ORIGINAL ARTICLE

Unconventional monetary policy and international equity capital flows to emerging markets

Christoforos K. Andreou[1] | **Nebojsa Dimic[2]** | **Vanja Piljak[2]** | **Andreas Savvides[1]**

[1]Department of Commerce, Finance and Shipping, Cyprus University of Technology, Limassol, Cyprus

[2]School of Accounting and Finance, University of Vaasa, Vaasa, Finland

Correspondence
Vanja Piljak, School of Accounting and Finance, University of Vaasa, P.O. Box 700, FI-65101, Vaasa, Finland.
Email: vanja.piljak@uva.fi

Abstract

This paper examines the relationship between monetary policies pursued by three major central banks (U.S. Federal Reserve, European Central Bank and Bank of Japan) and net equity capital flows to emerging markets (EMs) by global investment funds. We focus on two aspects of central bank policy: The growth of central bank assets and the surprise element of asset growth. We find, first, positive, economically large and statistically significant spillovers from the U.S. Federal Reserve asset growth to EM equity inflows following the adoption of unconventional monetary policies. Second, U.S. Federal Reserve and (to a lesser extent) European Central Bank asset growth surprises are negatively related to EM capital flows.

KEYWORDS
emerging markets, international capital flows, unconventional monetary policy

JEL CLASSIFICATION
E44, F30, G15

1 | INTRODUCTION

This study investigates the effects of unconventional monetary policy (UMP) by the major central banks on international capital flows. In particular, it focuses on the response of net equity flows by global investment funds to emerging markets (EMs) to the monetary policies undertaken by the Federal Reserve (Fed), the European Central Bank (ECB) and the Bank of Japan (BoJ). Motivation for this study comes from the fact that emerging economies have taken steps to liberalize their capital account during the past two decades and have become more fully integrated into international financial markets and, thus, able to attract increasing amounts of private international capital (Wang & Shih, 2013; Hillier & Loncan, 2019; Kiviaho et al., 2014). Since the onset of the global financial crisis in 2008, there has been a surge in capital flows to EMs (see e.g., Ghosh et al., 2014, 2017; Li et al., 2018). In the aftermath of the crisis, the level of policy interest rates reached the zero lower bound (ZLB) in developed markets and forced central banks to resort to UMP, which, in turn, affected the dynamics of international capital flows into emerging economies (Ahmed & Zlate, 2014; Chari et al., 2020).[1] This extraordinary environment of ZLB on interest rates elicited increased interest in examining the determinants and consequences of these capital flows, including the international spillover effects of UMP.

The existing literature on the determinants of capital flows to EMs distinguishes between two groups of factors, namely, global (push) and local (pull) factors. Pull factors are country-specific variables such as macroeconomic fundamentals and policy-related characteristics. Push factors are related to general global conditions that capture the economic climate for investment in emerging economies and are generally outside the control of these economies (e.g., global liquidity, global risk, etc.).[2] Besides push and pull factors, some studies include contagion as an additional set of variables that determine international capital flows (e.g., Forbes & Warnock, 2012; Li et al., 2018). In particular, Forbes and Warnock (2012) identify three variables that capture contagion effects: Trade linkages, financial linkages and geographic proximity.

One important theme of the recent literature is that a key determinant of capital flows to EMs is a 'global financial cycle', described as co-movements in gross capital flows, credit conditions and asset prices across countries (see, Anaya et al., 2017; Rey, 2015). Furthermore, the main driver of the 'global financial cycle' is U.S. monetary policy. There has been a lot of discussion in the literature about the effect of UMP on global capital flows. The main argument put forward is that by boosting global liquidity, UMP undertaken by the main central banks in the wake of the global financial crisis (GFC), has spilled over into capital flows, especially to EMs that have offered higher returns to global investors. On the contrary, following the announcement by the Fed of its intention to reduce the size of its balance sheet (assets) in 2013 (the 'taper tantrum'), it is claimed that the flow of equity capital to EMs by the private financial sector declined. The claimed link between UMP and equity capital flows to EMs has received substantial attention in the financial press (see e.g., Financial Times: Wheatley & Kynge, 2016; Wheatley, 2021)[3] and the recent academic literature (Chari et al., 2020; Dahlhaus & Vasishtha, 2020). The increase in global liquidity resulting from UMP by the major central

[1]For a more comprehensive discussion on UMP in the global low-interest-rate environment, see Wu and Xia (2016) and Wu and Zhang (2019).

[2]It is not our intention to review push/pull factors here; a comprehensive overview is provided in Ghosh et al. (2014, 2017) and Li et al. (2018).

[3]These are amongst a plethora of articles in the global financial press on this issue. The latter article points out that spillovers into EM capital flows experienced in the earlier episodes of unconventional monetary policy, following the global financial crisis, are being repeated during the current cycle of central bank asset expansion, following the outbreak of the Covid global pandemic.

banks and potential spillovers into net equity capital flows to EMs is one of the major issues tackled in this paper.

The majority of the existing literature is centred on Fed monetary policy (e.g., Chari et al., 2020; Dahlhaus & Vasishtha, 2020; Gamboa-Estrada, 2020; Koepke, 2018), whereas evidence from other major central banks is limited despite their important role in the global financial cycle (Chari et al., 2020; Dilts-Stedman, 2019; Fratzscher et al., 2016). We fill this gap by analyzing the impact of monetary policies of two other major central banks in addition to Fed, namely, the European Central Bank (ECB) and the Bank of Japan (BoJ). Our measure of UMP is the growth of each central bank's assets, a measure that reflects the growing importance of quantitative easing (QE) operations undertaken by central banks following the onset of the global financial crisis. Thus, the first issue examined in this paper is the extent to which UMP undertaken by the three major central banks (Fed, ECB and BoJ) has spilled over into increased equity flows to EMs. Though changes in central bank assets may reflect UMP within the ZLB environment, we recognize that they may also reflect changes in policy interest rates, or what can be termed 'conventional' monetary policy. In this paper, we disentangle the effects of changes in the policy interest rate on central bank asset growth to arrive at a measure of central bank asset growth that is net of the effects of changes in the policy rate.

Several studies adopt an expectations perspective to examine how monetary policy expectations are transmitted to EM capital flows (Chari et al., 2020; Koepke, 2018). Their main finding is that the surprise element to monetary policy is an important factor in explaining portfolio capital flows to EMs. Chari et al. (2020) investigate how monetary policy surprises around Federal Open Market Committee (FOMC) meetings (utilizing Fed Funds futures data) are related to capital flows from the U.S. to EMs. They find that Fed quantitative easing was a relevant factor in explaining capital flows, but the effects differed across episodes of quantitative easing. Koepke (2018) focuses on changes in monetary policy expectations (derived from federal funds futures contracts) and their link to capital flows dynamics and concludes that the surprise element of monetary policy is an important explanatory factor for portfolio capital flows to EMs. Thus, the second issue examined in this paper is the reaction of global investors to surprises or innovations to changes in central bank assets and how that is reflected in equity capital flows to EMs. We surmise that investors treat greater surprises to central bank asset growth as increasing monetary policy uncertainty and this will have a dampening effect on net capital flows.

The third issue addressed in this paper examines whether capital flows across geographic regions respond differently to central bank policy. Recent studies have shown that the dynamics of capital flows into EMs exhibit strong regional differences. Bathia et al. (2020) document an important heterogeneous pattern of equity flows across EM geographic regions. Gamboa-Estrada (2020) shows that capital flows to EMs increased substantially during Fed UMP, especially to emerging Asia. Capital flows to emerging Europe, however, were adversely affected by the Eurozone sovereign debt crisis. Eller et al. (2020) show that Asia and Latin America (LA) received substantially lower capital inflows than other regions before the global financial crisis and Asian EMs capital flows were significantly affected by the unwinding of Fed UMP after 2013. Furthermore, Tillmann (2016) documents regional heterogeneity of capital flows by comparing the Asia-Pacific and LA regions. In light of the literature on regional heterogeneity in capital flow dynamics, we investigate how the policies of the three central banks affected equity capital flows to three different regions: Asia, LA and Europe, Middle East and Africa (EMEA).

Fourth, one final theme of this paper is the degree to which other global (push) and country-specific (pull) factors affect equity capital flows to EMs. In this respect, we include a

number of push/pull factors identified by the previous literature as important determinants of portfolio capital flows to EMs and examine their importance.

Our contributions to the literature can be summarised as follows. First, we contribute to the literature on the link between UMP and capital flows to emerging markets (Chari et al., 2020; Dahlhaus & Vasishtha, 2020; Gamboa-Estrada, 2020) and extend it by focusing on the UMP undertaken by three major central banks (Fed, ECB and BoJ). Furthermore, our data set consists of equity capital flows to EMs by private global funds (from EPFR Global), enabling us to isolate and study the responsiveness of foreign investors to monetary policies of the major central banks.[4] Second, we contribute to the literature examining the role of the surprise component of monetary policy in explaining capital flows to EMs (Chari et al., 2020; Dahlhaus & Vasishtha, 2020; Koepke, 2018). This is especially relevant because the previous literature has shown this to be an important factor to foreign investors in EMs. Whereas previous studies have examined the role of expectations around specific events (e.g., central bank policy meetings) we are interested in how central bank policy surprises, as reflected in asset growth surprises (AGS), influence the time-series flow of equity capital to EMs during the past two decades. Furthermore, our analysis allows us to derive estimates of both the spillover and surprise elements of central bank asset growth before and after the implementation of UMP and, thus, we are able to compare the two effects. Third, our paper builds upon previous work that capital flows into EMs show strong regional tendencies. In this respect, we investigate how the policies of the three central banks are transmitted to different EM geographic regions and account for potential heterogeneous responses across those regions. Finally, our study complements the literature on the determinants of international capital flows by including a set of global (push) and country-specific (pull) factors (Fratzscher et al., 2016; Koepke, 2018; Li et al., 2018). In particular, we find that global (push) factors, one of which is foreign central bank monetary policy, tend to be significant, whereas domestic (pull) factors are of secondary importance.

We provide estimation results on the determinants of capital flows and the behaviour of global investors by combining advantageous fund flows data from EPFR and the growth and surprise components of monetary policy in the same framework. Our results provide several insights. First, we find that there are positive, economically large and statistically significant spillovers from Fed asset growth to EM equity capital flows during the QE period. There is also limited evidence of spillovers from ECB asset growth but no evidence of QE spillover effects by the BoJ. These results provide support to the oft-cited (but little researched in the academic literature) view on the spillover effects of global liquidity increases, made possible by UMP (especially by the Fed), on capital flows to EMs. Second, our study finds a negative and significant relationship between the surprise component of central bank asset growth and capital flows to EMs. Our evidence shows that global investors respond negatively to uncertainty and unexpected changes in Fed and (to a lesser extent) ECB monetary policies by reducing equity investment to EMs.

The remainder of the paper is organized as follows. Section 2 provides a discussion of the relevant literature. Section 3 describes the data and variable measurement and Section 4 presents the methodological framework. Section 5 highlights the novelty of our empirical results and Section 6 concludes the paper.

---

[4] The key advantages of the EPFR fund flow data and their conceptual differences from international portfolio flow data derived from Balance of Payments statistics are discussed in more detail in Koepke (2018). The EPFR capital flows data have been used in a number of recent papers. For a recent study on credit ratings and capital flows to EMs and a discussion of the usage of the EPFR data in the literature see Andreou et al. (2020).

2 | LITERATURE REVIEW

Our paper relates to two streams of the literature. The first focuses on the determinants of international capital flows to EMs. The main conclusion of the literature is that the determinants can be divided into two groups: Global (push) and country-specific (pull) factors (see Ghosh et al., 2014, for a general overview). This literature can be subdivided into three main interrelated strands. First, one group of studies aggregates capital flows to EMs with no distinction between the various forms of flows (e.g., Calvo et al., 1996; Eller et al., 2020; Fernandez-Arias, 1996; Ghosh et al., 2014). The main finding is the dominance of global factors relative to local factors. Second, several studies distinguish between various forms of capital flows such as foreign direct investment, portfolio flows or loans (e.g., Broto et al., 2011; Contessi et al., 2013; Kim & Wu, 2008). Third, more recent studies, including this one, focus increasingly on a specific type of capital flows, such as portfolio equity flows or portfolio bond flows (e.g., Bathia et al., 2020; Dahlhaus & Vasishtha, 2020; Fratzscher et al., 2016; Koepke, 2018; Li et al., 2018). This allows investigating the factors that motivate the decisions of foreign investors.

Most previous studies on the determinants of global capital flows use data from the Balance of Payments statistics of various emerging economies or flow of funds data from one developed market (e.g., United States) to various emerging economies (e.g., Ahmed & Zlate, 2014; Edison & Warnock, 2008). More recent studies use data from Emerging Portfolio Fund Research (EPFR) Global (e.g., Andreou et al., 2020; Dahlhaus & Vasishtha, 2020; Fratzscher et al., 2016; 2018; Koepke, 2018; Li et al., 2018). The main advantage of EPFR fund flows data is the higher frequency and disaggregated information (e.g., on the investor type). According to Koepke (2018), EPFR data can be considered as a 'timely high-frequency indicator of portfolio flows movements'.

The second stream of related literature assesses the impact of UMP implemented by the main central banks on the economies of EMs in general (e.g., Bowman et al., 2015; Eichengreen & Gupta, 2015; Tillmann, 2016). The main conclusion is that UMP had significant effects on financial conditions, equity prices, exchange rates and capital flows to EMs. Within this literature, Anaya et al. (2017), Chari et al. (2020), Fratzscher et al. (2016), ans Kiendrebeogo (2016), find that UMP implemented by the Fed had a significant impact on portfolio flows from the United States to EMs. The theoretical justification for this finding is linked to several transmission channels described in the literature (see Chari et al., 2020; Gamboa-Estrada, 2020; Joyce et al., 2012). The first and the one most emphasized in the literature (e.g., Anaya et al., 2017; Joyce et al., 2012), is a portfolio balance channel, according to which investors rebalance their portfolios in response to central banks' purchase of long-term bonds that lead to increased global liquidity, and that, in turn, potentially leads to portfolio capital spillovers to EMs. The second transmission channel is a signalling channel, whereby central bank operations are interpreted as a signal of lower future policy rates (Bauer & Rudebusch, 2014). The third or 'confidence' channel, relates to changes in investors' risk-taking behaviour (see Fratzscher et al., 2016).

One important issue in the literature on UMP relates to the measurement of UMP. One way to measure the effects of UMP is to use the size of central bank assets in the balance sheet (Anaya et al., 2017; Gambacorta et al., 2014; Molyneux et al., 2021). In particular, Gambacorta et al. (2014) argue that central bank assets are a preferable measure of UMP than the monetary base.[5] We also use the growth of central bank assets (CBA) as our measure of UMP. It should be

[5]Other studies have used the shadow fed funds rate (Wu & Xia, 2016) and Fed funds futures contracts (Chari et al., 2020; Dahlhaus & Vasishtha, 2020; Gospodinov & Jamali, 2018; Kiendrebeogo, 2016; Koepke, 2018) as their measure.

pointed out, however, that our measure of central bank asset growth has been purged of the effects of changes in the policy interest rate. Section 3 describes the methodology for accounting for the effects of changes in the policy interest rate on CBA growth.

In this paper, we bring together the various strands of the literature on capital flows and unconventional monetary policy discussed above. We focus on a single type of flow, equity capital by global funds, to isolate the response of foreign investors to UMP. We include as control variables the important push/pull factors identified by the literature. In our empirical analysis, we include a measure of the extent of UMP undertaken by the three central banks as well as the surprise element of UMP. Our measure of UMP, the growth of central bank assets, is readily available for the three central banks on a monthly basis, is comparable across the three central banks and captures the main element of UMP, the quantitative easing undertaken by central banks in the wake of the GFC. This measure is especially relevant in examining the expansion of global liquidity as a result of central bank UMP policies. Our paper provides a unified framework to test several hypotheses that are discussed in the remainder of the paper, after a brief description of the data and variables in the next section.

3 | DATA DESCRIPTION AND VARIABLE MEASUREMENT

The focus of this paper is the relationship between UMP by the major central banks (Fed, ECB and BoJ) and equity capital inflows to EMs. Given that the relationship between these two variables is central to our study, first, we describe in detail how we define and measure these two. To model adequately the main relationship of interest, we include a set of control variables that condition the relationship and they are also described in this section.

3.1 | Net equity capital inflows to emerging markets/regions

This study makes use of a proprietary data set compiled by EPFR Global as the data source for net equity capital flows to EMs. As of January 2018, EPFR tracked global funds with over $3tn in assets globally. Importantly, the funds tracked are registered globally (not just in the United States) and, thus, EPFR data measure global equity flows to EMs. EPFR combines data on asset allocation by fund managers and individual fund flows to arrive at a figure for net capital inflows to individual EMs countries or regions. EPFR provides data at two levels: The individual country level and the regional level. We work with two samples at the regional (three regions) and country (16 countries) level. The regional data reported by EPFR are not simply the sum of individual country data but include capital flows to each region that are not included in the country sample because some fund managers do not reveal their asset allocations by country but indicate only allocations by region. The regional sample includes data for three regions: Asia, LA and EMEA. The country sample includes data for the following EMs: Brazil, Chile, China, Czech Republic, Egypt, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Russia, South Africa, Taiwan, Thailand and Turkey.[6] The data are monthly and cover the period from April 1998 to March 2018. The choice of sample and time

---

[6]EPFR tracks data other than for these 16 EMs but that data could not be included in our analysis because they are relatively short in length or incomplete.

period is dictated by the availability of sufficiently lengthy time-series data for each region/country. More importantly, the 16 EMs in the sample are the largest of the EMs in terms of economic size, international trade and stock market capitalization.

EPFR calculates net equity inflows (investor contributions minus redemptions) to each EM or region during each month by excluding portfolio performance and currency fluctuations. To arrive at a figure for net equity flows, EPFR collects data for each investment fund on: (i) The fund's rate of return or the (percentage) change in net asset value (RNAV) during the month; (ii) total net assets (TNA) at the end of each month and, (iii) for funds not denominated in U.S. dollars, changes during the month in total assets due to currency fluctuations (ΔFX). These data form the basis for the calculation of net capital inflows to country/region i during month t in dollars as follows:

$$\text{FLOW}_{i,t} = \text{TNA}_{i,t} - (1 + \text{RNAV}_{i,t}) \times \text{TNA}_{i,t-1} - \Delta\text{FX}_{i,t} \qquad (1)$$

Flows by all investment funds are aggregated to arrive at the net capital inflow to each EM/region during each month. Therefore, FLOW represents net contributions/redemptions of investors globally to each EM/region after changes in portfolio performance and currency fluctuations have been netted out.

3.2 | Unconventional monetary policy

This paper tests two hypotheses relating to the impact of UMP on equity capital flows to EMs: one concerns the growth of central bank assets and the second the surprise or innovation element of the growth of central bank assets. Before testing the hypotheses, it should be noted that CBA growth, our measure of UMP, contains changes in assets related not only to measures aimed at quantitative easing but also changes related to the conventional monetary policy tool, the policy interest rate. It is important, therefore, to disentangle the two effects to compute a measure of asset growth that is net of the effects of the policy interest rate. To accomplish this first we obtain a measure of the growth of assets (balance sheet) of the three major central banks (Fed, ECB and BoJ) as the logarithmic first difference of each central bank's assets (ΔlnCBA).[7] Next, we estimate an autoregressive process for the growth of assets of each central bank separately as follows:[8]

$$\Delta\text{lnCBA}_{k,t} = \phi_0 + \sum_{j=1}^{N_1} \phi_{1j} \Delta\text{lnCBA}_{k,t-j} + \sum_{j=1}^{N_2} \phi_{2j} sint_{k,t-j} + \varepsilon_{k,t}. \qquad (2)$$

In Equation (2), $sint_{k,t-j}$ refers to the main policy interest rate of each central bank ($k = 1, 2, 3$ refers to each central bank). Therefore, changes in policy rates (what can be thought of as conventional monetary policy) are allowed to influence the growth of central bank assets. To arrive at a measure of CBA growth that is shorn of the influences of changes in policy rates (or $\Delta\text{ln}\widetilde{\text{CBA}}_{k,t}$), after estimating Equation (2) we subtract the linear projection of the policy interest

rate or $\Delta \ln \widetilde{CBA}_{k,t} = \Delta \ln CBA_{k,t} - \sum_{j=1}^{N_2} \hat{\phi}_{2j} sint_{k,t-j}$. This is the measure of CBA growth that will serve as our indicator of UMP in the empirical analysis. As is well known, in recent years, the policy interest rates of the three central banks have reached the zero lower bound and have been effectively negative. Therefore, instead of using the official policy interest rate, in Equation (2) $sint_{k,t-j}$ refers to the shadow interest rates for the Federal funds rate (Fed), ECB refinancing rate (ECB) and overnight call rate (BoJ).[9]

The second hypothesis this paper tests relates to the surprise (or innovation) element in CBA growth. As noted in the introduction, several studies have argued that investors interpret surprises to CBA growth as increasing monetary policy uncertainty and are expected to respond by reducing equity capital flows to EMs. We examine this hypothesis with a measure of asset growth innovations (or AGS) as the estimated residuals in Equation (2). Finally, we estimate Equation (2) for each central bank separately via a rolling regression with a 36-month window. The choice of optimal lag length (N_1 and N_2) for each central bank is based on the Akaike Information Criterion (AIC).[10]

3.3 | Control variables

The set of control variables includes both domestic (pull) and global (push) factors that are prevalent in the literature. Recent contributions to the literature were discussed in the previous section. Our intention is to include a set of control variables representative of push and pull factors to model adequately the determinants of equity capital flows to EMs.

The set of domestic (pull) variables includes sovereign credit ratings, the return on the domestic equity market, GDP growth and trade openness. We measure the sovereign credit rating of each country as the letter credit rating assigned to it by Standard and Poor's (S&P) at the end of each month. S&P is considered the 'lead' agency among the three major rating agencies (see Gande & Parsley, 2014). The credit rating measure (CR) is the letter grade assigned by S&P to the sovereign credit rating of a country's long-term foreign-currency obligations. The letter grade is transformed to a numerical scale and CR is calculated such that each letter rating provided by the S&P (the letter ratings range from SD/D to AAA) is assigned to a numerical value from 0 to 21 with higher numbers implying improved ratings (e.g., Almeida et al., 2017; Andreou et al., 2020). The rate of return of the domestic stock market (MRET) is calculated as the percentage change in the monthly MSCI equity index for each EM. The growth rate of GDP (i) for each country is obtained from quarterly data on domestic GDP for each country in US dollars. Quarterly GDP figures are transformed to a monthly frequency using the Chow and Lin (1971) interpolation technique and the monthly growth rate is the logarithmic first difference of monthly dollar GDP converted to annual terms. Finally, the literature identifies trade openness (OPENNESS) as an important element of a country's profile in attracting foreign capital; we measure trade openness as the sum of imports and exports scaled by GDP.

The set of global (push) factors includes general financial market uncertainty and economic policy uncertainty. First, global market uncertainty is measured by the (change)

---

[9]The calculation of the shadow policy rate for the Fed and the ECB follows the method in Wu and Xia (2016) and the data are available at https://sites.google.com/view/jingcynthiawu/shadow-rates. The shadow rate for BoJ follows Krippner (2013) and the data are available at https://www.ljkmfa.com/test-test/international-ssrs.

[10]The AIC optimal lag length (N_1, N_2) is (2,1) for the Fed, (3,3) for the ECB and (3,1) for the BoJ. In the robustness section, we report on alternative estimations of Equation (2) with different methods for the choice of lag length.

in the VIX index (ΔVIX), the indicator of US stock market volatility. The VIX measure has become known as the 'fear' index and is widely used as an indicator of uncertainty regarding global financial market conditions (e.g., Anaya et al., 2017; Ghosh et al., 2014; Lalancette & Simonato, 2017). Second, because one of this paper's principal objectives is to study the effects of surprises (uncertainty) in central bank monetary policy, we need to distinguish between the effects of monetary policy uncertainty from that of general economic policy uncertainty. To this end, we include as a control variable the Baker et al. (2016) index of economic policy uncertainty (EPU). This index has been shown to be important in capturing the effects of economic policy uncertainty on cross-border capital flows (Julio & Yook, 2016).[11]

The data source for the control variables is DataStream except for credit ratings that are from various reports of S&P and the economic policy uncertainty indexes from www.policyuncertainty.com. Table 1 reports summary statistics. The table shows that on average, each of the 16 EMs experienced a monthly net equity capital inflow of $9.4 million during 1998–2018.[12] At the regional level, average net equity inflows were negligible. The overall regional average, however, masks substantial regional variation: Net monthly capital inflows to Asia ($120 million) counterbalanced by substantial net outflows for EMEA and LA. Furthermore, capital flows tend to be relatively volatile, as measured by the high standard deviations at both the country and regional level: The coefficient of variation is 45.6 at the country level, 25.6 for Asia, 10.3 for EMEA and 20.7 for LA.

Figure 1 shows monthly net capital inflows and Figure 2 cumulative capital inflows to the three regions. The figures show that equity inflows are relatively low and stable until 2003, a period when EMs were, for all intents and purposes, closed to foreign equity portfolio flows. The value of cross-border equity flows to all three regions increases substantially after 2003, especially those to Asia. The period preceding the GFC exhibits substantial volatility and the volatile pattern persists in the years following the crisis (especially evident in flows to Asia). This would suggest that, as Raddatz and Schmukler (2012) point out, cross-border fund flows play an important role in the transmission of shocks across global markets in the postcrisis period. It is worth noting that cumulative capital flows continue to increase after the onset of the GFC and until 2011. As has been previously noted, during the early years of the GFC, capital flows were redirected from developed markets to EMs as these countries continued to experience reasonable growth rates (compared to developed markets) and did not begin to experience the economic impact of the GFC until the early 2010s. After 2011, cumulative capital flows to all three regions decline.

Table 1 shows that the average rate of growth of central bank assets is positive for all three, with the ECB experiencing the highest monthly growth (1.25%) followed by the Fed and BoJ. Higher asset growth is particularly evident after the central banks took extraordinary measures to boost liquidity through QE measures. This can be seen in Figure 3 that plots each central bank's assets (converted to US dollars using average exchange rates) and Figure 4 that shows assets scaled by domestic GDP. The Fed's assets increase rapidly in the months following October 2008 as the Fed was the first central bank to

---

[11]Baker et al. (2016) report EPU indexes at the aggregate (global) and disaggregate levels. Given that we look at three central banks, the empirical specification includes the economic policy uncertainty index relevant to each central bank, that is, the US EPU for the Fed, Europe EPU for the ECB and Japan EPU for the BoJ.

[12]Descriptive statistics for net equity capital flows to each individual country are reported in Appendix A1. The leader in attracting equity flows is India, followed by South Korea, Brazil and Russia. Seven countries experienced net capital outflows with China leading the way, followed by Mexico.

TABLE 1   Summary statistics

This table reports summary statistics for 16 emerging markets (EMs) and three EM regions from April 1998 to March 2018. The variables are defined in Section 3: FLOW represents net contributions/redemptions of investors globally to each EM/region after changes in portfolio performance and currency fluctuations have been netted out; ΔlnCBA denotes central bank asset growth defined as the logarithmic first difference of each central bank's (Federal Reserve [FED], European Central Bank [ECB] and Bank of Japan [BOJ]) assets; AGS refers to asset growth surprise; EPU is the Index of Economic Policy Uncertainty, ΔVIX is the change in the VIX Index; MRET is the rate of return of the domestic stock market calculated as the percentage change in the monthly MSCI equity index for each EM; GDPGR is the growth rate of GDP for each country, OPENNESS denotes trade openness measured as the sum of imports and exports scaled by GDP; CR denotes credit ratings given by the Standard and Poor's (S&P) and ΔTEDSPREAD is the change in the TED spread. Abbreviations: EMEA, Europe, Middle East and Africa; LA, Latin America.

Variable	Mean	Median	Standard deviation	Minimum	Maximum
FLOW: 16 EMs	9.471	−0.310	432.188	−8,316.960	5,061.270
FLOW: 3 Regions	0.779	−25.195	1,893.844	−14,403.080	8,842.010
FLOW: Asia	119.873	107.140	3,066.286	−14,403.080	8,842.010
FLOW: EMEA	−75.496	−27.660	781.530	−3,875.950	2,729.830
FLOW: LA	−42.040	−53.050	868.981	−2,939.880	3,341.580
ΔlnCBA:: Fed	0.929	0.399	4.191	−9.816	55.542
AGS: Fed	0.000	0.076	0.998	−6.736	4.011
ΔlnCBA: ECB	1.250	0.837	7.912	−36.014	45.389
AGS: ECB	0.000	−0.142	0.998	−3.041	4.656
ΔlnCBA: BoJ	0.884	0.728	5.738	−24.138	29.747
AGS: BoJ	0.000	0.038	0.998	−4.134	4.423
US EPU	111.037	102.146	35.614	57.203	245.127
Europe EPU	141.928	133.031	65.042	47.692	433.278
Japan EPU	107.901	102.089	35.121	48.569	236.243
ΔVIX	−0.005	−0.130	4.519	−15.280	20.500
MRET	0.959	1.028	8.912	−64.765	71.726
GDPGR	4.226	4.369	4.169	−19.847	22.302
OPENNESS	61.637	43.581	51.987	1.807	345.872
CR	12.841	13.000	3.487	0.000	20.000
ΔTEDSPREAD	−0.001	0.000	0.200	−1.250	1.350

engage in large-scale bond purchases. Starting in June 2013, the Fed announced its intention to scale back its bond purchase scheme (the 'taper tantrum'). In October 2010, BoJ announced the start of a QE programme on a relatively limited scale. The BoJ bond-buying programme was subsequently expanded to ¥60–70tn in April 2013 and ¥80tn the
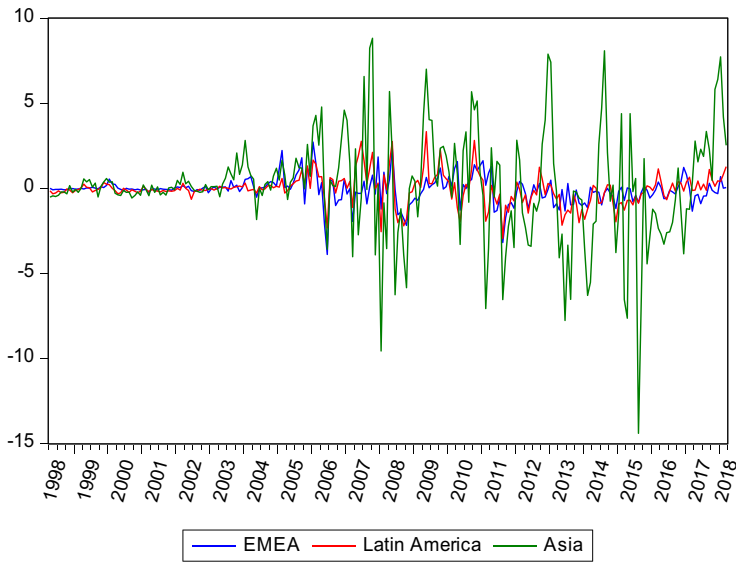
FIGURE 1 Monthly net equity inflows to three emerging market regions (billion US dollars). EMEA, Europe, Middle East and Africa
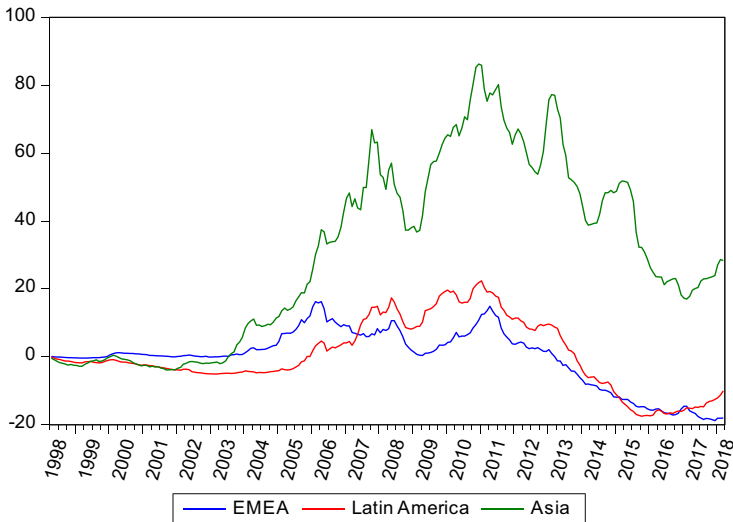
FIGURE 2 Cumulative net equity inflows to three emerging market regions (billion US dollars). EMEA, Europe, Middle East and Africa

following year and continued until 2018.[13] The ECB was the last of the three major central banks to implement a QE programme in March 2015 when it begun to buy €60 billion of bonds per month. These dates (marked in Figure 3) for the start of QE by each central

---

[13]In fact, the BoJ was the first of the three banks to engage in a QE programme in 2001 when the first signs of deflation appeared. The programme was ineffective and was reversed after 5 years. We do not consider this QE programme as it was carried out before the GFC and we have very few observations before the start of this programme.
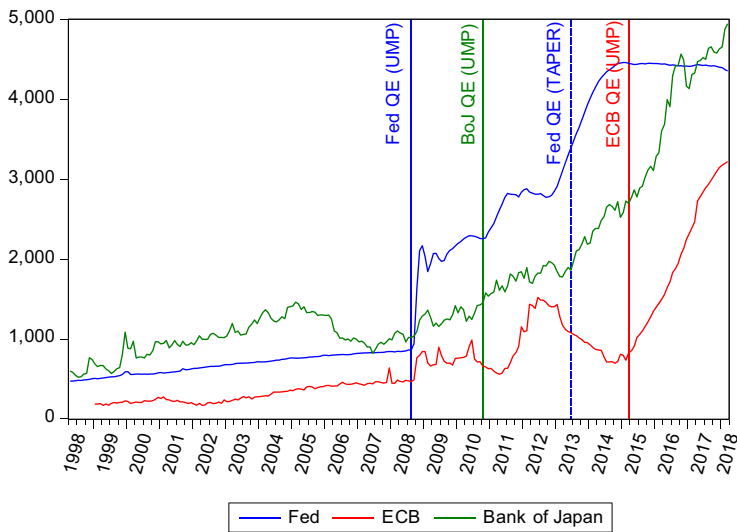
FIGURE 3 Central Bank Assets (billion US dollars). ECB, European Central Bank; Fed, Federal Reserve
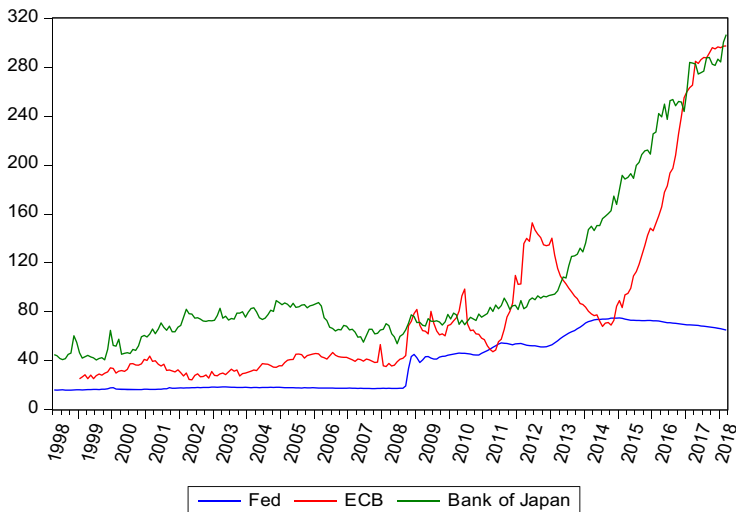
FIGURE 4 Central Bank Assets (percentage of gross domestic product). ECB, European Central Bank; Fed, Federal Reserve

bank (and the tapering by the Fed) will be utilized in the empirical section to account for the effects of UMP on capital flows to EMs. Finally, with regard to Table 1, it is note-worthy that the Fed and BoJ experienced relatively large AGS (the Fed experienced the highest median asset growth innovation), whereas the median surprise experienced by the ECB was negative.[14]

---

[14]AGS are standardized to enable, in subsequent sections, a discussion of their economic effects.

4 | METHODOLOGY

We examine the main hypotheses via a panel model with fixed effects to exploit the time and cross-country variation within our data. The model estimated initially is:

$$\text{FLOW}_{i,t} = \alpha_i + \theta_1 \times \Delta \ln \tilde{\text{CBA}}_{k,t} + \theta_2 \times \text{AGS}_{k,t} + \zeta \times Z_{i,t-1} + u_{i,t}. \tag{3}$$

The model includes country/region specific effects (α_i) and a vector Z of control variables that were discussed in the previous sections.[15] The model includes, among the control variables, lagged values of the dependent variable (LAGFLOW) to allow (and test) for persistence in capital inflows. The inclusion of the lagged dependent variable is important because high-frequency (monthly) time-series flow data exhibit strong autocorrelation, a specification that is consistent with the models in Lim and Mohapatra (2016) and Chari et al. (2020). The estimation method is instrumental variables (IV) because, in the presence of a lagged dependent variable, least-squares fixed-effects estimation would result in an inconsistent estimate for LAGFLOW.[16] The model in Equation (3) is the initial empirical specification that tests two hypotheses: (i) There are spillovers from central bank asset growth to capital flows (the estimate of θ_1) and (ii) AGS influence investor behaviour and, as a result, net capital flows to EMs (the estimate of θ_2).

The model in Equation (3), however, assumes a uniform effect of asset growth and surprises on capital flows across time. Because our main interest is the investigation of the effects of UMP (central bank quantitative easing) on capital flows, we need to allow for different effects before and after the adoption of QE. Thus, we estimate an alternative model that allows the response coefficient to differ before and after by introducing an indicator variable that distinguishes between the pre- and post-UMP period and by including several interaction effects. Specifically, we estimate the model

$$\begin{aligned}
\text{FLOW}_{i,t} = {} & \alpha_i + \theta_{1\text{PRE}} \times \Delta \ln \tilde{\text{CBA}}_{k,t} + (\theta_{1\text{POST}} - \theta_{1\text{PRE}}) \times \Delta \ln \tilde{\text{CBA}}_{k,t} \times \text{DUMP}_{k,t} \\
& + \theta_{2\text{PRE}} \times \text{AGS}_{k,t} + (\theta_{2\text{POST}} - \theta_{2\text{PRE}}) \times \text{AGS}_{k,t} \\
& \times \text{DUMP}_{k,t} + \beta \times \text{DUMP}_{k,t} + \zeta \times Z_{i,t-1} + u_{i,t},
\end{aligned} \tag{4}$$

where DUMP_k is an indicator variable that equals 1 after the adoption of QE policies by central bank k and 0 before. The model in Equation (4) estimates the effects of asset growth and surprises before the adoption of QE (the estimates of $\theta_{1\text{PRE}}$ and $\theta_{2\text{PRE}}$) and after the adoption of QE (the estimates of $\theta_{1\text{POST}}$ and $\theta_{2\text{POST}}$). Estimation of these parameters allows a discussion and comparison of the effects of central bank actions on net capital inflows before and after the implementation of QE.

In Section 5, we report the estimates of the parameters of interest ($\theta_{1\text{PRE}}$, $\theta_{2\text{PRE}}$, $\theta_{1\text{POST}}$ and $\theta_{2\text{POST}}$) and Wald-tests for their significance. The dates of the start of QE operations by each central bank were discussed in the previous section. Moreover, given that the Fed began operations to reduce the size of its balance sheet assets in 2013 (the 'tapering' and its much-discussed impact on EMs capital flows), the relevant model in Equation (4) for the Fed includes

---

[15]The control variables (except those expressed as changes) are lagged one period for two reasons: First, to allow sufficient time for the responsiveness of capital flows to take effect and, second, to mitigate possible endogeneity of the control variables.

[16]This issue is discussed in Maddala and Lahiri (2009, Ch. 13). Instruments for LAGFLOW are lagged values of the control variables so that instruments are dated $t-2$. In addition to the control variables, we include as instrument (lagged) values of global commodity prices (at $t-2$). It should be noted that dynamic panel methodologies of the Arellano/Bond type are not appropriate in our case with a relatively short cross-section dimension and relatively long time-series dimension.

interaction effects with two indicator variables: DUMP that signifies the start of QE (as for the other two central banks) and a second indicator variable DTAPER that equals 1 after the start of tapering operations by the Fed and 0 before.[17]

The models in Equations (3) and (4) are estimated separately for each of the three central banks (Fed, ECB and BoJ) and for two samples: One that contains data on capital flows to 16 emerging economies and the other to three regions. The elements of the vector of control variables in Z for the 16-country sample were discussed in the previous section. The control variables for the region-specific sample are generally global because region-specific variables such as GDP growth, credit rating, openness are not available on a regional basis. They include an additional control variable related to global financial markets, the change in the spread between the 3-month Treasury bill rate and the 3-month LIBOR rate, what is known as the TED spread (ΔTEDSPREAD). This is considered to be a measure of the tightness of global credit conditions (see Chari et al., 2020) so that an increase in ΔTEDSPREAD is tantamount to a tightening of global credit conditions and is expected to have a negative effect on equity capital flows. As discussed in the following section, because the regional sample contains only three regions, it allows us to exploit the geographic dimension and test for geographic differences in the responsiveness of capital flows. Thus, regional data provide insights into possible differential effects across regions. To model this, we include in the estimation three indicator variables equal to 1 for each of the three regions and 0 otherwise. For regional data, we also estimate a version of Equation (4) that includes double interaction effects between DUMP (and DTAPER) and each of the three regional indicator variables. The following section presents the empirical results.

5 | EMPIRICAL RESULTS

5.1 | Results for 16 EM economies

We estimate, first, the model in Equation (3) with data on capital inflows to the 16 EMs listed previously. The results are in Table 2. We find support for the hypothesis that Fed asset growth has positive spillovers to EM equity capital flows. The effect is statistically significant and economically important: A one percentage point increase in asset growth increases capital flows by, on average, $2.1 million per month to each EM. Second, we also find support for the hypothesis that Fed AGS have a negative and significant effect on EM capital flows. This result is consistent with the finding of Koepke (2018) and Chari et al. (2020) that the surprise element of monetary policy plays an important role in capital flows dynamics. The economic size of the effect shows that a one-standard-deviation increase in Fed asset growth surprise reduces capital flows to EMs by about $11 million. In addition, ECB AGS are negatively and significantly related to EM capital flows. In terms of magnitude the effect is similar to that of the Fed: A one-standard-deviation increase in ECB asset growth surprise reduces capital flows to EMs by $9 million. The effects for BoJ asset growth or surprises are insignificant.

---

[17]To conserve space, the equivalent model in Equation (4) for the Fed is not reported. We note, however, that it includes two sets of interaction effects: between $\widehat{\Delta lnCBA}$, on the one hand and DUMP and DTAPER, on the other, as well as interaction effects between AGS and DUMP and DTAPER. In Section 5, we report two sets of coefficient estimates: (a) for the effects of asset growth and surprises after the start of QE and before the start of tapering and (b) for the effects of asset growth and surprises after the start of tapering.

TABLE 2   Equity capital inflows and central bank assets: Sixteen emerging markets

This table reports instrumental-variables fixed-effects estimates of the model in Equation (3) for the 16-country sample. The dependent variable is FLOW (net capital inflows to each country). $\widehat{\Delta \ln CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate (as described in Section 3.2). LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	FED	ECB	BoJ
$\widehat{\Delta \ln CBA}$	2.064 (2.06)**	−0.081 (−0.62)	−2.871 (−1.15)
AGS	−10.955 (−2.02)**	−8.715 (−3.03)***	8.509 (0.67)
LAGFLOW	0.644 (3.28)***	0.421 (2.45)**	0.421 (1.80)*
ΔVIX	−8.583 (−2.00)**	−8.286 (−1.93)*	−8.420 (−2.03)**
MRET	−0.791 (−0.75)	0.012 (0.01)	−0.062 (−0.05)
EPU	0.019 (0.07)	−0.095 (−0.64)	−0.230 (−0.64)
GDPGR	3.748 (1.96)**	2.707 (1.95)*	2.327 (2.21)**
OPENNESS	0.302 (1.34)	0.513 (1.32)	0.346 (1.19)
CR	−1.212 (−0.34)	−2.140 (−0.52)	−1.925 (−0.42)
Country effects	Yes	Yes	Yes
Observations	3,616	3,488	3,616
R^2	0.135	0.135	0.136

Concerning the control variables, the persistence coefficient is positive and significant for all central banks and highest for the Fed, consistent with the findings of Lim and Mohapatra (2016) and Koepke (2018). An increase in global financial market volatility, or the month-to-month change in the VIX index, by one point, reduces capital flows by, on average, $8 million to each EM. Moreover, a one percentage point increase in domestic GDP growth is associated with a $2–$4 million increase in capital flows. General economic policy uncertainty does not influence significantly capital inflows. The effects of central bank asset growth on EM equity capital flows are independent of general economic policy uncertainty during the period under consideration.

Next, we examine differences between the pre- and post-UMP periods by estimating the model in Equation (4). The results are in Table 3. For the UMO policy of the Fed, they confirm the main hypotheses of this paper. First, there are no spillover effects from Fed asset growth to equity flows before the start of UMP. There is, however, positive and significant spillover after the adoption of QE policies by the Fed: A 1% increase in Fed asset growth is, on average, associated with a $3.2 million monthly increase in equity flows to individual EMs. There is no evidence of spillovers after the start of tapering operations by the Fed. Second, AGS after the start of Fed QE operations are negatively and significantly related to net capital inflows: A one standard deviation increase in AGS reduces capital flows to individual EMs by, on average, $16.1 million per month; the effect of before the start of QE by the Fed is insignificant. Third, when it comes to the other two central banks, ECB and BoJ, there is no evidence of spillover effects. Fourth, regarding the control variables, the persistence coefficient is significant and

TABLE 3 Equity capital inflows and unconventional monetary policy: Sixteen emerging markets

This table reports instrumental-variables fixed-effects estimates of model in Equation (4) for the 16-country sample. The dependent variable is FLOW (net capital inflows to each country). $\widehat{\Delta \ln CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. PRE-UMP refers to the time period before adoption of unconventional monetary policy, POST-UMP refers to the time period after the unconventional monetary policy and POST-TAPER the time period after the Fed tapering operations. DUMP is an indicator variable that equals 1 after the adoption of unconventional monetary policy by a central bank (and 0 before) and DTAPER is an indicator variable that equals 1 after the start of tapering operations by the Fed (and 0 before). Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	FED	ECB	BoJ
DUMP	−22.715 (−0.82)	13.726 (0.51)	−5.481 (−0.25)
DTAPER	9.106 (0.38)		
$\widehat{\Delta \ln CBA}$: PRE-UMP	1.187 (0.87)	−0.244 (−1.42)	−0.223 (−0.55)
AGS: PRE-UMP	4.883 (0.31)	−4.069 (−1.29)	−1.747 (−0.35)
$\widehat{\Delta \ln CBA}$: POST-UMP	3.232 (1.97)**	7.414 (1.04)	−6.105 (−0.95)
AGS: POST-UMP	−16.140 (−2.60)**	−68.924 (−1.59)	9.576 (0.24)
$\widehat{\Delta \ln CBA}$: POST-TAPER	−33.877 (−1.49)		
AGS: POST-TAPER	106.542 (1.16)		
LAGFLOW	0.728 (3.21)***	0.518 (3.15)***	0.428 (1.71)*
ΔVIX	−8.895 (−2.03)	−8.834 (−2.05)**	−8.428 (−2.05)**
MRET	−1.120 (−1.31)**	−0.534 (−0.56)	−0.088 (−0.07)
EPU	0.192 (0.43)	−0.182 (−1.53)	−0.223 (−0.55)
GDPGR	4.201 (2.03)**	2.512 (2.03)**	1.910 (1.94)*
OPENNESS	0.329 (1.26)	0.464 (1.24)	0.371 (1.03)
CR	−0.302 (−0.18)	−1.981 (−0.55)	0.242 (0.08)
Country effects	Yes	Yes	Yes
Observations	3,616	3,488	3,616
R^2	0.136	0.137	0.137

highest for the Fed. Of the push (global) factors, an increase in the monthly change in VIX by one point reduces capital flows by, on average, $9 million to each EM, whereas changes in economic policy uncertainty are insignificant. Of the pull factors, an increase in the growth rate of GDP by one percentage point increases flows by $2–$4 million. The coefficient estimates for the two indicator variables (DUMP and DTAPER) are insignificant so that, after accounting for monetary policy and other push/pull factors, there is no evidence of changes in mean capital flows after the start of UMP. To sum up, we find evidence that UMP operations by the Fed had important spillovers for equity capital inflows to individual EMs: Increases in Fed asset growth

TABLE 4 Equity capital inflows and central bank assets: Emerging market regions

This table reports instrumental-variables fixed-effects estimates of the model in Equation (3) for the three-region sample. The dependent variable is FLOW (net capital inflows to each region). $\widehat{\Delta \ln CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	FED	ECB	BoJ
$\widehat{\Delta \ln CBA}$	16.759 (3.32)***	3.188 (2.20)**	−30.848 (−0.72)
AGS	−116.437 (−1.71)*	−49.773 (−1.35)	151.602 (0.74)
LAGFLOW	0.611 (3.64)***	0.538 (3.68)***	0.538 (2.82)***
ΔVIX	−95.356 (−1.68)*	−96.21 (−1.62)	−93.950 (−1.62)
ΔTEDSPREAD	−276.327 (−6.42)***	−485.204 (−3.62)***	−494.643 (−2.10)**
EPU	−0.795 (−0.85)	−1.376 (−1.01)	−1.495 (0.35)
Region effects	Yes	Yes	Yes
Observations	699	660	693
R^2	0.240	0.244	0.243

were funneled into higher capital inflows during the post-UMP period and largerAGSs had a dampening effect on capital inflows post-UMP.

5.2 | Results for three EM regions

Estimates of the model in Equation (3) for the three-region sample are in Table 4. The results are supportive of the conclusions from the 16-country sample. Fed and ECB asset growth has positive and significant spillovers to regional capital flows. The economic effect of the Fed is larger than that of the ECB: A one percentage point increase in Fed asset growth is associated with a $16.8 million monthly increase in regional EM capital flows and for ECB asset growth with a $3.2 increase. Moreover, Fed AGS have a negative effect on capital inflows: A one standard deviation is associated with a reduction in monthly flows of $116.4 million. There is no evidence of significant policy effects from BoJ asset growth/surprises on EM capital flows. The estimate of the persistence coefficient for the Fed is significant and roughly in line with that of the individual EM results in Table 2. The two factors that measure global financial market risk/liquidity are important. An increase in the month-to-month change in VIX by one point is associated with a reduction of $95 million, but the effect is (marginally) insignificant. Moreover, an increase in the month-to-month change in the TED spread by 0.1 percentage point is associated with a reduction in capital flows of $28–$49 million and the effect is significant (0.05 level). Economic policy uncertainty, on the contrary, plays no role in determining EM equity capital flows. In sum, global financial conditions are important drivers of regional equity capital flows.

TABLE 5 Equity capital inflows and unconventional monetary policy: Three emerging market regions

This table reports instrumental-variables fixed-effects estimates of the model in Equation (4) for the three-region sample. The dependent variable is FLOW (net capital inflows to each region). $\widehat{\Delta \ln CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. PRE-UMP refers to the time period before adoption of unconventional monetary policy, POST-UMP refers to the time period after the unconventional monetary policy and POST-TAPER the time period after the Fed tapering operations. Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	FED	ECB	BoJ
$\widehat{\Delta \ln CBA}$: PRE-UMP	13.324 (3.31)***	1.216 (2.18)**	17.227 (1.39)
AGS: PRE-UMP	−104.106 (−1.93)**	−12.099 (−0.61)	−59.650 (−0.76)
$\widehat{\Delta \ln CBA}$: POST-UMP	31.938 (1.77)*	98.864 (0.83)	−119.438 (−1.11)
AGS: POST-UMP	−142.981 (−1.57)	−627.155 (−1.39)	543.932 (1.13)
$\widehat{\Delta \ln CBA}$: POST-TAPER	−421.255 (−1.18)		
AGS: POST-TAPER	1,659.919 (1.28)		
LAGFLOW	0.597 (3.40)***	0.554 (3.70)***	0.506 (2.54)**
ΔVIX	−93.278 (−1.69)*	−98.642 (−1.60)	−92.312 (−1.64)
ΔTEDSPREAD	−215.836 (−3.03)***	−466.195 (−4.17)***	−493.146 (−2.09)**
EPU	−1.486 (−0.97)	−1.874 (−1.09)	−1.899 (−0.41)
Region effects	Yes	Yes	Yes
Observations	699	660	693
R^2	0.253	0.254	0.259

 Results from the estimation of Equation (4) that allows for the differential effects of monetary policies before and after the implementation of QE are in Table 5.[18] There are significant spillover effects from Fed asset growth to EM regional capital flows but the effect more than doubles after the start of UMP by the Fed ($13 million pre-UMP relative to $32 million post-UMP for every 1% growth in Fed assets). Fed AGS are negatively related to EM capital flows, but the effect is (marginally) insignificant in the post-UMP period. The evidence for positive spillovers from the other two central banks is very limited: There is a positive effect only for pre-UMP asset growth for the ECB and none for the BoJ. Finally, the estimates of the control variables are consistent with the previous discussion.

 We exploit the limited (three) cross-sectional dimension of the regional data to test the effects of UMP policies across geographic regions. We re-estimate Equation (4) including a second interaction effect between central bank asset growth (surprises) with time (pre- and post-UMP) and geographic region (Asia, LA and EMEA). The results are in Table 6.[19] They are consistent with our previous conclusions. First, there are significant spillovers from Fed asset growth to Asia and LA. Whereas the

---

[18]For the regional model, because of perfect multicollinearity between the geographic region indicator variables and the UMP indicator variables, it is not possible to estimate separate coefficients for the indicator variables DUMP and DTAPER.

[19]It is not possible to use the fixed effect methodology for the estimation of this model because of interaction effects with the three regional indicator variables. The estimation method is generalized two-stage least squares with instrumental variables.

TABLE 6 Equity capital inflows and unconventional monetary policy: Three EM regions and geographic effects

This table reports generalized two-stage instrumental variable estimates of model in Equation (4) for the three-region sample. The dependent variable is FLOW (net capital inflows to each region). $\Delta\widetilde{\ln CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. The model includes interaction effects between central bank asset growth (surprises) with time (pre- and post-UMP) and geographic region (Asia, Latin America and EMEA). Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level, *significant at the 0.10 level.

	FED	ECB	BoJ
$\widetilde{\Delta\ln CBA}$: PRE-UMP ASIA	−16.435 (−1.95)**	3.042 (2.45)***	38.976 (2.17)**
$\widetilde{\Delta\ln CBA}$: PRE-UMP EMEA	18.404 (1.46)	0.492 (0.37)	17.154 (1.10)
$\widetilde{\Delta\ln CBA}$: PRE-UMP LA	31.656 (3.30)***	0.113 (0.07)	−4.449 (−0.18)
AGS: PRE-UMP ASIA	−55.907 (−4.80)***	−85.224 (−3.29)***	−132.714 (−1.74)*
AGS: PRE-UMP EMEA	9.250 (0.79)	57.704 (2.06)**	−105.013 (−1.58)
AGS: PRE-UMP LA	−40.012 (−4.14)***	−8.775 (−0.19)	58.776 (0.53)
$\widetilde{\Delta\ln CBA}$: POST-UMP ASIA	89.929 (3.58)***	248.350 (2.22)**	−221.487 (−2.71)***
$\widetilde{\Delta\ln CBA}$: POST-UMP EMEA	−7.167 (−0.50)	10.229 (1.23)	−59.771 (−1.53)
$\widetilde{\Delta\ln CBA}$: POST-UMP LA	3.032 (0.25)	38.014 (2.96)***	−77.055 (−1.62)
AGS: POST-UMP ASIA	−327.796 (−8.95)***	−1,085.077 (−3.29)***	1,048.069 (4.89)***
AGS: POST-UMP EMEA	−2.861 (−0.10)	−248.668 (−2.27)***	236.701 (1.12)
AGS: POST-UMP LA	−113.105 (−11.91)***	−547.718 (−2.82)***	347.027 (1.34)
$\widetilde{\Delta\ln CBA}$: POST-TAPER ASIA	−856.313 (−3.64)***		
$\widetilde{\Delta\ln CBA}$: POST-TAPER EMEA	−154.893 (−3.20)***		
$\widetilde{\Delta\ln CBA}$: POST-TAPER LA	−221.426 (−1.82)*		
AGS: POST-TAPER ASIA	4,461.972 (16.34)***		
AGS: POST-TAPER EMEA	243.204 (0.77)		
AGS: POST-TAPER LA	245.923 (3.88)***		
LAGFLOW	0.608 (3.31)***	0.559 (3.98)***	0.506 (2.52)**
ΔVIX	−95.149 (−1.69)*	−101.275 (−1.56)	−92.312 (−1.63)
ΔTEDSPREAD	−272.197 (−4.24)***	−454.081 (−4.31)***	−493.146 (−2.08)**
EPU	−1.365 (−0.89)	−1.967 (−1.01)	−1.899 (−0.41)
Region effects	No	No	No
Observations	696	660	693
R^2	0.267	0.269	0.266

spillovers to Asia are negative pre-UMP, they are positive, significant and economically large (about $90 million) post-UMP. Second, Fed AGS are negatively related to capital flows to Asia and LA pre and post-UMP, but the effect is economically much larger during the post-UMP period. Third, after the start of tapering operations by the Fed, asset growth is negatively (and significantly) related to equity capital flows to all three regions (highest for Asia). This result can be interpreted as Fed monetary policy exerting negative spillovers on EMs capital flows after the start of tapering and is consistent with the oft-cited claim that Fed operations during the post-tapering period saw equity capital flow out of many EMs (e.g., Aizenman et al., 2016; Nechio, 2014).[20] In addition, our finding that the negative effect was the highest for the Asian region is in line with Eller et al. (2020) who show that Asia was strongly impacted by the unwinding of US monetary policy. Fourth, there are significant positive spillovers from ECB asset growth to Asia and LA post-UMP; the effect pre-UMP is insignificant for LA and EMEA and significant but very small in magnitude ($3 million) for Asia. ECB AGS are negatively and significantly related to equity flows post-UMP to all three regions. Finally, there is very limited evidence for spillovers from asset growth/surprises for the BoJ to Asia. This finding, however, must be seen critically in light of the consistently insignificant effects of BoJ policy on EM capital flows elsewhere in this paper. Estimates of the control variables are robust and consistent with previous results. In conclusion, there is evidence of positive spillover effects from Fed and ECB asset growth post-UMP primarily towards Asia and to a lesser extent LA and no evidence of spillovers to EMEA. AGS are negatively related to equity capital flows to Asia and LA and the effect is larger in magnitude for Asia.

5.3 | Are AGS asymmetric?

One of the important conclusions of this paper is that AGS are negatively related to equity capital flows, a finding consistent with the argument that foreign investors treat larger surprises as an indication of increased uncertainty surrounding the conduct of monetary policy and respond by reducing equity flows to EMs. A related question is whether investors treat positive and negative asset surprises in a similar manner or, alternatively, whether AGS are symmetric. In other words, do investors treat higher asset growth than that predicted by the autoregressive process similarly to lower asset growth than the predicted growth? To investigate this hypothesis, we estimate a modified version of the model in Equation (3) as follows:

$$\text{FLOW}_{i,t} = \alpha_i + \theta_1 \times \Delta\ln\tilde{C}BA_{k,t} + \theta_{\text{NEG}} \times \text{AGS}_{k,t} + (\theta_{\text{POS}} - \theta_{\text{NEG}}) \times \text{AGS}_{k,t} \times \text{DPOS}_{i,t}$$
$$+ \zeta \times Z_{i,t-1} + u_{i,t}. \tag{5}$$

In this model, DPOS is an indicator variable that takes the value 1 if the asset growth surprise is positive and is zero otherwise. The hypothesis of the symmetry/asymmetry of surprises is tantamount to a test of the significance of the estimate of the interaction term, that is, the estimate of $(\theta_{\text{POS}} - \theta_{\text{NEG}})$. Estimation results of Equation (5) for both the 16-country and three-region samples are in Table 7. There is no evidence of asymmetry: the hypothesis $\theta_{\text{POS}} = \theta_{\text{NEG}}$ cannot be rejected in any of the cases. Thus, the estimation of a single coefficient for positive and negative surprises in the

---

[20]The post-taper positive effect of AGS for Asia and LA may itself be surprising. It may be interpreted as investors' revising their expectations regarding Fed Policy following the start of tapering operations. This nonetheless is very tentative and must be seen in view of the consistently negative effect of AGS elsewhere.

TABLE 7 Equity capital inflows and central bank assets: Asymmetry of asset growth surprises

This table reports instrumental-variables fixed-effects estimates of model in Equation (5) for the 16-country and three-region samples. The dependent variable is FLOW. $\Delta ln\overline{CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. DPOS is an indicator variable that takes the value 1 if the asset growth surprise is positive and is zero otherwise. $(\hat{\theta}_{NEG} = \hat{\theta}_{POS})$ a test of asymmetry of asset growth surprises (AGS). Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	Sixteen EMs			Three EM Regions		
	FED	ECB	BoJ	FED	ECB	BoJ
$\Delta ln\overline{CBA}$	1.633 (1.67)*	−0.099 (−0.68)	−3.311(−1.34)	15.136 (3.94)***	3.124 (1.84)*	−31.094 (−0.72)
AGS × DPOS($\hat{\theta}_{NEG} = \hat{\theta}_{POS}$)	13.893 (1.36)	−5.583 (−0.59)	−20.698 (−1.37)	52.178 (0.60)	−22.269 (−0.25)	−22.938 (−0.45)
LAGFLOW	0.658 (3.36)***	0.407 (2.39)**	0.375 (1.57)	0.611 (3.65)***	0.536 (3.98)***	0.536 (2.81)***
ΔVIX	−8.875 (−2.01)**	−8.296 (−1.93)*	−8.290 (−2.02)**	−96.366 (−1.65)	−96.307 (−1.63)	−93.888 (−1.62)
MRET	−0.863 (−0.81)	0.066 (0.04)	0.083 (0.06)			
EPU	−0.028 (−0.11)	−0.097 (−0.64)	−0.254 (−0.71)	−0.996 (−0.78)	−1.383 (−1.04)	−1.519 (−0.35)
GDPGR	3.940 (1.98)**	2.657 (1.87)*	2.460 (2.19)**			
OPENNESS	0.287 (1.31)	0.518 (1.33)	0.368 (1.26)			
CR	−1.075 (−0.32)	−2.226 (−0.53)	−2.525 (−0.53)			
ΔTEDSPREAD				−286.126 (−6.02)***	−487.264 (−3.88)***	−497.979 (−2.10)**
Country or region effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,616	3,488	3,616	699	660	693
R^2	0.135	0.135	0.136	0.240	0.244	0.243

TABLE 8 Equity capital inflows and unconventional monetary policy: Restricted sample 16 emerging markets

This table reports instrumental-variables fixed-effects estimates for the 16-country sample for a restricted sample after the start of UMP (after 2008) by each of the three central banks. For the exact date of the start of UMP by each of the three central banks see the text. The dependent variable is FLOW (net capital inflows to each country). $\widehat{\Delta \ln CBA}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. POST TAPER refers to the time period after the Fed tapering operations. DTAPER is an indicator variable that equals 1 after the start of tapering operations by the Fed and 0 otherwise. Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	FED	ECB	BoJ
DTAPER	24.888 (0.51)		
$\widehat{\Delta \ln CBA}$: POST-UMP	3.356 (2.14)**	12.296 (2.45)**	−6.948 (−1.04)
AGS: POST-UMP	−20.736 (−2.80)***	−84.441 (−1.77)*	19.188 (0.47)
$\widehat{\Delta \ln CBA}$: POST-TAPER	−45.432 (−1.92)**		
AGS: POST-TAPER	102.434 (1.34)		
LAGFLOW	0.522 (2.51)**	0.263 (1.88)*	0.443 (2.38)**
ΔVIX	−12.073 (−1.72)*	−15.996 (−1.20)	−11.786 (−1.56)
MRET	1.294 (1.49)	−1.314 (−0.44)	0.645 (0.32)
EPU	0.072 (0.08)	−0.373 (−1.41)	−1.061 (−1.31)
GDPGR	9.872 (2.10)**	2.942 (0.36)	9.087 (1.51)
OPENNESS	0.278 (0.45)	4.311 (1.21)	−0.794 (−0.35)
CR	−7.685 (−1.14)	−37.344 (−0.36)	−14.184 (−1.18)
Country effects	Yes	Yes	Yes
Observation	1,776	560	1,408
R^2	0.159	0.062	0.153

previous tables appears justified. The remaining coefficient estimates are very similar to our previous results.

5.4 | Restricted sample with data after the start of UMP

Our sample covers the period April 1998–March 2018 to allow maximum time coverage consistent with data availability. As noted in Section 3.3, UMP operations by the three central banks begun at different points after October 2008 (the start of QE operations by the Fed). The empirical framework in Equation (4) allows us to use maximum data availability and obtain and compare estimates before and after the start of UMP operations. An interesting question, however, is to examine whether our hypotheses hold during the period when UMP was in operation by each of the three central banks. Thus, we estimate a specification akin to Equation (3) only for the period after the start of UMP

TABLE 9   Equity capital inflows and unconventional monetary policy: Restricted sample of three emerging market regions

This table reports instrumental variables fixed-effects estimates for the three-region sample for a restricted sample after the start of UMP (after 2008) by each of the three central banks. For the exact date of the start of UMP by each of the three central banks see the text. The dependent variable is FLOW (net capital inflows to each region). $\widehat{\Delta \ln \text{CBA}}$ is a measure of central bank asset growth that is net of the effects of changes in the policy rate. LAGFLOW is the lagged value of the dependent variable. The description of the other variables is in Table 1. POST-TAPER refers to the time period after the Fed tapering operations. Heteroskedastic and autocorrelation consistent t statistics in parentheses. ***Significant at the 0.01 level, **significant at the 0.05 level and *significant at the 0.10 level.

	FED	ECB	BoJ
$\widehat{\Delta \ln \text{CBA}}$: POST-UMP	66.434 (2.14)**	182.722 (1.11)	−122.541 (−0.93)
AGS: POST-UMP	−212.967 (−1.97)**	−857.729 (−1.52)	582.418 (0.92)
$\widehat{\Delta \ln \text{CBA}}$: POST-TAPER	−283.673 (−1.11)		
AGS: POST-TAPER	1,739.077 (1.34)		
LAGFLOW	0.700 (5.09)***	0.254 (10.08)***	0.547 (2.51)**
ΔVIX	−109.939 (−1.48)	−165.326 (−1.22)	−122.483 (−1.73)*
ΔTEDSPREAD	814.827 (1.54)	2,348.041 (5.11)***	1,130.589 (3.41)***
EPU	0.711 (0.90)	−1.055 (−0.57)	−6.417 (−0.61)
Region effects	Yes	Yes	Yes
Observations	339	111	270
R^2	0.325	0.305	0.326

operations by the three central banks, specifically after October 2008 (Fed), after March 2015 (ECB) and after October 2010 (BoJ).[21] Thus, we provide estimates and hypotheses tests for only the period of UMP operations but at the cost of a substantially reduced time dimension for our sample.

    The results from the restricted sample are in Tables 8 and 9 for the 16 EMs and three EM regions, respectively. The results are completely consistent with our previous findings and provide additional support for our main hypotheses. Fed UMP policies after 2008 had statistically and economically significant spillovers on EM equity capital flows: A one percentage point increase in Fed asset growth increases capital flows by, on average, $3.4 million per month to each EM (Table 8). Second, Fed AGS are negatively and significantly related to EM equity capital flows: A one standard deviation increase in AGS reduces capital flows by, on average, $20.7 million per month to each EM. Both effects are similar to those for the complete sample in Table 3. Third, there is evidence of a reversal of Fed asset growth spillover effects after the start of tapering operations: Fed asset growth is negatively and significantly related to EM equity capital flows after tapering. This reinforces the argument (see Section 5.2) that the start of Fed tapering operations was a significant event and marked a reversal when it comes to capital flow spillovers to EMs. Fourth, there is evidence of significant positive

---

[21]We estimate a model such as in Equation (3) for the ECB and BoJ. For the Fed, the model includes an interaction effect with an indicator variable that denotes the start of tapering operations by the Fed in June 2013. Thus, the model estimated for the Fed is akin to that in Equation (4) where the indicator variable now equals 1 for the period after June 2013 and is equal to zero for the period October 2008–May 2013.

spillover effects from ECB asset growth and negative effects from ECB AGS. There is no evidence of spillover effects from the BoJ. Finally, the results from the three EM-region sample (Table 9) reinforce the significant spillover effects from Fed asset growth and negative effects from Fed AGS. In sum, the main conclusions from our hypotheses tests find strong supporting evidence from a restricted sample that includes only the period of UMP operations by the three central banks.

5.5 | Robustness tests

We conducted several checks on the robustness of our results. First, along with other studies including Lim and Mohapatra (2016) and Koepke (2018), our dependent variable is measured as capital flows to EMs in absolute (dollar) amount. Several studies measure capital flows in relation to economic size (GDP) (e.g., Chari et al., 2020) or assets under management of receiving country (e.g., Li et al., 2018). We have chosen the absolute amount of capital flows for two reasons. Our basic hypotheses relate to how the expansion of central bank assets influences global liquidity and its concomitant effects on EM capital flows. We believe a measure of absolute (dollar) flows is closer to the spirit of the global liquidity hypothesis. Second, the fixed-effects estimation method captures idiosyncratic country effects such as differences in economic size. Nonetheless, we conducted a robustness check with FLOW/GDP as our dependent variable and the results are similar (all robustness check results are available upon request).

Second, we use alternative criteria to choose the autoregressive lag length in Equation (2). Instead of the AIC criterion, we use (i) the Schwarz Bayesian Information, (ii) the same lag length and (3) for all central banks. The results are qualitatively identical and quantitatively very similar. Third, in the estimation of the model for the 16-country sample, we included two additional domestic (pull) control variables: The domestic discount rate and the rate of appreciation/depreciation of the domestic currency. The discount rate is an indicator of domestic monetary conditions in place of market-based short-term interest rates that are not available for most EMs for the sample duration. The rate of domestic currency appreciation/depreciation is measured as the logarithmic first difference of the nominal effective exchange rate of each EM.[22] As a global variable, we considered a global economic policy uncertainty index in place of the specific policy uncertainty indicators. The results are qualitatively the same and quantitatively very similar to those reported in the text.

6 | SUMMARY AND CONCLUSION

The theme of this paper is the link between the monetary policies pursued by the major central banks and flows of equity capital to EMs by global investment funds. This has become an important topic in global finance following the onset of the financial crisis and the adoption of unconventional policies by central banks. Focusing on capital flows by investment funds, we examine how global investors respond to the central bank policies. Specifically, we look at two aspects of monetary policy. First, the accumulation of assets by central banks and the related hypothesis that the rapid rate of accumulation since the advent of UMP has boosted global liquidity and that EM equity markets have been

---

[22]The data for the nominal effective exchange rate of each of the EMs are from the Bruegel database at https://www.bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/

recipients of the increased global liquidity as global investors sought higher returns. The second aspect of monetary policy concerns surprises in the asset accumulation by central banks.

We test these hypotheses with a monthly panel data set on equity capital flows by global investment funds from April 1998 to March 2018. We work with two data sets, at the individual country and regional level. The length of time-series data allows us to estimate the differential effects of central bank policy before and after the adoption of unconventional measures by the three banks. Thus, we are able to provide answers to the empirical questions central to this paper.

Several conclusions emerge from our empirical analysis. First, global investors in EMs respond to the monetary policy pursued by the Fed and to a lesser extent the ECB. There is no evidence of capital flow responsiveness to the monetary policy of the BoJ. Second, investor responsiveness concerns two aspects of central bank policy: (i) The accumulation of assets by central banks, especially evident during the QE period through direct purchases of government bonds and (ii) surprises to the growth of assets. Third, we test two concomitant hypotheses: (i) higher central bank asset growth has spilled over into higher net capital flows to EMs and (ii) greater surprises regarding the growth of central bank assets have a negative effect on EMs capital flows. We find consistent support for both hypotheses in the case of the Fed and the results are economically significant. This result is conditioned on the inclusion of a general policy uncertainty index so that our measure of AGS does not stand in for general policy uncertainty. The evidence on both hypotheses for the ECB is mixed. Fourth, we document a heterogeneous pattern of spillover effects across EM geographic regions: (i) positive effects from Fed and ECB asset growth post-UMP primarily towards Asia and (ii) Fed and ECB AGS negatively related to equity capital flows to Asia and LA and the effect for Asia is larger. In summary, our paper shows that unconventional monetary policies pursued by the Fed and to a lesser extent the ECB have been significant factors in the allocation of equity capital flows to EMs by global investment funds.

REFERENCES

Ahmed, S., & Zlate, A. (2014). Capital flows to emerging market economies: A brave new world? *Journal of International Money and Finance*, *48*, 221–248. https://doi.org/10.1016/j.jimonfin.2014.05.015

Aizenman, J., Binici, M., & Hutchison, M. M. (2016). The transmission of Federal Reserve tapering news to emerging financial markets. *International Journal of Central Banking*, *12*, 317–356.

Almeida, H., Cunha, I., Ferreira, M. A., & Restrepo, F. (2017). The real effects of credit ratings: The sovereign ceiling channel. *The Journal of Finance*, *72*(1), 249–290. https://doi.org/10.1111/jofi.12434

Anaya, P., Hachula, M., & Offermanns, C. J. (2017). Spillovers of US unconventional monetary policy to emerging markets: The role of capital flows. *Journal of International Money and Finance*, *73*, 275–295. https://doi.org/10.1016/j.jimonfin.2017.02.008

Andreou, C. K., Lambertides, N., & Savvides, A. (2020). Sovereign credit risk and global equity fund returns in emerging markets. *Journal of International Money and Finance*, *107*, 102218. https://doi.org/10.1016/j.jimonfin.2020.102218

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, *131*(4), 1593–1636. https://doi.org/10.1093/qje/qjw024

Bathia, D., Bouras, C., Demirer, R., & Gupta, R. (2020). Cross-border capital flows and return dynamics in emerging stock markets: Relative roles of equity and debt flows. *Journal of International Money and Finance*, *109*, 102258. https://doi.org/10.1016/j.jimonfin.2020.102258

Bauer, M., & Rudebusch, G. (2014). The signaling channel for Federal Reserve bond purchases. *International Journal of Central Banking*, *10*, 233–289.

Bowman, D., Londono, J. M., & Sapriza, H. (2015). US unconventional monetary policy and transmission to emerging market economies. *Journal of International Money and Finance*, *55*, 27–59. https://doi.org/10.1016/j.jimonfin.2015.02.016

Broto, C., Díaz-Cassou, J., & Erce, A. (2011). Measuring and explaining the volatility of capital flows to emerging countries. *Journal of Banking & Finance*, *35*(8), 1941–1953. https://doi.org/10.1016/j.jbankfin.2011.01.004

Calvo, G. A., Leiderman, L., & Reinhart, C. M. (1996). Inflows of capital to developing countries in the 1990s. *Journal of Economic Perspectives*, *10*(2), 123–139. https://doi.org/10.1257/jep.10.2.123

Chari, A., Stedman, K. D., & Lundblad, C. (2020). Taper tantrums: Quantitative easing, its aftermath, and emerging market capital flows. *The Review of Financial Studies*, *34*(3), 1445–1508. https://doi.org/10.1093/rfs/hhaa044

Chow, G. C., & Lin, A. L. (1971). Best linear unbiased interpolation, distribution, and extrapolation of time series by related series. *The Review of Economics and Statistics*, *53*, 372–375. https://doi.org/10.2307/1928739

Contessi, S., de Pace, P., & Francis, J. L. (2013). The cyclical properties of disaggregated capital flows. *Journal of International Money and Finance*, *32*, 528–555. https://doi.org/10.1016/j.jimonfin.2012.05.023

Dahlhaus, T., & Vasishtha, G. (2020). Monetary policy news in the US: Effects on emerging market capital flows. *Journal of International Money and Finance*, *109*, 102251. https://doi.org/10.1016/j.jimonfin.2020.102251

Dilts-Stedman, K. (2019). *Unconventional monetary policy, (A) Synchronicity and the yield curve*. SSRN.

Edison, H. J., & Warnock, F. E. (2008). Cross-border listings, capital controls, and equity flows to emerging markets. *Journal of International Money and Finance*, *27*(6), 1013–1027. https://doi.org/10.1016/j.jimonfin.2008.05.001

Edwards, S. (1983). Floating exchange rates, expectations and new information. *Journal of Monetary Economics*, *11*, 321–336. https://doi.org/10.1016/0304-3932(83)90022-3

Eichengreen, B., & Gupta, P. (2015). Tapering talk: The impact of expectations of reduced Federal Reserve security purchases on emerging markets. *Emerging Markets Review*, *25*, 1–15.

Eller, M., Huber, F., & Schuberth, H. (2020). How important are global factors for understanding the dynamics of international capital flows? *Journal of International Money and Finance*, *109*, 102221. https://doi.org/10.1016/j.jimonfin.2020.102221

Fernandez-Arias, E. (1996). The new wave of private capital inflows: Push or pull? *Journal of Development Economics*, *48*(2), 389–418. https://doi.org/10.1016/0304-3878(95)00041-0

Forbes, K. J., & Warnock, F. E. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of international economics*, *88*(2), 235–251. https://doi.org/10.1016/j.jinteco.2012.03.006

Fratzscher, M., Lo Duca, M., & Straub, R. (2016). ECB unconventional monetary policy: Market impact and international spillovers. *IMF Economic Review*, *64*(1), 36–74. https://doi.org/10.1057/imfer.2016.5

Fratzscher, M., Lo Duca, M., & Straub, R. (2018). On the international spillovers of US quantitative easing. *The Economic Journal*, *128*(608), 330–377. https://doi.org/10.1111/ecoj.12435

Gambacorta, L., Hofmann, B., & Peersman, G. (2014). The effectiveness of unconventional monetary policy at the zero lower bound: A cross-country analysis. *Journal of Money, Credit and Banking*, *46*(4), 615–642. https://doi.org/10.1111/jmcb.12119

Gamboa-Estrada, F. (2020). The determinants of private capital flows in emerging economies: The role of the Fed's unconventional monetary policy. *Contemporary Economic Policy*, *38*, 694–710. https://doi.org/10.1111/coep.12474

Gande, A., & Parsley, D. C. (2014, June 4). *Sovereign credit ratings, transparency and international portfolio flows* (HKIMR) Working Paper no. 12/2014, Vanderbilt Owen Graduate School of Management Research Paper no. 2445765). Available at SSRN https://ssrn.com/abstract=2445765 or https://doi.org/10.2139/ssrn.2445765

Ghosh, A. R., Ostry, J. D., & Qureshi, M. S. (2017, March). *Managing the tide: How do emerging markets respond to capital flows?* (IMF Working Paper WP/17/69). Washington, DC.

Ghosh, A. R., Qureshi, M. S., Kim, J. I., & Zalduendo, J. (2014). Surges. *Journal of International Economics*, *92*(2), 266–285. https://doi.org/10.1016/j.jinteco.2013.12.007

Gospodinov, N., & Jamali, I. (2018). Monetary policy uncertainty, positions of traders and changes in commodity futures prices. *European Financial Management*, *24*, 239–260. https://doi.org/10.1111/eufm.12150

Hillier, D., & Loncan, T. (2019). Stock market integration, cost of equity capital, and corporate investment: Evidence from Brazil. *European Financial Management*, *25*(1), 181–206. https://doi.org/10.1111/eufm.12147

Hoffman, D. L., & Schlagenhauf, D. E. (1985). The impact of news and alternative theories of exchange rate determination. *Journal of Money, Credit and Banking*, *17*(3), 328–346. https://doi.org/10.2307/1992628

Joyce, M., Miles, D., Scott, A., & Vayanos, D. (2012). Quantitative easing and unconventional monetary policy— An introduction. *The Economic Journal*, *122*(564), F271–F288. https://doi.org/10.1111/j.1468-0297.2012.02551.x

Julio, B., & Yook, Y. (2016). Policy uncertainty, irreversibility, and cross-border flows of capital. *Journal of International Economics*, *103*, 13–26. https://doi.org/10.1016/j.jinteco.2016.08.004

Kiendrebeogo, Y. (2016). Unconventional monetary policy and capital flows. *Economic Modelling*, *54*, 412–424. https://doi.org/10.1016/j.econmod.2016.01.008

Kim, S. J., & Wu, E. (2008). Sovereign credit ratings, capital flows and financial sector development in emerging markets. *Emerging Markets Review*, *9*(1), 17–39. https://doi.org/10.1016/j.ememar.2007.06.001

Kiviaho, J., Nikkinen, J., Piljak, V., & Rothovius, T. (2014). The co-movement dynamics of European frontier stock markets. *European Financial Management*, *20*(3), 574–595. https://doi.org/10.1111/j.1468-036X.2012.00646.x

Koepke, R. (2018). Fed policy expectations and portfolio flows to emerging markets. *Journal of International Financial Markets, Institutions and Money*, *55*, 170–194. https://doi.org/10.1016/j.intfin.2018.03.003

Krippner, L. (2013). Measuring the stance of monetary policy in zero policy lower bound environments. *Economics Letters*, *118*, 135–138. https://doi.org/10.1016/j.econlet.2012.10.011

Lalancette, S., & Simonato, J.-G. (2017). The role of the conditional skewness and kurtosis in VIX Index valuation. *European Financial Management*, *23*(2), 325–354. https://doi.org/10.1111/eufm.12096

Li, S., de Haan, J., & Scholtens, B. (2018). Surges of international fund flows. *Journal of International Money and Finance*, *82*, 97–119. https://doi.org/10.1016/j.jimonfin.2018.01.002

Lim, J. J., & Mohapatra, S. (2016). Quantitative easing and the post-crisis surge in financial flows to developing countries. *Journal of International Money and Finance*, *68*, 331–357. https://doi.org/10.1016/j.jimonfin.2016.02.009

Maddala, G. S., & Lahiri, K. (2009). *Introduction to econometrics* (4th ed.). Wiley.

Molyneux, P., Reghezza, A., Torriero, C., & Williams, J. (2021). Banks' noninterest income and securities holdings in a low interest rate environment: The case of Italy. *European Financial Management*, *27*(1), 98–119. https://doi.org/10.1111/eufm.12268

Nechio, F. (2014). Fed tapering news and emerging markets. *FRBSF Economic Letter*, *6*, 2014–06.

Raddatz, C., & Schmukler, S. L. (2012). On the international transmission of shocks: Micro-evidence from mutual fund portfolios. *Journal of International Economics*, *88*(2), 357–374. https://doi.org/10.1016/j.jinteco.2012.05.006

Rey, H. (2015, May). *Dilemma not trilemma: The global financial cycle and monetary policy independence* (NBER Working Paper No. 21162). Washington, DC. https://doi.org/10.3386/w21162

Tillmann, P. (2016). Unconventional monetary policy and the spillovers to emerging markets. *Journal of International Money and Finance*, *66*, 136–156. https://doi.org/10.1016/j.jimonfin.2015.12.010

Wang, M. C., & Shih, F. M. (2013). Time-varying world and regional integration in emerging European equity markets. *European Financial Management*, *19*(4), 703–729. https://doi.org/10.1111/j.1468-036X.2011.00623.x

Wheatley, J. (2021, January 22). Emerging markets attract $17bn of inflows in the first three weeks of 2021. Financial Times. https://www.ft.com/content/f9b94ac9-1df1-4d89-b129-5b30ff98e715

Wheatley, J., & Kynge, J. (2016, August 7). EM investing: Why it is back in fashion. Financial Times. https://www.ft.com/content/6c04a842-55ad-11e6-9664-e0bdc13c3bef

Wu, J. C., & Xia, F. D. (2016). Measuring the macroeconomic impact of monetary policy at the zero lower bound. *Journal of Money, Credit and Banking*, *48*(2–3), 253–291. https://doi.org/10.1111/jmcb.12300

Wu, J. C., & Zhang, J. (2019). Global effective lower bound and unconventional monetary policy. *Journal of International Economics*, *118*, 200–216. https://doi.org/10.1016/j.jinteco.2019.01.016

APPENDIX A1

Capital flows to individual countries ($ million)—Descriptive statistics

This table reports descriptive statistics for net equity capital flows for each individual emerging market included in the study.

	Mean	Median	Standard deviation	Maximum	Minimum
Brazil	23.303	−2.940	380.462	2,045.480	−1,011.990
Chile	0.525	−0.010	26.634	183.310	−64.070
China	−61.383	4.990	1,359.281	5,061.270	−8,316.960
Czech Republic	−0.492	−0.035	11.295	51.450	−130.790
Egypt	−0.745	−0.150	6.573	34.710	−40.930
India	183.835	5.580	630.587	3,513.370	−1,103.530
Indonesia	−0.656	−0.905	80.728	516.800	−316.580
Malaysia	−3.778	−1.275	72.956	496.750	−338.290
Mexico	−32.543	−4.685	189.686	1,073.360	−722.380
Philippines	0.726	−0.240	29.435	271.890	−109.480
Russia	22.978	−0.305	349.518	1,440.330	−1,471.430
South Africa	−5.762	−0.640	45.106	239.350	−196.350
South Korea	26.969	−0.895	461.384	3,567.330	−1,491.360
Taiwan	−5.154	−3.625	366.875	3,279.020	−1,289.970
Thailand	2.153	−2.490	135.646	794.830	−412.300
Turkey	0.233	−0.040	80.026	539.780	−407.780