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Quantitative Easing by the Fed and International Capital Flows

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Quantitative Easing by the Fed and International Capital Flows[1]

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Abstract

By employing a novel dataset on international capital flows, this paper examines the impact of Fed's quantitative easing (QE) policies on flows to emerging markets economies (EMEs) and the EU countries. Episodes of QE are examined separately, with the last episode divided between pre- and post-tapering. We find evidence that QE was associated with an increase in capital inflow, while tapering was associated with a period of retrenchment. The magnitude of the impact varied by different episodes of QE and the types of assets (bonds or equities). Our results show that the EU countries behaved differently than the EMEs. We also find support for the importance of "pull factors" and individual country characteristics for capital inflows. However, the paper shows that episodes of QE accounted for most of the variation in capital inflows during 2008-2014. G20 statements during the episodes of QE show that countries are increasingly cognizant of their inability to control flows and have thus called for better monetary policy coordination to avoid excessive volatility and negative spillovers.

Key words: Quantitative Easing (QE), spillovers, capital flows, emerging market economies (EMEs)

JEL Classification: E44, E52, E58, F32, F41, F42

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I. Introduction

In the aftermath of the Great Recession, the Federal Reserve lowered its Fed funds rate in order to boost aggregate demand, revive economic activity and lower unemployment. Given the "zero lower bound" (ZLB), the Fed had to resort to unconventional monetary policies (UMP) to revive the economy, namely large-scale asset purchase programmes (LSAP) or commonly known as "quantitative easing" (QE). The Fed's actions have been deemed successful at flattening the yield curve in the U.S.;[3] and there is a general consensus that it has helped in the broader macroeconomic recovery, albeit the extent of this help remains an empirical question.[4] However, Fed's actions have had global spillovers (mostly negative) in terms of international capital flows and impact on exchange rate risks, long-term bond yields, inflation and economic output, particularly among the large emerging markets.[5]

Indeed, in 2012, Brazil's president Dilma Rousseff called Fed's actions akin to a "monetary tsunami". More recently, in response to the news of the Fed's tapering (in the summer of 2013), the governor of India's central bank Raghuram Rajan said that the "international monetary cooperation has broken down."[6] Furthermore, as part of the reform of the global financial system, the G20 countries have called for a better management and regulation of global capital flows.[7] During 2008 and 2009, the focus was on reversing the outflow of capital from the emerging and developing countries. Then in 2010, the talk shifted towards avoiding volatility in capital inflows and in 2012 in Los Cabos, the G20 communiqué clearly stated that "excess volatility of financial flows and disorderly movements in exchange rates have adverse implications for economic and financial stability." Furthermore, in 2013 in St. Petersburg, the G20 reiterated that due to the recalibration in monetary policy in the advanced economies, volatility in capital flows would increase and would have adverse consequences on growth and employment in emerging and developing economies.

The main objective of this paper is to contribute to the policy debate on the spillover effects of Fed's QE to the emerging markets and the EU countries by employing a novel dataset on international capital flows into 120 countries, including all the major emerging markets, EU countries and other developing countries. This paper differs from the existing studies in three ways: first, it examines all three episodes of QE; second, it covers a large set of developing and emerging countries and the EU countries; third, it differentiates between debt and equity flows for all the countries in our sample. Moreover, it is worth noting that most of the paper that look at the capital flows in the wake of the QE by the Fed tend to focus on large emerging markets such as the BRICS or a selection of countries – the popular group being the "fragile five" which includes Brazil, India, Indonesia, South Africa and Turkey (for e.g., Bhattarai et al, 2015; Tillman, 2014; Eichengreen and Gupta, 2013).

In line with the existing studies on QE and international capital flows, the paper finds support for the argument that the episodes of QE by the Fed led to significant inflows and that tapering was associated with a period of severe retrenchment. However, not all episodes of QE had a clear impact on capital flows and there are clear differences between the two types of assets examined in the paper, namely bonds vs. equities. The difference in flows depending on the asset types is particularly salient to the EMEs as they try to manage and leverage flows for better economic performance. Meanwhile, our results show that the EU countries behave differently than the EMEs during the QE episodes. For example, the news of tapering did not lead to a period of retrenchment in the EU countries. Furthermore, we also find evidence for the

[3] Chen et al 2011; D'Amico et al, 2011; Gagnon et al, 2011; Hamilton and Wu, 2012; Joyce et al, 2011; Krishnamurthy and Vissing-Jorgensen, 2011; Li and Wei, 2013; Swanson, 2011; Williams 2011.
[4] Baumeister and Benati, 2012; Gambacorta et al, 2012; Chung et al, 2012.
[5] Aizenman et al, 2014; Bhattarai et al, 2015; Bowman et al, 2014; Dahlhaus and Vasishtha, 2014; Eichengreen and Gupta, 2013; Fratzscher, Lo Duca and Straub, 2013; Lim et al, 2014; MacDonald, 2015; and Tillman, 2014.
[6] Harding, R. (2014). "India's Raghuram Rajan hits out at uncoordinated global policy," Financial Times, Jan 30, 2014.
[7] See the appendix for tabulated summaries of G20 communiqués.

traditional "pull factors" of capital inflow such as change in industrial production (proxy for GDP growth) and past performance of stock market. Also, our results show that the level of financial development and reserves matter for capital flows. However, the economic importance of each of the "pull factors" pale in comparison to unobservable drivers of capital flows stemming from the Fed's QE policies. Indeed, our paper suggests that perhaps countries can do little to control capital flows while maintaining openness to global capital markets. In light of this, there is a need for better monetary policy coordination and communication among the major economies, in particular the G20 countries.

The rest of the paper is organized as follows: Section II provides the research context for this paper, examining most of the papers that are publicly available on the topic of UMP and global spillovers. Section III then takes a close look at the data and provides a detailed descriptive statistics across all the regions and country groups examined in the paper. For policy purposes, Section III provides a relatively comprehensive snapshot of international capital flows during the three main episodes of the quantitative easing. Section IV presents the empirical methodology used in the paper to examine the impact of QE on international capital flows and Section V then presents the results, focussing mainly on the emerging market economies (EMEs) and the EU countries. Section VI provides a discussion of the result, drawing out linkages with the existing literature, and Section VII concludes the paper by pointing out further areas of research.

II. Spillovers of Quantitative Easing: An overview of the research context

Studies have shown that the transmission mechanism for the Fed's QE to the rest of the world includes: i) liquidity, ii) portfolio rebalancing, and iii) confidence channels (Bauer and Neely, 2014; Chen at al., 2014; Fratzscher at al., 2013; Lim et al, 2014). These channels tend to get manifested in global financial flows, hence almost all the studies that look at the effects of QE on the emerging and developing economies examine capital flows. Among the first papers that looked at the effects of QE on capital flows is by Ahmed and Zlate (2013), where the authors examine the determinants of net private capital inflows to the EMEs by looking at the quarterly balance of payments data from 2002 and 2012. They show that growth and interest rate differentials between EMEs and advanced economies are an important determinant of inflows. They also show that capital controls introduced by several EMEs in recent years have had a dampening impact on total and portfolio inflows. The authors do not find a statistically significant positive impact of quantitative easing on net EME inflows. On the contrary, Cho and Rhee (2013) show that in the aftermath of the Great Recession, capital inflows among 10 large economies in Asia declined to 1.7 per cent of GDP in 2008-09 from an average of 8.4 per cent of GDP preceding the crisis.[8] But following unconventional monetary policies in the advanced economies, capital inflows to Asia rebounded almost as sharply as the decline that preceded it – 7.8 per cent of GDP in 2010-12. The fluctuation in the capital inflows was driven by portfolio investment as investors sought for higher yields in the emerging markets. Cho and Rhee (2013) find that the effect of QE1 in the US led to a decline in domestic interest rates, containing sovereign risk premiums and appreciating local currencies in Asia, while increasing housing prices in some countries.

Meanwhile, there are a set of studies in this literature that rely on announcements of Fed actions (also known as "event studies"). For example, the paper by Glick and Leduc (2013) makes use of high frequency intraday data to examine the US dollar's movements against the currencies of major US trading partners in the time period immediately following Fed announcements. The authors show that the US dollar depreciated significantly following both conventional and unconventional monetary policy surprises. Another event study by Neely (2014) looks at the impact of QE on bond yields and exchange rates of other

[8] The 10 large economies in Asia include: People's Republic of China; Hong Kong, China; India; Indonesia; Japan; the Republic of Korea; the Philippines; Singapore; Taipei, China; and Thailand.

advanced economies such as Australia, Canada, Germany, Japan and the UK.[9] Furthermore, Bauer and Neely (2014) differentiate between signalling and portfolio balancing channel of monetary transmission using a term structure model on international interest rate dynamics. They show that QE had a larger signalling effect on Canada and the U.S. than on the Australian and German yields, albeit a small signalling effect was present in these countries as well. However, in case of other advanced economies such as Japan signalling effect was non-existent while the portfolio balancing effect was present.

Fratzscher, Lo Duca and Straub (2013) examine how US monetary policy since 2007 has contributed to portfolio reallocation and re-pricing of risks in financial markets. They show that QE1 was effective in boosting bond and equity prices, particularly in the US, which then led to the appreciation of the US dollar. Meanwhile, QE2 boosted equity prices globally and led to the depreciation of the US dollar. Furthermore, the authors show that while QE1 triggered a portfolio rebalancing across countries out of the EMEs into the US, QE2 triggered rebalancing in the opposite direction. In essence, their main finding is that quantitative easing in the US did not affect the overall magnitude of capital flows but they magnified their variability and pro-cyclicality. Furthermore, countries with better institutions and more active monetary policy were less affected by quantitative easing. Lastly, Fratzscher et al show that having a pegged exchange rate regime or a relatively less open capital account did not necessarily shield the EMEs from the spill-over effects of quantitative easing in the US.

Aizenman et al (2014) use a "quasi-event study", similar to Dooley and Hutchinson (2009), to examine the impact of QE tapering news announcements by the Fed senior policy makers (most importantly, the Fed chairman) on financial asset prices in the EMEs. They employ a panel fixed effects framework making use of daily data to examine the impact on stock market, exchange rate and CDS spread. Furthermore, Aizenman et al (2014) divide the EMEs between two groups: first with strong fundamentals and second with weak fundamentals based on their current account, international reserves and foreign indebtedness. The authors find that the Fed chairman's statements had the most significant impact on the EME stock markets, exchange rates and CDS spreads. Also, somewhat surprisingly, they find that stronger countries were in fact more exposed (large drops in stock markets and increase in sovereign spreads, which were statistically significant) to the tapering news than the weaker countries (where the results were insignificant). The authors posit that countries that were less exposed to the global financial markets to begin with (a form of financial autarky) were "shielded" from Fed's tapering talks.

Bowman et al (2014) examine the effect of QE announcements on bond yields, exchange rates and stock prices in 17 EMEs by employing a mix of a VAR model to identify the impact of monetary policy shock on EME asset prices and a panel data setting to examine the country specific variables that drive the response of EME asset prices to US monetary policy.[10] The authors show that while the Fed's QE actions had an impact on EME asset prices around the days of announcements, however the impact was not particularly larger compared to the impact of historical or "conventional" changes in the US interest rates (with the notable exceptions of Brazil and Singapore). Furthermore, Bowman et al (2014) also show that the deterioration of domestic economic conditions (proxied using financial variables) in the EMEs worsens their vulnerability to the monetary policy surprises coming from the US. Meanwhile, following Dueker (1995), Tillmann (2015) uses Qual VAR which basically combines binary information (QE announcements) and standard monetary policy VAR. In fact, Tillman (2015) builds upon the work done in Meinusch and Tillmann (2014) that looked at the domestic effects of QE. Indeed, the focus of the paper is to quantify QE shocks and to explain what fraction of variables such as capital inflows, exchange rates, equity and

[9] Furthermore, using a portfolio balance model Neely (2014) shows that QE had a quantitatively significant effect consistent with the data. He shows that "the observed asset price behaviour is approximately consistent with the expected effects of an asset purchase in a simple PB [portfolio balance] model under the assumption of long-run purchasing power parity."

[10] The identification strategy in their VAR model Bowman et al's methodology is similar to Rigobon (2003).

bond prices in the EMEs are affected by QE vs. other determinants. The author finds that the impact of QE1 on the EME was limited, while QE2 and QE3 explain a substantial fraction of the changes in capital inflows, exchange rates and equity/bond prices.

Meanwhile, Bhattarai et al (2015) find a much stronger spillover effects of QE on financial variables than on real macroeconomic variables. Employing a panel VAR framework, the authors show that expansionary QE shock led to increased capital flow, exchange rate appreciation, reduction in long-term bond yields, and stock market booms in emerging economies. Furthermore, they show that the effects is much larger for the "fragile five" countries. However, the authors find no impact of US QE shock on output and consumer prices.

Dalhaus et al (2014) look at the impact of Fed's reversal from QE on portfolio flows into major EMEs. They show that the impact of Fed's decision to scale back from QE – the so called "taper talk" – was associated with small changes in capital flows, which were economically small (in relation to their GDP). However, this did not necessarily insulate the EMEs from considerable financial market volatility, argue the authors. Also, the authors show that the actual scaling back (the paper looked at the impact of Fed's signalling with its "taper talk") could lead to higher impact depending on the country specific characteristics and its interactions with the Fed's monetary policy. Likewise, Lim et al (2014) examine the effects of QE and monetary policy normalization (tapering of QE) on financial flows to developing countries. The authors look at different types of financial flows and show that most of the effects of QE stem from portfolio rather than FDI flows; also, in their simulations, tapering contracts financial flows to developing countries by 10 per cent irrespective of the speed of contraction.

Similarly, a recent paper by MacDonald (2015), which stands out in terms of the empirical approach as it relies on a gravity model, to show that QE was associated with large and significant currency appreciations, decrease in long-term yields and increase in asset prices in the EMEs.[11] Capital market frictions between the EMEs and the US seem to explain the heterogeneity of the impact on the EMEs, even after controlling for exchange rate regimes, capital control policies and domestic monetary policy. Most importantly, MacDonald (2015) shows that the type of assets purchased by the Fed was an important determinant of the impact on EME asset prices, with Treasury bill purchases having a bigger impact than the MBS purchases.[12]

Taking stock of the recent literature, it is evident that there is a general consensus on the effects of QEs on the capital flows to the EMEs, however the magnitude of the effects vary depending on the methodology and the date used. Also, there is evidence that Fed's tapering of QE led to a reduction in capital inflow into the EMEs. Indeed, EMEs which are heavily reliant on external financing endured significant financial instability in the aftermath of the Fed's tapering – therein lies the main motivation of this paper in looking at capital flows.[13] Studies show that large inflows generally lead to credit booms and "overborrowing", which is usually followed by asset price collapse and often severe recessions (Mohan, 2010; Bianchi and

[11] MacDonald (2015) uses gravity-in-finance literature, which is based on the gravity models from the trade literature, to identify the degree of capital market frictions between the US and the EMEs. These types of models first surfaced in finance and macro literature with the works of Portes and Rey (2005) and Portes, Rey and Oh (2001). The theoretical underpinnings followed later with the work of Okawa and Van Wincoop (2012).

[12] One of the main results that comes out of MacDonald (2015) is that EMEs will be better able to cope with unconventional monetary policy actions by advanced economies in the future if they are cognizant of their inter-connectedness (financial market frictions, level of integration) of their markets with the US market. Also, if the EMEs know in advance the types of assets purchases (with assets other than the government bonds being better) that are likely to take place when the advanced economies engage in unconventional measures, it would further mitigate the impact on their asset markets, exchange rates and borrowing costs (with the impact on bond yields).

[13] For e.g., countries such as Chile, Hungary, Malaysia, Philippines, Turkey and Ukraine's reliance on external financing is around or above 5 per cent of their GDP.

Mendoza, 2012; Lorenzoni, 2008; Korinek, 2009; Bianchi, 2011). "Sudden-stops" leave countries that are reliant on external finance vulnerable to financial and economic instability, not to mention there is the added risk of a "contagion". Among the different types of flows (FDI, debt, equity), the literature is pretty unanimous in showing the negative effects of debt flows on economic growth. Volatility in capital inflow usually leads to exchange rate volatility, which has important employment, output and distributional consequences (Mohan, 2004). Without providing an exhaustive review of the literature that sheds light on the importance of capital inflows, it is safe to conclude that volatility in inflows has serious consequences (positive and negative) on a country's macro fundamentals.

III. Data and descriptive Statistics

1. Data on capital flows

In this paper, I use country flows data from the Emerging Portfolio Fund Research (EPFR), which provides capital flows into and out of countries, based on allocations by mutual funds across the globe.[14] This novel database is an important source of high frequency capital flows data. The flows captured by EPFR is a subset of all capital flows into and out of the EMEs. The EPFR data is different from the standard Balance of Payment (BoP) data such as TIC on capital flows. In particular, standard capital flows data tracks total portfolio investment by non-residents to the EMEs and also residents' investments abroad. However, EPFR measures flows in and out of mutual funds and exchange traded funds (ETFs) and such flows are not necessarily transactions between residents and non-residents of a country (Koepke et al, 2015). For example, an emerging market dedicated bond fund located in the US experiences an outflow which forces the fund to sell a Turkish bond, the counterparty to this transaction is not necessarily a Turkish resident. If the counterparty is not a resident of Turkey, then this transaction is not recorded in Turkey's BoP. Likewise, when the EM-dedicated bond fund receives an inflow from a Turkish investor that leads to a purchase of bond issued in Turkey, this would not be recorded in the capital flows either. Furthermore, since mutual funds tend to maintain a cash buffer, monthly changes in the estimated allocation to each country does not necessarily lead to commensurate changes in transactions of EME securities (Koepke et al, 2015).

Despite the limitations of the EPFR data, there has been a number of studies in the past few years that have made use of it to examine international capital flows. For example, Jotikasthira et al (2010) was among the first papers that made use of the EPFR data – in it, they point out that even though the EPFR data is a sub-set of market capitalization in equity and bonds in most countries, it is a representative sample. The authors show that there is a close match between EPFR portfolio flows and flows stemming from the BoP data. Likewise, Fratzscher (2011) was the first study to make use of the EPFR data to examine the effects of unconventional monetary policy on emerging markets. Fratzscher (2011) points out that EPFR's main strength lies in its ability to capture rapid shift in sentiments among investors, which is well suited to examining the impact of the Fed's decision to engage in large scale asset purchase programmes (LSAPs). Furthermore, Bhattarai et al (2015) also make tangential use of the EPFR data to look at the effects of LSAPs on a subset of emerging markets, namely "fragile five" countries.

We make use of the monthly data from the EPFR, which covers a larger set of mutual funds than weekly data. For example, our sample covers 33,735 equity funds and 21,716 bond funds, while Fratzscher (2011), which uses weekly data, includes 16,000 equity funds and 8,000 bond funds. Indeed, monthly data from EPFR includes a globally more representative sample of mutual funds, albeit most of the funds are based in the advanced economies. EPFR data contains information on the total assets under management (AUM) at the end of each month, divided into the two asset class – bonds and equities. Based on the allocation

[14] The EPFR data used in this paper was bought by the Research Department of the International Labour Organization (ILO) in Geneva, Switzerland in 2014.

across different countries, EPFR estimates total assets in each country. I have labelled this as gross flows in the paper but this is not the same as the standard BoP definition of gross flows (difference between capital inflows by non-residents and capital outflows by residents). As stated above, flow of funds captured by EPFR does not necessarily reflect the transactions between residents and non-residents. Furthermore, EPFR includes data on net capital flows which is defined as the change in estimated allocation stemming from valuation and portfolio changes within each mutual fund (Fratzscher, 2011).

Meanwhile, another big advantage of the EPFR data is the sample size, as we have data for 120 recipient countries, including all the emerging markets and several developing economies (see the Annex for the list of countries). Furthermore, the data is divided into bonds and equities, thus we have four capital flow measures for each country: i) total bond allocation; ii) total equity allocation; iii) net bond allocation; and iv) net equity allocation. The sum of the first two is the total assets under management (AUM), which is in the billions of USD for most of the emerging markets and few developing countries. The second two variables are mostly in the USD millions, as these are monthly changes in the fund allocation to each country. The empirical analysis in Section IV mainly looks at the net allocation as this tends to capture the shift in investors' sentiment following the announcements by the Fed better than the total estimated allocation (Fratzscher, 2011). However, we also include results from this alternative measure of capital flows as it will allow us to compare the two measures. The period under consideration is January 2005 to April 2014, albeit the main focus of the empirical analysis is 2009-2014, which is when the large scale asset purchases took place in the US.

2. Capital flows into the emerging market economies

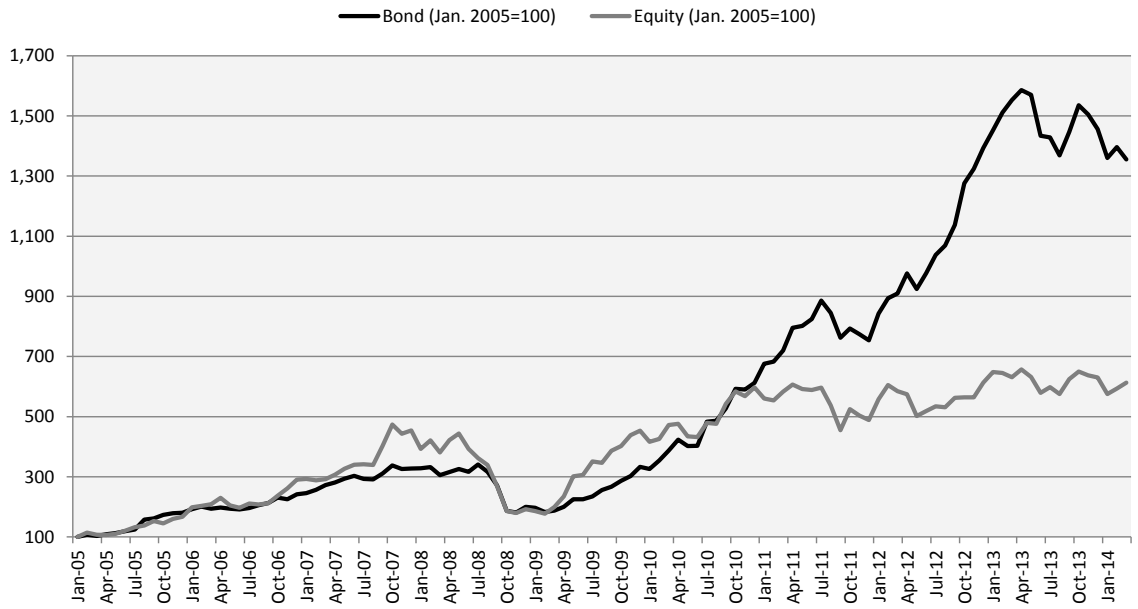
Leading up to the Great Recession, inflow of bond and equity capital into the EMEs increased steadily. In January 2005, gross bond inflow accounted for 27.4 billion and gross equity inflow accounted for 140 billion; by January 2008, bond inflow stood at 90 billion and equity at 550 billion. This represented 328 and 393 per cent increase in gross bond and equity flow into the EMEs (Figure 1). However, by the beginning of 2008 (in case of equities, it had already started by the summer of 2007) retrenchment in portfolio flows to EMEs started to take place. Indeed, both bond and equity flows declined considerably – 40 and 53 per cent decline in the course of the year. In January 2009, gross bond inflow stood 54 billion and equity inflow at 260 billion respectively. However, note that even after the most severe period of retrenchment in the second half of 2008, total gross bond inflows did not fall back to the pre-crisis levels in 2005. In fact, both the flows in early 2009 were almost double than the levels seen in early 2005 – this indicates, that while the retrenchment was severe, the gross flows were actually close to the levels observed just a few years back. By January 2014, after several rounds of QE by the Fed, gross bond and equity inflows into the EMEs stood at 372 and 804 billion respectively (in terms of per cent, these were 1360 and 575 per cent increase compared to January 2005).

Meanwhile, in terms of the countries receiving the largest shares of the two types of investments, we see several notable differences. In terms of the bond inflows – first, Brazil is the largest recipient of gross bond inflows in our sample – at 16 per cent in April 2014 (see Appendix 1). Other countries in the sample with above 10 per cent share of bond inflows include Russia (although in April, 2014 is was slightly lower than 10 per cent) and Mexico (13.9 per cent). Second, countries such as Argentina and Turkey had shares of gross bond inflow at 8.2 and 9.5 per cent respectively in January 2008, which as of April 2014 had declined to 0.7 and 5.3 per cent respectively. Third, countries that saw an increase in their share of gross bond inflows during this period are China (0.8 to 5.6 per cent), Hungary (2 to 5.4 per cent), Poland (4.1 to 9.2 per cent) and South Africa (2.4 to 4.3 per cent).

In terms of the equity inflows – first, China is by far the largest recipient of the equity inflows – 32.6 per cent of all equity investments flowing into the EMEs in April 2014 (see Appendix 1). The other two

countries with large shares of equity inflows in our sample include Brazil and India with 14.6 and 13.3 per cent of total equity inflows respectively. Second, over 80 per cent of all equity inflows among the EMEs is comprised of gross flows to just six countries – Brazil, China, India, Mexico, Russia and South Africa. Third, what stands out in terms of equity inflows in comparison to bond inflows is that the group of countries receiving the largest shares of equity inflows has not changed much since early 2008.

Figure 1: Total allocation to bond and equity investments into the EMEs, Jan 2005 – April 2014



Note: Gross inflows refers to the asset under management (AUM) held by mutual funds in either bond or equities. EMEs include 22 economies: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine and Venezuela.
Source: Author's calculations based on EPFR.

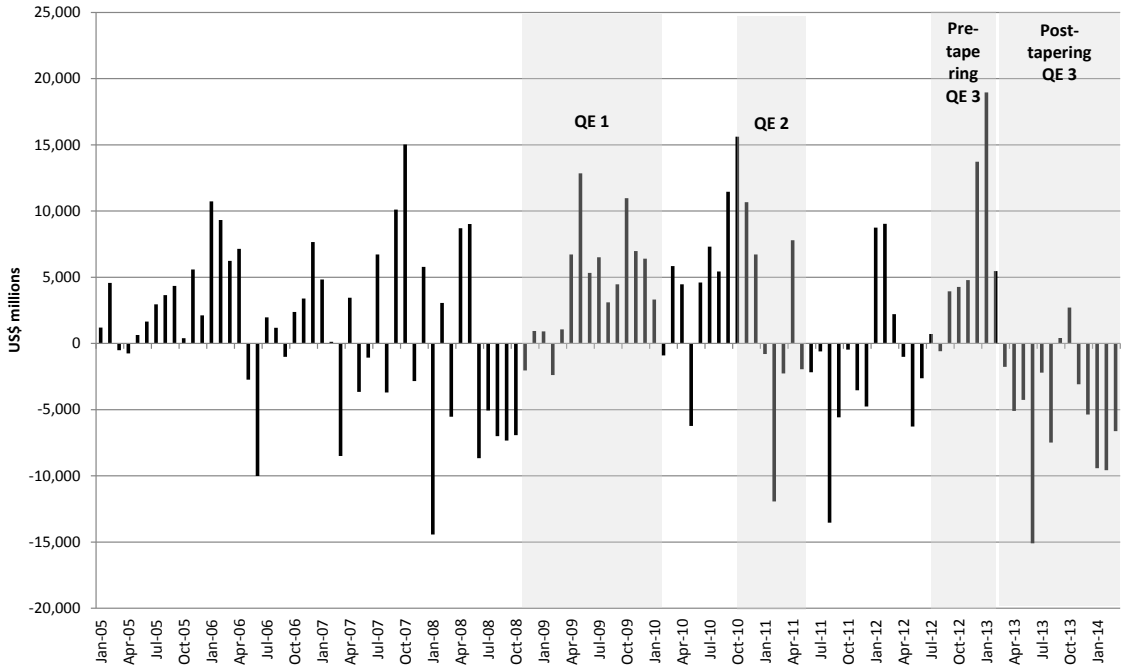
Gross portfolio inflows do not necessarily capture the volatility in capital inflows that took place since the onset of the Great Recession. Since the main objective of the paper is to understand the impact of QE by the Fed on the EMEs and other developing countries, I examine the different episodes of asset purchases as indicated in Table 1. The split between different episodes follows the announcement by the Fed. However, what is notable is how I have decided to examine the impact of QE3 and generally the effect of tapering. Indeed, as Table 1 shows, I have split the time period into "pre-tapering" QE3 and "post-tapering" QE3 in order to examine the effects of Fed's signalling – intention to scale back monthly asset purchases – in May 2013. Indeed, recent studies have shown that the actual "tapering" by the Fed that began in December 2013 did not have much of an impact on exchange rates, government bond yields and stock prices in the EMEs, as global financial markets had already factored in the news of "tapering" when it emerged in late May 2013 (Mishra et. al., 2014). In line with this finding, the period for "post-tapering QE" in our sample starts in May 2013.

Table 1: Episodes of QE

Episodes of UMP	Period
QE1	Nov. 2008 to March 2010
QE2	Nov. 2010 to May 2011
Pre-Tapering QE3	Sept. 2012 to April 2013
Post-Tapering QE3	May 2013 to April 2014
Note: The last episode ends in April 2014 because of the availability of data until April.	

When we look at the net equity inflows into the EMEs for a period of 10 years (2005 to 2014), we see that it is generally more volatile than the net bond inflows (Figure 2 vs. Figure 3). In fact, the episodes of QE and the volatility in net equity inflows that ensued, did not seem to have made much of a difference – the picture looks remarkably similar (Figure 2). However, one notable difference is the difference between pre-tapering QE3 and the post-tapering QE3. Here we do see a clear reversal once the Fed made an announcement of gradual scaling back of the asset purchase programmes. Furthermore, when we examine the large emerging markets that make up most of the equity inflows into the EMEs, we see that most of the variation in net equity inflows comes from Brazil and China (see Appendix 1). Moreover, it seems that the net inflow of equity capital into China is the main driver of the overall picture for the EMEs. Also, when we include all four countries in the mix – accounting for two-third of all equity inflows (67.8 per cent of total going to the 22 EMEs under consideration) – volatility in equity capital during the different episodes of QE matches the experience of these four countries.

Figure 2: Net equity inflows into the EMEs, Jan 2005 – April 2014

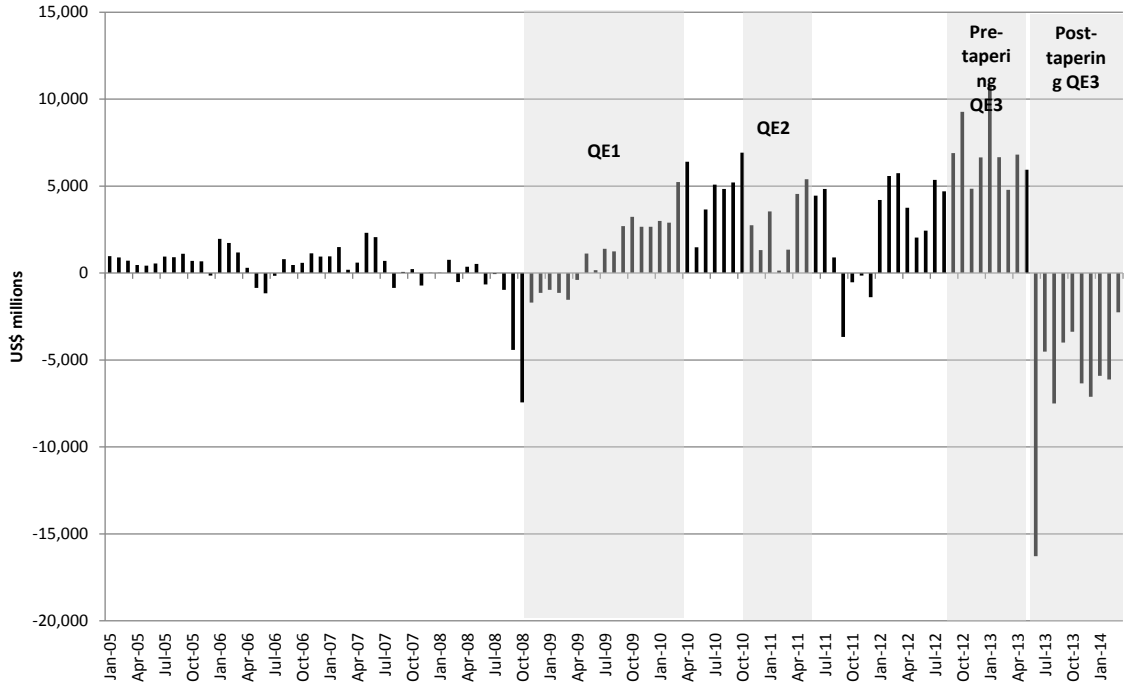


Note: EMEs include 22 economies: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine and Venezuela. Source: Author's calculations based on EPFR. Source: Author's calculations based on EPFR.

Meanwhile, net bond inflows during the different episodes of QE offers a different picture compared to the net equity inflows. First of all, leading up to the onset of the Great Recession, net bond inflows into the EMEs were remarkably stable, which was not the story with the net equity inflows. Second, there was a period of retrenchment during the height of the crisis (in late 2008), but once QE1 went into effect, net inflow into the EMEs were positive, which continued through QE2. Third, during the pre-tapering QE3 the net bond inflows into the EMEs peaked, however once the tapering announcement was made, there was also the sharpest reversal in bond inflows. In fact, the reversal of net bond inflows after the tapering announcement was larger than the peaks observed during QE1, QE2 and pre-tapering QE3.

Furthermore, it seems that few large economies such as Brazil, Mexico, Russia and Turkey seem to be the ones driving the overall picture of net bond inflows into the EMEs (see Appendix 1). In fact, the peaks during QE1, QE2 and pre-tapering QE3 matches the picture we see for the EMEs. Also, the sharp reversal in bond inflows that came on the heels of the tapering announcement was sharply felt across these four countries. One country that stands out in terms of the net bond inflows is Brazil – since the outset, it seems to be at the receiving end of international investors looking for better yields abroad; it saw some of the sharpest increases in the first part of the QEs and also the sharpest retrenchment once tapering was announced. However, during the pre-tapering QE3, Mexico and Russia also saw significant increases in net bond inflows; similarly Turkey saw significant increases as well, but to a lesser extent.

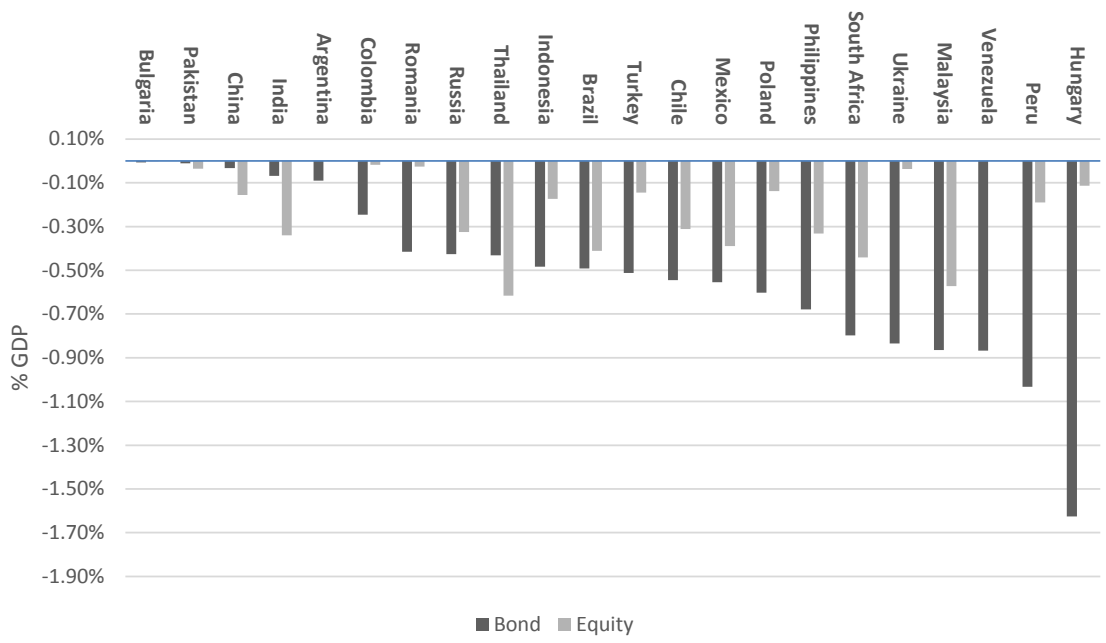
Figure 3: Net bond inflows into the EMEs, Jan 2005 – April, 2014



Note: EMEs include 22 economies: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine and Venezuela. Source: Author's calculations based on EPFR. Source: Author's calculations based on EPFR.

Before conducting any econometric analysis, when we zoom in on the period after the Fed announced that it was going to scale back QE3 – between June 2013 and March 2014 – we see that capital inflow to the EMEs declined sharply. Figure 4 shows the accumulated decline in net capital inflows during those nine months, over GDP for 2014. As it is evident from the picture, over half of the 22 countries saw a decline in bond inflow that was higher than 0.5 per cent of their GDP. In countries such as Hungary and Peru, it was over 1 per cent of GDP. In case of equity inflows, the decline was much less sharp during these nine months – except in Malaysia and Thailand where the cumulative decline was above 0.5 per cent of GDP; in Brazil, Mexico and South Africa it was about 0.4 per cent of GDP.

Figure 4: Reversal in capital inflows after the tapering announcement as a % of GDP (cumulative reversal between June 2013 and March 2014)



Note: The bars refer to reversal in net equity/bond inflows after the tapering announcement – sum of monthly reversals between June 2013 and March 2014 divided by 2014 GDP. Source: Author's calculations based on EPFR and World Economic Outlook, IMF.

3. Flows into other developing and emerging economies

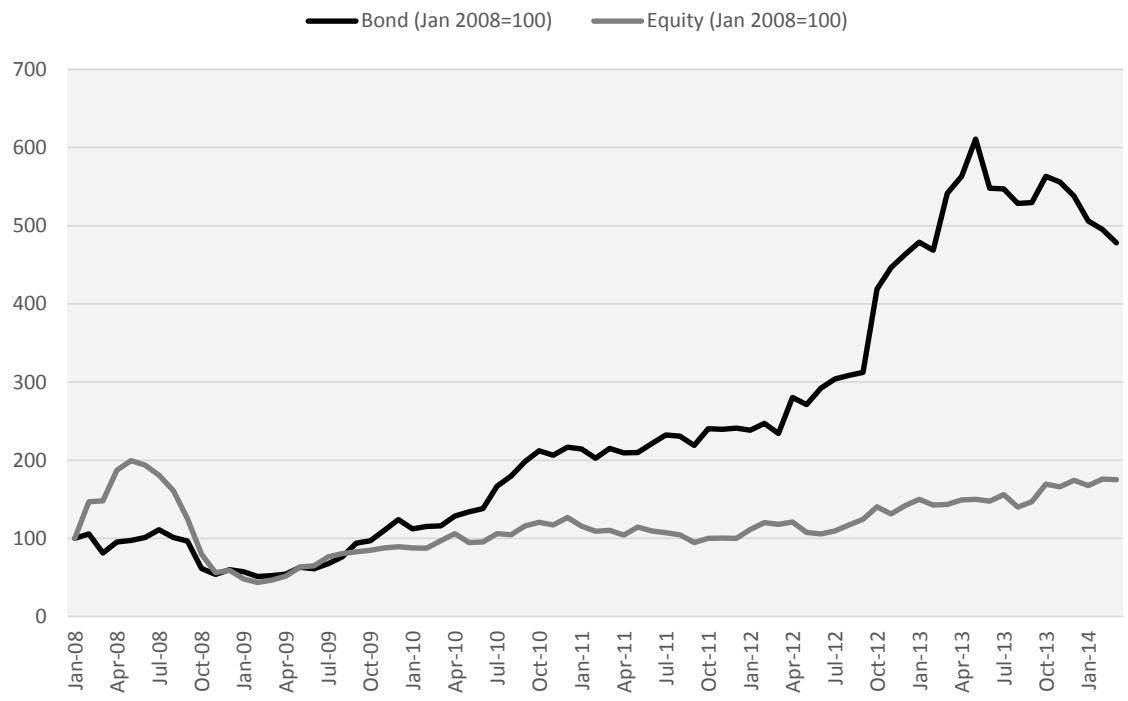
Most of the papers that look at the capital flows in the wake of the QEs by the Federal Reserve tend to focus mostly on large emerging markets such as the BRICS, or a selection of countries – the popular group being the "fragile five" which includes Brazil, India, Indonesia, South Africa and Turkey. What has mostly been ignored by almost all the studies that have examined capital flows are other developing and emerging economies, which do not belong to the emerging economy category as defined by the IMF. This "other" category, while not as important from a global perspective (in terms of the share of world GDP), includes 55 countries out of 120 in our sample (they do not belong to either advanced or emerging economies).[15]

[15] The data for this group is not as good, in fact there are many gaps and inconsistencies. Since the magnitude of flows are relatively small, for chunks of period of time there are no data at all. The coverage is better starting only in 2012, basically through the QE3 episodes. The Arab States have relatively better data coverage, but we don't have data for both types of assets in many cases.

In January 2008, gross bond and equity inflows into other developing and emerging economies stood at 9.5 and 12 billion respectively. A few months after the onset of the Great Recession, both these inflows declined by half – indeed, in January 2009, they stood at 5.4 and 5.8 billion respectively (Figure 5). However, since later 2009, both bond and equity inflows into these economies started increasing, particularly bond inflows. In fact, by January 2014 bond inflows had increased by 506 per cent while equity inflows had increased by 168 per cent. In terms of actual volumes of gross inflows, bond inflows stood at 47.8 billion and equity inflows stood at 20.1 billion. Indeed, since 2008, bond inflows into these economies has surpassed equity inflows – this was not the case leading up to the Great Recession. In fact, gross equity inflows in the summer of 2008 (May to July) was already above 20 billion, when bond inflows were still less than 10 billion.

Meanwhile, among this group of countries, the largest share of bond flow in April 2014 was to Qatar – 14 per cent, up from 11.1 per cent in Sept. 2012 (see Appendix 1). Moreover, Croatia, Kazakhstan, Qatar, Serbia, Sri Lanka and Uruguay accounted for over 60 per cent of all bond inflows into other developing and emerging economies. In case of gross equity inflows, the largest share in April 2014 went to the United Arab Emirates (UAE) – 21.5 per cent, up from 11.3 per cent in Sept. 2012 (see Appendix 1). Countries with over 10 per cent of the share of total gross equity inflow in April 2014 include Egypt (12.7 per cent), Nigeria (11.7 per cent) and Panama (10.4 per cent). In case of Egypt, the country saw a severe retrenchment between Sept. 2012 and April 2014 – from 22 per cent to 12.7 per cent. Approximately 90 per cent of all equity capital investments is comprised of flows to Egypt, Ghana, Kenya, Kuwait, Kazakhstan, Nigeria, Qatar, Panama, Saudi Arabia and the UAE.

Figure 5: Total allocation to bond and equity investments into other developing and emerging economies, Jan 2005 – April 2014

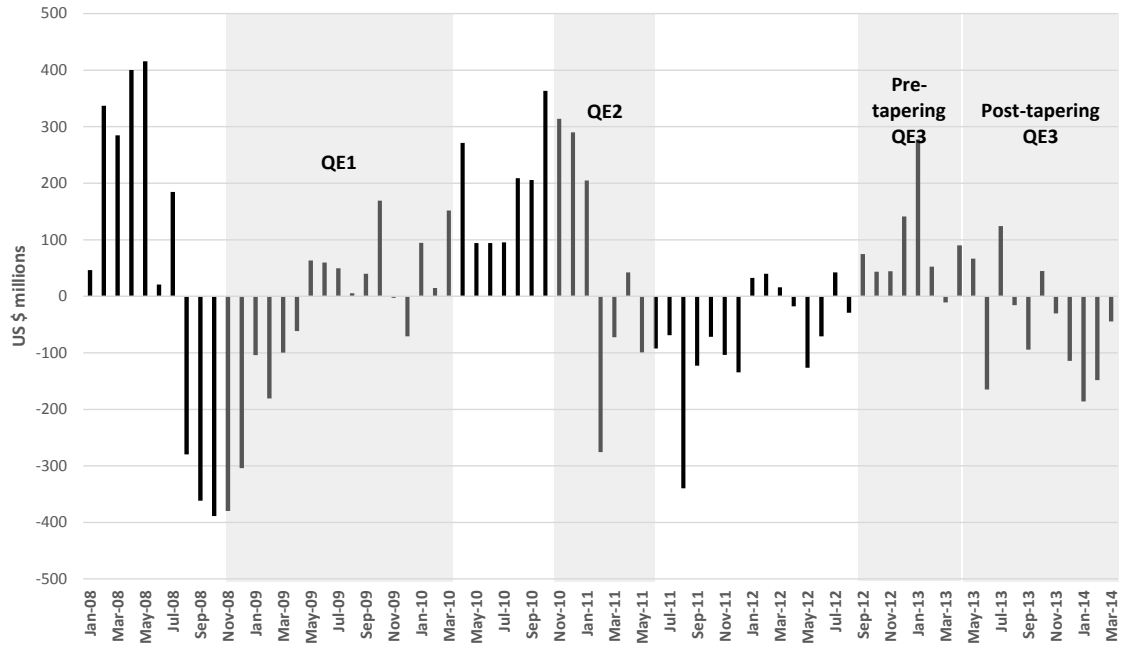


Note: Bond gross flows includes 33 countries: Angola, Bosnia Herzegovina, Congo (Kinshasa), Costa Rica, Croatia, Cuba, Dominican Rep., Ecuador, Egypt, El Salvador, Gabon, Georgia, Ghana, Guatemala, Iraq, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kuwait, Lebanon, Nicaragua, Nigeria, Oman, Panama, Qatar, Saudi Arabia, Serbia, Sri Lanka, Trinidad & Tobago, Tunisia, Uruguay and Zambia.

Equity gross flows includes 30 countries: Bahrain, Bangladesh, Botswana, Croatia, Egypt, Estonia, Georgia, Ghana, Ivory Coast, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Malawi, Mauritius, Namibia, Nigeria, Oman, Panama, Qatar, Rwanda, Saudi Arabia, Serbia, Sri Lanka, Tanzania, Tunisia, UAE, Zambia and Zimbabwe.
Source: Author's calculations based on EPFR

As we saw earlier, and same is true with this group of countries, gross capital inflows only capture part of the story related to capital flows in the last 10 years. When we examine net inflows (Figure 6 and Figure 7) we can make the following observations: first, net equity inflows saw a large reversal during the height of the Great Recession.[16] Second, net bond inflows to these group of countries was stable in the lead up to the recession, but then they faced relatively more severe retrenchment during the height of the crisis which was larger in magnitude than the reversal in equity inflows (1 billion per month vs. 400 million per month). Third, once the QE program was put in place in the U.S., particularly the first two episodes (QE1 and QE2), we observe an increase in net inflows into these economies (although the relationship does not appear clean for net equity inflows). Fourth, net bond inflows seem to have increased during the pre-tapering QE3, peaking above 1 billion per month, followed by a sharp reversal once tapering was announced in the summer of 2013. In fact, the reversal in net bond inflows once tapering was announced was above 2 billion. Lastly, in case of equities, while we don't see a clean picture, the pattern is similar to that of net bond inflows.

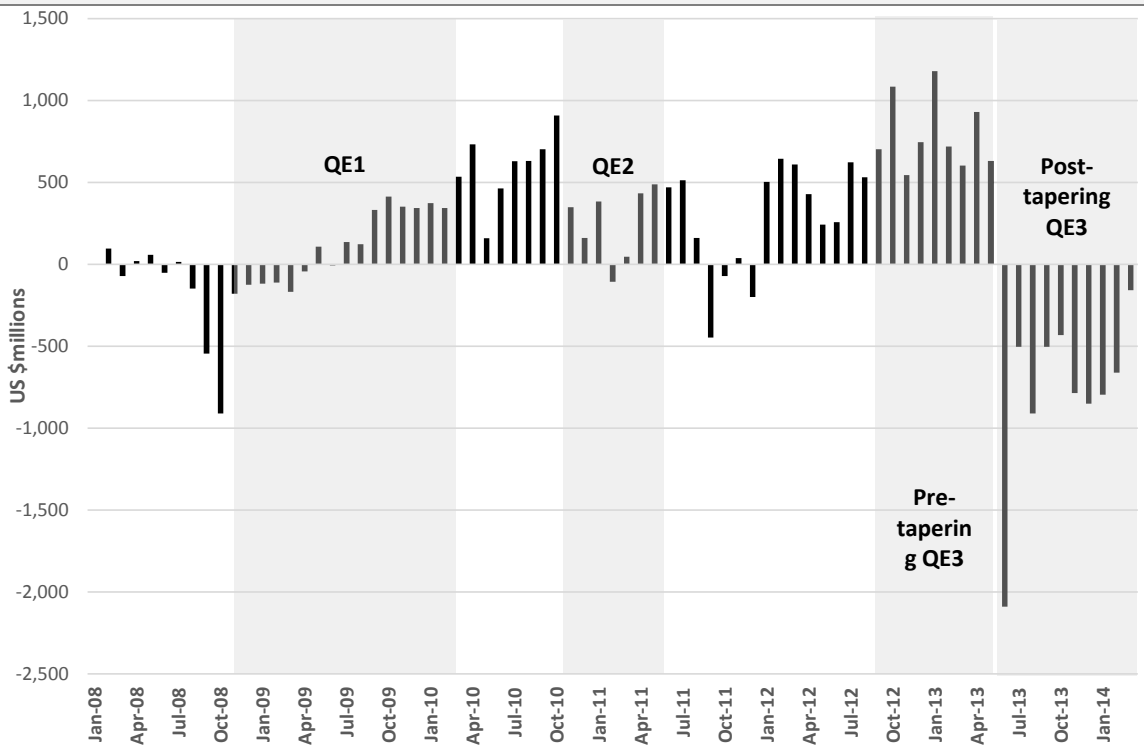
Figure 6: Net equity inflows into other developing and emerging economies (25 countries not included in the EMEs), Jan 2008 – April 2014



Note: Other developing and emerging economies include 25 countries: Bahrain, Bangladesh, Botswana, Croatia, Egypt, Estonia, Ivory Coast, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Malawi, Mauritius, Namibia, Nigeria, Oman, Panama, Qatar, Saudi Arabia, Sri Lanka, Tunisia, UAE, Zambia and Zimbabwe. Source: Author's calculations based on EPFR.

[16] However, note that the magnitude of net equity inflows is smaller than bond inflows; for illustration, see the axes for Figure 6 and Figure 7.

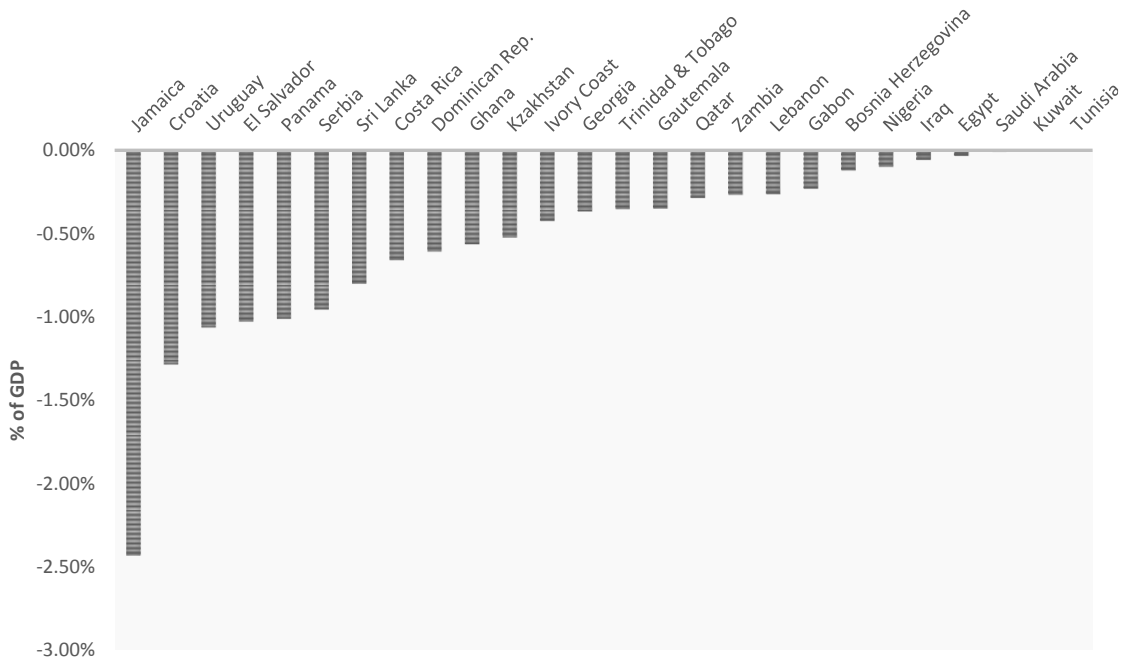
Figure 7: Net bond inflows other developing and emerging economies (29 countries not included in the EMEs), Jan 2008 – April 2014



Note: Other developing and emerging economies include 29 countries: Bosnia Herzegovina, Congo (Kinshasa), Costa Rica, Croatia, Cuba, Dominican Rep., Egypt, El Salvador, Gabon, Georgia, Ghana, Guatemala, Iraq, Ivory Coast, Jamaica, Kazakhstan, Kuwait, Lebanon, Nicaragua, Nigeria, Panama, Qatar, Saudi Arabia, Serbia, Sri Lanka, Trinidad & Tobago, Tunisia, Uruguay and Zambia.
Source: Author's calculations based on EPFR

Like before for the large EMEs, when we focus on the months that followed after the Fed announced that it was withdrawing from QE3, we see that the cumulative decline in bond inflows between June 2013 and March 2014 was severe for a large set of countries in this group (Figure 8). Out of the 26 countries in this sample, about 40 per cent of them saw a decline of over 0.5 per cent of their GDP in nine months. In case of Jamaica, it amounted to 2.4 per cent of its GDP. Other countries such as Croatia, El Salvador, Panama, Serbia and Uruguay saw a decline in bond inflows of approximately 1 per cent of their GDP. Likewise, countries such as Costa Rica, Dominican Republic, Ghana, Kazakhstan and Sri Lanka saw a cumulative decline in bond inflows of between 0.5 and 0.8 per cent of their GDP. Meanwhile, the data on equity inflow decline was not available for the same group of countries.

Figure 8: Reversal in net bond inflows after the tapering announcement in other developing and emerging economies, as a % of GDP



Note: the bars refer to the cumulative reversal between June 2013 and March 2014.
Source: Author's calculations based on EPFR and World Economic Outlook, IMF.

IV. Empirical methodology

As it is evident from the descriptive statistics presented in the previous section, actions taken by the Fed over the last few years has had a direct impact on the risk-return trade-off for international investors. In order to better understand the link between actions taken by the Fed and its impact on international capital flows, we use a simple model of portfolio allocation between a risky asset (emerging markets) and a risk free asset (US Treasuries). We consider EU to be the second best risk free asset after the US, but peripheral Europe could also behave as large emerging markets.

An investor optimizes the following:

$$U = E\left(\sum \alpha_i R_i\right) - \frac{\gamma}{2} Var\left(\sum \alpha_i R_i\right)$$

Subject to the following constraint:

$$\sum_i^n \alpha_i = 1$$

Standard optimization with respect to α_i yields:

$$\alpha_i = \frac{E(R_i - R_{US})}{\gamma\, Var(R_i - R_{US})}$$

This simple framework of investment weighs risks, $Var(R_i - R_{US})$, against the expected returns, $E(R_i - R_{US})$, where an investor seeks higher returns for taking more risks. An investor typically chooses the lowest variance for an expected return, or the highest return from an expected variance. In this model, we assume that $Var(R_{US})$ is zero as it is the risk free asset; while EU and EME are risky assets, with the latter being riskier than the former. Thus, we have:

$$\alpha_{US} = 1 - \alpha_{EU} - \alpha_{EME}$$

During the episodes of QE, the numerator, i.e. expected returns -- $E(R_{EME} - R_{US})$ – was generally higher than the risks associated with investing in the emerging markets -- $Var(R_{EME} - R_{US})$, hence the share of investments going into EME, α_{EME}, was higher. However, once the Fed hinted at scaling back QE, the expected returns on the US assets, $E(R_{US})$, increased, which then reduced both α_{EU} and α_{EME}.

Furthermore, assuming that Var_{EME} was initially larger than Var_{EU}, which seems reasonable, this would then imply that α_{EME} is less sensitive to the change in $E(R_{US})$. This would then mean that after the news of "tapering" there would not be a large pullback of capital as investors' presence in EME was limited to begin with. However, $E(R_{US})$ is only part of the story – in fact, variance of returns in the EME and the EU might be a more important part of the story. Indeed, once the news of Fed's impending withdrawal from QE surfaced, $Var(R_{EME} - R_{US})$ increased, thus leading to a decrease in α_{EME}. Fed's signalling that it was getting ready to scale back QEs put upward pressure on the variance of EME returns and downward pressure on expected returns. Moreover, in the aftermath of the QE episodes, there were instances of increased capital controls in the EMEs (Pasricha et al, 2015; Singh, 2010) – and once liquidity is already in the country, the prospect of additional capital controls tends to create "runs" on the emerging market assets as investors are afraid they would not be able to pull out quickly enough (Diamond and Dybvig, 1983;

Gallagher, 2014). Meanwhile, considering that the EU is seen less risky than the EMEs, presumably Var_{EU} increased less in the aftermath of "taper-talk", hence a smaller effect on α_{EU}.

From this mean-variance framework applied to international investments, we can derive following testable hypotheses:

Hypothesis 1: QE1 should have led to an increase in capital inflow into the EMEs. However, since the first part of the asset purchases took place at the height of the Great Recession, the increase in inflow could be lower than anticipated. European Union should also see an increase in capital inflow during QE1.

Hypothesis 2: QE2 should see an increase in capital inflow into the emerging markets, however the magnitude of the increase is expected to be smaller as this round of purchases was of a smaller scale than QE1. Europe should also see an increase in inflow during QE2, but the magnitude should be smaller than the EMEs considering the economic slowdown in the EU.

Hypothesis 3: QE3 should see a significant increase in capital inflow into the emerging markets as it was the largest episode of asset purchases;[17] but once tapering was announced, the increase in inflow is expected to be reversed as investors reduced their fund allocation to the EMEs. In case of the EU, there should be no difference between "pre" and "post-tapering" QE3.

In order to test these hypotheses, I make use of the empirical methodology from the literature that examines the determinants of international capital flows. Some of the most recent studies in this literature include Lim et al (2014), Nier at al. (2014), Ahmed and Zlate (2013), Cho and Rhee (2013), Forbes and Warnock (2011), Fratzhscher et al. (2013), Ghosh et al (2012), and Milessi-Feretti and Tille (2011). Several studies have documented the importance of "push" factors – conditions in advanced economies – in explaining capital flows into and out of the emerging markets (Calvo et al, 1993, 1996; Chuhan et al, 1998; Forbes and Warnock, 2012; Fratzcher, 2012). Furthermore, considering the unconventional monetary policies in the U.S. and other advanced economies, several new studies have looked at monetary policy in advanced economy, supply of global liquidity and global risk aversion, as some of the major push factors in recent years (Cerutti et al, 2015; Ahmed and Zlate, 2014; Rey, 2013; Milesi-Feretti and Tille, 2011). In fact, a new study by Feyen et al (2015) showed that bond issuance (both sovereign and corporate) surged following the Great Recession, highlighting the fact that emerging and developing economies benefitted from the surge in global liquidity on the heels of QE in the U.S. Indeed, bond markets have become a major transmission channel of global liquidity from advanced to emerging markets – our paper examines the link between episodes of QE and bond inflows to further shed light on this issue. However, in case of flows to the EU, there should be no difference between bonds and equities.

Meanwhile, domestic "pull" factors that also potentially explain capital inflows into emerging markets include growth differential with advanced economies, interest rate differentials, level of reserves, financial development, exchange rates and institutional factors such as capital account restrictiveness etc. (Ahmed and Zlate, 2014; Nier et al, 2014). However, there is considerable debate whether domestic "pull" factors are significant and to what extent they explain capital inflows. For example, Forbes and Warnock (2012) show that there is no significant relationship between capital controls and the country's likelihood of experiencing a surge or stop in capital flows from abroad, which is largely in line with Fratzscher et al (2013). In fact, a new study by Nier et al (2014) shows that countries might not be able to control capital flows without incurring substantial costs. Moreover, in the wake of QE in the U.S., it seems that the "push" factors, have mattered more as investors were looking for better yield elsewhere (Aizenman et al, 2014;

[17] QE3 first started in September 2012 with $40 billion MBS purchases per month, then in December the Fed announced that it would also buy $45 billion in Treasuries per month. The combined purchases was largest among the three episodes of QE. See Annex for major announcement dates for LSAPs and the magnitude of purchases.

Bhattarai et al, 2015; Bowman et al, 2014; Dahlhaus and Vasishtha, 2014; Eichengreen and Gupta, 2013; Fratzscher, Lo Duca and Straub, 2013; Lim et al, 2014; MacDonald, 2015; and Tillmann, 2014).

To analyse the impact of QE in the U.S. on international capital flows, I use various panel data specifications. The baseline model is as follows:

$$CIF_{i,t} = \alpha + \gamma\, UMP'_t + \sum_{j=1}^{n} \beta_j\, x_{i,t}^{j} + \lambda\, VIX_t + \delta FED_t + \mu_i + \varepsilon_{i,t}$$

Here, CIF refers to either net or gross capital inflows, where the types of inflows are divided into bond or equity inflows. There should be a difference between gross and net inflows. Presumably, net inflow of capital is more affected by the episodes of QE than the gross inflows; however, since the episodes of QE have varied in terms of the total duration and size of purchases, there might be no clear difference. The subscript *i* refers to country *i* and subscript *t* refers to month *t* and α, γ, β and λ are parameters to be estimated, while μ captures the unobservables in each country and ε is the error term. UMP refers to the four episodes of unconventional monetary policy measures, which are indicated by time dummies:

$$UMP'_t = \begin{Bmatrix} QE1 \\ QE2 \\ Pretaper\ QE3 \\ Posttaper\ QE3 \end{Bmatrix}$$

Among the "push" factors, VIX is the CBOE volatility index, which is available at a higher frequency but I have used month end closing values. It measures the volatility of Standard & Poor's (S&P) 500 index options and the market's expectations of volatility over the next 30 days. Hence, it captures investors' appetite for risk taking. Empirical evidence finds a strong negative correlation between capital inflows into the EMEs and the VIX (Bruno and Shin, 2013; Nier et al, 2014). I expect to replicate this result – negative coefficient estimate for VIX in our model. Considering that the unconventional monetary policy episodes in the U.S. are time dummies, we also include monthly change in total assets of the Federal Reserve as one of the determinants of international capital flows. Meanwhile, $x_{i,t}^{j}$ are country specific determinants, i.e. pull factors, of capital inflows:[18]

Growth differential: Studies that look at the determinants of capital flows look at the difference in GDP growth rate between country *i* and the U.S. However, this is possible only when working with quarterly data as GDP data does not exist at a monthly frequency. However, there is monthly data on industrial production (IP), which is a good proxy for GDP growth. We use percent change in IP instead of growth differential and expect to see a positive sign on the coefficient estimate. However, when we examine the impact of QE episodes on gross capital inflows instead of net, we construct gross inflow as a share of GDP as the dependent variable by employing cubic spline methodology to convert quarterly GDP data into monthly.[19]

Interest rate differential: one of the most important determinants of capital inflows is the interest rates prevalent in the country. Here we use three different measures of interest rate differential: first, we use the difference in long-term government bond yield between country *i* and the U.S, but this data is not available for all the emerging market economies. Hence, second, we use the difference in policy rate, also known as the benchmark interest rate set by the central bank in a country. This has considerably higher coverage among the EMEs in our sample. Lastly, we also employ the difference in money market interest rates between

[18] See literature on determinants of capital flows for details; for example Nier et al (2014), Zlate (2013), Cho and Rhee (2013), Forbes and Warnock (2011), Fratzhscher et al (2013), Ghosh et al (2012), and Milessi-Feretti and Tille (2011).
[19] For a review of challenges working with a panel data with irregular spacing, see Millimet and McDonough (2013).

country *i* and the U.S., which also has a higher coverage. Here we expect to see a positive sign on our coefficient estimates – i.e. higher the interest rates abroad, more likely increase in capital inflows (particularly for bond inflows).

Level of reserves: several new papers that have looked at the determinants of capital flows have used reserves as a measure of strength of a country in handling the effect of sudden inflow and outflow of capital (Aizenman et al, 2014). Indeed, reserves generally play an important role in cushioning the impact of capital inflows and outflows (Alberola et al, 2015; Broner et al, 2013). We expect to see a positive sign on the coefficient estimate of reserves in our model.

Real exchange rate: here we use the percentage change in real exchange rate as one of the determinants of capital inflows (Bruno and Shin, 2013). For a U.S. investor looking to make investments abroad, appreciation of a foreign currency against the U.S. dollar increases confidence in the foreign borrowers' ability to repay back the loans, hence the American investor is more likely to put money into that country. Since our measure of exchange rate is the amount of local currency unit (LCU) that one USD can buy, we expect to see a negative sign on the coefficient estimate of the real exchange rate.

Level of financial development: we proxy the level of financial development in a country by employing credit to the private sector as a share of GDP (similar to Eichengreen and Gupta, 2014; Nier et al, 2014). We assume that higher the level of financial development, higher the capital inflow. Furthermore, this is likely to matter more for bond inflows rather than equities. Also, in case of the EU countries, level of financial development is not expected to have a statistically significant effect on capital inflows.

We report fix effects (FE) estimates in our regression tables – FE estimation accounts for unobserved heterogeneity across countries that could potentially bias the coefficient estimates on the variables included in our model. For example, the institutional strength of a country, including the transparency and effectiveness of financial market regulations and other variables that could mater for capital inflows, is subsumed into μ_i. In other words, omitted variables that could potentially impact capital inflows and are correlated with other explanatory variables are captured by μ_i. Lastly, in order to further address the issue of endogeneity, we also estimate a dynamic panel data (DPD) model:

$$CIF_{i,t} = \alpha + \Phi CIF_{i,t-1} + \gamma\, UMP'_t + \sum_{j=1}^{n} \beta_j\, x_{i,t}^{j} + \lambda\, VIX_t + \mu_i + \varepsilon_{i,t}$$

However, the complication here is the presence of μ_i (individual specific unobservable) and $CIF_{i,t-1}$ – the FE estimator is inconsistent because time averages of the lagged dependent variable are correlated with time averages of the error term (Nickell, 1981; Hansen and West, 2002). Here the solution would be to take the first difference (FD), but we cannot run OLS on the FD model because $E(\Delta CIF_{i,t-1}\Delta\varepsilon_{i,t}) \neq 0$. In this case, lags of $CIF_{i,t-1}(\Delta CIF_{i,t-2}$ & $CIF_{i,t-2})$ are valid instruments (Anderson and Hsiao, 1981, 1982). The number of valid instruments is proportional to the number of available lags and Arellano and Bond (1991) estimator exploits all the lags as instruments and is efficient. In our model, lags of net and/or gross capital inflows and the current values of other explanatory variables enter as instruments.

V. Results

1. Emerging market economies

Table 2 shows our baseline regressions where net inflow of bond and equity capital are our dependent variables. QE1 was associated with an increase in net equity inflow into the EMEs (slightly over $200 million per month for an average emerging market),[20] while there was no statistically significant impact on the net bond inflow. Likewise, QE2 also did not have a statistically significant impact on net bond inflow. On the contrary, it led to a decline in net equity inflow into the EMEs (slightly over $70 million per month for an average emerging market) and the result is statistically significant (columns 4-6). Our results suggest that the last episode of QE had the most significant impact on the bond inflows into the EMEs. Indeed, while pre-tapering QE3 was associated with an increase in net bond inflow ($115-$130 million per month for an average market), while post-tapering QE3 was associated with a decline in bond inflow ($250-$330 million per month). Both sets of coefficient estimates are statistically significant at one per cent level. Likewise, the results are similar with the net equity inflow as well – pre-tapering was associated with an increase (slightly over $200 million per month), while post-tapering was associated with a decline (approximately $330 million per month). Note that the gap between pre- and post-tapering is larger for bonds than equities.

Meanwhile, when we examine the portfolio rebalancing channel in Table 2, we see that change in industrial production (IP) has a statistically significant impact on net capital inflow. In fact, it is positively associated with both bond and equity inflow. Another determinant of capital inflow that is statistically important is the returns in the stock market of emerging economies (here, percent change in stock market index is the proxy for returns). Among the interest rates used in our regression, the difference in long-term bond yield is the only one that matters for net bond inflow. But as noted earlier, the sample size using this measure is only 10 countries. In terms of the confidence channels, we examine the impact of change in exchange rate (appreciation or depreciation) and VIX on net capital inflow into the EMEs. As expected, depreciation of emerging market currencies against the US dollar is associated with a decline in capital inflow. Similarly, increase in VIX is associated with a decline in capital inflow. Both these coefficient estimates are statistically significant at the conventional levels. Country characteristics such as the level of financial development does not seem to play an important role in determining net capital inflows. Similarly, the level of reserves does not matter for bond inflow, while for equity inflow, higher the reserves, the more likely a country is to receive equity capital.

[20] Note that the regression using long term bond yield as the measure of interest rate differential gives us $75.3 million as the coefficient estimate for the impact of QE1 on net equity inflow. However, bond yield as the measure of interest rate, the sample size reduces to 10 EMEs. Therefore, the other two measures – policy rate and money market rate – are used for the discussion of the coefficient estimates for the impact of QEs on capital inflows.

Table 2: Baseline panel regressions: Net inflows into the EMEs

	1	2	3	4	5	6
	Net bond inflows			Net equity inflows		
Y (t-1)	0.35***	0.33***	0.36***	0.32***	0.16***	0.33***
	(0.028)	(0.042)	(0.027)	(0.014)	(0.039)	(0.013)
	Episodes of unconventional monetary policy					
QE1	0.36	4.27	3.23	204.67**	75.34***	200.11**
	(7.57)	(20.02)	(7.89)	(83.79)	(21.43)	(79.96)
QE2	-7.41	17.24	-6.92	-71.97**	-28.54**	-73.49***
	(6.44)	(18.74)	(6.57)	(25.94)	(12.89)	(25.64)
Pre-Tapering QE3	130.49***	114.88***	125.58***	214.97*	44.55	207.34*
	(23.59)	(30.35)	(23.22)	(115.76)	(39.32)	(113.69)
Post-Tapering QE3	-331.58***	-255.65***	-322.45***	-344.85***	-151.34**	-336.18***
	(78.02)	(59.31)	(76.30)	(120.15)	(66.97)	(117.52)
Δ *Fed Assets*	55.37***	49.09	51.39***	33.32**	17.79	31.73**
	(12.28)	(22.33)	(12.75)	(15.21)	(25.04)	(12.78)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-2.44			0.89		
	(1.49)			(4.17)		
Diff in LT bond yield (t-1)		13.43***			-1.03	
		(3.93)			(4.73)	
Diff in Money market rate (t-1)			-0.76			-4.60
			(0.88)			(4.54)
Δ *Industrial Production (t-1)*	0.57**	1.66***	0.58*	2.27**	0.26	1.73***
	(0.28)	(0.42)	(0.33)	(0.87)	(0.68)	(0.57)
Δ *Stock market (t-1)*	1.32***	2.13***	1.39***	-1.67	2.09	-1.59
	(0.44)	(0.56)	(0.47)	(1.35)	(1.77)	(1.44)
	Confidence channel					
Δ *Exchange rate*	-0.10***	-1.94**	-0.10***	-0.05***	-0.71	-0.049***
	(0.016)	(0.70)	(0.015)	(0.015)	(0.99)	(0.013)
VIX	-0.63	-1.37*	-0.91**	-6.74***	-6.49*	-6.34***
	(0.41)	(0.66)	(0.40)	(2.32)	(3.22)	(2.13)
	Financial development and reserves					
Δ *Reserves*	0.031	-0.124	0.033	3.33***	0.74	3.33***
	(0.069)	(0.412)	(0.074)	(0.414)	(0.53)	(0.46)
Credit as a % of GDP	8.23	-4.83	9.39	-29.91*	14.57	-23.95
	(6.38)	(8.98)	(6.77)	(14.55)	(13.88)	(15.80)
R^2 (Within)	0.41	0.42	0.41	0.17	0.09	0.17
R^2 (Between)	0.37	0.23	0.38	0.12	0.09	0.23
No of countries	20	10	21	20	10	21
No of observations	1,839	683	1,812	1,839	721	1,850
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

As indicated in the previous section, we also conducted our empirical analysis by employing a dynamic panel data (DPD) model. Here, the results for QE1 are similar to the regular panel, but not for QE2. In fact, Table 3 (columns 4-6) shows that QE2 did not have a statistically significant impact on net equity inflows into the EMEs, even though the sign on the coefficient estimate is negative (same as with the regular panel), indicating decline in equity inflows. Furthermore, the impact of pre and post-tapering QE3 on both bond and equity is stronger (in terms of statistical significance) when we use the DPD model. Meanwhile, the impact of increase in Fed assets on net equity inflows is positive but not statistically significant like before. But in case of net bond inflows, the coefficient estimate on Fed assets is positive and statistically significant as before.

Meanwhile, among the other determinants of capital inflows, the importance of IP disappears for equity inflows with the use of DPD model. But in the case of bond inflows, IP in previous month is a positive and statistically significant important determinant of net capital inflow (columns 1-3, Table 3). Likewise, as before, change in stock market index is positively associated with net bond inflow but it has no association with net equity inflows. In terms of the confidence channel, both VIX and exchange rate have the expected negative impact on net inflows and the results are significant. And unlike the regular panel, DPD model shows that the level of financial development (proxied by private sector credit as a share of GDP) is positively associated with net bond inflow. Lastly, same as before, reserves are positively associated with increase in equity inflow.

Table 3: Dynamic panel regressions: Net inflows into the EMEs

	1	2	3	4	5	6
	Net bond inflows			Net equity inflows		
Y (t-1)	0.35***	0.33***	0.34***	0.32***	0.16***	0.29***
	(0.027)	(0.040)	(0.028)	(0.023)	(0.039)	(0.023)
	Episodes of unconventional monetary policy					
QE1	2.29	11.72	5.43	207.86***	74.67	235.14***
	(8.05)	(21.45)	(9.99)	(57.21)	(47.39)	(57.12)
QE2	-7.64	17.65	-7.99	-71.74	-26.31	-68.53
	(6.27)	(17.45)	(6.47)	(70.86)	(60.02)	(69.64)
Pre-Tapering QE3	130.83***	118.04***	124.53***	215.78***	51.97	202.25***
	(22.78)	(31.14)	(21.90)	(72.76)	(59.98)	(71.42)
Post-Tapering QE3	-331.85***	-251.25***	-329.14***	-343.28***	-140.79**	-349.78***
	(76.18)	(52.45)	(77.21)	(80.86)	(73.04)	(79.57)
Δ *Fed Assets*	54.44***	45.37**	54.89***	28.91	7.76	26.89
	(12.29)	(22.03)	(13.84)	(47.77)	(38.13)	(50.57)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-2.49			0.48		
	(1.62)			(8.58)		
Diff in LT bond yield (t-1)		14.56***			1.62	
		(4.05)			(9.53)	
Diff in Money market rate (t-1)			-1.73**			-4.94
			(0.88)			(6.38)
Δ *Industrial Production (t-1)*	0.54*	1.62***	0.54*	2.27	0.24	2.44
	(0.29)	(0.37)	(0.30)	(2.20)	(1.77)	(2.35)
Δ *Stock market (t-1)*	1.36***	2.26***	1.42***	-1.71	2.06	-1.63
	(0.45)	(0.52)	(0.46)	(1.76)	(1.43)	(1.76)
	Confidence channel					
Δ *Exchange rate*	-0.10***	-1.86***	-0.103***	-0.046	-0.49	-0.046
	(0.015)	(0.59)	(0.015)	(0.11)	(2.45)	(0.11)
VIX	-0.63	-1.52**	-0.57*	-6.89***	-6.74***	-5.88***
	(0.45)	(0.63)	(0.35)	(2.06)	(1.37)	(1.99)
	Financial development and reserves					
Δ *Reserves*	0.031	-0.14	0.037	3.36***	0.72	3.65***
	(0.069)	(0.38)	(0.078)	(0.45)	(0.96)	(0.45)
Credit as a % of GDP	10.27	-1.17	16.00*	-30.14	18.17	12.85
	(6.87)	(9.69)	(9.95)	(22.84)	(19.65)	(25.28)
No of countries	20	10	21	20	10	21
No of observations	1,813	666	1,730	1,813	706	1,770
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

2. European Union (EU)

In case of the European Union, the first notable difference is that QE1 was associated with an increase in both net bond and net equity inflows unlike in the case of the EMEs (Table 4). Bond inflows on average were slightly above $50 million per month (columns 1-3) while net equity inflows were above $150 million per month. Meanwhile, QE2 was associated with an increase in net bond inflow into the EU but impact on equity inflow, while positive, is statistically insignificant. Furthermore, pre-tapering QE3 was associated with an increase in both net bond and equity inflows into the EU countries -- $ 101-112 million and $179-209 million on average per month respectively. However, unlike the EMEs, in case of the EU, post-tapering QE3 was associated with both a decline in inflow (bond) and increase in inflows (equity). The decline in bond inflow was on average $120-133 million per month for an average EU country, while the increase in net equity inflow was $550-600 per month. This shows that the two asset types behaved differently in the aftermath of the "taper talk" than in the case of the EMEs where both bond and equity inflow declined. Furthermore, what is also evident in case of the EU countries is that the episodes of QE were marked by a relative surge in equity inflows rather than bond inflows.

Among the three interest rates used in the regression, all three matter in case of net bond inflow but in the opposite direction than would be expected and the coefficient estimates are weakly significant (columns 1-3, Table 4). In case of net equity inflow, only the money market rate seems to matter, but the estimate is weakly significant and is also in the opposite direction than would be expected. Meanwhile, among other determinants of capital inflows into the EU, change in IP had a positive and statistically significant effect on net bond inflows, but not on equity inflows. Changes in stock market indices in Europe had no discernable impact on either bond or equity inflows. In terms of the confidence channels for the EU, exchange rate movements had an impact on net bond inflows but not on the net equity inflows. In other words, when the Euro depreciated against the US dollar, there was a decline in net bond inflow but there was no impact on equity inflows. Also, increase in VIX was associated with a decline in both bond and equity inflows into the EU. Lastly, change in reserves was positively associated with net bond inflow into the EU but not in the case of equity inflow. And, credit as a share of GDP, which is our proxy for the level of financial development, was positively associated with equity inflow but negatively associated with bond inflow.

Table 4: Baseline panel regressions: Net inflows into the European Union

	1	2	3	4	5	6
	Net bond inflows			Net equity inflows		
Y (t-1)	0.44***	0.43***	0.43***	0.16	0.16	0.16
	(0.049)	(0.050)	(0.049)	(0.21)	(0.22)	(0.22)
	Episodes of unconventional monetary policy					
QE1	50.49**	53.27**	52.67**	152.64*	179.96*	151.97*
	(19.59)	(23.98)	(20.11)	(78.51)	(91.47)	(78.49)
QE2	47.93**	44.11**	48.58**	262.99	276.37	261.63
	(17.67)	(18.13)	(18.11)	(163.37)	(172.71)	(163.41)
Pre-Tapering QE3	111.10***	112.34***	101.39***	189.49**	208.67***	178.90**
	(30.77)	(32.13)	(29.01)	(68.24)	(73.03)	(64.71)
Post-Tapering QE3	-119.08**	-132.73**	-123.19**	567.22**	602.57**	547.42**
	(56.15)	(59.12)	(56.78)	(232.69)	(244.05)	(226.29)
Δ *Fed Assets*	86.86***	91.92***	86.76***	-26.08	-77.76*	-32.76
	(27.52)	(24.42)	(26.13)	(27.28)	(38.86)	(31.09)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-14.25*			-35.72		
	(7.33)			(22.36)		
Diff in LT bond yield (t-1)		-3.92*			2.24	
		(1.94)			(3.24)	
Diff in Money market rate (t-1)			-16.02**			-31.94*
			(6.93)			(17.33)
Δ *Industrial Production (t-1)*	1.89**	2.62**	1.67**	-0.88	0.99	-1.21
	(0.77)	(1.06)	(0.75)	(3.39)	(3.81)	(3.02)
Δ *Stock market (t-1)*	-0.087	0.008	-0.14	0.57	0.81	0.23
	(0.35)	(0.38)	(0.38)	(2.02)	(2.23)	(1.86)
	Confidence channel					
Δ *Exchange rate*	-1.48***	-1.83***	-2.03***	1.72	1.36	0.21
	(0.16)	(0.27)	(0.33)	(1.46)	(1.26)	(0.92)
VIX	0.55	-0.79**	0.45	-4.41**	-8.03**	-4.53***
	(0.58)	(0.31)	(0.47)	(1.64)	(3.02)	(1.51)
	Financial development and reserves					
Δ *Reserves*	4.89***	4.92***	4.97***	0.70	1.07	0.26
	(0.85)	(0.84)	(0.80)	(6.94)	(7.05)	(7.09)
Credit as a % of GDP	-0.053**	-0.053**	-0.024*	0.097**	0.093**	0.14***
	(0.021)	(0.021)	(0.014)	(0.036)	(0.034)	(0.049)
R^2 (Within)	0.31	0.31	0.31	0.12	0.12	0.12
R^2 (Between)	0.48	0.50	0.58	0.05	0.02	0.02
No of countries	18	19	20	18	19	20
No of observations	1,452	1,335	1,437	1,539	1,482	1,580
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

When we use the DPD model, the biggest difference in terms of the impact of episodes of UMP on net capital flow is related to QE2. Indeed, unlike the regular panel model (where the effect of QE2 on equity inflow was positive but not significant), the DPD model shows that QE2 led to an increase in net equity inflow into the EU and this result is statistically significant at 1 percent level (columns 4-6, Table 5). The effects of other episodes of UMP is similar to the ones we saw with the regular panel. However, the overall difference between bond and equity inflows during the episodes of UMP is clearer when we employ the DPD model – relative surge in equity inflow in comparison to bond inflows (compare columns 1-3 with 4-6 in Table 5).

Meanwhile, as we saw before, the difference in interest rates – irrespective of which one is used in the regressions – was negatively associated with net capital inflow and the estimates are statistically significant at the conventional levels. One explanation for this is that QE in the US, particularly QE2 and QE3, took place during the Eurozone crisis. Rising interest rates in the EU was not necessarily due to the macro fundamentals being strong, but a sign that some of the sovereign bonds were risky (particularly the case with the peripheral EU). Among the other determinants, as with the regular panel, the DPD model shows that the change in IP in period *t-1* was positively associated with net bond inflow into the EU in time *t*. In terms of the confidence channels, exchange rate mattered for bond inflows but not equity, while VIX was negatively associated with both types of inflows. Also, we see evidence that countries with higher reserves had an increased net bond inflow, but in case of equity, reserves did not matter.

Table 5: Dynamic panel regressions: Net inflows into the European Union

	1	2	3	4	5	6
	Net bond inflows			Net equity inflows		
Y (t-1)	0.44***	0.43***	0.43***	0.16	0.16***	0.12***
	(0.048)	(0.049)	(0.049)	(0.21)	0.027	(0.026)
	Episodes of unconventional monetary policy					
QE1	52.59***	55.98**	54.61***	156.28**	181.74***	158.76***
	(19.54)	(24.16)	(20.17)	(77.74)	(63.36)	(55.57)
QE2	48.41***	44.36**	49.21***	264.14*	274.31***	266.43***
	(17.18)	(17.66)	(17.79)	(158.03)	(75.52)	(65.69)
Pre-Tapering QE3	109.51***	112.45***	102.15***	195.78***	224.82***	206.87***
	(30.10)	(31.72)	(28.92)	(68.93)	(71.00)	(65.18)
Post-Tapering QE3	-121.98**	-133.46**	-126.04***	574.03**	619.48***	579.96***
	(55.15)	(58.38)	(56.98)	(228.22)	(79.71)	(71.53)
Δ *Fed Assets*	91.88***	97.55***	106.42***	-23.69	-70.63	47.64
	(28.19)	(24.71)	(29.42)	(29.17)	(44.64)	(41.99)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-15.02**			-37.22*		
	(7.45)			(22.07)		
Diff in LT bond yield (t-1)		-3.94**			1.08	
		(1.92)			(7.69)	
Diff in Money market rate (t-1)			-16.57**			-31.42**
			(6.64)			(14.19)
Δ *Industrial Production (t-1)*	1.84**	2.59**	1.79**	-0.98	1.08	-0.07
	(0.74)	(1.05)	(0.78)	(3.41)	(2.94)	(2.78)
Δ *Stock market (t-1)*	-0.032	0.064	-0.11	0.52	0.73	0.49
	(0.34)	(0.38)	(0.39)	(1.97)	(2.04)	(1.83)
	Confidence channel					
Δ *Exchange rate*	-1.50***	-1.87***	-2.26***	1.85	1.43	-0.324
	(0.19)	(0.27)	(0.37)	(1.45)	(4.81)	(4.61)
VIX	0.65	-0.75***	1.03**	-4.43***	-8.28***	-2.41
	(0.61)	(0.29)	(0.53)	(1.57)	(1.94)	(2.10)
	Financial development and reserves					
Δ *Reserves*	4.89***	4.93***	4.98***	0.76	1.22	1.27
	(0.824)	(0.812)	(0.78)	(6.71)	(2.71)	(2.57)
Credit as a % of GDP	-0.095***	-0.103***	-0.024**	-0.019	-0.046	0.009
	(0.032)	(0.035)	(0.011)	(0.082)	(0.617)	(0.637)
No of countries	18	19	20	18	19	20
No of observations	1,418	1,297	1,367	1,516	1,456	1,518
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

3. Alternative measure of the dependent variable: Gross flows

As highlighted in Section III, EPFR provides data on total allocation on bonds and equities by recipient countries, which for the purposes of this paper, are called gross inflows. In this Section, we examine the impact of the episodes of QE on gross inflows. As Table 6 shows, one of the main differences with the net capital inflow as discussed earlier, QE1 is associated with the decline in gross inflow of both bond and equity capital into the EMEs. In fact, irrespective of the interest rate used, it seems that gross inflows declined during QE1 – between 0.3 and 0.42 per cent per month for an average emerging market – and the estimates are statistically significant. Furthermore, another notable difference between net capital and gross inflows is the effect of QE2 – no impact in case of the former and positive in case of the later. Indeed, QE2 is associated with an increase in gross equity inflow by about 0.5 per cent; in case of bonds, the increase in gross inflow is not statistically significant.

In terms of the economic significance of the impact of different episodes of QE, it seems that pre-tapering QE3 had the most significant impact on gross bond inflow into the EMEs – an increase of around 0.9 per cent and the estimates are significant at the 1 per cent level. Note that the coefficient estimate using long term bond yield is only 0.12 per cent, but the sample size with this specification is only 10 countries. In case of equity inflow, the increase during pre-tapering QE3 was at 0.11 per cent. Lastly, as with net inflow, post-tapering QE3 is associated with a decline in gross inflow as well, but the estimates for bond inflows are not significant; in case of equities, the decline as about 0.14 per cent per month.

Meanwhile, another notable finding here is that the change in industrial production doesn't really have a positive impact on gross inflow, while it does on net inflow. But the economic significance of the impact is small (see portfolio rebalancing channel in Table 6). Furthermore, we see that the level of reserves and financial development is positively associated with increase in gross capital inflow, but the estimates are not statistically significant across all the different specifications. Earlier with net capital inflow, level of financial development did not seem to matter, while reserves did matter for equities. The signs on confidence channels – exchange rate and VIX – are as expected negative and statistically significant, which is the same as we saw with the net capital inflow as the dependent variable.

Table 6: Gross inflow into the EMEs as the dependent variable

	1	2	3	4	5	6
	Δ Gross bond inflows as a % of GDP			Δ Gross equity inflows as a % of GDP		
Y (t-1)	0.067*	0.082	0.068*	-0.12***	-0.18**	-0.10***
	(0.039)	(0.057)	(0.040)	(0.036)	(0.064)	(0.029)
	Episodes of unconventional monetary policy					
QE1	-0.0029**	-0.0035**	-0.0029**	-0.0042*	-0.0096	-0.0039*
	(0.0011)	(0.0016)	(0.0011)	(0.0023)	(0.0064)	(0.0021)
QE2	0.00011	0.0044	0.000075	0.0048*	0.0049	0.0046*
	(0.0028)	(0.0073)	(0.0027)	(0.0026)	(0.0058)	(0.0026)
Pre-Tapering QE3	0.0085***	0.0012*	0.0098***	0.011*	0.0024	0.011*
	(0.0028)	(0.006)	(0.0030)	(0.006)	(0.0056)	(0.0058)
Post-Tapering QE3	-0.0022	-0.00036	-0.0028	-0.014***	0.0019	-0.013***
	(0.0037)	(0.014)	(0.0039)	(0.0039)	(0.0035)	(0.0038)
Δ *Fed Assets*	-0.00045	-0.0024	-0.00091	-0.0071**	-0.0040	-0.0071**
	(0.00086)	(0.0019)	(0.0012)	(0.0031)	(0.0033)	(0.0029)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-0.000052			0.000096		
	(0.00010)			(0.00036)		
Diff in LT bond yield (t-1)		0.0025*			0.00022	
		(0.0012)			(0.0012)	
Diff in Money market rate (t-1)			0.00018			0.00030
			(0.00021)			(0.00045)
Δ *Industrial Production (t-1)*	-0.00019***	-0.00019	-0.00017***	-0.00077***	-0.00078	-0.00071***
	(0.000056)	(0.00013)	(0.00005)	(0.00025)	(0.00054)	(0.0002)
Δ *Stock market (t-1)*	0.000054	0.000079	0.000054	0.00011	0.00011	0.00010
	(0.000036)	(0.000055)	(0.000041)	(0.00008)	(0.00012)	(0.000078)
	Confidence channel					
Δ *Exchange rate*	-0.000013***	-0.0014***	-0.000012***	-0.000046***	-0.0014***	-0.000045***
	(0.00000)	(0.00031)	(0.00000)	(0.00000)	(0.00039)	(0.00000)
VIX	-0.000044	-0.00014**	-0.000052*	-0.00040***	-0.00053*	-0.00041***
	(0.00003)	(0.00005)	(0.000026)	(0.00013)	(0.00025)	(0.00013)
	Financial development and reserves					
Δ *Reserves*	0.000031	0.0021	0.000031	0.00028*	0.0013**	0.00027*
	(0.000026)	(0.0021)	(0.000026)	(0.00014)	(0.00043)	(0.00014)
Credit as a % of GDP	0.00091	0.0022*	0.00085	0.0039**	0.0036	0.0033*
	(0.00062)	(0.0012)	(0.00066)	(0.0018)	(0.0032)	(0.0016)
R^2 (Within)	0.03	0.11	0.04	0.14	0.24	0.14
R^2 (Between)	0.12	0.46	0.14	0.32	0.24	0.13
No of countries	20	10	21	20	10	21
No of observations	1,822	671	1,789	1,822	711	1,829
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

In case of the EU, the picture is considerably different when we examine the total allocation of funds towards bonds and equities. First, as Table 7 shows, QE1 was associated with a decline in bond inflow into the QE (between 0.2 and 0.3 per cent per month for an average EU country), unlike before when we saw that it was associated with an increase in monthly net flow. Second, QE2 was associated with an increase in gross equity inflow (0.18 per cent) and the estimates are statistically significant (with net inflow they were not significant). Third, pre-tapering QE3 had a negligible impact on total fund allocation towards the EU, while it had led to an increase in net inflow of both bonds and equities. Fourth, post-tapering did not lead to a decrease in total fund allocation to EU bonds, but led to an increase in allocation towards equities in the EU (around 0.2 per cent). With the net inflow, we saw a decline in bond flows and increase in equity flows.

Meanwhile, interest rate differentials between the EU countries and the US do not seem to matter for gross inflows; while increase in IP does not necessarily lead to an increase in total allocation. In fact, the coefficient estimates suggest a negative relationship between IP and gross inflows. With net inflow, we saw that IP mattered for bond inflow but not for equities. Furthermore, reserves and the level of financial development are positively associated with total allocation to the EU countries, particularly in case of funds allocated to equities. Lastly, the impact of confidence channels – exchange rate and VIX – is as expected negative on total allocation and the estimates are statistically significant.

Table 7: Gross inflow into the EU as the dependent variable

	1	2	3	4	5	6
	Δ Gross bond inflows as a % of GDP			Δ Gross equity inflows as a % of GDP		
Y (t-1)	0.077	0.078*	0.076*	0.029	0.039*	0.035*
	(0.047)	(0.046)	(0.044)	(0.019)	(0.019)	(0.019)
	Episodes of unconventional monetary policy					
QE1	-0.0031***	-0.0022**	-0.0029**	0.00007	-0.00042	-0.0012
	(0.0011)	(0.0010)	(0.0011)	(0.0025)	(0.0031)	(0.0025)
QE2	0.0015	0.0024	0.0011	0.017***	0.018***	0.018***
	(0.0029)	(0.0032)	(0.0026)	(0.0032)	(0.0034)	(0.0033)
Pre-Tapering QE3	0.0028	0.0049	0.0045	0.0031	0.0038*	0.0025
	(0.0028)	(0.0032)	(0.0030)	(0.0019)	(0.0019)	(0.0021)
Post-Tapering QE3	0.0052*	0.0051	0.0043	0.019***	0.020***	0.018***
	(0.0026)	(0.0034)	(0.0032)	(0.0044)	(0.0041)	(0.0043)
Δ *Fed Assets*	0.00037	-0.00053	-0.00039	-0.0074***	-0.0078***	-0.0053***
	(0.00072)	(0.0007)	(0.00075)	(0.0015)	(0.0014)	(0.0014)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-0.00019			0.00011		
	(0.00016)			(0.00048)		
Diff in LT bond yield (t-1)		0.00024			0.000059	
		(0.00032)			(0.00024)	
Diff in Money market rate (t-1)			0.00073			-0.0017**
			(0.00077)			(0.0006)
Δ *Industrial Production (t-1)*	-0.00019***	-0.00017***	-0.00014*	-0.00087***	-0.00094***	-0.0099***
	(0.00006)	(0.00006)	(0.00008)	(0.00015)	(0.00018)	(0.00017)
Δ *Stock market (t-1)*	0.0000	0.0000	0.00002	-0.000016	-0.000033	-0.000037
	(0.0000)	(0.0000)	(0.000032)	(0.000071)	(0.000075)	(0.000065)
	Confidence channel					
Δ *Exchange rate*	-0.0013***	-0.0013***	-0.0014***	-0.0011***	-0.0011***	-0.0012***
	(0.00002)	(0.00003)	(0.00003)	(0.00011)	(0.00006)	(0.00011)
VIX	-0.0000	-0.00004*	-0.000075	-0.00045***	-0.00046***	-0.00028***
	(0.0000)	(0.000022)	(0.00005)	(0.00009)	(0.00007)	(0.00005)
	Financial development and reserves					
Δ *Reserves*	0.00026**	0.00026**	0.00025**	0.0010***	0.0010***	0.0010***
	(0.00011)	(0.00012)	(0.00011)	(0.00025)	(0.00026)	(0.00026)
Credit as a % of GDP	-0.0000	-0.0000	-0.0000	0.000013***	0.000014***	0.000016***
	(0.0000)	(0.0000)	(0.0000)	(0.00000)	(0.00000)	(0.00000)
R^2 (Within)	0.06	0.06	0.07	0.12	0.11	0.11
R^2 (Between)	0.13	0.28	0.45	0.003	0.007	0.03
No of countries	18	19	20	18	19	20
No of observations	1,423	1,302	1,403	1,521	1,461	1,558
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

VI. Discussion

Reconciling the two measures of capital flows and the link with episodes of unconventional monetary policy

As it is evident from the results presented in the previous section, there are some clear differences between the two measures of capital flow. The most notable one is the impact of first episode of QE – when we employed net capital inflow, we saw that QE1 was associated with an increase in equity inflow but there was no statistically significant impact on bond inflow. On the contrary, when we employed gross inflow as our measure of capital flows, we saw decline in both bonds and equities during QE1. This means that investors reduced their overall exposure to the EME bonds and equities during 2008-09, but the net monthly change in case of equities was positive. Similarly, in case of the EU countries, when we employ net capital inflow as our dependent variable, we see that QE1 was associated with an increase in both bond and equity inflow. However, when we use gross inflow, we see that QE1 was associated with a decline in gross bond inflow while the impact on equities was not statistically significant. Again, investors reduced their overall exposure to the EU bonds, while the net monthly changes to both bond and equity was positive during QE1.

Meanwhile, based on the results presented in Section V, it is not clear whether QE2 was associated with an increase in capital inflow to the EMEs. This is the case when we use net monthly changes as our measure of capital inflow. However, when we use gross inflow as the dependent variable, we see that QE2 was associated with an increase in equity inflow into the EMEs; in case of bonds, we do not see a statistically significant impact. In other words, we can unequivocally state that QE2 had no impact on either net monthly changes or total allocation to the EME bonds. But in case of equities, the results are mixed. Meanwhile, in case of the EU countries, we find that QE2 was associated with an increase in both net bond and equity inflows. When we use gross flow as the measure, QE2 is also associated with an increase in inflows, but in case of bonds, the estimate is not statistically significant. In short, with either measure of capital flow, QE2 led to an increase in equity inflow into the EU countries but the results for allocation to bonds is mixed.

Among the three episodes of QE, the last episode seems to have the clearest impact on international capital flows. With either measure of capital flows, we find pre-tapering QE3 to be associated with increase in both bond and equity inflow into the EMEs. Likewise, in the aftermath of taper talk, we find evidence of retrenchment in both bond and equity inflows with either measure of capital flows. Moreover, when we use net inflow as the dependent variable, the gap between the peak and trough in case of bonds is larger than equities. Meanwhile, in case of the EU countries, we find that pre-tapering QE3 was associated with an increase in net inflow for both assets. In the aftermath of the taper talk, there was a decline in net bond inflow but a significant increase in net equity inflow; in fact, the increase in net equity inflow into the EU countries post-tapering in quite large. However, when we use gross inflow as the dependent variable, we do not see a statistically significant impact of either pre- or post-tapering QE3 on capital inflows to the EU countries.

In short, the link between the first two episodes of QE and capital inflow into the EMEs is not clear, in line with the recent literature, for e.g. Ahmed and Zlate (2013) and Fratzscher et al, (2013). However, the last episode of QE, particularly the taper talk, had an unequivocal impact on international capital flows. This finding is in line with, for e.g., Aizenman et al (2014), Bhattarai et al (2015), Dahlhaus and Vasishtha (2014), Eichengreen and Gupta (2013), Lim et al (2014) and Tillman (2014). These studies have highlighted the importance of push factors, i.e. excess liquidity, lacklustre growth in the advanced economies and historically low interest rates, as the drivers of capital flows into the EMEs. This paper contributes to this literature by examining each episode of QE separately.

Do "pull factors" matter for capital flows?

There is a considerable debate in the literature regarding the importance of "pull factors" in determining capital flows and this paper sheds light on some of the most commonly examined determinants. When we examine net monthly changes in flow to the EMEs, we find that industrial production (IP) and stock market performance in the previous period matters for capital inflow in current period. Likewise, in case of bond inflow, we see that the difference in long term bond yield between the emerging market and the US also plays an important role in attracting capital. When we use the DPD model, these results (importance of IP, stock market, bond yield) hold in case of bonds but not in case equities. However, when we use gross inflow as our measure of capital flow, the importance of both IP and stock market seem to disappear. In case of bonds, the yield matters also when we use gross inflow.

We also looked at the role financial development (proxied by credit as a share of GDP) and level of reserves play in determining capital flows. Here, when we look at the monthly changes in allocations to bond and equities, we do not find the level of financial development to be important. However, when we look at the total allocation (gross measure), the level of financial development seems to play a statistically significant role in capital inflow. In case of reserves, when we look at the monthly changes in allocations, we find that it matters only for net equity inflow, not for bonds. However, with the gross measure of capital flows, reserves matter for both bonds and equities. In short, this paper provides some support for the importance of pull factors for international capital flows.

What role do confidence channels play?

In this paper we examined the impact of exchange rate and VIX on capital inflows. Large capital inflows tend to be associated with exchange rate appreciations and our results for EMEs corroborate this finding. The coefficient estimates are significant with the use of both regular and dynamic panel, and also with both measures of capital flows. In case of the EU countries, our results show that exchange rate movements had an impact on net bond inflows but not on net equities. However, when we use gross inflow as a measure of capital flow, exchange rate matters for both types of assets. Meanwhile, in case of VIX, an increase in the index is associated with a decline in capital inflow to both the EMEs and the EU countries. Moreover, this holds for either net or gross measure of capital flows, and also with either regular or the DPD model. In sum, confidence channels, namely exchange rate risks and perception of volatility, plays an important role in international capital flows.

Policy implications: can governments' control capital flows?

Our discussion so far suggests that both push and pull factors matter for capital flows to emerging markets. In case of the EU, pull factors seem to matter less. However, the economic significance of the episodes of QE is much larger than the traditional determinants of capital flows. This results holds for both EMEs and the EU, and also across different measures of capital flow and different econometric specifications. In other words, the unobservable stemming from Fed's actions seem to explain most of the increase and decrease in capital inflows, to both the EMEs and the EU countries. This finding suggests that perhaps economic performance and individual country characteristics matters less than theory would suggest. Given the historically low interest rates in the US and abundant liquidity, investors had plenty of cash to invest abroad, irrespective of the pull factors prevalent in the destination country. Indeed, our paper is in line with the recent literature that shows that push factors have mattered more for capital flows than traditional pull factors (Aizenman et al, 2014; Dahlhaus and Vasishtha, 2014; Eichengreen and Gupta, 2013; Fratzscher, Lo Duca and Straub, 2013; Lim et al, 2014; Tillman, 2014). Furthermore, our finding is also in agreement

with the literature that is sceptical regarding the role of capital controls in "controlling" capital flows (for e.g. Forbes et al, 2015; Pasricha et al, 2015).[21]

As the political economy aspect of capital flows suggest, countries are increasingly cognizant of the fact that they have not been able to control capital flows, particularly so in the aftermath of the Great Recession (Gallagher, 2014). During 2008-09, the G20 countries emphasized the role of unfettered capital flows in global growth (see the Appendix for a tabulated summary of G20 statements vis-à-vis capital flows). This was the period when countries were afraid of retrenchment and trade wars, which would have affected those that were heavily reliant on external financing. Then during the period of QE2 (2010/11), G20 communiqués started emphasizing the importance of putting in place right measures to avoid excess inflows and outflows of capital. Several countries such as Argentina, Brazil, Indonesia and South Korea put in place measures to put controls on speculative capital entering the country; for example, Brazil put in place taxes on stock and bond trading (Gallagher, 2014). Even the IMF's Article IV consultation reports started recommending capital control measures to avoid negative consequences of excessive inflows. Meanwhile, in the last period of QE3, as the anticipation of Fed's scaling back of QE3 was running high, the G20 started talking about monetary policy coordination. The governor of India's central bank, one of the emerging markets with the most stringent capital controls in place, declared that international monetary coordination had broken down. In a way, it was a tacit recognition that countries were faced with excessive volatility in capital flows, irrespective of the institutional factors in place to control such flows.

VII. Conclusion

Employing a novel data set covering a large set of countries, this paper shows that the episodes of unconventional monetary policy in the U.S. was associated with increase in capital flows to the EMEs and the EU countries. The magnitude of inflows varied by the asset types – bonds vs. equities. However, not all episodes of QE was associated with an increase in capital inflows into the rest of the world. The EU countries behaved differently that the EMEs – for e.g., in the wake of the taper talk in the U.S., the EU countries did not see retrenchment in capital inflows. In fact, net equity inflow to the EU increased in the aftermath of the taper talk. On the contrary, in case of the EMEs, we see a clear retrenchment in both bond and equity inflows. In fact, the gap between peak and trough during QE3 – pre and post taper talk – was larger for bond inflows than equities.

Meanwhile, the paper also found support for the traditional "pull factors" for capital inflow. In particular, the change in industrial production (proxy for GDP growth) and stock market performance seem to matter for capital inflows into the EMEs. Similarly, country's level of financial development and the stock of reserves also played a key role in determining the magnitude of inflows. However, what is clear from the results and the discussion in the preceding section, is that QE by the Fed accounted for most of the variation in capital inflows between 2008 and 2014. Indeed, our results show that factors outside of countries' control played a key role in determining the surges, sudden stops and flights of capital. And as the paper highlights, the G20 countries' public stance on capital flows reflect this realization, and thus have called for better monetary policy coordination among major economies.

While the data employed in this paper is unique, covering large set of countries at high frequency, its weakness also stems from the fact that it is not the same as the traditional balance of payment (BoP) statistics. In particular, it does not allow us to differentiate between capital inflow (driven by non-residents) and capital outflow (driven by residents). Increasingly, capital outflows from large emerging markets have proven to be an important source of capital and have implications for policy (Pasricha et al, 2015).

[21] However, we do not explicitly examine the role of capital controls as this data is usually at annual frequency and the database used in the paper is at a monthly frequency.

Furthermore, since the data used in the paper comes from mutual funds, a majority of which tend to be present in the large emerging markets, presumably there are spillovers between the EMEs vis-à-vis the unconventional measures in the advanced economies. In other words, an investor's decision to allocate money into bonds in Brazil, after Fed's decision to buy Treasuries, could have consequences for the allocation to Argentina. In short, net monthly changes in allocation between the EMEs are presumably interlinked. In order to further shed light on the spillover effects of QE, it would be important to conduct a panel VAR analysis, similar to Bhattarai et al (2015) and Tillmann (2015), but for a larger sample of countries.

In terms of future areas of work based on this paper, the liquidity channel of international capital flows could be examined in greater detail (similar to Lim et al, 2014). Currently, time dummies for episodes of QE and the change in Fed assets are the indicators used to capture the liquidity channel. Another area where the paper could be expanded easily is by examining the impact of QE on developing countries that are not part of the IMF's definition of EMEs. The descriptive statistics presented in Section III provided pictures showing potential correlation between the Fed's actions and capital inflow in developing countries, but the empirical analysis does not examine this group of countries. This is largely due to the lack of reliable data on other indicators of capital inflows. However, with a limited set of covariates, the analysis could be expanded using the same empirical framework as used in this paper.

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Appendices

Appendix 1 – Data and descriptive statistics

Table 8: EPFR data on capital flows

Equity Funds (Monthly Reports)			Bond Funds (Monthly Reports)		
Fund Group	No. of Funds	$US Billions	Fund Group	No. of Funds	$US billions
Asia ex-Japan	2,932	375.03	Balanced	2,354	1,321.02
EMEA	803	50.66	Emerging Markets	3,029	313.64
GEM	2,241	536.57	Global	6,045	1,457.96
Global	9,591	3,322.75	High Yield	2,437	627.11
Japan	1,081	213.22	Money Market	2,650	3,792.57
Latin America	526	44.65	USA	5,201	2,653.47
Pacific	465	76.88			
USA	11,022	6,685.64			
Western Europe	5,074	1,090.70			
TOTAL	**33,735**	**12,396.10**	**TOTAL**	**21,716**	**10,165.77**

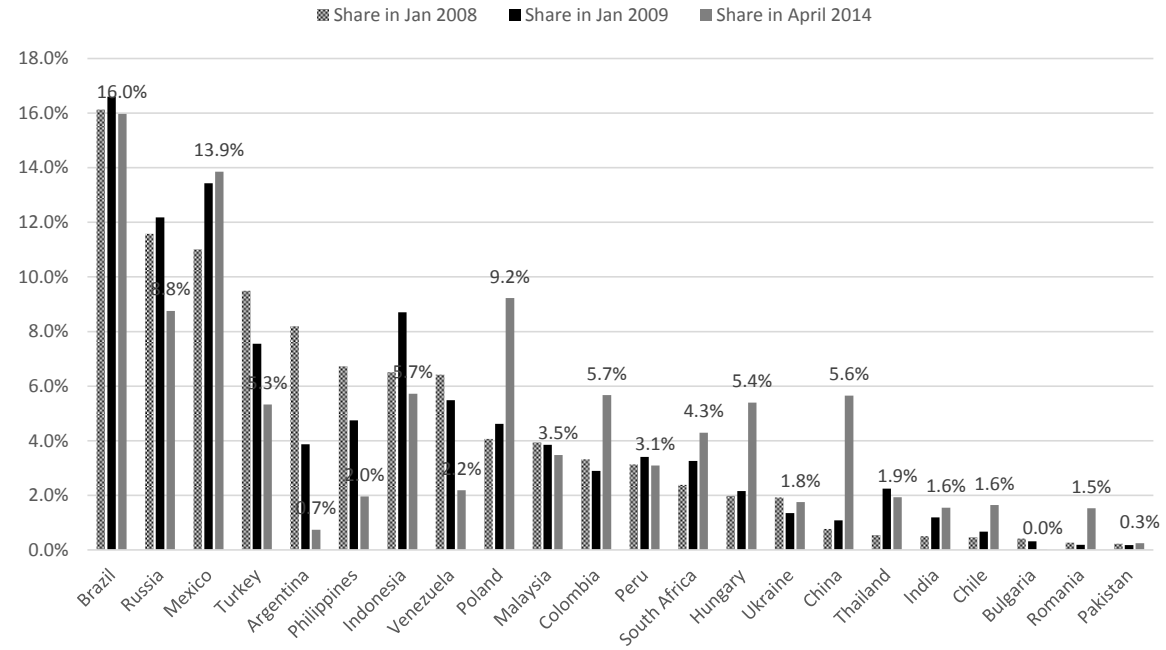
Note: the cut-off is June, 2014.

Table 9: List of countries and territories

Albania	Czech Republic	Italy	Netherlands	Sri Lanka
Algeria	Denmark	Ivory Coast	New Zealand	Sweden
Angola	Dominican Republic	Jamaica	Nicaragua	Switzerland
Argentina	Ecuador	Japan	Nigeria	Taiwan
Australia	Egypt	Jordan	Norway	Tanzania
Austria	El Salvador	Kazakhstan	Oman	Thailand
Azerbaijan	Estonia	Kenya	Pakistan	Trinidad and Tobago
Bahrain	Finland	Korea (North)	Panama	Tunisia
Baltic Republics	France	Korea (South)	Papua New Guinea	Turkey
Bangladesh	Gabon	Kuwait	Paraguay	Turkmenistan
Belarus	Georgia	Latvia	Peru	Uganda
Belgium	Germany	Lebanon	Philippines	Ukraine
Bosnia Herzegovina	Ghana	Liberia	Poland	United Arab Emirates
Botswana	Greece	Lithuania	Portugal	United Kingdom
Brazil	Guatemala	Macedonia	Qatar	Uruguay
Bulgaria	Honduras	Madagascar	Romania	United States of America
Canada	Hong Kong	Malawi	Russia	Venezuela
Chile	Hungary	Malaysia	Rwanda	Vietnam
China	Iceland	Mauritius	Saudi Arabia	Zambia
Colombia	India	Mexico	Serbia	Zimbabwe
Congo-Kinshasa	Indonesia	Moldova	Singapore	
Costa Rica	Iran	Mongolia	Slovakia	
Croatia	Iraq	Morocco	Slovenia	
Cuba	Ireland	Mozambique	South Africa	
Cyprus	Israel	Namibia	Spain	

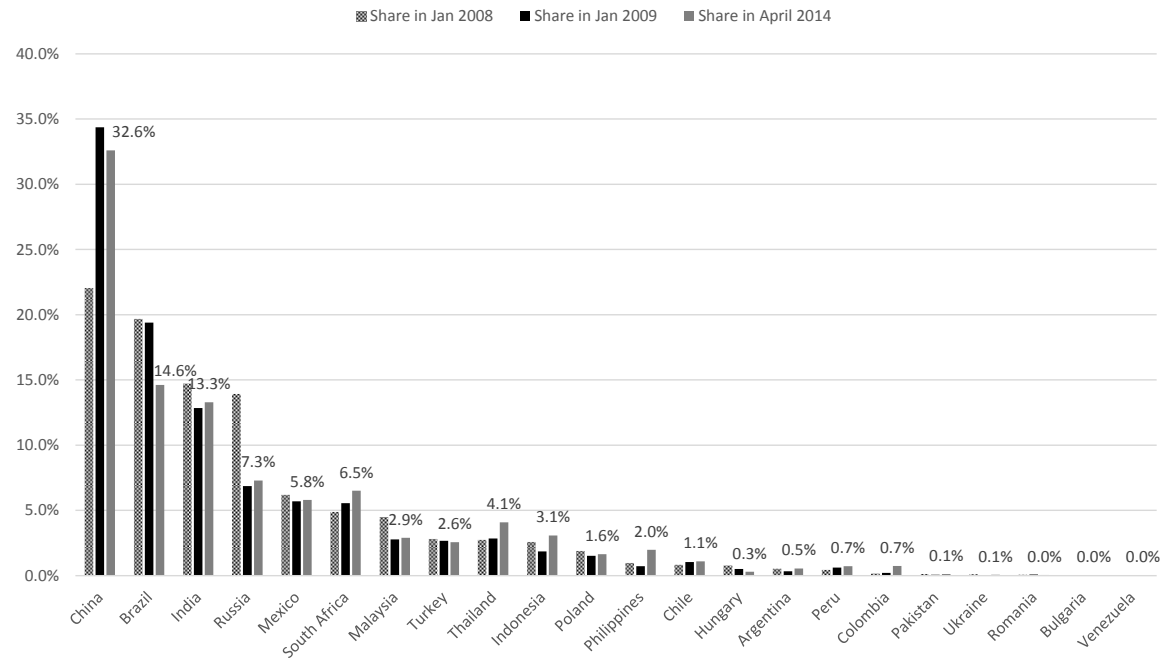
Note: Not all countries and territories have full coverage for the period under consideration. Besides the EMEs and the EU, the coverage varies considerably. Bond inflows is more common among smaller developing countries.

Figure 9: Each country's share of the total allocation to bonds, EMEs, Jan 2008 – April 2014



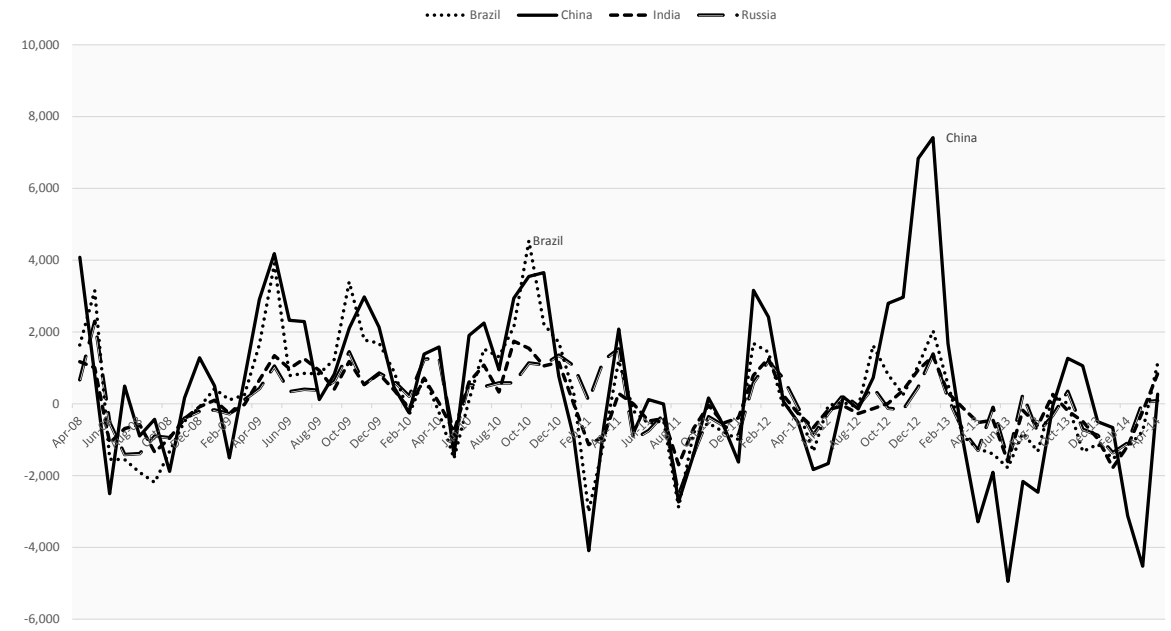
Note: the data label refers to the grey bar – gross bond inflow share in April 2014.
Source: Author's calculations based on EPFR.

Figure 10: Each country's share of the total allocation to equity, EMEs, Jan 2008 – April 2014



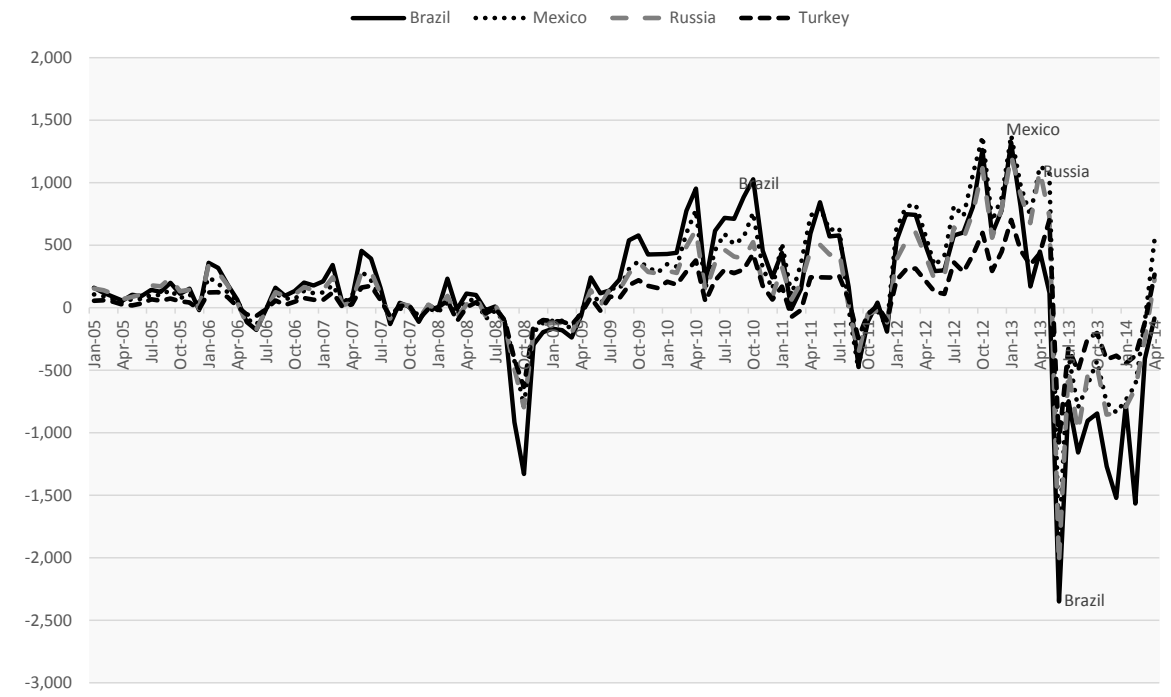
Note: the data label refers to the grey bar – gross equity inflow share in April 2014.
Source: Author's calculations based on EPFR.

Figure 11: Net equity inflows into Brazil, China, India and Russia



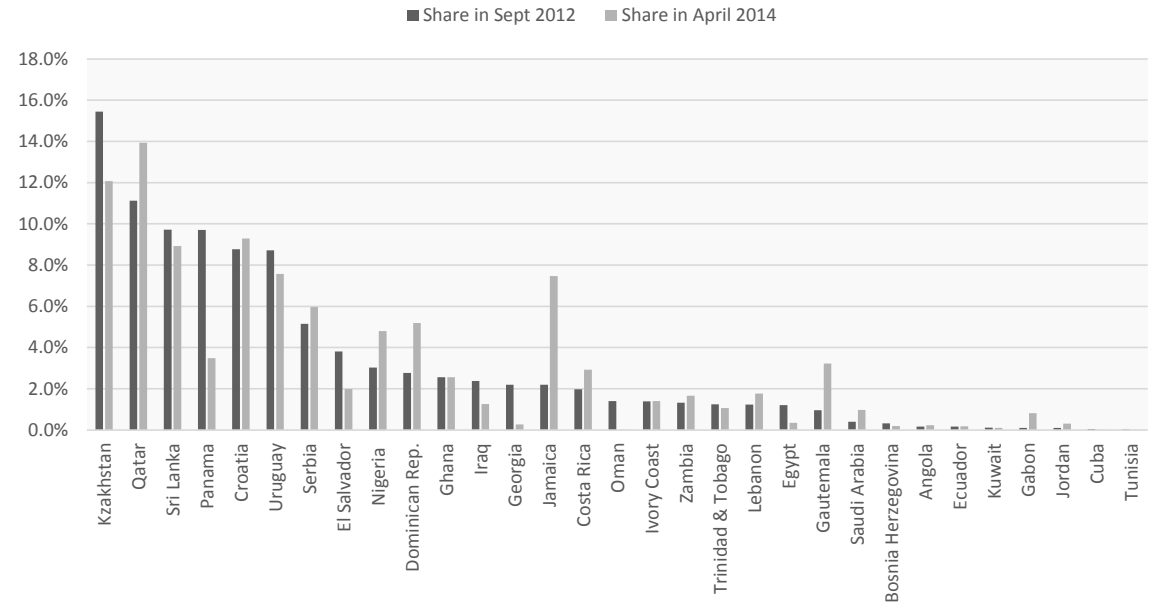
Note: Brazil, China, India and Russia make up for two-thirds of gross equity inflows into the EMEs.
Source: Author's calculations based on EPFR.

Figure 12: Net bond inflows into Brazil, Mexico, Russia and Turkey



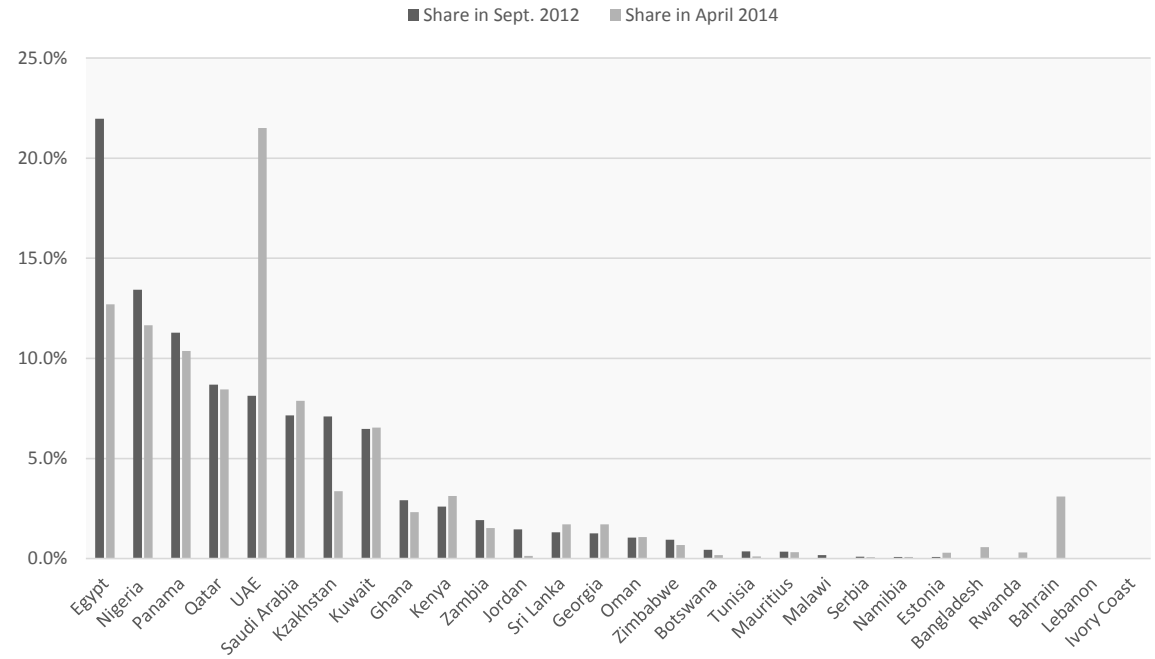
Note: Brazil, Mexico, Russia and Turkey make up close to 50 per cent of net bond inflows into the EMEs. However, note that in case of bond inflows, countries that received relatively less capital inflow in the past have increased their share – notably, China, Colombia, Hungary and Poland.
Source: Author's calculations based on EPFR.

Figure 13: Each country's share of allocation to bonds, other developing and emerging economies, Sept. 2012 – April 2014



Note: Unlike the EMEs and advanced economies, there are several missing values for other countries such as the ones presented in the chart. This picture takes into account countries where there is data for both Sept. 2012 and April 2014.
Source: Author's calculations based on EPFR.

Figure 14: Each country's share of allocation to equity, other developing and emerging economies, Sept. 12 – April 2014



Note: Unlike the EMEs and advanced economies, there are several missing values for other countries such as the ones presented in the chart. This picture takes into account countries where there is data for both Sept. 2012 and April 2014.
Source: Author's calculations based on EPFR.

Appendix 2 – Fed announcements and G20's concern for excessive capital flows

Table 10: Major Announcement Dates for LASAPs, United States

Programme	Dates	Details
QE1	11/25/2008	FOMC announces plans for purchasing $600 billion MBS and agency debt
	12/15/2008	Plan officially implemented
	3/18/2009	FOMC announces extension of $750 billion in MBS, $300 billion Treasuries
QE2	8/27/2010	Ben Bernanke's Jackson Hole speech suggests QE2
	11/3/2010	FOMC announces plans for purchasing $600 billion in Treasuries
MEP	9/21/2011	FOMC announces plans for purchasing $400 billion in longer-dated Treasuries by selling shorter-dated ones
	6/20/2012	FOMC announces extension of $267 billion
QE3	9/13/2012	FOMC announces plans for purchasing $40 billion in MBS per month
	12/12/2012	FOMC announces plans for purchasing $40 billion in MBS and $45 billion in Treasuries per month
Tapering	May 2013	FOMC announces plans to scale back QE3
	Dec 2013	FOMC begins reduction in the scale of asset purchases: from $40 billion to $35 billion per month in the case of MBS and from $45 billion to $40 billion per month in the case of Treasuries.

Note: the table also includes Maturity Extension Programmes (MEP), which were announced back in 2011. Source: Based on Federal Reserve press releases.

Table 11: G20 and the role of capital flows, 2008-2014

G20 Summit	Commitments	Interpretation
Washington, D.C., US 14 -15 November 2008	• Enhance co-ordination of capital flows • Avoid over-regulation of capital flow	Capital flows should not be bound by any restrictions although increased coordination could be enhanced
London, UK 1-2 April 2009	• Avoid measures that would constrain capital flows	Economic growth will restored until capital flows are restored
Pittsburgh, US 24-25 September 2009	• Measures to reduce capital flow volatility were needed • Avoiding measures that constrain capital flows was re-emphasised.	Unrestricted capital flows were central but that "sudden swings" were harmful
Toronto, Canada 26-27 June 2010	• Finance Ministers and Central Bank Governors at the international, regional and national level are tasked to develop policy options to deal with capital flow volatility	Measures to address the swings in capital flows are needed and would be developed under the aegis of the G20
Seoul, Korea 11-12 November 2010	• Efforts will made to overcome sudden reversals of international capital flows	The risk of excessive volatility in capital flows facing some emerging countries could dampen recovery prospects
Cannes, France 3-4 November 2011	• Stated objective to improve resilience against volatile capital flows to foster growth and development • IMF is to monitor capital flow developments	Risk of a reversal of capital flows is growing and requires closer monitoring and potential future action
Los Cabos, Mexico 18-19 June 2012	• Reiterated the fact that economic and financial stability are negatively affected by excess volatility of capital • Increased emphasis on monitoring	Risks of volatile capital flows and their monitoring is central to recovery but little change in the approach from the meeting in Cannes.
St. Petersburg, Russian Federation 5-6 September, 2013	• Continued recognition of the risk, notably to emerging economies in light of expected change in monetary policy in advanced economies	Recognition of problem is waning at a time when monetary policy in advanced economies is likely to have most profound impact on emerging economies
Brisbane, Australia 15-16 November, 2014	• No discussion	No longer is of policy concern despite the significant impact it is having on emerging economies

Source: Author's summary based on official G20 Communiques.

Appendix 3 – Gross flows and dynamic panels

Table 12: Gross inflow using dynamic panels: Emerging market economies

	1	2	3	4	5	6
	Δ Gross bond inflows as a % of GDP			Δ Gross equity inflows as a % of GDP		
Y (t-1)	0.067*	0.08	0.069*	-0.12***	-0.18***	-0.11***
	(0.039)	(0.054)	(0.038)	(0.024)	(0.035)	(0.023)
	Episodes of unconventional monetary policy					
QE1	-0.0027***	-0.0028***	-0.0026**	-0.0034	-0.0099*	-0.0035
	(0.0011)	(0.0008)	(0.0011)	(0.0033)	(0.0056)	(0.0032)
QE2	0.0001	0.0047	-0.00004	0.0048	0.0051	0.0046
	(0.003)	(0.0068)	(0.0027)	(0.0041)	(0.0070)	(0.0039)
Pre-Tapering QE3	0.0085***	0.013**	0.0098***	0.010**	0.0022	0.010***
	(0.0028)	(0.0065)	(0.0029)	(0.0042)	(0.0070)	(0.0039)
Post-Tapering QE3	-0.0022	0.0011	-0.0029	-0.014***	0.0025	-0.013***
	0.0036	(0.014)	(0.0039)	(0.0047)	(0.0086)	(0.0044)
Δ *Fed Assets*	-0.0006	-0.0034*	-0.0015	-0.0084***	-0.0057	-0.011***
	(0.0009)	(0.0018)	(0.0010)	(0.0028)	(0.0045)	(0.0028)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-0.000084			-0.0000		
	(0.00013)			(0.0000)		
Diff in LT bond yield (t-1)		0.0029***			0.00061	
		(0.001)			(0.0011)	
Diff in Money market rate (t-1)			0.00017			0.00016
			(0.00023)			(0.00035)
Δ *Industrial Production (t-1)*	-0.00019***	-0.00022*	-0.00015***	-0.00078***	-0.00079***	-0.00079***
	(0.000057)	(0.00013)	(0.00005)	(0.00013)	(0.00021)	(0.00013)
Δ *Stock market (t-1)*	0.000054	0.000096*	0.000054	0.00011	0.00010	0.000085
	(0.000036)	(0.000055)	(0.000042)	(0.00011)	(0.00017)	(0.00010)
	Confidence channel					
Δ *Exchange rate*	-0.000013***	-0.0014***	-0.000012***	-0.000046***	-0.0014***	-0.000046***
	(0.00000)	(0.00029)	(0.00000)	(0.0000)	(0.00029)	(0.00000)
VIX	-0.000044	-0.00017***	-0.000068***	-0.00043***	-0.00057***	-0.00048***
	(0.000032)	(0.000049)	(0.000027)	(0.00012)	(0.00016)	(0.00011)
	Financial development and reserves					
Δ *Reserves*	0.000032	0.00021	0.000032	0.00028***	0.0013***	0.00027***
	(0.000026)	(0.0002)	(0.000025)	(0.000026)	(0.00011)	(0.000025)
Credit as a % of GDP	0.0012	0.0032***	0.0010	0.0048***	0.0042*	0.0047***
	(0.00076)	(0.0012)	(0.00076)	(0.0014)	(0.0023)	(0.0014)
No of countries	20	10	21	20	10	21
No of observations	1,796	655	1,708	1,796	696	1,749
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						

Table 13: Gross inflow using dynamic panels: European Union

	1	2	3	4	5	6
	Δ Gross bond inflows as a % of GDP			Δ Gross equity inflows as a % of GDP		
Y (t-1)	0.076*	0.076*	0.074*	0.025	0.037	0.029
	(0.046)	(0.045)	(0.044)	(0.023)	(0.023)	(0.021)
	Episodes of unconventional monetary policy					
QE1	-0.003***	-0.002**	-0.0028***	0.000069	-0.00064	-0.0015
	(0.001)	(0.0009)	(0.0011)	(0.0025)	(0.0032)	(0.0027)
QE2	0.0015	0.0024	0.0011	0.018***	0.018***	0.019***
	(0.0028)	(0.0031)	(0.0025)	(0.0032)	(0.0033)	(0.0033)
Pre-Tapering QE3	0.0030	0.0051	0.0045	0.0039	0.0047*	0.0029
	(0.0028)	(0.0031)	(0.0029)	(0.0025)	(0.0026)	(0.0028)
Post-Tapering QE3	0.0054**	0.0052	0.0044	0.021***	0.021***	0.019***
	(0.0025)	(0.0033)	(0.0032)	(0.0051)	(0.0049)	(0.0052)
Δ *Fed Assets*	0.00058	-0.00038	-0.00071	-0.0073***	-0.0077***	-0.0076***
	(0.00075)	(0.00067)	(0.00075)	(0.0015)	(0.0014)	(0.0016)
	Portfolio rebalancing channel					
Diff in Policy rate (t-1)	-0.00022			0.0000		
	(0.00017)			(0.0000)		
Diff in LT bond yield (t-1)		0.00024			0.000051	
		(0.00032)			(0.00023)	
Diff in Money market rate (t-1)			0.00073			-0.0021***
			(0.00078)			(0.0007)
Δ *Industrial Production (t-1)*	-0.00019***	-0.00018***	-0.00015*	-0.00092***	-0.0010***	-0.0011***
	(0.00006)	(0.000061)	(0.000084)	(0.00016)	(0.00018)	(0.00019)
Δ *Stock market (t-1)*	0.0000	0.0000	0.000019	-0.000019	-0.000037	-0.000039
	(0.0000)	(0.0000)	(0.000031)	(0.000072)	(0.000075)	(0.000072)
	Confidence channel					
Δ *Exchange rate*	-0.0013***	-0.0013***	-0.0014***	-0.0011***	-0.0011***	-0.0012***
	(0.00002)	(0.00003)	(0.000027)	(0.00009)	(0.000046)	(0.000095)
VIX	-0.0000	-0.000043*	-0.000091*	-0.00045***	-0.00047***	-0.00035***
	(0.0000)	(0.000021)	(0.000052)	(0.00009)	(0.000069)	(0.00006)
	Financial development and reserves					
Δ *Reserves*	0.00026**	0.00026**	0.00025**	0.0010***	0.0010***	0.0010***
	(0.00011)	(0.00011)	(0.00011)	(0.00025)	(0.00025)	(0.00025)
Credit as a % of GDP	-0.0000**	-0.0000**	-0.00001***	0.00002***	0.000016***	0.00000***
	(0.0000)	(0.0000)	(0.00000)	(0.00000)	(0.0000)	(0.0000)
No of countries	18	19	20	18	19	20
No of observations	1,391	1,267	1,345	1,499	1,436	1,497
Clustered standard errors in parenthesis (*p<0.1, **p<0.05, ***p<0.01)						