International Capital Flows and Unconventional Monetary Policy

Stephanie Curcuru, Chiara Scotti and Aaron Rosenblum

Diverging Monetary Policies, Global Capital Flows and Financial Stability

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How has Unconventional Monetary Policy (UMP) Affected International Capital Flows?

- Many studies on asset prices; relatively few on capital flows
- Unconventional monetary policy works through several channels:
  - *portfolio balance channel* –purchases of long-term bonds by the central bank compress the term premium, which drives up demand for substitute risky assets (Gagnon et al. 2010; D'Amico and King 2010; Hamilton and Wu 2012).
  - *signaling channel* – commitment to keep yields low can boost carry-induced demand for emerging market bonds and equity (Bauer and Rudebusch 2013)
  - *confidence channel* – an easing announcement is interpreted as a commitment to do "whatever it takes" to support growth (Fratzscher, Lo Duca and Straub 2013, Chen et al 2012, others)
- No consensus exists even though "liftoff" is imminent
  - Fratzscher et al (2013), Koepke (2014) others find spillovers
  - Ahmed and Zlate (2013); Ahmed et al (2015) disagree

Our approach

- UMP announcements by 4 developed market central banks
  - Federal Reserve (Fed), the Bank of England (BOE), the European Central Bank (ECB), and the Bank of Japan (BOJ)
- Monetary policy surprises (MPS) from Scotti, Rogers and Wright (2014, 2015)
- Asymmetric model allowing both easing and "tightening"
- Carefully constructed data set
  - daily net flows and total assets of mutual funds: developed market (DM) bond funds, DM equity funds, emerging market (EM) bond funds, and EM equity funds.
- Traditional and novel measures of capital flows
  - Isolate active portfolio reallocations Ahmed et al (2015), others

Plan and Preview of Results

- More details on our approach
  - MPS
  - Capital flows
  - Model
- Results
  - No excess flows to EM
  - Tighter policy may still result in outflows from EMs

Monetary Policy Surprises

- The Scotti et al MPS is based on changes in government bond yields around monetary policy announcement times (the change in yields from 15 minutes before the announcement, to 105 minutes after .)
  - Fed: the first principal component of the change in futures yields for 2-, 5-, 10- and 30-year Treasury futures
  - BOE: the change in long gilt futures yields
  - BOJ: change in 10-year JGB futures
  - ECB: change in cash-market spreads between yields on Italian 10-year government bonds and their German counterparts.
- Separately identify announcements associated with Large Scale Asset Purchase Programs (LSAPs)
- MPS normalized to lower 10-year S Treasury yields in the United States, the United Kingdom and Japan, and the Italian-German spread by 25 basis points.
- MPS are signed so that a positive surprise represents an easing of monetary policy.
- The data starts in May 2007 for Japan, in August 2007 for the ECB, and in October 2008 for the Fed and the BOE.

Monetary Policy Surprises

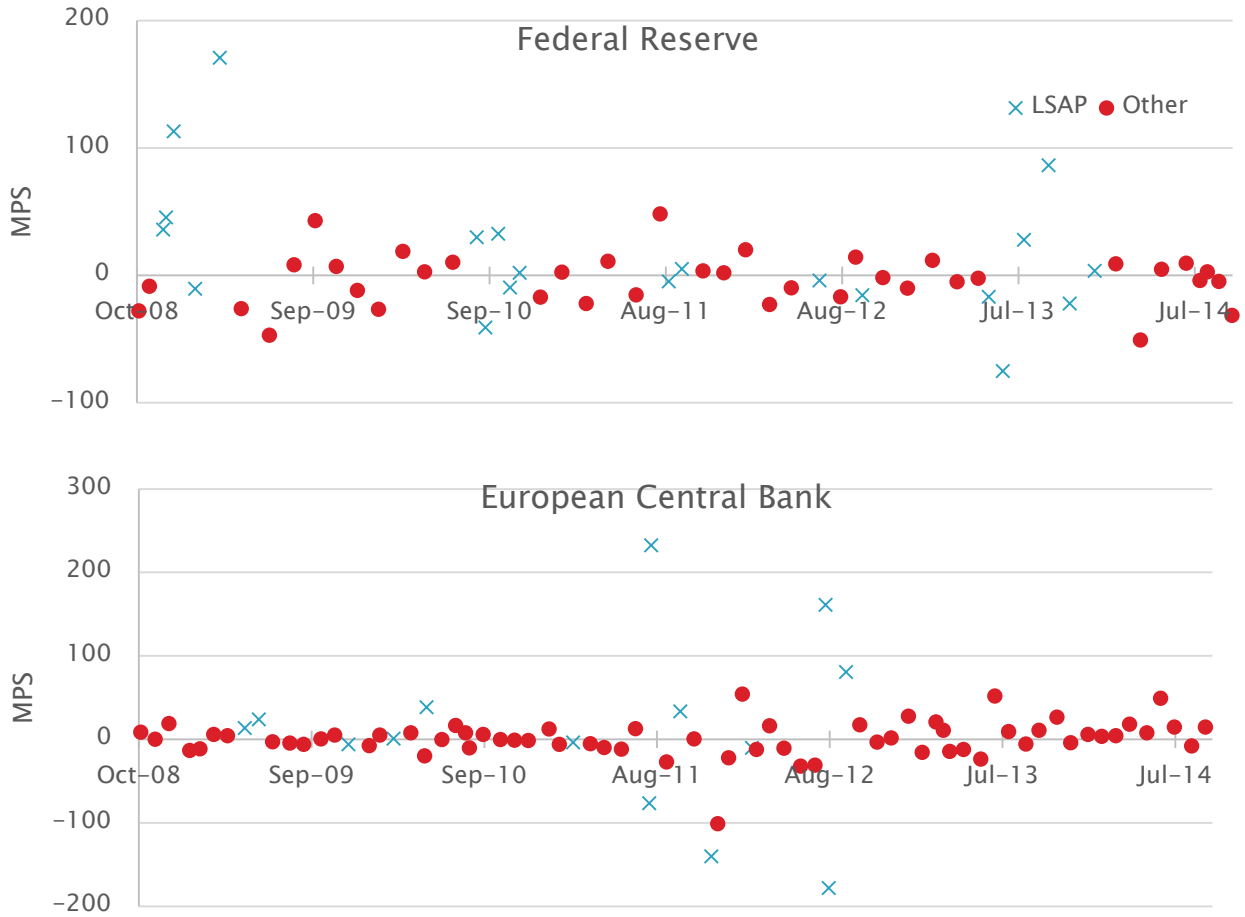

Figure 1

- Surprises vary in size
- Both positive and negative values

Capital Flows

- Emerging Portfolio Fund Research (EPFR) reported flows
  - 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 g market funds are cross-border flows.
- EPFR constructed 4 daily aggregates into dedicated country and regional funds
  - Country allocations only provided monthly
  - DM bond and equity funds, EM bond and equity funds
- We use 2-day flow measures
  - Sum flows both the day of the announcement and the following day to capture reactions that occur late in the day

Capital Flows

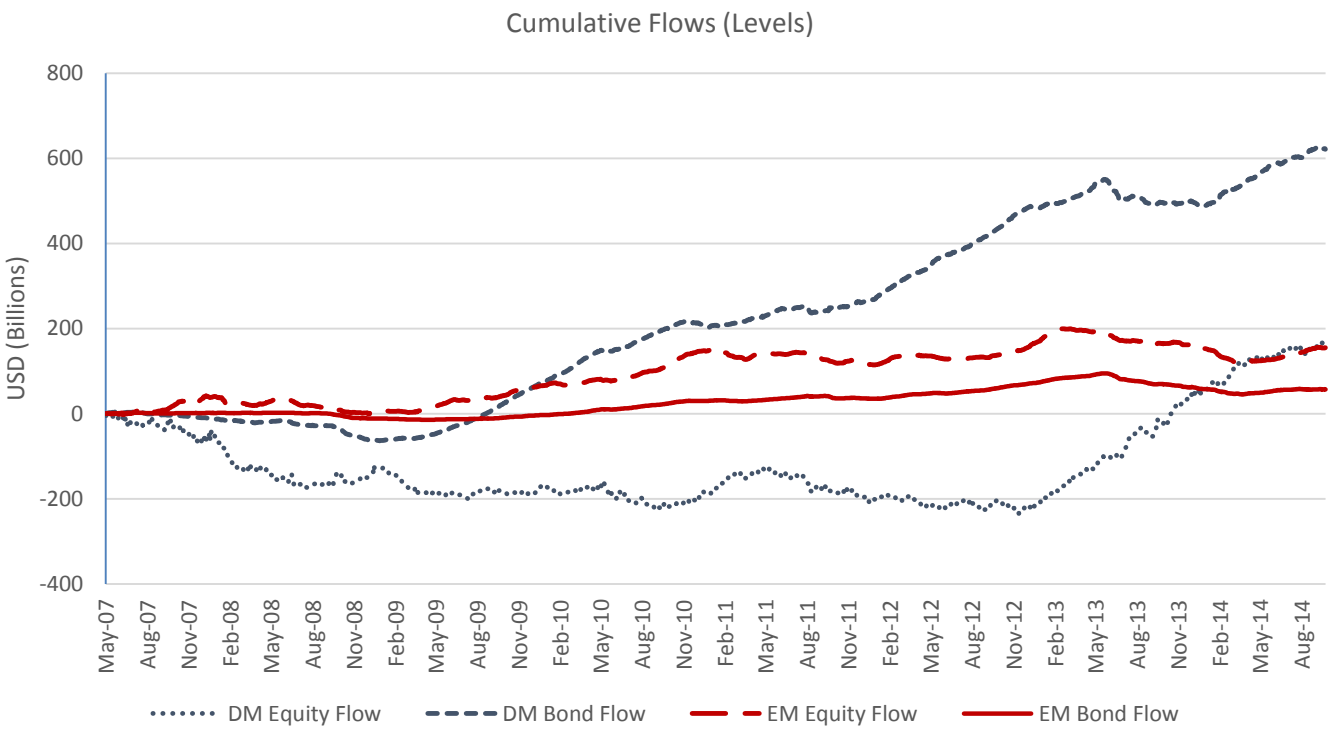

Figure 2

- Positive time trend
- GFC hit DM more than EM
- Taper tantrum a small blip

Capital Flows

- Each of the channels through which monetary policy operates involves portfolio rebalancing, which is not accurately captured by looking at bilateral flows
- A sizable portion of flows can be attributed to allocation of new income across assets.
  - The financial wealth of U.S. residents steadily increased from about $40 trillion in 2007 to $63 trillion in 2014
  - Ahmed *et al* (2015) estimate that allocation of growing wealth accounts for as much as 76% of U.S. investor flows to EM equities 2011–2013.
- Capital flows are the result of portfolio growth and portfolio reallocation, which itself has active and passive components (from relative price changes,Tille and van Wincoop 2010)
- Active change in portfolio weight measure removes contribution of passive portfolio reallocation:

$$A^{i,j}_{[t,t+1]} = w^{i,j}_{t+1} - w^{i,j}_{t}\frac{1+r^{i,j}_{t}}{1+r^{TOT}_{t}} \quad \text{where} \qquad w^{i,j}_{t} = \frac{NAV^{i,j}_{t}}{NAV^{TOT}_{t}}$$

Model

- Symmetric model

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

- where $F^{i}_{[t-1,t+1]}$ represents the flow measure in fund *i= equity, bonds* and *j = DM, EM, country* during the day of and the day following the time *t* announcement;
- MPS^b_t is the monetary policy surprise of central bank *b = Fed, ECB, BOE, BOJ* on day *t*.
- We use two-day changes in flows to capture reaction to monetary policy announcements that occur late in the day
- Dependent variables: level flows, change in flows, flows/NAV

Model

- Asymmetric model

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

- $\beta_1^{i,j,b}$ 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.

Flow Results – Symmetric Model

Table 2: Results for Symmetric Model, Two-day Change in Flows (USD Millions)

	Fed	BOE	ECB	BOJ
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)

- Positive coefficients mean that fund inflows increase following monetary policy easing, and vice versa.
- Monetary policy surprises are significant only for EM equity flows.
  - BOE surprises are associated with increased outflows from EM equity funds
  - ECB surprises are associated with inflows.
  - The magnitudes are moderate, with inflows into EM equities increasing 5 million (13 avg) following 25 basis points of unanticipated ECB easing.
- Similar results for other dependent variables

Flow Results – Asymmetric Model

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
	β2	9.48 (20.59)	10.84 (40.15)	12.82 (18.7)	280.35*** (103
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)

- 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).
- Easing announcements (β_2) generally associated with an increase in net inflows to DM markets and outflows from EM markets.
- We observe similar reactions to tightening announcements (β_1), though investors react to actions by a different mix of central banks.

Summary – Asymmetric Flow Regressions

- 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.

Active Weight Results – Symmetric Model

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*** (0.00
DM Bond	-0.00029*** (0.00011)	0.00017 (0.00014)	-0.00011* (0.00006)	0.00089** (0.000
EM Equity	-0.00001 (0.00006)	0.00021** (0.00009)	0.00002 (0.00005)	0.00062** (0.000
EM Bond	-0.00004* (0.00002)	-0.00003 (0.00003)	-0.00001 (0.00001)	0.00005 (0.0000

- Positive coefficients mean that fund inflows increase following monetary policy easing, and vice versa.
- 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.

Active Weight Results – Asymmetric Model

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.(
	β2	0.00068*** (0.00015)	-0.00046 (0.0003)	0.00019 (0.00013)	0.00089 (0.00
DM Bond	β1	0.00041 (0.00026)	-0.00015 (0.00029)	-0.00021** (0.0001)	0.00319*** (0.(
	β2	-0.00052*** (0.00013)	0.00031 (0.0002)	-0.00005 (0.00009)	-0.00119* (0.0(
EM Equity	β1	0.00015 (0.00016)	0.00029 (0.00019)	0.00014* (0.00008)	0.00072 (0.00
	β2	-0.00007 (0.00008)	0.00015 (0.00013)	-0.00012* (0.00007)	0.00054 (0.00
EM Bond	β1	0.00016*** (0.00005)	0.00002 (0.00007)	-0.00001 (0.00002)	0.0004** (0.0(
	β2	-0.00007*** (0.00002)	-0.00005 (0.00005)	-0.00001 (0.00002)	-0.00009 (0.00

- Investors actively reallocate their portfolios toward DM equities and out of other asset types in response to Fed easings.
- Investors also reduce their allocations of DM bonds following BOJ easing, and EM equities following ECB easings.
- Investors shift their allocation toward DM equities following tightenings actions by the Fed and BOJ. In contrast, investors increase their allocation of DM bonds and decrease their allocations of EM equities following an ECB tightening
- Magnitudes are increase of 50-75% over typical 2-day average

Active Weight Results – Asymmetric Model

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)

- During QE1, investors actively reallocated their portfolios from both DM and EM bonds to DM equities in response to easing.
- Investors also reallocated from DM bonds to DM equities following LSAP easing announcements.
- The only significant reactions to tightening occurred during QE3, when investors again reallocated from EM bonds to DM equities.

Summary – Asymmetric Active Weight Regressions

- Investors actively reallocate their portfolios toward DM equities and out of other asset types in response to Fed easings.
- During QE3 investors reallocated from EM bonds to DM equities following a tightening move by the FEd
- Investors reduce their allocations of DM bonds following BOJ easing, and EM equities following ECB easings.
- Investors shift their allocation toward DM equities following tightenings actions by the BOJ. In contrast, investors increase their allocation of DM bonds and decrease their allocations of EM equities following an ECB tightening
- Response to tightenings similar to earlier results – reaction to easings and tightenings is the same!
- Channel is unclear – confidence is most likely

Robustness Checks

- Crisis and non-crisis sub-periods
- One-day flows
- Country-level weekly flows
- Alternative specification to test $\beta_1 \neq \beta_2$
- Dummy indicator variable

Results – Symmetric Model, Indicator Dummy

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 (0.014
DM Bond	0.05859*** (0.01521)	0.0613*** (0.0095)	0.0457*** (0.01002)	0.0424*** (0.0
EM Equity	0.05224** (0.02346)	0.03564* (0.02115)	0.02618 (0.02098)	0.0257 (0.021(
EM Bond	0.10591*** (0.03988)	0.1161*** (0.03639)	0.097*** (0.0327)	0.0857*** (0.02

- Positive coefficients mean that fund inflows increase following monetary policy easing, and vice versa.
- Using flows/NAV many actions are significant
- May reconcile our results with Fratzscher et al (2013), others

Conclusion

- Flows to EMEs picked up after the GFC.
  - But not more than flows to DMs
- So flow measure needs to account for wealth effect
- Channel is not clear – Investors shifted toward DM equities and out of everything else following both easings and tightenings by Fed and ECB
- BOE actions didn't appear to have an effect on capital flows. Reaction to BOJ actions were sometimes in the opposite direction of ECB and Fed, suggesting a different channel is at work

Conclusion

- Flows did not surge disproportionately to EMEs because of UMP
  - (Do EME policy makers care that the flows were because of DM recovery? Probably.)
- EMEs aren't off in the clear
  - DM investors have been reallocating toward DM equities in most recent QE period – may be more rebalancing to come
- Thank you!!

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 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.

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

	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