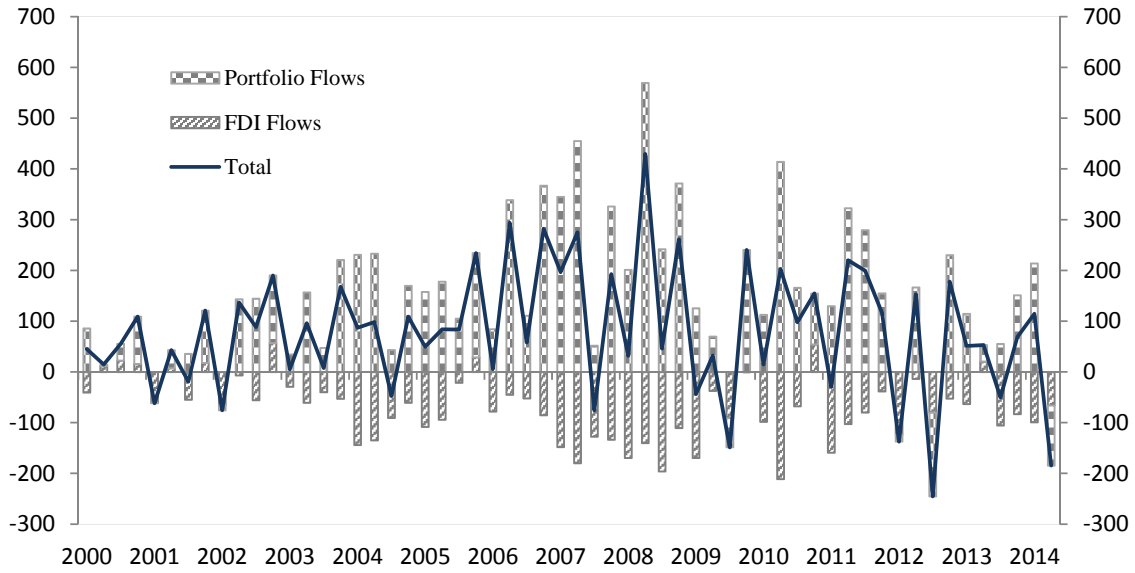


Figure 2a: Capital Inflows to Eemerging Market Economies
(Billion USD)

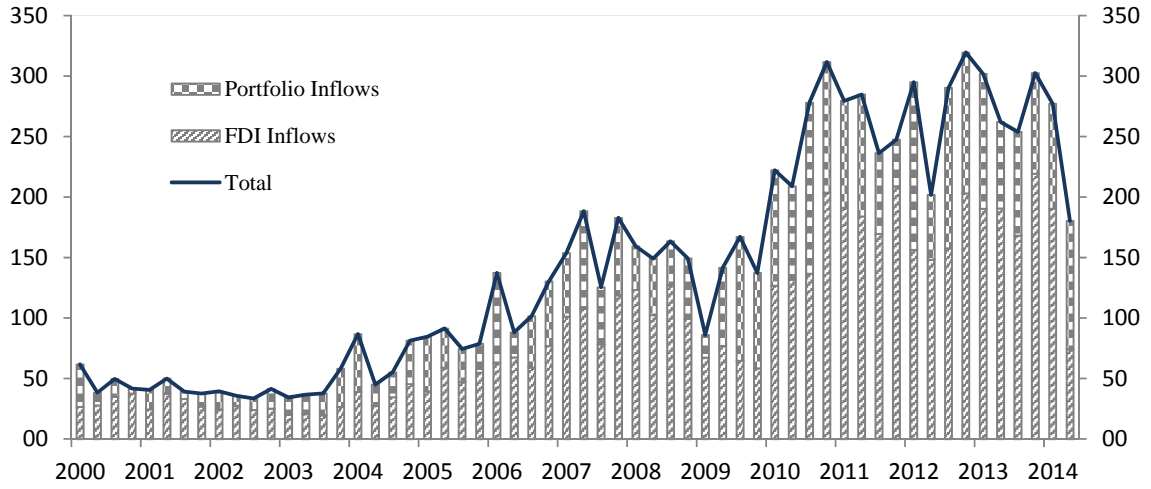


Figure 2b: Capital Outflows from Eemerging Market Economies
(Billion USD)

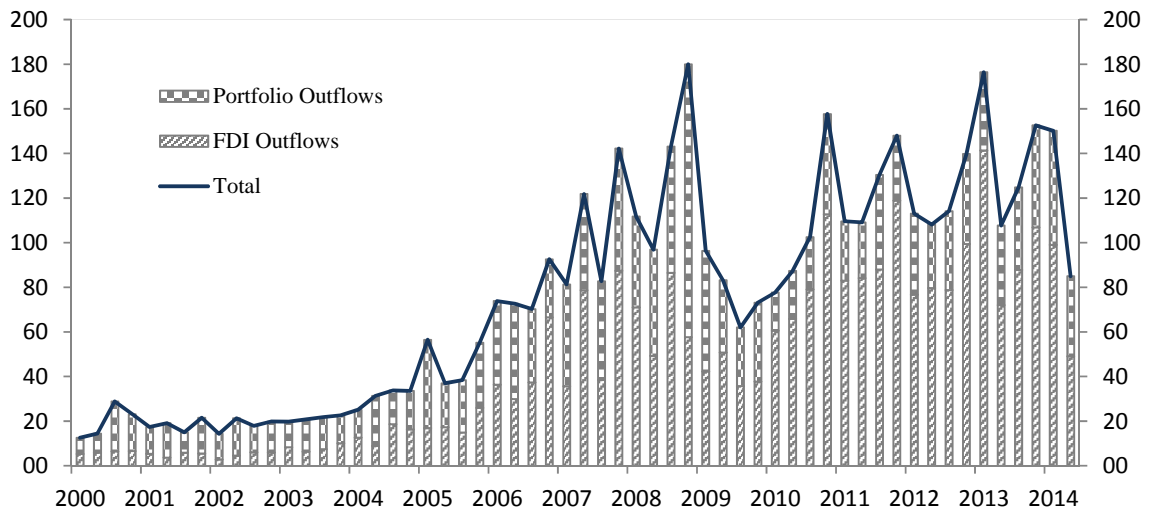


Figure 2c: Capital Inflows to OECD Countries
(Billion USD)

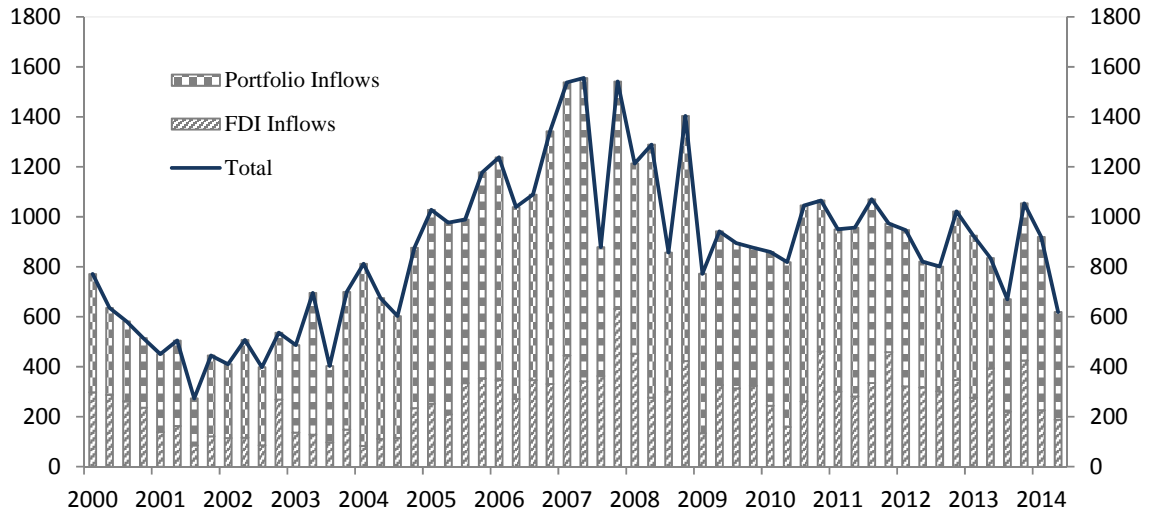


Figure 2d: Capital Outflows from OECD Countries
(Billion USD)

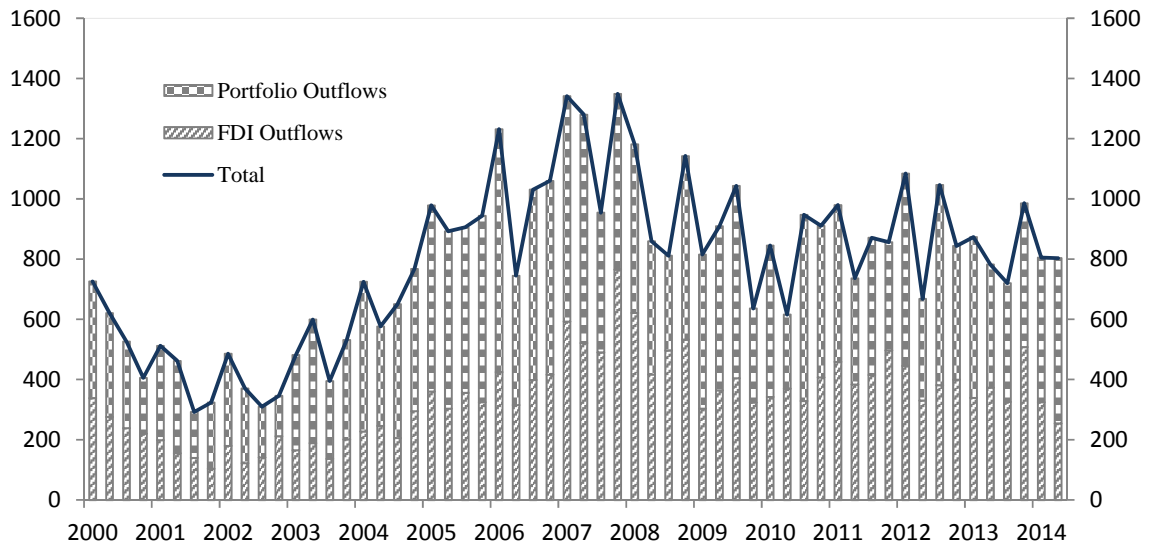


Figure 3a: Exchange Market Pressures - Full Sample (%)

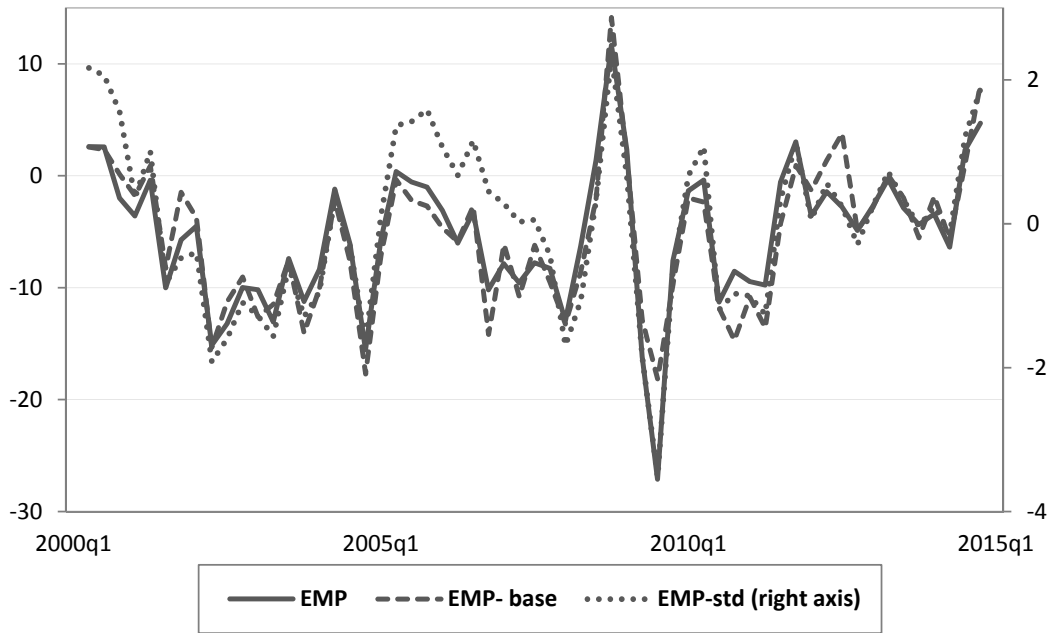


Figure 3b: Exchange Market Pressures – OECD Countries (%)

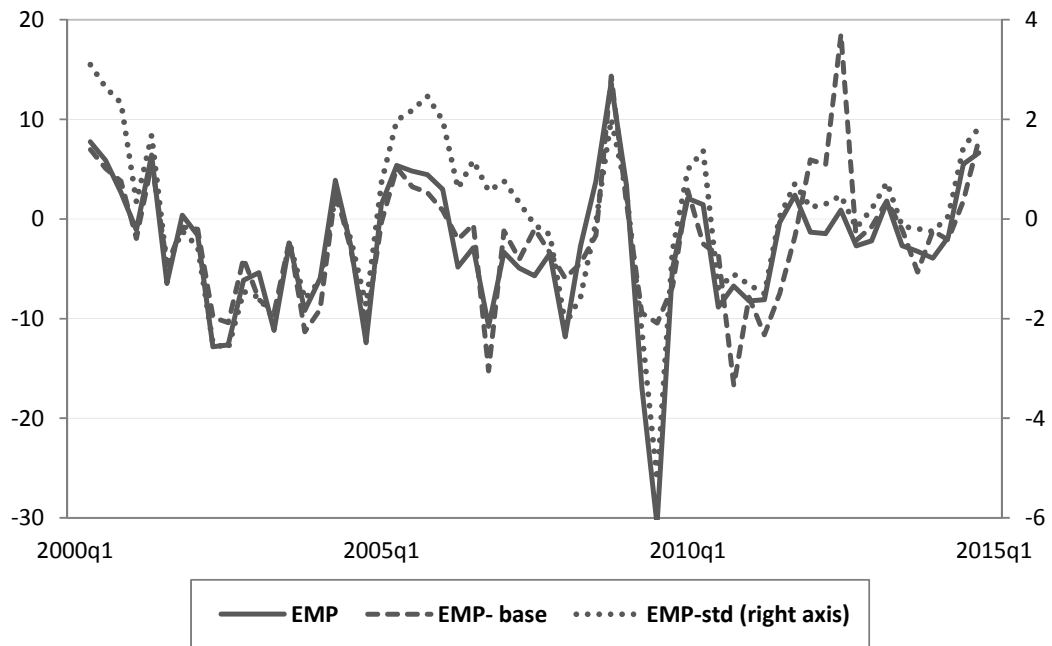


Figure 3c: Exchange Market Pressures – Eemerging Market Economies (%)

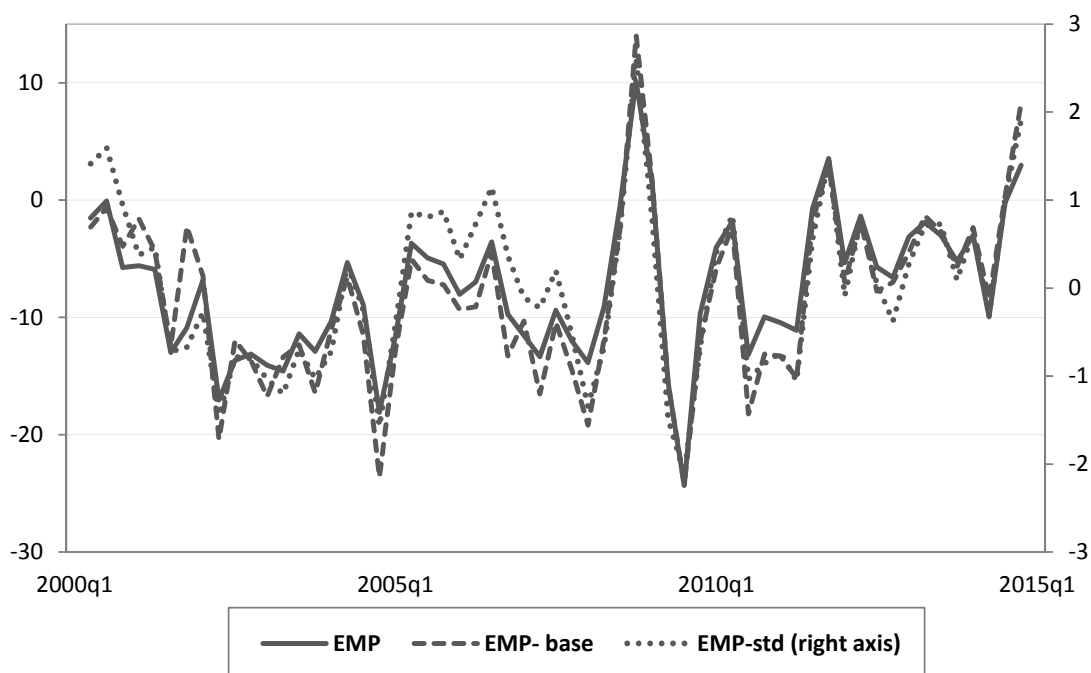


Table 1: Summary Statistics -- Full Sample

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
EMP (%)	2895	-5.37	12.43	-167.36	69.25
EMP- base (%)	2792	-5.53	18.44	-290.99	407.46
EMP – standard (%)	2865	-0.02	1.78	-8.14	8.55
Real GDP per capita Growth (%)	2742	0.63	2.69	-16.43	17.95
CPI Inflation (%)	2785	4.02	4.79	-6.11	70.33
Trade Balance (% GDP)	2800	-0.23	2.11	-7.44	8.11
CTOT (% change)	2900	-0.23	5.12	-29.66	37.19
Domestic Credit (% GDP, change)	2659	0.46	6.36	-217.37	69.46
Short-term External Debt (% GDP, change)	2439	-0.10	23.13	-458.56	332.07
Stock Market Returns (%)*	2945	0.00	7.92	-54.21	43.83
FDI Flows (net, % GDP)	2676	-0.15	5.30	-118.87	116.30
Portfolio Flows (net, % GDP)	2616	-0.95	9.77	-192.30	55.80
FDI Inflows (% GDP)	2676	3.23	19.87	0.00	369.40
FDI Outflows (% GDP)	2626	3.14	19.64	0.00	388.93
Portfolio Inflows (% GDP)	2676	4.11	20.50	0.00	319.29
Portfolio Outflows (% GDP)	2616	3.25	15.91	0.00	294.03
Aggregate Capital Controls (index, 0-1)	2632	0.33	0.33	0.00	1.00
Capital Inflow Controls (index, 0-1)	2632	0.31	0.31	0.00	1.00
Capital Outflow Control (index, 0-1)	2632	0.36	0.37	0.00	1.00
VIX (predicted residual)*	60	0.00	7.15	-11.24	18.00
TED Spread (level)	60	0.46	0.42	0.15	2.45
Effective FFR (change)	59	-0.10	0.47	-1.42	0.56

Notes*: VIX is regressed on the TED spread, and residuals are used as a pure measure of risk. Additionally, domestic equity returns are regressed on S&P 500 return and the residuals are used as the measure of the domestic returns.

Table 2: Baseline Estimation Results -- Alternative EMP Measures

	EMP			EMP - Base			EMP - Standard		
	Full Sample (1)	OECD (2)	EME (3)	Full Sample (4)	OECD (5)	EME (6)	Full Sample (7)	OECD (8)	EME (9)
EMP (t-1)	0.196*** (0.076)	0.151*** (0.056)	0.205*** (0.023)						
EMP- base (t-1)				0.262*** (0.031)	0.257*** (0.014)	0.193*** (0.057)			
EMP - standard (t-1)							0.427*** (0.032)	0.359*** (0.030)	0.362*** (0.069)
Real GDP per capita	-0.180*** (0.054)	-0.054 (0.099)	-0.098 (0.068)	-0.326*** (0.110)	0.038 (0.073)	-0.253*** (0.091)	-0.025*** (0.008)	-0.014 (0.016)	-0.006 (0.012)
Inflation	-0.630*** (0.114)	0.005 (0.705)	-0.581*** (0.138)	-0.860*** (0.155)	-0.605 (0.488)	-0.723*** (0.254)	-0.020** (0.010)	0.050 (0.068)	-0.029*** (0.009)
Trade Balance	-0.078 (0.137)	0.007 (0.125)	-0.097 (0.187)	-0.352* (0.201)	0.035 (0.168)	-0.585* (0.338)	-0.029** (0.011)	0.004 (0.014)	-0.027 (0.024)
CTOT	0.029 (0.085)	0.253** (0.127)	-0.057 (0.085)	-0.022 (0.175)	0.486* (0.291)	-0.220 (0.168)	-0.002 (0.012)	0.035* (0.020)	-0.015 (0.011)
Domestic Credit	-0.121 (0.085)	-0.181*** (0.068)	0.465* (0.245)	-0.279* (0.157)	-0.337*** (0.120)	0.639* (0.378)	-0.006 (0.007)	-0.015*** (0.006)	0.093** (0.039)
Short-term External Debt	0.003 (0.004)	0.001 (0.005)	0.013 (0.010)	0.007 (0.007)	0.004 (0.007)	0.002 (0.018)	0.001 (0.001)	0.001 (0.001)	0.003*** (0.001)
Stock Returns	-0.216*** (0.046)	-0.009 (0.070)	-0.286*** (0.049)	-0.263*** (0.062)	-0.023 (0.073)	-0.364*** (0.067)	-0.026*** (0.007)	0.007 (0.011)	-0.037*** (0.007)
VIX	0.091* (0.051)	-0.047 (0.078)	0.201*** (0.059)	0.139 (0.087)	-0.055 (0.092)	0.327*** (0.097)	0.005 (0.007)	-0.013 (0.008)	0.017** (0.008)
TED Spread	6.560*** (0.840)	5.627*** (1.192)	5.027*** (0.920)	7.097*** (0.948)	5.210*** (1.011)	6.217*** (1.248)	1.003*** (0.116)	0.996*** (0.139)	0.779*** (0.172)
Effective FFR	2.745*** (0.837)	2.978** (1.398)	2.407*** (0.821)	1.947 (1.228)	0.255 (1.661)	3.141** (1.531)	0.726*** (0.135)	1.099*** (0.221)	0.474*** (0.162)
FDI Flows (net)	0.011 (0.031)	-0.017* (0.009)	1.755** (0.759)	0.053 (0.093)	0.019 (0.066)	1.333 (0.972)	-0.002 (0.002)	-0.004*** (0.001)	0.162** (0.063)
Portfolio Flows (net)	0.049 (0.056)	0.027 (0.031)	2.154*** (0.465)	0.079 (0.076)	0.042 (0.040)	2.645*** (0.847)	0.004 (0.005)	0.000 (0.002)	0.324*** (0.067)
Constant	-4.742*** (0.688)	-4.854*** (0.979)	-4.017*** (0.660)	-4.090*** (0.758)	-2.551*** (0.819)	-5.502*** (1.143)	-0.380*** (0.073)	-0.572*** (0.156)	-0.115 (0.118)
Observations	2,202	995	1,207	2,153	995	1,158	2,174	995	1,179
Number of countries	50	22	28	50	22	28	50	22	28
Hansen J statistic	46.72	21.05	18.96	44.34	20.19	14.69	47.74	20.38	24.94
p value of Hansen stat.	0.157	0.988	1	0.870	1	1	0.134	0.991	0.949
AR(1) test statistic	-4.906	-2.768	-3.468	-1.506	-1.121	-3.112	-5.772	-3.983	-4.303
p value of AR(1)	9.29e-07	0.00563	0.000525	0.132	0.262	0.00186	7.83e-09	6.81e-05	1.69e-05
AR(2) test statistic	-1.480	-1.906	-0.823	1.058	0.937	0.607	-2.032	-2.443	-0.743
p value of AR(2)	0.139	0.0567	0.411	0.290	0.349	0.544	0.0421	0.0146	0.458

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 3: EMP Estimation – Capital Inflows and Outflows

	Full Sample		OECD		EME	
	(1)	(2)	(3)	(4)	(5)	(6)
EMP (t-1)	0.269*** (0.077)	0.202*** (0.074)	0.218** (0.086)	0.218** (0.086)	0.306** (0.133)	0.199* (0.117)
Real GDP per capita	-0.187*** (0.059)	-0.183*** (0.056)	-0.084 (0.096)	-0.094 (0.098)	-0.114 (0.073)	-0.114 (0.074)
Inflation	-0.584*** (0.111)	-0.607*** (0.117)	0.014 (0.685)	0.014 (0.686)	-0.588*** (0.137)	-0.495*** (0.164)
Trade Balance	-0.032 (0.125)	-0.031 (0.134)	0.063 (0.129)	0.092 (0.129)	0.111 (0.215)	0.032 (0.226)
CTOT	0.030 (0.087)	0.025 (0.086)	0.251* (0.131)	0.246* (0.130)	-0.061 (0.090)	-0.072 (0.086)
Domestic Credit	-0.122 (0.089)	-0.115 (0.086)	-0.181** (0.071)	-0.180** (0.071)	0.667** (0.263)	0.770*** (0.254)
Short-term External Debt	0.004 (0.006)	0.005 (0.007)	-0.001 (0.007)	0.000 (0.008)	0.016 (0.011)	0.010 (0.010)
Stock Returns	-0.223*** (0.047)	-0.217*** (0.046)	-0.005 (0.071)	-0.007 (0.071)	-0.303*** (0.050)	-0.309*** (0.049)
VIX	0.065 (0.054)	0.090* (0.051)	-0.046 (0.066)	-0.045 (0.066)	0.175** (0.068)	0.226*** (0.064)
TED Spread	6.158*** (0.874)	6.447*** (0.839)	5.351*** (1.094)	5.316*** (1.082)	5.529*** (1.488)	5.347*** (1.280)
Effective FFR	2.354*** (0.840)	2.597*** (0.833)	2.680** (1.132)	2.659** (1.135)	2.329** (0.978)	2.667*** (0.967)
FDI Inflows	0.002 (0.008)		0.006 (0.006)		-0.434 (0.445)	
Portfolio Inflows	-0.003 (0.011)		-0.009 (0.008)		-2.211*** (0.680)	
FDI Outflows		-0.005 (0.014)		0.001 (0.011)		-0.124 (0.085)
Portfolio Outflows		0.023 (0.015)		0.005 (0.008)		1.910*** (0.592)
Constant	-4.400*** (0.660)	-4.847*** (0.689)	-4.555*** (0.830)	-4.618*** (0.818)	-2.738** (1.102)	-6.747*** (1.228)
Observations	2,227	2,184	995	995	1,232	1,189
Number of countries	50	50	22	22	28	28
Hansen J statistic	47.55	46.70	21.19	21.30	15.80	18.62
p value of Hansen statistic	0.138	0.157	0.817	0.812	0.864	0.723
AR(1) test statistic	-4.592	-4.892	-3.182	-3.167	-2.620	-2.854
p value of AR(1)	4.39e-06	9.96e-07	0.00146	0.00154	0.00879	0.00431
AR(2) test statistic	-1.116	-1.447	-1.097	-1.103	-0.647	-0.770
p value of AR(2)	0.265	0.148	0.273	0.270	0.517	0.441

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 4a: EMP Estimation – Capital Flows and Controls

	Full Sample (1)	OECD (2)	EME (3)	Full Sample (4)	OECD (5)	EME (6)
EMP (t-1)	0.282*** (0.063)	0.180*** (0.045)	0.229*** (0.024)	0.179*** (0.062)	0.338** (0.147)	0.217** (0.085)
Real GDP per capita	-0.195*** (0.062)	-0.062 (0.122)	-0.122* (0.073)	-0.183*** (0.062)	-0.179 (0.118)	-0.123 (0.083)
Inflation	-0.471*** (0.134)	0.222 (0.697)	-0.463*** (0.151)	-0.545*** (0.165)	0.189 (0.561)	-0.568*** (0.170)
Trade Balance	-0.031 (0.146)	0.182 (0.168)	0.064 (0.237)	-0.092 (0.176)	0.116 (0.156)	-0.133 (0.206)
CTOT	0.021 (0.086)	0.286* (0.150)	-0.062 (0.088)	0.027 (0.089)	0.307* (0.157)	-0.065 (0.087)
Domestic Credit	-0.140 (0.088)	-0.203*** (0.058)	0.839*** (0.253)	-0.146* (0.074)	-0.233*** (0.043)	0.529* (0.281)
Short-term External Debt	0.012 (0.015)	-0.001 (0.013)	0.024*** (0.008)	0.006 (0.012)	-0.010 (0.018)	0.022*** (0.006)
Stock Returns	-0.224*** (0.044)	0.019 (0.079)	-0.301*** (0.047)	-0.227*** (0.044)	-0.007 (0.084)	-0.300*** (0.042)
VIX	0.093* (0.053)	-0.045 (0.080)	0.205*** (0.069)	0.123** (0.054)	-0.052 (0.062)	0.248*** (0.064)
TED Spread	5.979*** (0.821)	5.181*** (1.104)	5.700*** (0.931)	6.655*** (0.781)	4.389*** (1.073)	5.389*** (1.252)
Effective FFR	2.264*** (0.849)	2.284 (1.656)	2.622*** (0.874)	2.889*** (0.834)	1.332 (1.242)	2.848*** (0.966)
FDI Flows (net)				0.372** (0.187)	0.253* (0.146)	1.389*** (0.439)
Portfolio Flows (net)				0.444** (0.187)	0.284* (0.160)	2.493*** (0.597)
Capital Controls	-2.611** (1.040)	-7.254*** (2.274)	-1.035 (1.325)	-2.489* (1.466)	-6.110*** (1.803)	-0.183 (1.328)
Constant	-4.036*** (0.546)	-4.495*** (1.207)	-5.751*** (0.673)	-4.534*** (0.552)	-3.637*** (0.929)	-4.489*** (0.729)
Observations	2,066	907	1,159	1,971	907	1,064
Number of countries	47	21	26	47	21	26
Hansen J statistic	44.33	17.76	16.63	44.72	8.457	16.31
p value of Hansen statistic	0.222	0.986	1	0.210	0.997	0.842
AR(1) test statistic	-4.299	-2.461	-3.150	-4.583	-3.651	-2.635
p value of AR(1)	1.72e-05	0.0139	0.00163	4.58e-06	0.000261	0.00841
AR(2) test statistic	-1.040	-1.643	-0.997	-1.595	-0.389	-0.711
p value of AR(2)	0.298	0.100	0.319	0.111	0.697	0.477

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 4b: EMP Estimation – Capital Inflows and Outflow Controls

	Full Sample		OECD		EME	
	(1)	(2)	(3)	(4)	(5)	(6)
EMP (t-1)	0.284*** (0.063)	0.279*** (0.064)	0.186*** (0.044)	0.173*** (0.045)	0.365*** (0.091)	0.363*** (0.091)
Real GDP per capita	-0.196*** (0.062)	-0.194*** (0.061)	-0.067 (0.123)	-0.058 (0.121)	-0.134* (0.081)	-0.134* (0.081)
Inflation	-0.464*** (0.134)	-0.485*** (0.131)	0.300 (0.701)	0.123 (0.707)	-0.382*** (0.148)	-0.387*** (0.145)
Trade Balance	-0.011 (0.144)	-0.043 (0.146)	0.224 (0.171)	0.156 (0.160)	0.043 (0.201)	0.028 (0.205)
CTOT	0.021 (0.086)	0.020 (0.086)	0.287* (0.151)	0.283* (0.150)	-0.065 (0.093)	-0.065 (0.093)
Domestic Credit	-0.139 (0.088)	-0.140 (0.088)	-0.201*** (0.059)	-0.206*** (0.058)	0.848*** (0.271)	0.848*** (0.272)
Short-term External Debt	0.012 (0.015)	0.012 (0.015)	-0.002 (0.013)	-0.001 (0.013)	0.025*** (0.008)	0.025*** (0.008)
Stock Returns	-0.224*** (0.044)	-0.224*** (0.044)	0.018 (0.079)	0.019 (0.079)	-0.299*** (0.047)	-0.299*** (0.047)
VIX	0.093* (0.053)	0.093* (0.054)	-0.041 (0.079)	-0.048 (0.081)	0.216*** (0.063)	0.216*** (0.064)
TED Spread	5.951*** (0.820)	6.024*** (0.822)	5.006*** (1.080)	5.332*** (1.091)	5.363*** (1.259)	5.380*** (1.253)
Effective FFR	2.240*** (0.848)	2.292*** (0.850)	2.240 (1.644)	2.307 (1.638)	2.370** (0.920)	2.388*** (0.915)
Capital Inflow Controls	-2.878*** (1.110)		-9.351*** (2.952)		-0.925 (1.211)	
Capital Outflow Controls		-2.087*** (0.889)		-3.834** (1.852)		-0.784 (0.923)
Constant	-4.033*** (0.557)	-4.133*** (0.552)	-4.381*** (1.161)	-4.721*** (1.290)	-5.003*** (0.865)	-4.993*** (0.886)
Observations	2,066	2,066	907	907	1,159	1,159
Number of countries	47	47	21	21	26	26
Hansen J statistic	44.45	43.90	20.11	17.46	16.48	16.37
p value of Hansen statistic	0.218	0.236	0.962	0.988	0.834	0.839
AR(1) test statistic	-4.294	-4.313	-2.449	-2.470	-2.684	-2.688
p value of AR(1)	1.76e-05	1.61e-05	0.0143	0.0135	0.00727	0.00718
AR(2) test statistic	-1.030	-1.058	-1.570	-1.709	-0.637	-0.640
p value of AR(2)	0.303	0.290	0.117	0.0874	0.524	0.522

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 5a: Sub-period Analysis -- Full Sample of Countries

	Great Moderation (2000-2007Q1)		GFC (2007Q2 - 2009Q2)		Post-Crisis (2009Q3 -2013Q1)		Tapering (2013Q2- 2014Q3)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EMP (t-1)	0.079*** (0.028)	0.095*** (0.026)	0.121 (0.102)	0.122 (0.103)	0.162*** (0.036)	0.165*** (0.034)	0.159*** (0.058)
Real GDP per capita	-0.334** (0.154)	-0.405*** (0.142)	0.077 (0.184)	0.073 (0.185)	-0.007 (0.099)	0.008 (0.104)	-0.076 (0.096)	-0.079 (0.096)
Inflation	-1.124*** (0.082)	-1.078*** (0.075)	-0.324* (0.175)	-0.313* (0.179)	-0.134 (0.161)	-0.143 (0.161)	-0.415** (0.204)	-0.408** (0.204)
Trade Balance	0.310 (0.216)	0.282 (0.216)	0.008 (0.292)	0.001 (0.288)	-0.196 (0.201)	-0.175 (0.213)	0.052 (0.247)	0.057 (0.239)
CTOT	-0.038 (0.141)	-0.039 (0.151)	0.075 (0.164)	0.067 (0.164)	-0.090 (0.224)	-0.082 (0.228)	-0.001 (0.096)	-0.003 (0.096)
Domestic Credit	0.112 (0.131)	0.107 (0.110)	-0.115*** (0.028)	-0.126*** (0.025)	0.003 (0.121)	0.046 (0.109)	0.096 (0.098)	0.081 (0.105)
Short-term External Debt	0.050 (0.045)	0.049 (0.037)	-0.013 (0.035)	-0.032 (0.036)	0.007 (0.008)	0.005 (0.007)	0.005 (0.004)	0.007 (0.005)
Stock Returns	-0.065* (0.038)	-0.030 (0.040)	-0.235** (0.120)	-0.233* (0.119)	-0.320*** (0.082)	-0.317*** (0.084)	-0.212*** (0.077)	-0.214*** (0.077)
VIX	-0.106 (0.122)	-0.067 (0.113)	0.253** (0.110)	0.252** (0.109)	0.209** (0.088)	0.210** (0.088)	0.558 (0.374)	0.556 (0.375)
TED Spread	21.255*** (6.303)	23.049*** (6.485)	8.957*** (1.381)	9.012*** (1.385)	-6.858 (4.970)	-7.019 (4.958)	45.515* (23.390)	46.178** (23.531)
Yield Curve Slope	0.896 (0.627)	1.043 (0.646)	-1.237* (0.695)	-1.261* (0.701)	-3.875*** (0.700)	-3.850*** (0.693)	-1.263 (1.074)	-1.249 (1.078)
FDI Inflows	-0.051 (0.039)		0.004 (0.014)		0.021 (0.016)		0.006 (0.006)	
Portfolio Inflows	0.018 (0.027)		0.003 (0.034)		-0.020 (0.012)		0.013 (0.012)	
FDI Outflows		-0.078 (0.059)		-0.035 (0.032)		0.042*** (0.016)		0.005 (0.007)
Portfolio Outflows		0.068** (0.027)		0.071* (0.043)		-0.066*** (0.018)		0.025 (0.019)
Constant	-10.071*** (3.253)	-10.831*** (3.395)	-11.922*** (1.438)	-12.057*** (1.450)	6.154** (2.553)	6.240** (2.509)	-5.414 (6.459)	-5.635 (6.510)
Observations	848	809	419	419	719	715	241	241
Number of countries	47	47	47	47	50	50	48	48
Hansen J statistic	39.16	38.40	43.30	43.81	46.21	47.73	41.75	41.69
p value of Hansen statistic	0.0470	0.0555	0.158	0.146	0.626	0.565	0.922	0.923
AR(1) test statistic	-2.830	-2.883	-3.556	-3.581	-2.838	-2.863	-3.820	-3.791
p value of AR(1)	0.00466	0.00394	0.000376	0.000342	0.00454	0.00420	0.000134	0.000150
AR(2) test statistic	-0.424	-0.403	-0.467	-0.445	-0.756	-0.741	-0.237	-0.229
p value of AR(2)	0.672	0.687	0.641	0.657	0.450	0.458	0.812	0.819

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 5b: Sub-period Analysis -- OECD Countries

	Great Moderation (2000-2007Q1)		GFC (2007Q2 - 2009Q2)		Post-Crisis (2009Q3 -2013Q1)		Tapering (2013Q2- 2014Q3)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EMP (t-1)	0.098** (0.040)	0.096** (0.040)	-0.016 (0.080)	-0.011 (0.081)	0.107 (0.220)	0.112 (0.219)	-0.168 (0.257)
Real GDP per capita	-0.182 (0.302)	-0.223 (0.310)	-0.127 (0.449)	-0.126 (0.447)	0.110 (0.345)	0.173 (0.371)	-0.128 (0.136)	-0.129 (0.140)
Inflation	-2.098** (0.993)	-2.139** (1.003)	0.197 (0.860)	0.212 (0.883)	1.038* (0.574)	1.035* (0.581)	-1.557*** (0.434)	-1.583*** (0.427)
Trade Balance	0.053 (0.380)	0.036 (0.357)	0.059 (0.251)	0.019 (0.235)	-0.046 (0.326)	-0.019 (0.326)	-0.172 (0.378)	-0.127 (0.375)
CTOT	0.076 (0.265)	0.093 (0.272)	0.406* (0.227)	0.389* (0.225)	0.216 (0.272)	0.238 (0.271)	-0.001 (0.129)	0.002 (0.131)
Domestic Credit	0.036 (0.101)	0.040 (0.093)	-0.180*** (0.032)	-0.186*** (0.032)	-0.081 (0.115)	-0.029 (0.096)	0.087 (0.067)	0.100 (0.074)
Short-term External Debt	0.065 (0.057)	0.061 (0.047)	-0.044** (0.018)	-0.051* (0.028)	-0.004 (0.008)	-0.005 (0.007)	-0.008 (0.007)	-0.010 (0.007)
Stock Returns	0.194 (0.130)	0.184 (0.132)	0.221 (0.254)	0.216 (0.261)	-0.129 (0.116)	-0.121 (0.116)	-0.059 (0.103)	-0.063 (0.103)
VIX	-0.065 (0.072)	-0.060 (0.069)	0.213 (0.134)	0.213 (0.133)	-0.137 (0.139)	-0.144 (0.139)	-0.060 (0.425)	-0.049 (0.420)
TED Spread	20.851*** (6.388)	22.033*** (7.113)	8.218*** (1.751)	8.250*** (1.768)	3.763 (9.524)	3.444 (9.480)	53.169 (46.730)	53.138 (46.859)
Yield Curve Slope	1.045** (0.501)	1.117** (0.535)	-2.099** (1.016)	-2.150** (1.040)	-2.954** (1.148)	-2.845** (1.161)	-4.918*** (1.525)	-4.935*** (1.548)
FDI Inflows	-0.035*** (0.012)		0.011 (0.020)		0.012 (0.013)		0.017** (0.007)	
Portfolio Inflows	0.005 (0.018)		0.034** (0.015)		-0.023*** (0.008)		-0.016** (0.008)	
FDI Outflows		-0.084 (0.066)		-0.004 (0.026)		0.037*** (0.013)		0.020** (0.008)
Portfolio Outflows		0.052 (0.034)		0.057 (0.045)		-0.076*** (0.016)		-0.020* (0.010)
Constant	-7.257*** (2.099)	-7.730*** (2.216)	-9.193*** (1.757)	-9.187*** (1.840)	0.667 (2.521)	0.650 (2.561)	1.235 (11.431)	1.333 (11.540)
Observations	372	372	189	189	320	320	114	114
Number of countries	21	21	21	21	22	22	22	22
Hansen J statistic	14.76	9.944	17.52	15.60	18.26	17.33	5.042	5.104
p value of Hansen statistic	0.962	0.998	0.229	0.339	0.195	0.239	0.411	0.403
AR(1) test statistic	-1.792	-1.804	-2.457	-2.444	-1.991	-2.025	0.249	0.265
p value of AR(1)	0.0732	0.0712	0.0140	0.0145	0.0465	0.0429	0.803	0.791
AR(2) test statistic	-0.375	-0.385	-0.758	-0.787	-0.394	-0.354	-0.971	-0.989
p value of AR(2)	0.708	0.700	0.448	0.431	0.693	0.723	0.332	0.323

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 5c: Sub-period Analysis -- Emerging Market Economies

	Great Moderation (2000 - 2007Q1)		GFC (2007Q2 - 2009Q2)		Post-Crisis (2009Q3 - 2013Q1)		Tapering (2013Q2 - 2014Q3)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EMP (t-1)	-0.000 (0.042)	0.059 (0.037)	0.051 (0.190)	0.166 (0.188)	0.168 (0.123)	0.224* (0.125)	0.571 (0.411)
Real GDP per capita	-0.302* (0.173)	-0.393** (0.164)	0.205 (0.161)	0.188 (0.177)	-0.027 (0.130)	-0.019 (0.134)	0.038 (0.182)	-0.017 (0.127)
Inflation	-1.116*** (0.095)	-0.880*** (0.106)	-0.151 (0.186)	-0.057 (0.197)	-0.297* (0.168)	-0.152 (0.216)	-0.220 (0.212)	0.062 (0.230)
Trade Balance	0.342 (0.344)	0.646** (0.281)	0.481 (0.488)	-0.343 (0.534)	-0.108 (0.290)	-0.371* (0.210)	0.229 (0.271)	0.017 (0.304)
CTOT	-0.099 (0.129)	-0.142 (0.135)	-0.027 (0.184)	-0.014 (0.189)	-0.226 (0.233)	-0.254 (0.259)	-0.135 (0.149)	-0.104 (0.136)
Domestic Credit	0.944*** (0.305)	1.059*** (0.405)	0.795* (0.461)	0.506 (0.534)	0.454 (0.365)	0.805** (0.335)	-0.642* (0.344)	-0.492* (0.298)
Short-term External Debt	-0.367 (0.352)	-0.435 (0.358)	-1.342** (0.525)	-2.112*** (0.413)	0.034*** (0.013)	0.040*** (0.009)	0.032** (0.014)	0.023** (0.011)
Stock Returns	-0.142*** (0.038)	-0.098** (0.040)	-0.397** (0.171)	-0.389** (0.164)	-0.353*** (0.089)	-0.389*** (0.091)	-0.349*** (0.086)	-0.354*** (0.087)
VIX	-0.111 (0.163)	-0.023 (0.169)	0.437*** (0.161)	0.362** (0.156)	0.370*** (0.135)	0.464*** (0.120)	-0.073 (0.416)	-0.154 (0.387)
TED Spread	20.030** (8.497)	27.018*** (7.988)	6.769*** (1.872)	5.830*** (1.872)	-8.129 (6.152)	-9.633 (6.911)	28.535 (34.333)	36.554 (31.682)
Yield Curve Slope	0.512 (0.779)	1.367 (0.940)	-1.420* (0.797)	-1.486* (0.767)	-3.379*** (1.018)	-3.496*** (0.997)	-0.984 (1.781)	-0.211 (1.599)
FDI Inflows	-1.378 (1.239)		-0.136 (0.085)		0.012 (0.252)		-0.667 (0.741)	
Portfolio Inflows	-1.783*** (0.583)		-3.362*** (1.296)		-2.514** (0.996)		-1.029* (0.537)	
FDI Outflows		-0.806 (0.518)		-0.054 (0.102)		0.422* (0.232)		1.217* (0.690)
Portfolio Outflows		2.799*** (0.591)		3.942*** (1.151)		-0.423 (1.247)		1.993** (0.812)
Constant	-8.239** (3.801)	-15.757*** (4.502)	-9.969*** (2.926)	-13.110*** (2.925)	6.516* (3.701)	4.429 (4.316)	-4.112 (11.044)	-12.440 (10.801)
Observations	476	437	230	230	399	395	153	153
Number of countries	26	26	26	26	28	28	26	26
Hansen J statistic	15.59	15.51	18.26	18.87	21.52	20	8.139	12.07
p value of Hansen statistic	0.946	0.947	0.195	0.170	0.0890	0.130	0.149	0.0339
AR(1) test statistic	-3.612	-3.525	-1.807	-2.076	-2.481	-2.391	-1.974	-2.156
p value of AR(1)	0.000304	0.000424	0.0707	0.0379	0.0131	0.0168	0.0484	0.0311
AR(2) test statistic	-0.373	-0.206	0.361	0.876	-0.867	-0.525	0.788	0.200
p value of AR(2)	0.709	0.837	0.718	0.381	0.386	0.600	0.431	0.842

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 6a: Tapering Period -- Emerging Market Economies (Capital Inflow and Market Variables)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMP (t-1)	0.212*** (0.074)	0.310*** (0.075)	0.183** (0.088)	0.204** (0.086)	0.216** (0.091)	0.148* (0.086)	0.137 (0.085)
Real GDP per capita	-0.013 (0.170)	-0.006 (0.177)	-0.117 (0.188)	-0.051 (0.199)	-0.069 (0.185)	-0.120 (0.181)	-0.107 (0.187)
Inflation	-0.176 (0.201)	-0.229 (0.167)	-0.182 (0.182)	-0.195 (0.183)	-0.172 (0.182)	-0.176 (0.185)	-0.181 (0.184)
Trade Balance	0.238 (0.334)	0.344 (0.333)	0.352 (0.341)	0.282 (0.345)	0.301 (0.330)	0.320 (0.356)	0.327 (0.367)
CTOT	-0.025 (0.142)	-0.112 (0.167)	-0.046 (0.143)	-0.119 (0.151)	-0.038 (0.153)	-0.002 (0.151)	-0.028 (0.145)
Domestic Credit	-0.366 (0.359)	-0.271 (0.379)	-0.292 (0.420)	-0.363 (0.428)	-0.307 (0.437)	-0.269 (0.401)	-0.300 (0.394)
Short-term External Debt	0.005 (0.007)	0.004 (0.007)	0.013 (0.008)	0.004 (0.007)	0.008 (0.009)	0.014* (0.008)	0.013* (0.008)
FDI Inflows	-0.658 (0.763)	-0.557 (0.828)	-0.709 (0.938)	-0.439 (0.854)	-0.469 (0.973)	-0.802 (0.931)	-0.785 (0.919)
Portfolio Inflows	-0.877 (0.590)	-1.254* (0.694)	-0.899 (0.771)	-1.160 (0.727)	-1.055 (0.777)	-0.858 (0.717)	-0.910 (0.701)
Stock Returns	-0.269*** (0.091)						
VIX		0.289*** (0.061)					
TED Spread			75.855** (32.208)				
Yield Curve Slope				-2.807** (1.400)			
US Yields - 3 Months					-66.907*** (25.384)		
US Yields-- 5-Year						4.738** (2.164)	
US Yields-- 10-Year							3.071* (1.800)
Constant	-1.697 (1.208)	0.457 (1.199)	-15.794** (6.750)	6.807* (3.873)	-0.937 (1.461)	-1.075 (1.384)	-0.721 (1.295)
Observations	127	127	127	127	127	127	127
Number of countries	26	26	26	26	26	26	26
Hansen J statistic	18.02	19.52	19.91	17.61	20	21.04	20.19
p value of Hansen statistic	0.521	0.424	0.400	0.549	0.394	0.335	0.383
AR(1) test statistic	-2.990	-3.318	-3.181	-3.172	-3.082	-3.209	-3.262
p value of AR(1)	0.00279	0.000907	0.00147	0.00151	0.00205	0.00133	0.00111
AR(2) test statistic	0.505	0.943	0.0396	1.271	0.224	-0.0702	0.180
p value of AR(2)	0.613	0.346	0.968	0.204	0.823	0.944	0.857

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table 6b: Tapering Period -- Emerging Market Economies (Capital Outflow and Market Variables)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMP (t-1)	0.199*** (0.074)	0.290*** (0.081)	0.162* (0.094)	0.187** (0.089)	0.195** (0.096)	0.129 (0.090)	0.117 (0.088)
Real GDP per capita	-0.048 (0.134)	-0.071 (0.146)	-0.159 (0.163)	-0.111 (0.175)	-0.127 (0.155)	-0.154 (0.152)	-0.144 (0.157)
Inflation	0.153 (0.251)	0.148 (0.221)	0.135 (0.229)	0.160 (0.232)	0.158 (0.231)	0.134 (0.231)	0.138 (0.234)
Trade Balance	0.011 (0.347)	0.172 (0.316)	0.170 (0.332)	0.080 (0.337)	0.118 (0.319)	0.146 (0.346)	0.144 (0.354)
CTOT	-0.023 (0.131)	-0.104 (0.170)	-0.043 (0.131)	-0.121 (0.141)	-0.034 (0.139)	0.004 (0.132)	-0.021 (0.130)
Domestic Credit	-0.399 (0.308)	-0.238 (0.359)	-0.301 (0.364)	-0.332 (0.376)	-0.288 (0.379)	-0.282 (0.350)	-0.304 (0.349)
Short-term External Debt	-0.002 (0.008)	-0.004 (0.008)	0.007 (0.008)	-0.004 (0.007)	0.001 (0.008)	0.007 (0.008)	0.005 (0.007)
FDI Outflows	1.899 (1.301)	1.335 (1.759)	1.403 (1.279)	1.681 (1.488)	1.435 (1.335)	1.360 (1.261)	1.452 (1.322)
Portfolio Outflows	2.099** (0.868)	2.679*** (0.865)	2.184** (0.990)	2.346** (0.973)	2.297** (0.984)	2.056** (1.016)	2.069** (1.037)
Stock Returns	-0.291*** (0.093)						
VIX		0.301*** (0.067)					
TED Spread			78.993*** (28.604)				
Yield Curve Slope				-3.287** (1.285)			
US Yields - 3 Months					-69.933*** (22.772)		
US Yields-- 5-Year						4.753** (2.001)	
US Yields-- 10-Year							3.082* (1.723)
Constant	-5.892*** (1.807)	-3.977** (1.852)	-20.362*** (6.543)	3.793 (3.751)	-4.915*** (1.730)	-4.947*** (1.739)	-4.700*** (1.748)
Observations	127	127	127	127	127	127	127
Number of countries	26	26	26	26	26	26	26
Hansen J statistic	19.86	21.13	19.44	18.77	19.80	19.87	20.09
p value of Hansen statistic	0.403	0.330	0.429	0.471	0.407	0.402	0.389
AR(1) test statistic	-3.231	-3.525	-3.272	-3.330	-3.225	-3.258	-3.327
p value of AR(1)	0.00123	0.000423	0.00107	0.000869	0.00126	0.00112	0.000879
AR(2) test statistic	-0.257	0.379	-0.572	1.074	-0.347	-0.681	-0.437
p value of AR(2)	0.797	0.705	0.567	0.283	0.728	0.496	0.662

Notes: Standard errors are given in parenthesis and adjusted for heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM.

Table A1: List of Countries in Sample

Country Name	OECD/EME	Country Name	OECD/EME
Australia	1	Korea, Republic of	2
Austria	1	Turkey	2
Belgium	1	Czech Republic	2
Canada	1	Estonia	2
Denmark	1	Mexico	2
Finland	1	Slovak Republic	2
France	1	Slovenia	2
Germany	1	Argentina	3
Greece	1	Brazil	3
Iceland	1	Chile	3
Ireland	1	China	3
Italy	1	Colombia	3
Japan	1	Egypt	3
Luxembourg	1	India	3
Netherlands	1	Indonesia	3
New Zealand	1	Malaysia	3
Norway	1	Morocco	3
Portugal	1	Pakistan	3
Spain	1	Peru	3
Sweden	1	Philippines	3
Switzerland	1	Romania	3
United Kingdom	1	Russian Federation	3
Hungary	2	South Africa	3
Israel	2	Sri Lanka	3
Poland	2	Thailand	3

Notes: 1 indicates if the country is OECD member, 2 if the country is OECD member but also considered as emerging market economy (EME), and 3 if the country is EME only.