International Capital Flows and Unconventional Monetary Policy*

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Abstract

This paper analyzes the relationship between international capital flows and the unconventional monetary policies implemented by the Federal Reserve, Bank of England, European Central Bank, and Bank of Japan since the start of the Global Financial Crisis. We use daily fund flow data provided by Emerging Portfolio Fund Research (EPFR) and measures of monetary policy shocks from Rogers *et al* (2014, 2015), which allows us to examine the asymmetric effects of both policy easings as well as announcements which are less accommodative than expected. We use both standard measures of flows as well as a measure of active portfolio reallocation discussed in Tille and van Wincoop (2010) and Ahmed *et al* (2015). We find that monetary policy easings are generally associated with inflows into developed market funds, particularly equity funds. Interestingly, we do not find much evidence that quantitative easing by any of the developed central banks has caused a reallocation toward EM assets. That said, our analysis of the asymmetric investor response to easing and tightening suggest that investors may still shift their portfolios out of EM funds when monetary policy accommodation is finally removed.

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1. Introduction

The relationship between international capital flows and the unconventional monetary policies implemented by the major central banks over the past decade is an important and open question. In this paper we analyze this relationship with a simple and straightforward methodology. We zoom in to the question of whether unconventional monetary policy has an impact on international capital flows and whether this impact is symmetric, a question that is of particular interest in a time when some of those major central banks are getting ready to increase policy rates and others are still implementing unconventional policies. Our task is more modest than studying the determinants of capital flows more generally, such as in Ahmed and Zlate (2013) who consider possible causes of quarterly private capital inflows to individual emerging market economies. However, in another dimension, this is a significant effort because we analyze the impact of the policies of all the major central banks, namely the Federal Reserve (Fed), the Bank of England (BOE), the European Central Bank (ECB), and the Bank of Japan (BOJ).

As yet, there is still no consensus on whether unconventional monetary policy has resulted in excess inflow into the asset markets of emerging economies. Unconventional monetary policy works through several channels, several of which have implications for capital flows. In the *portfolio balance channel*, purchases of long-term bonds by the central bank compress the term premium, which drives up demand for substitute risky assets such as emerging market equities (Gagnon et al. 2010; D'Amico and King 2010; Hamilton and Wu 2012). The central bank is then committed to keep the prices of these assets elevated, which is a *signaling channel* through which investors take these purchases as a commitment to keep yields low, a ripe environment to boost carry-induced demand for emerging market bonds and equity.[1] In addition there is the *confidence channel*, whereby an easing announcement by a central bank is interpreted as a commitment to do "whatever it takes" to support growth, which will draw investment to the country. Other channels discussed in the literature which more directly affect banking flows or asset prices, and multiple channels may play interact simultaneously[2].

To offer a new perspective on the effect of unconventional monetary policy on financial flows, we use a state-of-the-art methodology and carefully constructed data to shed light on a topic

[1] Bauer and Rudebusch (2013b) stress the importance of the signaling channel for Federal Reserve announcements since 2008, and show that this channel was as important as the portfolio balance channel.
[2] Fratzscher, Lo Duca and Straub (2013), Chen et al. (2012), Kozicki, Santor and Suchanek (2011), and Santor and Suchanek (2013) provide summaries of the various channels of transmission.

that has been on the minds of both researches and policy makers, that is, whether unconventional policies in the advanced economies have created substantial capital movements across countries. In addition, a novelty of the analysis is to investigate whether monetary policy easings have a different impact than policy tightening on capital flows, an issue that will become important as the these central banks begin to lift rates.

We utilize fund flow data provided by Emerging Portfolio Fund Research (EPFR), as is the case in a portion of the literature because of the availability of daily data. Fratzscher *et al* (2014), for example, use fund-level daily bond and equity flow data from EPFR to study the effect of unconventional monetary policy announcements and operations by the Federal Reserve on asset prices and portfolio allocations for a set of individual countries. In related work, Koepke (2014) utilizes monthly equity and bond fund flow data obtained from EPFR to study the effect of market expectations of future Fed monetary policy moves on portfolio allocations to emerging markets. We use four daily aggregates constructed from net flows and total assets of country-dedicated funds: developed market (DM) bond funds, DM equity funds, emerging market (EM) bond funds, and EM equity funds. We restrict our analysis to regional or country-dedicated funds because country allocations for multi-country funds are only available at a monthly frequency.

We use both the traditional flow measures in the literature and also a portfolio-based measure discussed in Tille and van Wincoop (2010) and Ahmed *et al* (2015), which isolates active portfolio reallocations from passive portfolio growth and reallocations. Each of the channels through which monetary policy operates involves portfolio rebalancing, which is not accurately captured by looking at bilateral fund flows, or even a system of flows unless there is a control for financial wealth. This is because a sometimes sizable portion of flows can be attributed to allocation of new income across assets. For example, the financial wealth of U.S. residents steadily increased from about $40 trillion in 2007 to $63 trillion in 2014[3], and Ahmed *et al* (2015) estimate that allocation of growing wealth accounts for as much as 76% of U.S. investor flows to EM equities between 2011 and 2013. The active portfolio reallocation measure we employ in this paper allows us to control for increasing financial wealth, something not directly considered in related papers.

We use an event study technique in the analysis of capital flows and unconventional monetary policy similar to, among others, Chen et al. (2012) who examine the cross border impacts

[3] The Financial Account of the United States Z.1 report published by the Federal Reserve Board.

of quantitative easing on capital inflows to emerging economies. However, we 'augment' this analysis with the use of intradaily data in the measurement of monetary policy shocks (Rogers et al., 2014 and 2015). This is in contrast to other studies which generally use indicator dummies on policy announcement dates to capture the announcement effect. It also allows us to identify and analyze the effects of announcements which are less accommodative than expected, which could provide some insights into the effect of the removal of monetary policy accommodation.

Our results suggest that when we use standard measures of flows and a symmetric model which does not allow for different effects of monetary policy easing and tightenings, flows do not appear to respond significantly to actions by the Fed or BOJ, and EM flows respond to actions by the BOE or ECB, albeit modestly. The results when we use an asymmetric model are intriguing, in that both surprise easings *and* tightenings result in increased flows into DM assets and out of EM assets. These results contrast with earlier work which finds that DM easing spurred flows into EM assets (see, for example, Cho and Rhee 2013 and Fratzscher *et al* 2013, Lim *et al* 2014) and that expectations of tighter Fed monetary policy are associated with relatively large outflows from EM assets (Koepke 2014). Taken together, the combination of outflows from EM assets and inflows into DM assets suggests that monetary policy easing is working through the confidence channel.

We get a somewhat different picture of investor response to monetary policy announcements when we examine active changes in portfolio allocations. Using this metric, it appears that investors appear to reallocate their portfolios toward DM equities and out of other asset types in response to DM central bank easings, including DM bonds. Once again, we observe that investor react in a similar manner to both monetary policy easings and tightenings. The picture becomes a bit clearer when we estimate the different phases of quantitative easing (QE) separately. During the first phase of QE, investors actively reallocated their portfolios from both DM and EM bonds to DM equities in response to easing. The only significant reactions to tightening occurred during QE3, when investors again reallocated from EM bonds to DM equities. In sum, it appears that DM equities were the main beneficiaries of unconventional monetary policy, and the improved relative growth prospects of DM economies may continue to pull investor funds into EM equities as policy normalizes.

Our lack of evidence in favor of increased flows to EM funds during monetary policy easings is consistent with Ahmed *et al* (2015). That study found that while on the surface it appears

that flows into EM assets increased coincident with DM easings, the increased EM flows were almost entirely the result of allocations of new savings rather than an active reallocation toward EM assets. Our results may differ from Fratzscher et al (2013), Burns et al. (2014), Koepke (2014), and others because of differences in the construction of the data sample, identification of monetary policy surprises, model setup, or some combination of these three factors.

The remainder of the paper is organized as follows: Section 2 describes the data, Section 3 outlines the model, Section 4 illustrates the results and Section 5 concludes.

2. Data

2.1 Monetary Policy Surprises

Monetary policy surprises are calculated using the technique introduced in Rogers *et al* (2014, 2015). The surprise is based on changes in government bond yields around monetary policy announcement times; specifically the change in yields from 15 minutes before the announcement, to 105 minutes after the announcement.[4] Our surprise data covers unconventional monetary policy announcements by Fed, the ECB, the BOE, and the BOJ. For Fed announcements, the monetary policy surprise (MPS) is the first principal component of the change in futures yields for 2-, 5-, 10- and 30-year Treasury futures. For the BOE and BOJ, it is the change in long gilt futures yields and 10-year JGB futures, respectively. Finally, for the ECB, the MPS is the intraday change in cash-market spreads between yields on Italian 10-year government bonds and their German counterparts. The MPS, shown in Figure 1, are normalized to lower 10-year government bond yields in the United States, the United Kingdom and Japan, and narrow the Italian-German spread by 25 basis points. The MPS are roughly equally split between positive and negative values, and are fairly variable which highlights a potential problem with using an indicator dummy as a proxy for monetary policy action.

Our sample period begins at start of the era of unconventional policy through September 2014; more precisely, the data starts in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Appendix Tables 1-4 list the dates of monetary policy meetings and other types of monetary policy actions undertaken by each central bank starting in

[4] This is the wide window from Rogers et al (2014), but results are similar using the narrow window [t-15 mins, t+1h 45mins].

October 2008. Other studies including Rogers *et al* (2014) find that QE effects vary depending on the type of policy action. So we separately identify (in bold) announcements associated with Large Scale Asset Purchase Programs (LSAPs), and for the U.S. the three phases of quantitative easing: the first phase (QE1) from 11/3/2008 to 6/30/2010, the second phase (QE2) from 11/1/2010 to 6/30/2011, and the ongoing continuation of the earlier policies (QE3).

2.2 Fund flows

Daily capital flows are provided by EPFR, which tracks flows, performance and asset allocation of equity and debt retail and institutional funds invested in over 130 developed and emerging markets covering $24 trillion in assets. For each reporting period (daily, monthly, or weekly) EPFR collects data that is also sent to government regulators and other data aggregators like Bloomberg and Morningstar. The data items include beginning of period assets, end of period assets, and the percentage change of the net asset value (NAV). Fund holdings represent between 5 and 25% of the float-adjusted market capitalization of individual equity markets. The fund sample is roughly evenly split between retail and institutional investors. Domiciles for most of the funds are in advanced countries, so the bulk of the flows in and out of emerging market funds are cross-border flows.

To gauge the effect of monetary policy changes on flows, we want to match as closely as possible the windows over which the surprise and flows are measured, so we use daily EPFR flows. We limit our analysis to flows into dedicated country or regional funds to get an accurate reading of the geography of EPFR daily flows.[5] Although EPFR provides flow information at the country level on a daily or weekly basis, for multi-country funds these country level flows are estimated based on country allocations reported by the fund for the previous month-end. Since we are interested in the effect of DM monetary policy on EM flows, it is important that we get the country allocation correct so we do not use flows reported by multi-country funds other than dedicated EM or DM bond or equity funds.[6]

[5] Although not always clear, related papers appear to use estimates of country-level daily flows from all funds, not just dedicated emerging market/developed market or country funds.

[6] For funds investing in multiple countries, there will be no inter-country reallocation between months. In other words, flows will be either into all countries or out of all countries in intermediate reporting periods. In the appendix we provide a comparison of aggregate NAV of the 4 series we are getting vs the total amount in EPFR, to see how much extra we would be getting if we did not limit the sample to the country dedicated funds

Table 1 provides summary statistics on our flow measures on the dates of monetary policy actions. We use four aggregates constructed from net flows and total assets of country-dedicated funds: DM bond funds, DM equity funds, EM bond funds, and EM equity funds.[7] The table summarizes the mean, median, and standard deviation of flows computed over each central bank's announcement days from Appendix Table 1, and also over days with no events. As mentioned earlier, we focus our analysis on flows during both the day of the announcement and the following day to capture reaction to monetary policy announcements that occur late in the day.[8]

Flows into developed and emerging funds exhibit quite different behaviors early in the sample period, as shown in Figure 2. The top panel shows the flows in levels (USD billions), while in the bottom panel flows are scaled by the fund net asset value (NAV). Investors pulled money out of DM equity funds in 2007 and 2008 as the U.S. financial crisis escalated, and these funds remained out of favor with investors until late 2012. Flows into DM bond funds recovered more quickly, in mid-2009, and grew steadily over the remainder of the sample period, as did flows into EM equity funds. Flows into EM bond funds picked up later in 2009.

Some of the growth in fund inflows observed in Figure 2 is because over our sample period EPFR significantly increased its fund coverage from about 2000 funds in 2005 to over 11,500 in 2014. To try to minimize the effect of this we also run our analysis using flows scaled by net asset value, and scaled by the number of funds in robustness checks.

3. Model

To assess the impact of unconventional monetary policy announcements on bond and equity flows, for each central bank, we use the following event-study regression:

$$F^{i,j}_{[t-1,t+1]} = \alpha + \beta^{i,j,b} MPS^b_t + \varepsilon^{i,j}_t \qquad (1)$$

where $F^{i}_{[t-1,t+1]}$ represents the flow measure in fund i= *equity, bonds* and j = *DM, EM, country* during the day of and the day following the time t announcement; and MPS^b_t is the monetary policy

[7] We thank EPFR for providing us with these fund aggregates.

[8] Indeed, this seems to be important for Federal Reserve announcements, as flows summed over the announcement and following day are noticeably more than double the flows on the announcement day, though the standard deviation of flows is so large the difference is not statistically significant. For announcements by the BOE and ECB, for some series the 2-day flows are noticeably less than twice the 1-day flows, suggesting that all the action is on the announcement day. The BOJ event day flows are too volatile to draw any conclusions. For non-event days, the 2-day flows are close to twice the 1-day flows, as would be expected.

surprise of central bank b = *Fed, ECB, BOE, BOJ* on day t (though the surprise, as explained in Section 2.1, is computed with intradaily data). We follow existing literature and use a two-day period for the flow data to give investors sufficient time to react and reallocate their investments given that announcements times vary across central banks, and Fed announcements are the last ones to occur during day t.[9] Daily flow data are as of close of business, 5pm EST; hence $F^{i}_{[t-1,t+1]}$ represents the cumulative inflows from close of business of the day before the announcement to close of business of day following the announcement. For robustness, we also compute the analysis using one-day flows.

A number of papers have investigated the possibility that the price impact of easing monetary policies might be different than that of tightening policies, both in the context of conventional monetary policy (Kuttner, 2001) and unconventional policy (Rogers et al, 2014) . To explore a potential asymmetric response of flows to monetary policies we estimate the regression:

$$F^{i,j}_{[t-1,t+1]} = \alpha + \beta_1^{i,j,b} MPS_t^b 1\left(MPS_t^b < 0\right) + \beta_2^{i.j,b} MPS_t^b \, 1\left(MPS_t^b > 0\right) + \varepsilon_t^{i,j}. \qquad (2)$$

The coefficients $\beta_1^{i,j,b}$ and $\beta_2^{i,j,b}$represent the impact of monetary policy surprises from central bank b on equity or bond flows (i) into developed or emerging economies (j). In particular, given the fact that we distinguish between tightening (MPS<0) and easing (MPS>0), a positive value of $\beta_1^{i,j,b}$ indicates that tighter policy is accompanied by outflows, while a positive value of $\beta_2^{i.j,b}$ indicates that monetary easing is accompanied by inflows. This analysis might offer interesting insights ahead of the removal of accommodative monetary policy.

We normalize monetary policy shocks to lower 10-year government bond yields in the United States, the United Kingdom and Japan, and the Italian-German spread by 25 basis points. The surprises are signed so that a positive surprise represents an easing of monetary policy. Because we are only interested in the impact of monetary policy surprises on capital flows, and not on all the determinants of flows, we do not include additional covariates. Following Rogers et al (2014), we estimate regressions by robust regression to avoid excessive influence of outliers.[10]

We use several alternative specification for flows. Following other literature we use both the level of flows and flows scaled by net asset value (NAV). Because of the growth in EPFR

[9] This is quite common in this literature, see Chen et al. (2012), Mishra et al. (2014).
[10] We use the robust regression M-estimator of Huber (1981) with the bisquare weighting function.

coverage over the sample period, in robustness checks we scale flows by the number of funds in the sample. Ideally we would also have a term in (1) and (2) representing expected flows. However, most specifications proposed in the literature have very little power at a daily frequency. Instead we run our model using the change in flows as an alternate dependent variable, which effectively uses the previous observation of the 2-day flow as a proxy for expected flows.

As discussed in the introduction, we also use a portfolio based flow measure. We treat our four fund series as a portfolio. To isolate the active change in weight, we back out the passive change in portfolio weight for each fund by scaling the portfolio weight of each fund in the previous period by the ratio of the return on the fund scaled by the return of the 4-fund portfolio, or:

$$A_{[t,t+1]}^{i,j} = w_{t+1}^{i,j} - w_t^{i,j} \frac{1+r_t^{i,j}}{1+r_t^{TOT}} \tag{3}$$

where:

$$w_t^{i,j} = \frac{NAV_t^{i,j}}{NAV_t^{TOT}} \tag{4}$$

where r^{TOT} is the return of each fund or portfolio, less net fund flows, and NAV is the net asset value of each fund, provided by EPFR. Appendix Table A6 provides summary statistics on the active change in portfolio weights.

4. Results

Our results suggest that the effect of monetary policy on capital flows is asymmetric across unexpected tightenings and easings, and differs across the different phases of U.S. quantitative easing.

4.1 Flow Regressions

Results from equation (1), where the positive and negative monetary policy surprises are pooled together, are shown in Table 2. Positive coefficients mean that fund inflows increase following monetary policy easing, and vice versa. The dependent variable is the 2-day total flows (top panel), 2-day change in flows (middle panel), and the 2-day change in the flows scaled by NAV (bottom panel), and the signs and significance of the coefficients are similar across the panels. Since the flows data exhibit a significant increasing trend, we focus on the results in the

middle and bottom panels. Monetary policy surprises are significant only for EM equity flows. Interestingly, BOE surprises are associated with increased outflows from EM equity funds, while ECB surprises are associated with inflows. The magnitudes are small, with inflows into EM equities increasing only slightly following 25 basis points of unexpected ECB easing. Flows do not appear to respond significantly to actions by the Fed or BOJ.

As suggested in other literature, we find the impact of tightening and easing is generally not symmetric. Table 3 reports the results of regression (2), where β_1 and β_2 measure the impact of policy tightenings and policy easings, respectively. A significantly positive (negative) value of β_1 indicates that monetary policy tightening is accompanied by outflows (inflows), and a significant positive (negative) value of β_2 indicates that a surprise easing announcement is accompanied by inflows (outflows). Results are shown for the same flow dependent variables as in Table 2.

Starting with monetary policy easing announcements (β_2), our results suggest that easing announcements were associated with an increase in net inflows to DM markets and outflows from EM markets. Inflows into DM equity funds increased following easing announcements by all four central banks, significantly so for BOJ announcements. Inflows into DM bond funds also picked up following ECB easing announcements. In contrast, EM equity funds recorded outflows following BOE easing announcements, and EM bond outflows amplified following similar actions by the ECB. Easing announcements by the Fed did not have a significant impact on flows.

Interestingly, overall we observe similar reactions to tightening announcements (β_1), though for the most part investors react to actions by a different mix of central banks. Flows into DM equities and DM bonds pick up following BOJ and BOE tightening announcements, respectively, and tightening announcements by the Fed are associated with outflows from EM bonds. In terms of economic magnitude, flows into EM equities were largest following BOJ announcements, increased by as much as 2 percent of NAV.

Taken together, the combination of outflows from EM assets and inflows into DM assets following easing suggests that monetary policy is working through the confidence channel, as actions by central banks increase investor willingness to invest in DM assets, and are accompanied by outflows from EM funds. These results seem to be at odds with a number of other papers suggesting that DM easing is responsible for significant inflows into EM equity funds. It is particularly notable that actions by the Fed are rarely significant, and are never associated with significant inflows into EM funds.

These results also raise the possibility of an asymmetric impact once DM central banks start to remove policy easing. Overall, investors appear to respond to tightenings in a manner similar to easings, suggesting that once again monetary policy might be working through a confidence channel. In this case, however, the explanation might be that investors interpret less accommodative monetary policy as a signal that central banks are optimistic about prospects for their economies, resulting in reallocations toward DM assets. Our results contrast with Koepke (2014), which finds that shifts in expectations towards easier Fed policy lead to greater inflows in foreign portfolios and expectation shifts toward tighter policy have an opposite, and larger effect.

4.2 Portfolio Allocation Regressions

We get a somewhat different picture of investor response to monetary policy announcements when we examine active changes in portfolio allocations. As shown in Table 4, the symmetric model suggests that investors reallocate their portfolios toward DM equities and out of other asset types in response to Fed and ECB actions. The shift toward EM equities in response to 25 basis points of Fed easing is very small – a change of less than 0.1 percent points. Intriguingly, the reverse is true for actions by the BOE and BOJ – investors reallocate *out* of DM equities in response to easier monetary policy.

Investor responses are more consistent across central banks when we use the asymmetric model, in Table 5. Investors appear to reallocate their portfolios toward DM equities and out of other asset types in response to Fed easings (β_2). Investors also reduce their allocations of DM bonds following BOJ easing, and EM equities following ECB easings.

Once again, we observe that investor react in a similar manner to both monetary policy easings and tightenings (β_2). Investors shift their allocation toward DM equities following actions by the Fed and BOJ (both easings and tightenings). In contrast, investors increase their allocation of DM bonds and decrease their allocations of EM equities following an ECB tightening. This is consistent with Burns et al. (2014), which estimates that EM inflows will decline in response to future policy normalization. None of the BOE actions are significant in the asymmetric model.

In contrast to the flow results, investors appear to actively reallocate their portfolio in response to Fed monetary policy actions. In this case, however, monetary policy does not appear to be acting through the confidence channel since a key feature is the expectation for policy makers to keep interest rates low (and bond prices high) for a sustained period of time, and we see evidence

of investors actively allocating away from DM bonds. As mentioned earlier, investors could be interpreting tighter policy as improved confidence in DM economies, which would spur investment in DM equities.

4.3 Sub-period analysis

The sub-period analysis sheds some light on our somewhat surprising results that showed inflows into DM equities during both surprise monetary easing and tightening. As shown in Table 6 some of these behaviors were limited to different parts of the sample period. During QE1, investors actively reallocated their portfolios from both DM and EM bonds to DM equities in response to easing. The only significant reactions to tightening occurred during QE3, when investors again reallocated from EM bonds to DM equities. Investors also reallocated from DM bonds to DM equities following LSAP easing announcements. These results are similar to other studies which identified differences in investor responses to QE1 and QE2, and with Fratzscher *et al* (2013) which found that easing pushed flows toward the United States, and in contrast to Cho and Rhee (2013) which found that easing, especially QE1, contributed to increased capital inflows to Asian assets. Unlike other papers, however, in Table 6 the magnitude of the coefficients for the QE and LSAP operations are very similar. This is in contrast to Fratzscher *et al* (2013), which finds that Fed unconventional policies had a larger effect on asset prices than on capital flows, and operations themselves had a more significant effect than the announcements of the operations.

Table 7 shows results over crisis and non-crisis sample periods. Crisis periods are defined a little differently across countries. For the U.S., England, and Japan the crisis period corresponds roughly with the global financial crisis between 9/1/2008 and 7/31/2009, while for the euro area, the crisis period is between 10/1/2009 and 12/31/2013. All dates not indicated as in the crisis period are considered non-crisis. Monetary policy announcements appear to have a greater impact on DM flows over the non-crisis period, especially for the ECB and the BOJ. This is probably not surprising as most of the boldest policy measures were taken following the global financial crisis. The only evidence of unconventional monetary policies affecting EM funds during the crisis periods, can be found following ECB measures. Both positive and negative ECB policy shocks are followed by and equally-sized outflows from EM equity funds. During the global financial crisis period, there is evidence of outflows from EM bond funds and EM equity funds following Fed and BOE tightening announcements, respectively.

4.4 Robustness checks

To check the validity of our results we run a similar analysis with one-day flows, weekly country-level flows, and replacing our MPS with a dummy indicator variable.

4.4.1 One-day flows

Table 8 shows results for the asymmetric model with one-day flows computed accounting for the active change in portfolio weights. These results are consistent with those shown in Table 5 for the two-day return. The main difference is a slight loss in significance and smaller coefficient estimates following Fed actions, in line with our idea that a two-day flow analysis would be better representative for the U.S. analysis where Fed announcements would occur toward the end of the one-day period.

4.4.2 Weekly flows

The results on weekly country level flows, in Table 9, are generally consistent with the other results. Flows into bond and equity funds in several advanced countries increase significantly following Fed easing, but the response of flows to EM countries is mixed – fund flows into Philippine equities increase, but Thai equities decrease. Response to other central bank actions is similarly difficult to interpret. A likely explanation is that additional controls are needed to isolate the effects of actions on flows at the weekly frequency.

4.4.2 Dummy indicator

For our last robustness check we replace the MPS with a dummy indicator variable equal to 1 whenever there is a monetary policy announcement, similar to other literature. This change no longer allows us to differentiate between tightenings and easings, as all monetary policy announcements and LSAPs will be modeled as an easing even if the announcement was less accommodative than expected and yields increased following the announcement.

The results in Tables 10 and 11 are striking and shed light on the difference between our results and others. DM central bank announcements are always associated with higher inflows into EM bonds, and also EM equities for Fed and BOE announcements. Fed announcements are also associated with retrenchment of flows into DM bonds and equities.

Consistent with our earlier analysis and Fratzscher *et al* (2013), Table 11 shows that the flows differed depending on the phase of QE: QE1 pulled flows into DM bond funds, QE2 pushed funds into EM bonds, and LSAPs are associated with increased flows into both DM and EM equities. This is in contrast with Table 6, which showed a reallocation from DM equities from DM bonds following a LSAP announcement. Further refinement of this analysis is needed to figure out exactly what is going on.

5. Conclusions

In this paper we find that the main effect of unconventional monetary policy by DM central banks was to increase investment allocations of DM equity funds and decrease allocations of DM bonds, EM bonds, and EM equities. This result differs from other studies which use EPFR data, possibly due to differences in construction of the data sample, identification of monetary policy surprises, model setup, or some combination of these three factors. Recent work by Ahmed et al (2015) suggests that a wealth effects might be responsible for most of the inflows into EM assets. This has the broad implication that the pro-cyclicality of flows to emerging economies documented by many authors is a wealth effect rather than a QE effect. Further work is needed to determine the exact cause of the differences between our results and other studies.

Although we do not find evidence of increased flows into EM assets during the period of unconventional monetary policy, these countries may not be insulated from negative spillovers once DM central banks begin to tighten. Although we find no evidence that there were excessive inflows into these countries that are waiting to be unwound, our tightening results suggest that investor allocations to DM assets could still increase as these economies continue to recover, putting downward pressure on EM asset prices and exchange rates.

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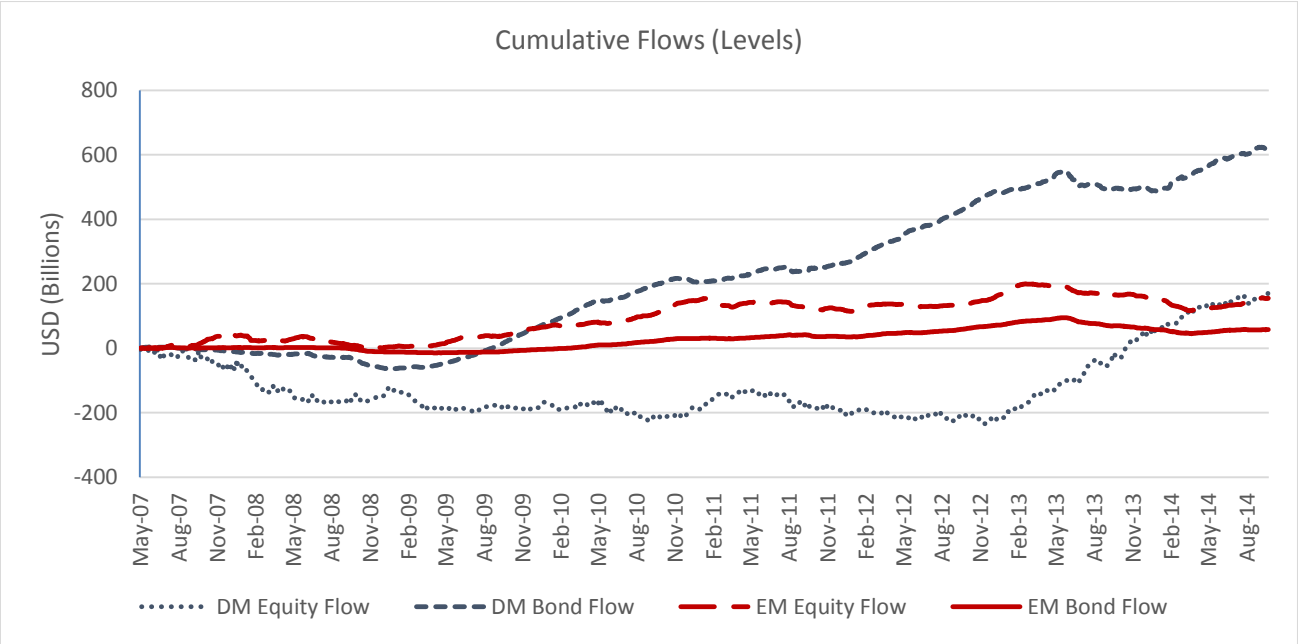
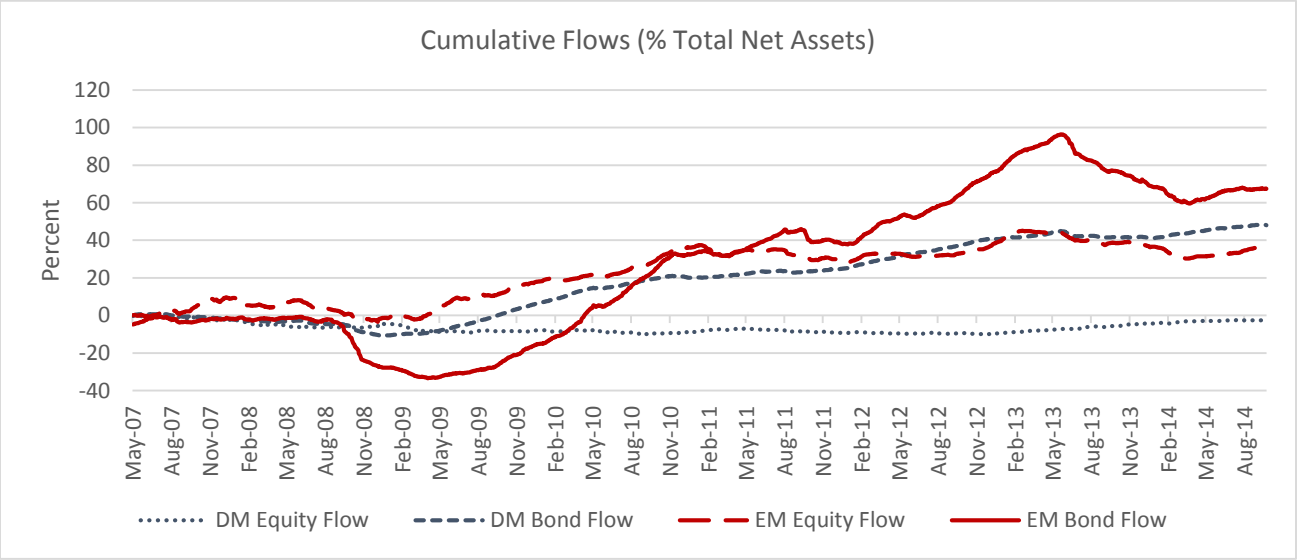
Figure 1: Monetary Policy Surprises

The monetary policy surprise (MPS) for Federal Reserve announcements, is the first principal component of the change in futures yields for 2-, 5-, 10- and 30-year Treasury futures; for the Bank of England and Bank of Japan, it is the change in long gilt futures yields and 10-year JGB futures, respectively; for the European Central Bank it is the intraday change in cash-market spreads between yields on Italian 10-year government bonds and their German counterparts. Monetary policy shocks are normalized to lower 10-year government bond yields in the United States, the United Kingdom and Japan, and narrow the Italian-German spread by 25 basis points.

Figure 2: Cumulative Fund Flows





Note: Series provided by EPFR and contain daily flows into regional or country dedicated funds. Sample starts on 5/4/2007 and ends on 9/26/2014.

Table 1: Summary Statistics

	One day			*Two Days*		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev
Non-Event Days: 1,314						
DM Equity	194.7	188.0	2,450.7	371.2	351.1	3,729.6
DM Bond	436.8	511.1	907.2	873.5	1,056.6	1,535.1
EM Equity	103.1	103.6	566.1	202.5	222.2	1,014.8
EM Bond	39.4	62.1	228.8	78.7	123.5	406.4
Fed Event Days: 58						
DM Equity	258.5	417.1	2,516.9	1,078.0	1,056.3	4,230.6
DM Bond	303.4	380.9	962.0	677.9	904.0	1,980.3
EM Equity	19.6	32.6	716.0	106.7	350.8	1,257.3
EM Bond	26.4	30.7	224.9	72.1	150.5	433.0
BOE Event Days: 79						
DM Equity	360.6	85.0	2,495.6	630.3	223.3	3,985.9
DM Bond	348.8	346.7	754.1	753.2	765.6	1,419.9
EM Equity	91.3	111.2	621.0	118.7	174.2	1,110.3
EM Bond	47.0	60.9	236.8	91.7	131.5	396.0
ECB Event Days: 97						
DM Equity	214.1	273.9	2,619.6	286.7	-46.1	3,927.3
DM Bond	320.0	329.8	906.0	555.2	586.6	1,574.7
EM Equity	62.4	43.4	627.3	114.0	174.2	1,171.9
EM Bond	48.0	21.0	208.2	86.1	96.7	369.5
BOJ Event Days: 110						
DM Equity	-1.8	-34.7	3,534.3	-106.7	-316.9	4,867.4
DM Bond	147.7	200.7	743.0	436.9	418.5	1,360.9
EM Equity	-12.5	33.9	640.6	49.7	68.5	1,222.7
EM Bond	31.7	35.8	187.1	62.5	81.5	366.7

The event days for each central bank are listed in Appendix tables 1-4.

Table 2: Results for Symmetric Model, Two-day Change in Flows

	Fed	BOE	ECB	BOJ
Dependent variable: 2-day flows				
DM Equity	20.4 (14.45)	-17.21 (21.14)	17.7* (9.32)	-49.67 (59.31)
DM Bond	-2.08 (6.31)	-7.44 (6.22)	-0.93 (2.98)	3.25 (16.42)
EM Equity	3.57 (3.76)	2.85 (5.86)	5.80** (2.53)	13.16 (14.85)
EM Bond	-0.54 (1.22)	-0.90 (2.14)	-0.79 (0.87)	0.11 (4.57)
Dependent variable: 2-day change in flows				
DM Equity	9.98 (15.64)	-5.75 (28.86)	9.1 (13.19)	-12.51 (74.24)
DM Bond	-2.03 (5.65)	-4.55 (5.95)	1.62 (2.59)	2.49 (13.1)
EM Equity	-1.08 (2.65)	-11.03*** (4.25)	4.55** (2.15)	-7.19 (12.27)
EM Bond	0.95 (0.95)	-0.10 (1.3)	0.57 (0.56)	-0.19 (2.73)
Dependent variable: 2-day change in flows/NAV				
DM Equity	0.00046 (0.00056)	-0.00009 (0.00091)	0.00033 (0.00044)	0.00137 (0.00252)
DM Bond	-0.00004 (0.00033)	-0.00036 (0.0004)	0.00012 (0.00021)	0.00041 (0.00111)
EM Equity	-0.00024 (0.00045)	-0.00259*** (0.00083)	0.00078* (0.00043)	-0.00104 (0.00253)
EM Bond	0.00095 (0.00081)	0.0004 (0.00125)	0.00038 (0.00056)	0.00249 (0.00297)

The table shows estimates of the variable β from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta^{i,j,b} MPS^b_t + \varepsilon^{i,j}_t$$

where $F^i_{[t-1,t+1]}$ represents either the flow or flow/NAV of fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS^b_t is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. Positive coefficients mean that fund inflows increase following monetary policy easing, and vice versa. The flows are in USD millions; the change in flows/NAV is in percent. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing. The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 3: Results for Asymmetric Model, Two-day Change in Flows

		Fed	BOE	ECB	BOJ
Dependent variable: 2-day change in flows					
DM Equity	β1	10.31 (40.25)	-37.98 (58.25)	4.52 (21.94)	-468.1*** (140.97)
	β2	9.48 (20.59)	10.84 (40.15)	12.82 (18.7)	280.35*** (103.52)
DM Bond	β1	16.15 (14.3)	-16.9 (12.1)	-2.82 (4.25)	41.02 (27.05)
	β2	-8.38 (7.32)	2.92 (8.34)	11.37*** (3.62)	-22.37 (19.87)
EM Equity	β1	-5.26 (6.83)	-7.23 (8.68)	4.27 (3.58)	-15.75 (24.89)
	β2	0.46 (3.49)	-18.26*** (5.98)	5.04* (3.05)	-3.22 (18.28)
EM Bond	β1	6.12** (2.37)	-0.14 (2.79)	0.87 (0.93)	-0.79 (5.64)
	β2	-0.52 (1.21)	-0.07 (1.92)	-4.42*** (0.79)	0.18 (4.14)
Dependent variable: 2-day change in flows/NAV					
DM Equity	β1	0.00008 (0.00146)	-0.00172 (0.00183)	0.00028 (0.00074)	-0.01964*** (0.00492)
	β2	0.00054 (0.00074)	0.00077 (0.00126)	0.00042 (0.00063)	0.01196*** (0.00361)
DM Bond	β1	0.0011 (0.00085)	-0.00162** (0.00078)	-0.00022 (0.00033)	0.00419* (0.0022)
	β2	-0.0007 (0.00044)	0.00059 (0.00054)	0.00068** (0.00028)	-0.00184 (0.00162)
EM Equity	β1	-0.00139 (0.00122)	-0.00193 (0.00168)	0.00067 (0.00071)	-0.00196 (0.0052)
	β2	0.0002 (0.00062)	-0.0036*** (0.00116)	0.00096 (0.00061)	-0.00075 (0.00382)
EM Bond	β1	0.0044** (0.00205)	-0.00107 (0.00257)	0.00094 (0.00091)	0.00537 (0.00609)
	β2	-0.00016 (0.00105)	0.00112 (0.00177)	-0.00343*** (0.00077)	0.00073 (0.00447)

The table shows estimates of the variables β_1 and β_2 from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta_1^{i,j,b} MPS_t^b 1\left(MPS_t^b < 0\right) + \beta_2^{i.j,b} MPS_t^b 1(MPS_t^b > 0) \ + \varepsilon_t^{i,j}$$

where $F^i_{[t-1,t+1]}$ represents either the flow or flow/NAV of fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS_t^b is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. The change in flows in USD millions; the change in flows/NAV is in percent. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing. A positive (negative) value of β_1 indicates that monetary tightening is accompanied by outflows (inflows), a positive (negative) value of β_2 indicates that monetary easing is accompanied by inflows (outflows). The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 4: Results for Symmetric Model, Two-day Active Change in Portfolio Weights

	Fed	BOE	ECB	BOJ
Dependent variable: 2-day active change in portfolio weights				
DM Equity	0.00034*** (0.00013)	-0.00037* (0.00022)	0.00016* (0.00009)	-0.00195*** (0.0006)
DM Bond	-0.00029*** (0.00011)	0.00017 (0.00014)	-0.00011* (0.00006)	0.00089** (0.00042)
EM Equity	-0.00001 (0.00006)	0.00021** (0.00009)	0.00002 (0.00005)	0.00062** (0.00026)
EM Bond	-0.00004* (0.00002)	-0.00003 (0.00003)	-0.00001 (0.00001)	0.00005 (0.00008)

The table shows estimates of the variable β from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta^{i,j,b} MPS^b_t + \varepsilon^{i,j}_t$$

where $F^i_{[t-1,t+1]}$ represents the 2-day active change in the portfolio weights for fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS^b_t is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. Positive coefficients mean that fund inflows increase following monetary policy easing, and vice versa. The active change in portfolio weights is calculated using equation (3) in the text, and converted to percent. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing.). The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 5: Results for Asymmetric Model, Two-day Active Change in Portfolio Weights

		Fed	BOE	ECB	BOJ
Dependent variable: 2-day active change in portfolio weights					
DM Equity	β1	-0.00067** (0.00029)	-0.00017 (0.00044)	0.00012 (0.00015)	-0.00473*** (0.00115)
	β2	0.00068*** (0.00015)	-0.00046 (0.0003)	0.00019 (0.00013)	0.00089 (0.00085)
DM Bond	β1	0.00041 (0.00026)	-0.00015 (0.00029)	-0.00021** (0.0001)	0.00319*** (0.00083)
	β2	-0.00052*** (0.00013)	0.00031 (0.0002)	-0.00005 (0.00009)	-0.00119* (0.00061)
EM Equity	β1	0.00015 (0.00016)	0.00029 (0.00019)	0.00014* (0.00008)	0.00072 (0.00053)
	β2	-0.00007 (0.00008)	0.00015 (0.00013)	-0.00012* (0.00007)	0.00054 (0.00039)
EM Bond	β1	0.00016*** (0.00005)	0.00002 (0.00007)	-0.00001 (0.00002)	0.0004** (0.00016)
	β2	-0.00007*** (0.00002)	-0.00005 (0.00005)	-0.00001 (0.00002)	-0.00009 (0.00012)

The table shows estimates of the variables β_1 and β_2 from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta_1^{i,j,b} MPS_t^b 1\left(MPS_t^b < 0\right) + \beta_2^{i.j,b} MPS_t^b 1(MPS_t^b > 0) \ + \varepsilon_t^{i,j}$$

where $F^{i}_{[t-1,t+1]}$ represents the 2-day active change in the portfolio weights for fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS_t^b is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. The active change in portfolio weights is calculated using equation (3) in the text, and converted to percent. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing. A positive value of β_1 indicates that monetary tightening is accompanied by outflows, a positive value of β_2 indicates that monetary easing is accompanied by inflows. The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 6: Results for Asymmetric Model, Federal Reserve Actions During QE and LSAPs

		QE1	QE2	QE3	LSAP
Dependent variable: 2-day active change in portfolio weights					
DM Equity	β1	0.00023 (0.00072)	-0.00085 (0.00438)	-0.00067* (0.00037)	-0.00062 (0.00038)
	β2	0.0007*** (0.00021)	-0.00129 (0.003)	0.00085** (0.00037)	0.00067*** (0.00015)
DM Bond	β1	-0.00029 (0.00077)	0.00012 (0.00353)	0.00035 (0.00032)	0.00036 (0.0003)
	β2	-0.00058*** (0.00022)	0.00062 (0.00242)	-0.00056* (0.00032)	-0.00051*** (0.00012)
EM Equity	β1	0.0001 (0.00034)	0.00085 (0.00323)	0.00016 (0.00017)	0.00013 (0.00022)
	β2	-0.00005 (0.0001)	0.00038 (0.00221)	-0.00021 (0.00017)	-0.0001 (0.00009)
EM Bond	β1	0.00007 (0.00011)	-0.00002 (0.00014)	0.0002*** (0.00005)	0.00014 (0.00009)
	β2	-0.00007** (0.00003)	0.00009 (0.0001)	-0.00006 (0.00005)	-0.00005 (0.00004)

The regression specification is similar to Table 5, except that it is limited to Federal Reserve actions during the phases of QE or LSAP actions listed in Appendix Table 1. QE1 is from 11/3/2008 to 6/30/2010. QE2 is from 11/1/2010 to 6/30/2011. QE3 is from 9/13/2012 through the end of our sample period. LSAP dates correspond to the bold dates in Table 1a.

***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 7: Results for Asymmetric Model, Crisis and Non-Crisis Sub-Periods

		Fed	BOE	ECB	BOJ
Dependent variable: 2-day active change in portfolio weights					
			Crisis		
DM Equity	β1	0.00046 (0.00066)	0.00008 (0.00089)	0.00009 (0.00016)	-0.0043 (0.00463)
	β2	0.00046*** (0.00018)	-0.00045 (0.00044)	0.00016 (0.00014)	-0.00152 (0.00273)
DM Bond	β1	-0.00102* (0.00058)	-0.00041 (0.00065)	-0.0002* (0.00011)	0.00208 (0.00341)
	β2	-0.00031* (0.00016)	0.00029 (0.00032)	-0.00002 (0.00009)	0.00043 (0.00201)
EM Equity	β1	0.00063 (0.00043)	0.00033 (0.00036)	0.00014** (0.00007)	0.0017 (0.00156)
	β2	-0.00018 (0.00012)	0.00019 (0.00018)	-0.00013** (0.00006)	0.00101 (0.00092)
EM Bond	β1	-0.00007 (0.00022)	-0.00008 (0.00009)	0.00002 (0.00003)	0.0007 (0.00062)
	β2	0.00002 (0.00006)	-0.00002 (0.00004)	-0.00002 (0.00002)	0.00013 (0.00037)
			Non-Crisis		
DM Equity	β1	-0.00075** (0.00033)	-0.00048 (0.00058)	0.00349* (0.00191)	-0.0044*** (0.00118)
	β2	0.00054* (0.00031)	0 (0.00069)	0.00024 (0.00067)	0.00012 (0.00101)
DM Bond	β1	0.00049* (0.00028)	0.00005 (0.00038)	-0.00277*** (0.001)	0.00297*** (0.00086)
	β2	-0.00025 (0.00026)	0.00021 (0.00046)	-0.00032 (0.00035)	-0.00072 (0.00074)
EM Equity	β1	0.00012 (0.00018)	0.00042* (0.00023)	0.00004 (0.00129)	0.00038 (0.00056)
	β2	-0.00008 (0.00016)	-0.00028 (0.00028)	0.00017 (0.00045)	0.00027 (0.00048)
EM Bond	β1	0.00017*** (0.00005)	0.00006 (0.00009)	-0.00003 (0.00021)	0.00022 (0.00017)
	β2	-0.00006 (0.00004)	-0.00004 (0.00011)	-0.00002 (0.00007)	0.00004 (0.00014)

The regression specification is similar to Table 4. Crisis periods for the U.S., England, and Japan are between 9/1/2008 and 7/31/2009. For the Euro area, the crisis period is between 10/1/2009 and 12/31/2013. All dates not indicated as in the crisis period are considered non-crisis.

***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 8: Results for Asymmetric Model, One-day Active Change in Portfolio Weights

		Fed	BOE	ECB	BOJ
Dependent variable: 1-day active change in portfolio weights					
DM Equity	β1	-0.00026 (0.00018)	0.00012 (0.00023)	-0.00012 (0.00009)	-0.00164*** (0.0006)
	β2	0.00017* (0.00009)	-0.00004 (0.00016)	0.00011 (0.00007)	0.00021 (0.00044)
DM Bond	β1	0.0001 (0.00016)	-0.00026* (0.00016)	0.00006 (0.00006)	0.00067 (0.00045)
	β2	-0.00009 (0.00008)	0.00007 (0.00011)	-0.00006 (0.00005)	0.00004 (0.00033)
EM Equity	β1	0.00012 (0.00009)	0.00015 (0.00011)	0.00011*** (0.00004)	0.00087*** (0.00028)
	β2	-0.00008* (0.00004)	0 (0.00008)	-0.00004 (0.00004)	0.00025 (0.00021)
EM Bond	β1	0.00006** (0.00003)	0 (0.00004)	0 (0.00001)	0.00018** (0.00009)
	β2	-0.00001 (0.00001)	-0.00003 (0.00003)	-0.00001 (0.00001)	-0.00002 (0.00006)

The table shows estimates of the variables β_1 and β_2 from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta_1^{i,j,b} MPS_t^b 1\left(MPS_t^b < 0\right) + \beta_2^{i.j,b} MPS_t^b 1(MPS_t^b > 0) \ + \varepsilon_t^{i,j}$$

where $F^{i}_{[t-1,t+1]}$ represents the 1-day active change in the portfolio weights for fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS_t^b is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. The active change in portfolio weights is calculated using equation (3) in the text, and converted to percent. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing. A positive value of β_1 indicates that monetary tightening is accompanied by outflows, a positive value of β_2 indicates that monetary easing is accompanied by inflows. The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 9: Results for Asymmetric Model, Weekly Change in Flows/NAV

		Fed	BOE	ECB	BOJ
North America					
United States Bond	β1	-0.0001 (0.0014)	-0.0021 (0.0018)	-0.0005 (0.0007)	0.0086** (0.0042)
	β2	0.0015* (0.0007)	0.0024* (0.0012)	-0.0003 (0.0006)	-0.0011* (0.0032)
United States Equity	β1	-0.0056* (0.0032)	-0.0035 (0.0046)	0.0027 (0.0017)	-0.009 (0.0097)
	β2	0.0048* (0.0016)	-0.0012 (0.0032)	0.0008 (0.0014)	0.0051 (0.0074)
Canada Equity	β1	-0.0102 (0.0068)	0.0087* (0.0051)	0.0011 (0.0026)	-0.0099 (0.0186)
	β2	0.0114* (0.0034)	-0.0187* (0.0035)	0.0011 (0.0022)	-0.0003 (0.0141)
Asia					
Australia Equity	β1	0.0017 (0.0083)	0.0051 (0.0074)	0.0003 (0.0031)	-0.0161 (0.0241)
	β2	-0.006 (0.0041)	0.0234* (0.0052)	0.0039 (0.0025)	-0.008 (0.0183)
Japan Bond	β1	0.0104 (0.0235)	0.0106 (0.0252)	0.0088 (0.0107)	0.0374 (0.0631)
	β2	-0.0152 (0.0117)	0.0003 (0.0176)	0.0079 (0.0088)	-0.1081* (0.0478)
Japan Equity	β1	-0.0059 (0.0064)	-0.0054 (0.0068)	0.0012 (0.003)	0.0295* (0.017)
	β2	0.0053* (0.0032)	-0.0067 (0.0047)	0.0034 (0.0024)	-0.0005 (0.0129)
Indonesia Equity	β1	0.0217 (0.0265)	-0.0118 (0.022)	0.0031 (0.0097)	0.0671 (0.0647)
	β2	-0.0176 (0.0133)	-0.0221 (0.0153)	-0.0085 (0.0079)	0.1302* (0.049)
India Equity	β1	0.0099* (0.0051)	-0.0107** (0.0044)	0.0026 (0.002)	-0.0025 (0.0137)
	β2	-0.0013 (0.0026)	0.0023* (0.003)	0.0019 (0.0016)	0.0117 (0.0104)
South Korea Equity	β1	-0.0131 (0.0124)	0.0077 (0.016)	-0.0004 (0.0054)	0.005 (0.0401)
	β2	0.0111* (0.0062)	-0.007 (0.0112)	-0.004 (0.0044)	0.0225 (0.0304)
Philippines Equity	β1	-0.004 (0.0382)	0.0369 (0.0458)	0.0159 (0.0224)	0.1551 (0.1234)
	β2	0.0403* (0.0191)	-0.0089 (0.0319)	0.0123 (0.0184)	-0.0249 (0.0936)
Thailand Equity	β1	0.0196 (0.0138)	-0.0729*** (0.0183)	0.006 (0.0089)	0.0691 (0.0452)
	β2	-0.0141* (0.0069)	0.0328*** (0.0128)	-0.0089 (0.0073)	0.0322 (0.0343)
Singapore Equity	β1	-0.0024 (0.0092)	0.003 (0.0124)	0.0155** (0.0061)	-0.0171 (0.0298)
	β2	0.007 (0.0046)	0.0197* (0.0086)	-0.0051* (0.005)	0.0301 (0.0226)
Hong Kong Bond	β1	0.0074 (0.0072)	-0.003 (0.0113)	0.0028 (0.0045)	0.0373 (0.0273)
	β2	-0.0012 (0.0036)	0.0135* (0.0079)	0.0018 (0.0037)	0.0129 (0.0207)
Hong Kong Equity	β1	0.0211 (0.013)	0.0269** (0.0132)	0.0013 (0.0059)	0.0026 (0.034)
	β2	0.0033 (0.0065)	-0.0502** (0.0092)	0.006 (0.0048)	0.0269 (0.0258)
Latin America					
Brazil Bond	β1	0.0026 (0.0256)	-0.0202 (0.019)	0.0033 (0.0128)	0.0164 (0.0715)
	β2	-0.0006 (0.0128)	0.0372* (0.0132)	-0.0031 (0.0105)	0.014 (0.0542)
Brazil Equity	β1	0.0088 (0.007)	-0.001 (0.01)	0.0023 (0.0035)	-0.0088 (0.0255)
	β2	-0.0038 (0.0035)	0.0027 (0.007)	-0.0005 (0.0029)	-0.0278 (0.0194)
Mexico Equity	β1	0.0172 (0.028)	-0.0524 (0.0393)	0.0166 (0.0164)	0.1223 (0.1104)
	β2	-0.0282* (0.014)	0.0156 (0.0274)	0.003 (0.0135)	-0.0712 (0.0837)

Table 9: Results for Asymmetric Model, Weekly Change in Flows/NAV(cont.)

		Fed	BOE	ECB	BOJ
Europe					
Switzerland Equity	β1	0.0005 (0.0033)	0.0016 (0.0037)	0 (0.0023)	0.0029 (0.0127)
	β2	-0.004* (0.0016)	0.0041 (0.0026)	0 (0.0019)	-0.0044 (0.0096)
Sweden Equity	β1	0.0079 (0.015)	-0.0027 (0.0132)	0.0018 (0.0082)	0.0486 (0.0522)
	β2	0.0012 (0.0075)	-0.0018 (0.0092)	-0.0007 (0.0067)	-0.0448 (0.0396)
Belgium Equity	β1	-0.0013 (0.0047)	-0.0147** (0.0063)	-0.0009 (0.0026)	0.0062 (0.0112)
	β2	0.0092* (0.0023)	0.016** (0.0044)	-0.0004 (0.0021)	-0.0133 (0.0085)
France Equity	β1	-0.0034 (0.006)	0.0046 (0.008)	0.0021 (0.0035)	-0.0237 (0.0224)
	β2	0.0062* (0.003)	-0.0104* (0.0055)	0.0002 (0.0029)	0.0105 (0.017)
Germany Equity	β1	0.0009 (0.0128)	-0.0214 (0.0222)	-0.0008 (0.0058)	0.014 (0.0433)
	β2	0.0025 (0.0064)	0.0069 (0.0155)	-0.0046 (0.0048)	-0.0222 (0.0328)
Italy Equity	β1	0.0052 (0.0147)	-0.0237 (0.0145)	0.0019 (0.0063)	-0.0061 (0.0452)
	β2	0.0159* (0.0073)	-0.0222* (0.0101)	0.012* (0.0052)	0.0063 (0.0343)
Spain Equity	β1	0.0157 (0.0184)	-0.01 (0.0201)	0.0008 (0.0072)	0.0203 (0.0608)
	β2	-0.0031 (0.0092)	-0.002 (0.014)	0.0018 (0.0059)	-0.0607 (0.0461)
Netherlands Equity	β1	0.0007 (0.01)	-0.0156 (0.0102)	0.0015 (0.0034)	-0.0334 (0.0234)
	β2	-0.0024 (0.005)	-0.0048 (0.0071)	0.0033 (0.0028)	0.0205 (0.0177)
U.K. Bond	β1	-0.0046 (0.0113)	0.0025 (0.0066)	-0.0004 (0.0029)	0.0008 (0.0278)
	β2	0.0079 (0.0056)	0.0023 (0.0046)	0.001 (0.0023)	0.0075 (0.0211)
U.K. Equity	β1	-0.0011 (0.0027)	0.0013 (0.0029)	0.0013 (0.0011)	0.0009 (0.0076)
	β2	-0.0047* (0.0014)	0.0053* (0.002)	-0.002* (0.0009)	0.0047 (0.0058)

The table shows estimates of the variables β_1 and β_2 from the equation:

$$\Delta F^{i,j}_{[t-i,t-i+7]} = \alpha + \beta_1^{i,j,b} MPS_t^b 1\left(MPS_t^b < 0\right) + \beta_2^{i.j,b} MPS_t^b 1(MPS_t^b > 0) \ + \varepsilon_t^{i,j}$$

where $F^{i}_{[t-i,t-i+7]}$ represents the flow/NAV in percent of fund *i= equity, bonds* and *j = DM, EM* during a seven day period ending on Wednesday covering the time *t* announcement; and MPS_t^b is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing. A positive (negative) value of β_1 indicates that monetary tightening is accompanied by outflows (inflows), a positive (negative) value of β_2 indicates that monetary easing is accompanied by inflows (outflows). The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 10: Results for Symmetric Model, Two-day Flows, Dummy Variable

	Fed	BOE	ECB	BOJ
Dependent variable: 2-day flows/NAV				
DM Equity	0.03622** (0.01459)	0.01302 (0.01493)	0.00031 (0.0148)	-0.00255 (0.01405)
DM Bond	0.05859*** (0.01521)	0.0613*** (0.0095)	0.0457*** (0.01002)	0.0424*** (0.008)
EM Equity	0.05224** (0.02346)	0.03564* (0.02115)	0.02618 (0.02098)	0.0257 (0.02105)
EM Bond	0.10591*** (0.03988)	0.1161*** (0.03639)	0.097*** (0.0327)	0.0857*** (0.0278)

The table shows estimates of the variable β from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta^{i,j,b} MPS^b_t + \varepsilon^{i,j}_t$$

where $F^i_{[t-1,t+1]}$ represents the flow/NAV in percent of fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS^b_t is a dummy variable for the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 11: Results for Symmetric Model, Federal Reserve Actions During QE and LSAPs, Dummy Variable

	QE1	QE2	QE3	LSAP
Dependent variable: 2-day flows/NAV				
DM Equity	0.0559 (0.04648)	0.04001 (0.03114)	0.04422** (0.02076)	0.05655*** (0.01603)
DM Bond	0.08373** (0.03766)	0.03089 (0.05933)	0.02163 (0.01907)	0.02959 (0.02403)
EM Equity	0.08778* (0.04706)	0.05614 (0.09698)	0.02768 (0.03384)	0.07427* (0.04135)
EM Bond	0.0744 (0.09179)	0.16323*** (0.02532)	0.0539 (0.05589)	0.00355 (0.07506)

The regression specification is similar to Table 10, except that it is limited to Federal Reserve actions during the phases of QE or LSAP actions listed in Appendix Table 1. QE1 is from 11/3/2008 to 6/30/2010. QE2 is from 11/1/2010 to 6/30/2011. QE3 is from 9/13/2012 through the end of our sample period. LSAP dates correspond to the bold dates in Table 1a.

***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.

Appendix

Table A1: Dates and Times of US Monetary Policy Announcements

Year	Day	Time (New York)	Description
2008	10/8	7:00	Federal Funds Target Rate (FFTR) decreased to 1.5%
	10/29	14:15	FFTR decreased to 1%
	11/25	8:15	Fed Announces Purchases of Mortgage-Backed Securities and Agency Bonds
	12/1	13:45	Bernanke states Treasuries may be purchased
	12/16	14:15	Federal Open Market Committee (FOMC) Meeting: FFTR decreased to 0–0.25%
2009	**1/28 3/18** 4/29 6/24 8/12 9/23 11/4 12/16	14:15	FOMC Meeting
2010	1/27 3/16 4/28 6/23 **8/10**	14:15	FOMC Meeting
	8/27	10:00	Bernanke Speech at Jackson Hole
	9/21	14:15	FOMC Meeting
	10/15	8:15	Bernanke Speech at Boston Fed
	11/3 - 12/14	14:15	FOMC Meeting
2011	1/26 3/15 4/27(12:30) 6/22(12:30) 8/9	14:15	FOMC Meeting
	8/26	10:00	Bernanke Speech at Jackson Hole
	9/21 - 11/2(12:30) - 12/13	14:15	FOMC Meeting
2012	1/25(12:30) 3/13 4/25(12:30) **6/20(12:30)** 8/1	14:15	FOMC Meeting
	8/31	10:00	Bernanke Speech at Jackson Hole
	9/13(12:30) 10/24 12/12(12:30)	14:15	FOMC Meeting
2013	1/30 3/20(14:00) 5/1(14:00)	14:15	FOMC Meeting
	5/22	10:00	Bernanke Testimony
	6/19 7/31 9/18 10/30 12/18	14:00	FOMC Meeting
2014	1/29 3/19 4/30 6/18	14:00	FOMC Meeting
	7/15	10:00	Yellen Semiannual Report to Congress
	7/30	14:00	FOMC Meeting
	8/22	10:00	Yellen Speech at Jackson Hole
	9/17	14:00	FOMC Meeting

Notes: Date only is an FOMC meeting, time is 14:15 unless otherwise indicated. Entries in bold denote announcements that we treat as LSAP announcements; all other announcements are treated as non-LSAP. QE1 is from 11/3/2008 to 6/30/2010. QE2 is from 11/1/2010 to 6/30/2011. QE3 is from 9/13/2012 through the end of our sample period.

Table A2: Dates and Times of UK Monetary Policy Announcements

Year	Day	Time (London)	Description
2008	10/8	12:00	Monetary Policy Committee (MPC) meeting, bank rate decreased to 4.5%
	11/6	12:00	MPC meeting, bank rate decreased to 3%
	12/4	12:00	MPC meeting, bank rate decreased to 2%
2009	1/8	12:00	MPC meeting, bank rate decreased to 1.5%
	1/19	12:00	Chancellor of the Exchequer announces the BOE will set up Asset Purchase Facility
	1/29	12:00	Asset Purchase Facility (APF) announcement
	2/5	12:00	MPC meeting, rate decreased to 1%
	2/11	12:00	Inflation report and press conference give strong indication QE is likely
	3/5	12:00	APF announcement: £75 billion of Gilts, 5-25 years; bank rate decreased to 0.5%
	4/9	12:00	MPC meeting
	5/7	12:00	APF extended to £125 billion
	6/4 - 7/9	12:00	MPC meeting
	8/6	12:00	APF extended to £175 billion, 3+ years maturity
	9/10 - 10/8	12:00	MPC meeting
	11/5	12:00	APF extended to £200 billion
	12/10	12:00	MPC meeting
2010	1/7	12:00	MPC meeting
	2/4	12:00	APF will be maintained at £200 billion
	3/4 4/8 5/6 6/10 7/8 8/5 9/9 10/7 11/4 12/9	12:00	MPC meeting
2011	1/13 2/10 3/10 4/7 5/5 6/9 7/7 8/4 9/8	12:00	MPC meeting
	10/6	12:00	APF extended to £275 billion
	11/10 12/8	12:00	MPC meeting
2012	1/12	12:00	MPC meeting
	2/9	12:00	APF extended to £325 billion,
	3/8 4/5 5/10 6/7	12:00	MPC meeting
	7/5	12:00	APF extended to £375 billion
	8/2 9/6 10/4 11/8 12/6	12:00	MPC meeting
2013	1/10 2/7 3/7 4/4	12:00	MPC meeting
	5/9	12:00	MPC meeting
	5/15	10:30	Inflation report
	6/6 7/4 8/1	12:00	MPC meeting
	8/7	10:30	Inflation report, forward guidance announced
	9/5 10/10 11/7	12:00	MPC Meeting
	11/13	10:30	Inflation report
	12/5	12:00	MPC meeting
2014	1/9 2/6	12:00	MPC meeting
	2/12	10:30	Inflation report, change to forward guidance
	3/6 4/10 5/8	12:00	MPC meeting
	5/14	10:30	Inflation report
	6/5	12:00	MPC meeting
	6/12	19:00	Carney speech at Mansion House Bankers Dinner
	7/10 8/7	12:00	MPC meeting
	8/13	10:30	Inflation report
	9/4	12:00	MPC meeting

Notes: Entries in bold denote the announcements that we treat as Asset Purchase Facility announcements; all other announcements are treated as non-APF.

Table A3: Dates and Times of ECB Monetary Policy Announcements

Year	Day	Time (Frankfurt)	Description
2007	8/2	13:45	Governing Council (GC) meeting
	8/9	12:32	Special fine-tuning operations
	8/22	15:33	Supplementary Long Term Refinancing Operation (LTRO) announcement
	8/23	11:18	Supplementary LTRO (allotment)
	9/6 10/4 11/8 12/6	13:45	GC meeting
2008	1/10 2/7 3/6	13:45	GC meeting
	3/28	15:00	ECB introduces 6-m LTROs
	4/10 5/8 6/5	13:45	GC meeting
	7/3	13:45	GC meeting, Main Refinancing Operations (MRO) rate increased to 4.25%
	8/7 9/4	13:45	GC meeting
	10/8	13:00	GC meeting, MRO rate decreased to 3.75%
	10/8		Fixed-rate full allotment (FRFA) on MROs
	11/6	13:45	GC meeting, MRO rate decreased to 3.25%
	12/4	13:45	GC meeting, MRO rate decreased to 2.50%
2009	1/15	13:45	GC meeting, MRO rate decreased to 2.00%
	2/5	13:45	GC meeting
	3/5	13:45	GC meeting, MRO rate decreased to 1.50%
	4/2	13:45	GC meeting, MRO rate decreased to 1.25%
	5/7	13:45-14:30	GC meeting, three 1yr LTROs, Covered Bond Purchase Programme (CBPP)
	6/4*	13:45-14:30	GC meeting, CBPP details announced
	7/2 8/6 9/3 10/8 11/5	13:45	GC meeting
	12/3	13:45-14:30	GC meeting, Phasing out of 6m LTROs, indexation of 1y LTROs
2010	1/14	13:45	GC meeting
	2/4	13:45	GC meeting
	3/4	13:45-14:30	GC meeting, Phasing out of 3m LTROs, indexation of 6m LTROs
	4/8 5/6	13:45	GC meeting
	5/9*	–	Securities Market Programme (SMP)
	6/10 7/8	13:45	GC meeting
	7/28	13:45	Collateral rules tightened, revised haircuts
	8/5 9/2 10/7 11/4 12/2	13:45	GC meeting
2011	1/13 2/3	13:45	GC meeting
	3/3	13:45-14:30	GC meeting, FRFA extended to July 2011
	4/7	13:45	GC meeting, MRO rate increased to 1.25%
	5/5 6/9	13:45	GC meeting
	7/7	13:45	GC meeting, MRO rate increased to 1.50%
	8/4*	13:45-14:30	GC meeting, SMP covers Spain and Italy
	8/7*	–	SMP on Italy and Spain acknowledged by ECB
	9/8	13:45	GC meeting
	10/6*	13:45-14:30	GC meeting, CBPP2 launched
	11/3	13:45	GC meeting, MRO rate decreased 1.25%
	12/8	13:45-14:30	GC meeting: Two 3-year LTROs, reserve ratio to 1%, MRO rate to 1%
	12/21	11:15	Results of first 3-year LTRO

Table A3: ECB Monetary Policy Announcements (Continued)

Year	Day	Time (Frankfurt)	Description
2012	1/1	13:45	GC meeting
	2/9	13:45	GC meeting, ECB approved criteria for credit claims for 7 NCBs
	2/28	11:16	Results of second 3-year LTRO
	3/8 4/4 5/3 6/6	13:45	GC meeting
	7/5	13:45	GC meeting, MRO rate decreased to 0.75%, deposit facility rate to 0
	7/26*	11:30-12:15	"Whatever it takes" London speech
	8/2*	13:45-14:30	GC meeting, Outright Monetary Transactions (OMT) program
	9/6*	13:45-14:30	GC meeting, OMT details released, no ex-ante size limit
			Collateral rules eased
	10/4 11/8 12/6	13:45	GC meeting
2013	1/10 2/7 3/7	13:45	GC meeting
	3/22	15:00	Collateral rule changes for some uncovered gov-guaranteed bank bonds
	4/4	13:45	GC meeting
	5/2	13:45	GC meeting: MRO rate to 0.5%, FRFA extended to July 2014
	6/6 7/4 9/5 10/2	13:45	GC meeting
	11/7	13:45	GC meeting, MRO rate decreased to 0.25%
	12/5	13:45	GC meeting
2014	1/9 2/6 3/6 4/3 5/8	13:45	GC meeting
	6/5	13:45	GC meeting, MRO rate to 0.15%
	6/5	15:30	Targeted Longer-Term Refinancing Operations (TLTRO) Announcement
	7/3 8/5	13:45	GC meeting
	8/22	19:30	Draghi speech at Jackson Hole
	9/4	13:45	GC meeting, MRO rate decreased to 0.05%

Notes: Entries in bold and bold with * denote announcements that we treat as LTRO-type and bond purchases announcements, respectively. 14:30 is the start of the ECB press conference. The announcements on 5/9/2010 and 8/7/2011 are both on Sundays, when financial markets were closed. We take changes from market close to market open before/after the weekend for these dates.

Table A4: Dates and Times of Japanese Monetary Policy Announcements

Year	Day	Time (Tokyo)	Description
2007	5/17(12:41) 6/15(12:18) 7/12(12:55) 8/23(12:35) 9/19(13:21)		Monetary Policy meeting
	10/11(13:32) 10/31(12:42) 11/13 (12:29) 12/20(12:51)		Monetary Policy meeting
2008	1/22(12:19) 2/15(12:51) 3/7(12:52) 4/9(12:24) 4/30(13:28)		Monetary Policy meeting
	5/20(12:04) 6/13(12:23) 7/15(13:34) 8/19(12:30)		Monetary Policy meeting
	9/17(12:47) 10/7(12:58) 10/8(21:00) 10/14(21:38)		Monetary Policy meeting
	10/31	13:58	Call rate lowered to 0.3%
	11/21(12:34) 12/2(14:34)		Monetary policy meeting
	12/19	14:05	Call rate lowered to 0.1%
2009	1/22	13:43	Outright purchases (CPs, corp bonds)
	2/19	13:52	Details on corporate bond purchases
	3/18(12:27) 4/7(12:22) 4/30(13:37) 5/22(12:33)		Monetary Policy meeting
	6/16(12:34 7/15(13:35) 8/11(11:51) 9/17(12:39)		Monetary Policy meeting
	10/14(13:14) 10/30(13:05) 11/20(12:35) 12/1(15:38) 12/18(12:13)		Monetary Policy meeting
2010	1/26(12:26) 2/18(11:45) 3/17(12:49) 4/7(12:03)		Monetary Policy meeting
	4/30(13:18) 5/10(12:11)		Monetary Policy meeting
	5/21(12:42) 6/15(12:56)		Call rate unchanged, Fund-Provisioning
	7/15(12:45) 8/10(12:28)		Monetary policy meeting
	8/30 (12:11)		Enhancement of easy monetary conditions
	9/7	12:39	Monetary Policy Meeting
	10/5	13:38	Asset Purchase Program (APP) - ¥35 trillion
	10/28	13:31	APP details
	11/5(11:36) 12/21(12:55)		Monetary Policy meeting
2011	1/25(12:29) 2/15(12:37)	12:29	Monetary Policy meeting
	3/14	14:48	APP extended to ¥40 tr
	4/7(13:10) 4/28(13:31)		
	5/20(12:14) 6/14(12:42) 7/12(13:20)		Monetary Policy meeting
	8/4	14:00	APP extended to ¥50 tr
	9/7(12:21) 10/7(12:37)	12:21	Monetary Policy meeting
	10/27	13:31	APP extended to ¥55 tr
	11/16(12:49) 11/30(22:00) 12/21(12:16)	12:49	Monetary Policy meeting
2012	1/24	12:31	Monetary Policy meeting
	2/14	12:43	APP extended to ¥65 tr
	3/13(14:07) 4/10(12:09)		Monetary Policy meeting
	4/27	12:46	APP extended to ¥70 tr
	5/23(11:37) 6/15(11:52)		Monetary Policy meeting
	7/12	12:51	No increase in APP, shift in composition
	8/9	12:19	Monetary Policy meeting
	9/19	12:44	APP extended to ¥80 trillion
	10/5	12:14	Monetary Policy meeting
	10/30	14:46	APP extended to ¥91 tr
	11/20	12:14	Monetary Policy meeting
	12/20	13:01	APP extended to ¥101 tr
2013	**1/22**	12:47	APP extended to ¥13 tr monthly
			2% inflation target, open-ended QE
	2/14(12:39) 3/7(12:24)		Monetary Policy meeting
	4/4	13:40	Quantitative and Qualitative Monetary Easing
	4/26(13:35) 5/22(12:07) 6/11(11:48) 7/11(11:47) 8/8(11:59)		Monetary Policy meeting
	9/5(11:42) 10/4(11:49) 10/31(13:14) 11/21(12:15) 12/20(11:57)		Monetary Policy meeting
2014	1/22(12:20) 2/18(12:28) 3/11(12:00) 4/8(11:50) 4/30(12:51)		Monetary Policy meeting
	5/21(11:41) 6/13(11:41) 7/15(11:58) 8/8(12:08) 9/4(12:07)		Monetary Policy meeting

Notes: Entries in bold denote the announcements that we treat as APP announcements; all other announcements are treated as non-APP.

Table A5: Summary Statistics, Change in Flows and Flows/NAV

	Change in 2-Day Flows (USD Millions)			*Change in two-day flows/NAV (pp)*		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Non-Event Days: 1,314						
DM Equity	26.6	94.5	4,779.1	0.001	0.002	0.168
DM Bond	26.2	-17.3	1,447.9	0.003	-0.002	0.086
EM Equity	12.6	-27.2	839.7	0.002	-0.005	0.173
EM Bond	4.8	0.8	326.2	0.003	-0.001	0.256
Fed Event Days: 58						
DM Equity	249.2	781.6	4,109.3	0.009	0.017	0.152
DM Bond	250.5	75.6	1,604.9	0.007	0.007	0.098
EM Equity	-44.9	-9.7	830.1	0.005	-0.002	0.197
EM Bond	-11.2	-7.8	307.1	-0.019	-0.010	0.281
BOE Event Days: 79						
DM Equity	34.1	-321.9	5,304.3	-0.004	-0.011	0.172
DM Bond	-290.4	-292.9	1,505.2	-0.018	-0.015	0.077
EM Equity	-94.0	-106.5	852.0	-0.018	-0.016	0.173
EM Bond	-68.1	25.9	411.6	-0.009	0.024	0.269
ECB Event Days: 97						
DM Equity	680.8	57.6	5,395.0	0.022	0.001	0.189
DM Bond	-245.6	-292.9	1,554.3	-0.018	-0.021	0.092
EM Equity	23.1	-42.7	980.6	0.007	-0.014	0.208
EM Bond	-54.0	43.7	389.4	-0.020	0.032	0.286
BOJ Event Days: 110						
DM Equity	-1,026.4	-396.3	6,701.1	-0.037	-0.018	0.289
DM Bond	-243.3	-262.3	1,094.0	-0.022	-0.021	0.086
EM Equity	-117.3	-241.4	924.9	-0.028	-0.040	0.228
EM Bond	9.4	-8.7	264.1	0.001	-0.006	0.268

The event days for each central bank are listed in Appendix tables 1-4.

Table A6: Daily Fund Flows, Summary Statistics

2-Day Active Change in Portfolio Weights	Mean	Median	Std. Dev.
Non-Event Days: 1,314			
DM Equity	-3.32	-3.52	9.50
DM Bond	2.51	2.40	7.23
EM Equity	0.55	0.28	4.30
EM Bond	0.27	0.41	1.62
Fed Event Days: 58			
DM Equity	-0.35	-0.18	9.14
DM Bond	0.56	0.12	7.58
EM Equity	-0.29	-0.62	4.13
EM Bond	0.08	0.36	1.67
BOE Event Days: 79			
DM Equity	-2.29	-4.64	10.70
DM Bond	1.88	1.76	7.09
EM Equity	0.06	0.31	5.03
EM Bond	0.35	0.19	1.62
ECB Event Days: 97			
DM Equity	-1.97	-3.36	9.97
DM Bond	1.29	0.94	6.79
EM Equity	0.33	0.31	5.32
EM Bond	0.34	0.23	1.54
BOJ Event Days: 110			
DM Equity	-1.65	-2.40	11.79
DM Bond	1.20	2.34	8.34
EM Equity	0.27	0.25	5.94
EM Bond	0.18	0.52	1.76

The active change in portfolio weights is calculated using equation (3) in the text, and converted to annualized percentage points. The event days for each central bank are listed in Appendix tables 1-4.

Table A7: Results for Asymmetric Model (alt. spec), Two-day Active Change in Portfolio Weights

		Fed	BOE	ECB	BOJ
Dependent variable: 2-day active change in portfolio weights					
DM Equity	β1	-0.00136*** (0.00036)	0.00029 (0.00059)	-0.00007 (0.00021)	-0.00562*** (0.00162)
	β2	0.00068*** (0.00015)	-0.00046 (0.0003)	0.00019 (0.00013)	0.00089 (0.00085)
DM Bond	β1	0.00094*** (0.00032)	-0.00046 (0.00039)	-0.00017 (0.00014)	0.00438*** (0.00117)
	β2	-0.00052*** (0.00013)	0.00031 (0.0002)	-0.00005 (0.00009)	-0.00119* (0.00061)
EM Equity	β1	0.00023 (0.00019)	0.00014 (0.00025)	0.00026** (0.00011)	0.00018 (0.00075)
	β2	-0.00007 (0.00008)	0.00015 (0.00013)	-0.00012* (0.00007)	0.00054 (0.00039)
EM Bond	β1	0.00023*** (0.00006)	0.00006 (0.00009)	0 (0.00003)	0.00049** (0.00023)
	β2	-0.00007*** (0.00002)	-0.00005 (0.00005)	-0.00001 (0.00002)	-0.00009 (0.00012)

The table shows estimates of the variables β_1 and β_2 from the equation:

$$\Delta F^{i,j}_{[t-1,t+1]} = \alpha + \beta_1^{i,j,b} MPS_t^b 1\left(MPS_t^b < 0\right) + \beta_2^{i.j,b} MPS_t^b \ + \varepsilon_t^{i,j}$$

where $F^{i}_{[t-1,t+1]}$ represents the 2-day active change in the portfolio weights for fund *i= equity, bonds* and *j = DM, EM* during the two days following the time *t* announcement; and MPS_t^b is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on *t*. The active change in portfolio weights is calculated using equation (3) in the text, and converted to percent. MPS are scaled so that a value of 1 is equivalent to 25 basis points of easing. A positive value of (β_1+ β_2) indicates that monetary tightening is accompanied by outflows, a positive value of β_2 indicates that monetary easing is accompanied by inflows. The model is estimated using the robust regression M-estimator of Huber (1981) with the bisquare weighting function. The data start in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE. Standard errors in parentheses. ***, ** and * indicates significance at the 1%, 5%, and 10% level, respectively.