EUROPEAN CENTRAL BANK
EUROSYSTEM

A Global Monetary Tsunami? Measuring the Spill-overs of US Quantitative Easing

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Domestic and International Dimensions of Unconventional Monetary Policy
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"This crisis started in the developed world, … it will not be overcome through quantitative easing policies that have triggered … a monetary tsunami, have led to a currency war and have introduced new and perverse forms of protectionism in the world."

Dilma Rousseff,
President of Brazil (2012)

literature

Is there evidence for global spill-overs of Fed QE policies?

- So far relatively more focus on the domestic effects, only a few studies on the on international spillovers of QE
  - ✓ Neely (2010) – yields in advanced economies (event study)
  - ✓ Chen, Filardo, He, Zhu (2012), BIS WP66 – asset prices (event study) and macro (VAR)
  - ✓ Leduc (2012), JIMF – commodities (event study)
  - ✓ Bauer and Neely (2013), JIMF – channels (event study)

What is missing?

- looking and price and quantities (capital flows)
- Going beyond event studies and analysing the impact of operations

What we do…

Goal of this study: to quantify the impact of US quantitative easing on asset prices and portfolio flows across the globe

- We differentiate among US, other advanced economies and emerging markets (we also look at the role of country specific features in influencing spillovers)
- We look at the impact of different QE policies (liquidity provision, purchases of treasuries, purchases of MBS and GSE debt)
- We measure the impact of both announcements (event study) and operations. Why operations?
  - ✓ Looking at announcements might not be enough when markets are dysfunctional
  - ✓ Announcement effect = traders' best guess of what other investors will do (Shilller)

Conclusions I

1. **US QE policies affected global asset prices, capital flows and exchange rates**

2. **Important to look at both announcements and operations**
   - ✓ Portfolio rebalancing occurs mainly with operations

3. **Different QE instruments have different impact on markets:**
   - ✓ **QEI:** Portfolio Rebalancing into the US
   - ✓ **QE2:** portfolio rebalancing across countries (into EMEs) and assets (from bonds to equity) - boost global equities

Conclusions II

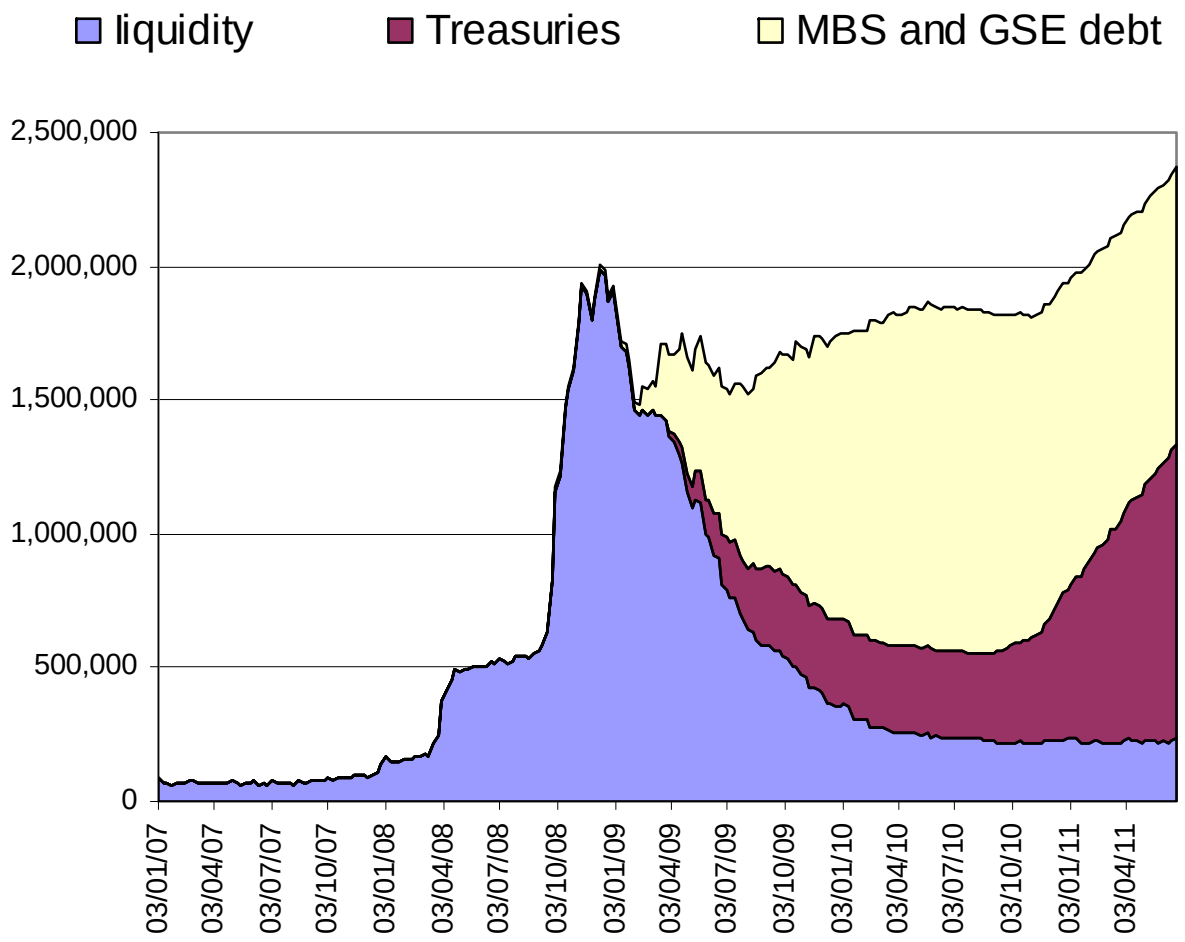
4. **Overall, QE policies are not the main drivers of flows and prices (limited economic impact)**

5. **QE increased pro-cyclicality of flows into EMEs**

6. **Domestic policies in EMEs help smoothing the international spillovers of QE**

Fed unconventional policy tools

Unconventional operations in the FED balance sheet (USD millions)



Data (portfolio flows)

- EPFR (Emerging Portfolio Fund Research) – portfolio allocation of mutual funds
- Cover16,000 equity funds, 8,000 bond funds
- Mainly US investor perspective (US domiciled funds)
- Aggregated at level of 65 countries of destination of the flows
- correlated with BoP data
- frequency of the data: daily

Methodology I

$$y_{i,t} = E_{i,t-1}\left[y_{i,t}\right] + (\beta + \gamma^{EME} D_i^{EME} + \gamma^{AE} D_i^{AE}) MP_t + \varepsilon_{i,t}$$

$$\text{with} \quad MP_t = [AN1_t, AN2_t, LQ_t, TR_t, MBS_t]'$$

$y_{i,t}$ → portfolio flows, equity returns, bond yields, FX returns in country i on day t

AN_t → QE1 and QE2 announcement dummies (same as in Wright 2011)

LQ_t, TR_t, MBS_t → Liquidity support, Treasury and MBS purchases by Fed

$E_{t-1}[y_{i,t}]$ → controls variables (fixed effect, lags of VIX, US short term rate, equity returns in the US and in country i, previous days' trend)

Panel fixed-effect estimator

Methodology II

Factors alleviating endogeneity concerns

- Treasuries and MBS purchases are predetermined
  - ✓ Detailed calendar of operations released at the beginning of each month
- Liquidity operations: market developments in one specific day should not affect the demand of central bank liquidity over long horizons
- Use of daily data (QE not all the time active)
- Use of "special" controls: indicators of predetermined market conditions that might affect the size of operations
  - ✓ intraday returns and volatilities for asset prices and exchange rates in the morning session of European markets (2h time window between 12PM and 2PM CET, before US markets start)

Total Impact of QE instruments

(total impact = estimated coefficient x total size of the operations)

	Portfolio Equity Flows (flows in % of AUM)			Portfolio Bond Flows (flows in % of AUM)		
	US	EME	AE	US	EME	AE
QE I Announcements (AN1)	1.36 ***	0.16	0.57 ***	0.66 ***	-0.58 ***	0.33 ***
QE II Announcements (AN2)	0.00	0.34 ***	-0.04	0.07 ***	0.20 ***	0.04
Liquidity (LQ)	2.57 ***	-2.98 **	-0.13	2.14 ***	-3.11 ***	0.52
Treasuries QE1 (TR1)	2.31 ***	0.31	-0.69 ***	0.92 ***	-1.07 ***	-0.23
Treasuries QE 2 (TR2)	-2.91 ***	0.98	-3.59 ***	-5.68 ***	-11.32 ***	-4.16 ***
MBS (MBS)	-0.85 ***	1.06 **	-0.67 **	-0.65 ***	-2.96 ***	-2.47 ***

	Equity prices (Return in %)			Bond Yields (Change in p.p.)		
	US	EME	AE	US	EME	AE
QE I Announcements (AN1)	10.40 ***	5.53 ***	2.10 **	-0.58 ***	-0.77 *	-0.81 *
QE II Announcements (AN2)	3.33 ***	1.71 ***	1.25 ***	-0.03 ***	0.11 *	0.01
Liquidity (LQ)	8.79 ***	-9.70 ***	-3.79	0.55 *	-0.51	0.33
Treasuries QE1 (TR1)	-2.52 ***	0.12	-1.17	-0.22 ***	0.98	2.43
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MBS (MBS)	16.13 ***	9.81 ***	16.16 ***	-0.23 ***	-0.45	-0.19

Global spill-overs of US quantitative easing

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Liquidity operations: rebalancing to the US

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QE I Announcements: rebalancing to the US and AEs

	Portfolio Equity Flows (flows in % of AUM)			Portfolio Bond Flows (flows in % of AUM)		
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QE I Announcements (AN1)	1.36 ***	0.16	0.57 ***	0.66 ***	-0.58 ***	0.33 ***
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QE1 Treasury purchases : rebalancing to the US

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QE2 announcements: rebalancing into EMEs, boosting equity prices worldwide

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QE2 treasury purchases: relative rebalancing into EME equities, boosting equity prices worldwide

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Total impact of QE instruments on exchange rates

	Exchange Rate (Return in %, + USD appreciation)		
	US	EME	AE
QE I Announcements (AN1)	-2.06 ***	-1.00 *	-6.06 ***
QE II Announcements (AN2)	-0.11 ***	-0.29 **	-0.76 ***
Liquidity (LQ)	3.74 ***	4.52 ***	7.10 ***
Treasuries QE1 (TR1)	0.56 ***	2.70 **	-0.25
Treasuries QE 2 (TR2)	-1.18 ***	-0.58	-1.33
MBS (MBS)	-1.46 **	-5.08 ***	-3.33 ***

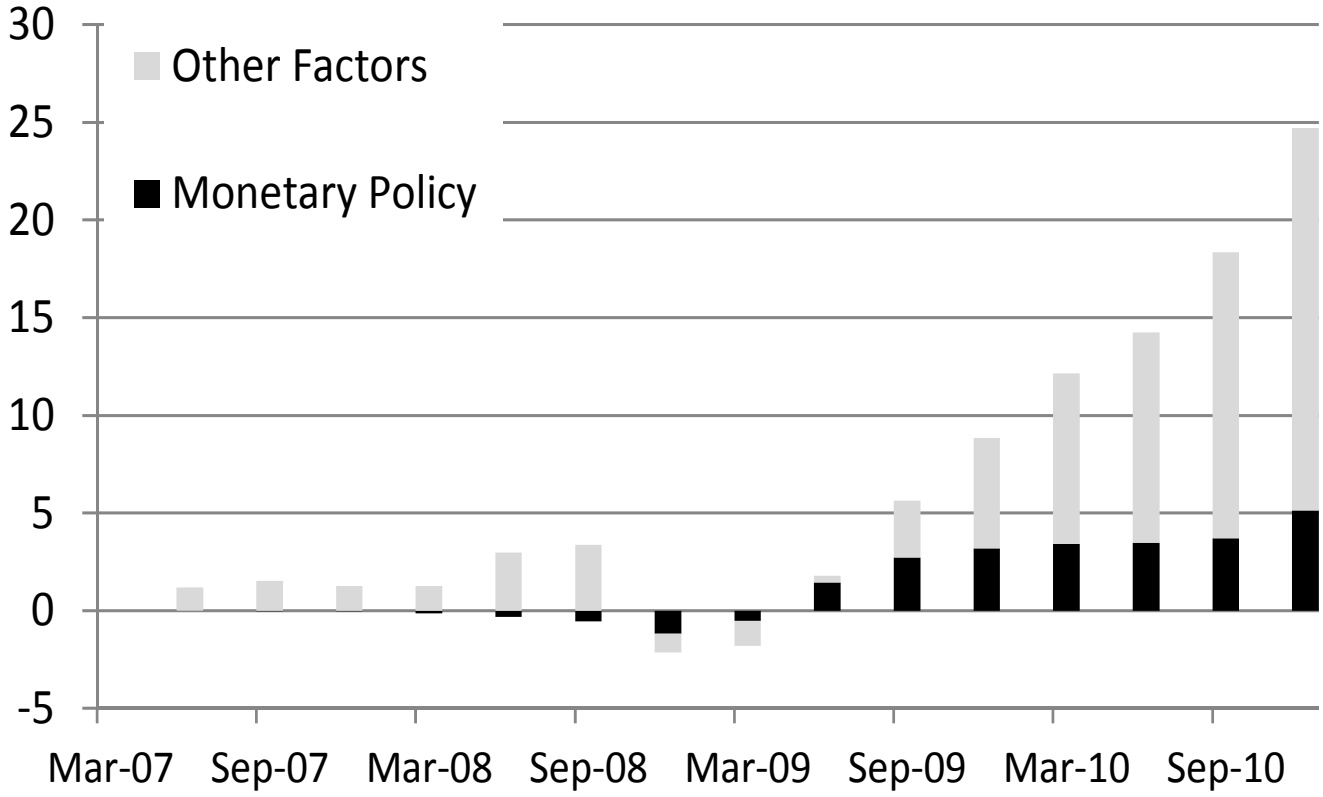
- Sizeable exchange rate movements

First set of conclusions

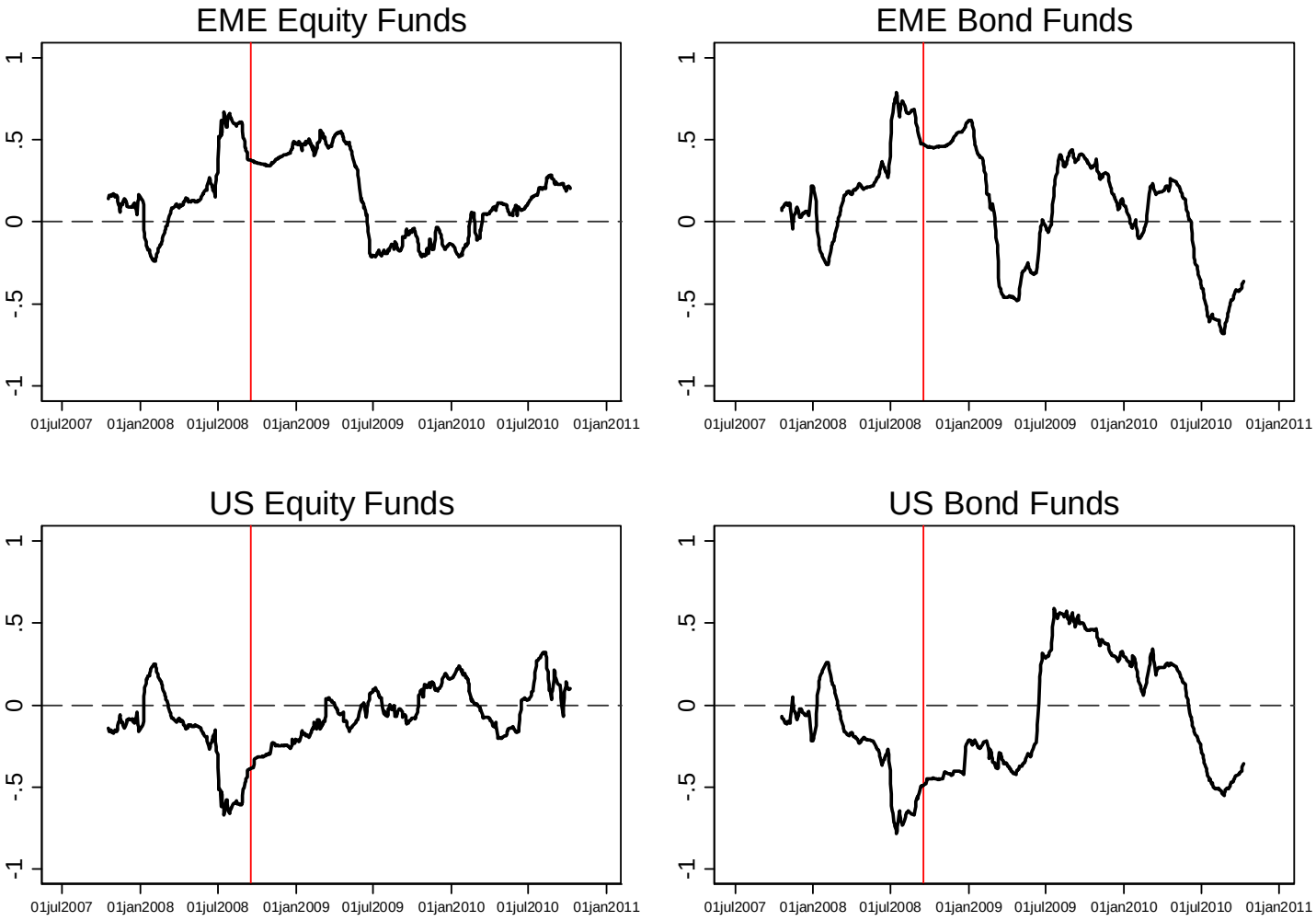
1. **US QE policies affected global asset prices, capital flows and exchange rates**
2. **Important to look at both announcements and operations**
   - ✓ Portfolio rebalancing occurs mainly with operations
3. **Different QE instruments have different impact on markets**
   - ✓ **QE1:** Portfolio Rebalancing into the US
   - ✓ **QE2:** portfolio rebalancing across countries (into EMEs) and assets (from bonds to equity) - boost global equities

Economic impact of QE policies on equity flows to EMEs

Cumulated impact of QE on EME equity flows (% AUM)



Pro-cyclical for EMEs – counter-cyclical for US

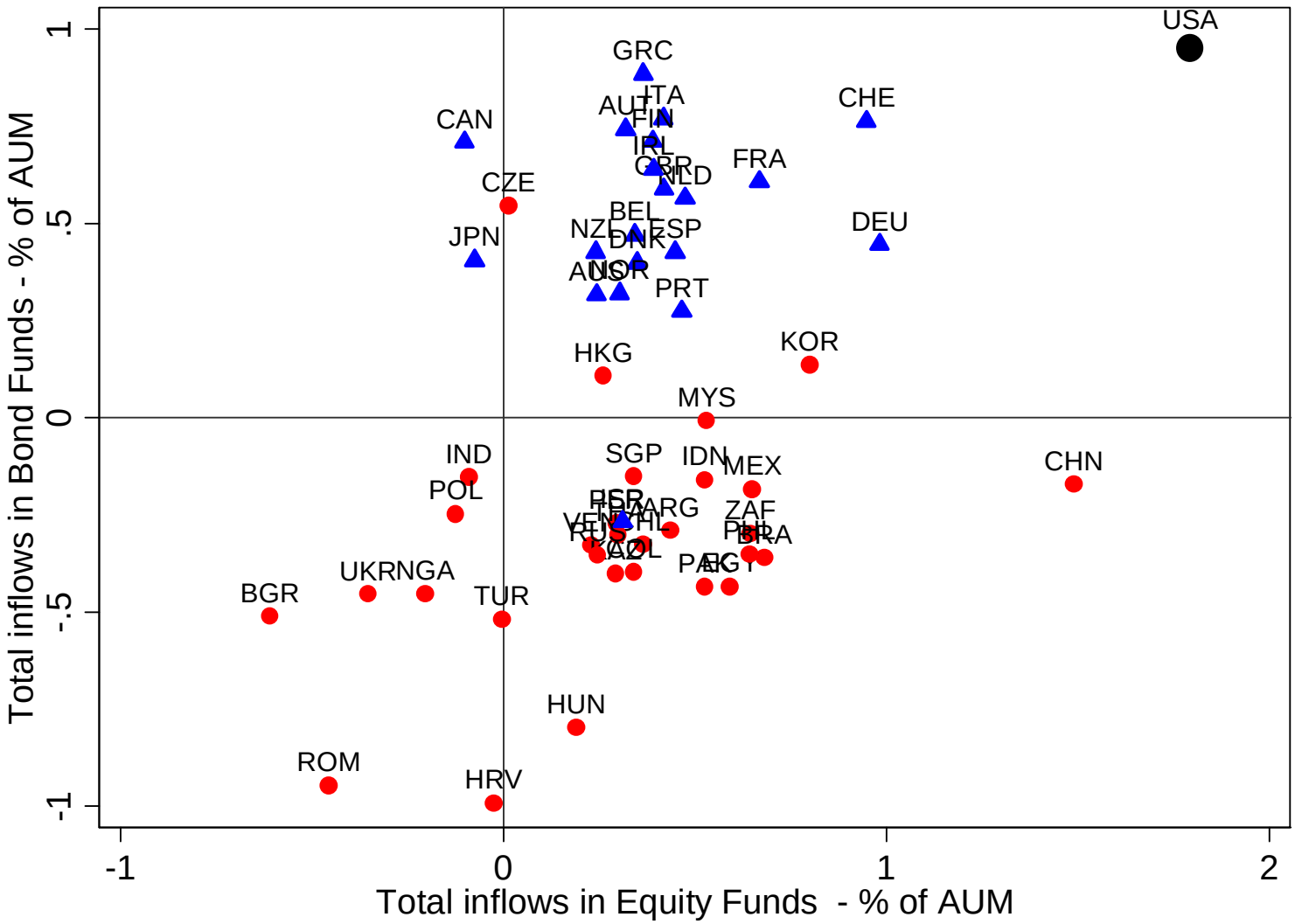


Second set of conclusions

4. **Overall, QE policies are not the main drivers of flows and prices (limited economic impact)**
5. **QE increased pro-cyclicality of flows into EMEs**

- **Policy implications**
  - Presence of adverse externalities (though limited)
  - EME policy-makers' concerns not unfounded

Impact of QE: country heterogeneity



Role of policies

		Fx flexibility		CB activism		FP activism		Institutions	
		low	high	low	high	low	high	low	high
equity flows	*QE I Announcements (AN1)*	0.0459 **	0.1264 *** *	0.0711 *	0.0919 ***	0.1247 ***	0.0619 **	0.0590 *	0.1132 ***
	QE II Announcements (AN2)	0.0901 ***	0.0056 ***	0.0942 **	0.0441 ***	0.0474 ***	0.0636 **	0.1140 ***	-0.0024 ***
	Liquidity (LQ)	-0.0007 ***	-0.0002	-0.0019	-0.0005 ***	-0.0011	-0.0008 ***	-0.0016 **	-0.0002 *
	QE1 Treasuries (TR1)	0.0002	-0.0009	-0.0004	-0.0003	-0.0018	-0.0009	0.0010	-0.0018 **
	QE2 Treasuries (TR2)	-0.0002	-0.0045 *** *	0.0011	-0.0025 *	-0.0001	-0.0040 ***	0.0015	-0.0050 *** **
	MBS (MBS)	0.0000	0.0006	0.0010	0.0000	0.0003	0.0010 ***	0.0011 *	-0.0004 **
bond flows	*QE I Announcements (AN1)*	-0.0512 ***	-0.0068	-0.0963 ***	-0.0155 **	-0.0120	-0.0780 ***	-0.1079 ***	0.0332 ***
	QE II Announcements (AN2)	-0.0153	-0.0873 *** *	0.0071	-0.0548 ***	-0.0351	-0.0420	0.0144	-0.0939 *** ***
	Liquidity (LQ)	-0.0011 ***	-0.0006 **	-0.0013 ***	-0.0008 ***	-0.0007 ***	-0.0011 ***	-0.0017 ***	-0.0001 ***
	QE1 Treasuries (TR1)	-0.0030 ***	-0.0016 *	-0.0029 ***	-0.0025 ***	-0.0022 ***	-0.0027 ***	-0.0041 ***	-0.0008 ***
	QE2 Treasuries (TR2)	-0.0217 ***	-0.0201 ***	-0.0236 ***	-0.0199 *** ***	-0.0183 ***	-0.0206 ***	-0.0239 ***	-0.0170 *** ***
	MBS (MBS)	-0.0034 ***	-0.0025 ***	-0.0035 ***	-0.0031 ***	-0.0031 ***	-0.0034 ***	-0.0033 ***	-0.0032 ***
equity prices	*QE I Announcements (AN1)*	0.8999 ***	1.2013 ***	0.4706	1.2209 *** **	0.9863 ***	1.2286 ***	1.2322 ***	0.7568 ***
	QE II Announcements (AN2)	0.4005 ***	0.5209 ***	0.6453 ***	0.4349 ***	0.6046 ***	0.4177 ***	0.6146 ***	0.3743 ***
	Liquidity (LQ)	-0.0041 ***	-0.0037 **	-0.0041 **	-0.0036 ***	-0.0026 *	-0.0043 **	-0.0048 ***	-0.0026 **
	QE1 Treasuries (TR1)	0.0049	-0.0204 *** **	0.0165	-0.0081 *	0.0030	-0.0139	0.0021	-0.0051
	QE2 Treasuries (TR2)	0.0243 ***	0.0167 ***	0.0168 ***	0.0228 ***	0.0153 ***	0.0231 ***	0.0242 ***	0.0168 ***
	MBS (MBS)	0.0145 ***	0.0149 ***	0.0160 ***	0.0138 ***	0.0155 ***	0.0128 ***	0.0109 ***	0.0187 *** **
bond yields	*QE I Announcements (AN1)*	-0.2774 **	-0.0747 ***	-0.3423	-0.1528 **	-0.1939	-0.2173 *	-0.2472 **	-0.1594
	QE II Announcements (AN2)	0.0246	0.0136	0.0118	0.0239	0.0308 ***	-0.0128 ***	0.0382	0.0043
	Liquidity (LQ)	0.0001	-0.0002	-0.0001	0.0000	0.0001	-0.0002	-0.0003	0.0001
	QE1 Treasuries (TR1)	0.0087 *	0.0016 **	0.0118	0.0036 ***	0.0073	0.0049 **	0.0039 *	0.0070
	QE2 Treasuries (TR2)	0.0005	0.0008 **	0.0001	0.0008 ***	0.0006	0.0006 *	0.0006	0.0007 **
	MBS (MBS)	-0.0008	0.0002	-0.0014	0.0000	-0.0003	-0.0006	-0.0008	0.0000
FX	*QE I Announcements (AN1)*	-0.6564 ***	-1.0287 *** *	-0.4684 **	-0.9678 *** *	-1.0805 ***	-0.5428 *** **	-0.2915 *	-1.1365 *** ***
	QE II Announcements (AN2)	-0.1093 ***	-0.2795 *** *	-0.1824 **	-0.1664 ***	-0.1944 ***	-0.1604 ***	-0.1269 ***	-0.1912 ***
	Liquidity (LQ)	0.0033 ***	0.0024 **	0.0020 *	0.0034 ***	0.0037 ***	0.0021 **	0.0020 **	0.0036 ***
	QE1 Treasuries (TR1)	-0.0013	0.0155 ** **	0.0091	0.0023	0.0084	0.0021	0.0101 **	-0.0004 *
	QE2 Treasuries (TR2)	0.0028 **	-0.0094 *** ***	-0.0018	-0.0016	-0.0012	-0.0013	-0.0009	-0.0017
	MBS (MBS)	-0.0028 **	-0.0100 *** **	-0.0082 ***	-0.0032 ** *	-0.0066 ***	-0.0045 **	-0.0066 ***	-0.0040 ***

Role of policies

		Fx flexibility			CB activism			FP activism			Institutions		
		low	high		low	high		low	high		low	high	
equity flows	*QE I Announcements (AN1)*	0.0459 **	0.1264 ***	*	0.0711 *	0.0919 ***		0.1247 ***	0.0619 **		0.0590 *	0.1132 ***	
	QE II Announcements (AN2)	0.0901 ***	0.0056	***	0.0942 **	0.0441 ***		0.0474 ***	0.0636 **		0.1140 ***	-0.0024	***
	Liquidity (LQ)	-0.0007 ***	-0.0002		-0.0019	-0.0005 ***		-0.0011	-0.0008 ***		-0.0016 **	-0.0002	*
	QE1 Treasuries (TR1)	0.0002	-0.0009		-0.0004	-0.0003		-0.0018	-0.0009		0.0010	-0.0018 **	
	QE2 Treasuries (TR2)	-0.0002	-0.0045 ***	*	0.0011	-0.0025 *		-0.0001	-0.0040 ***		0.0015	-0.0050 ***	**
	MBS (MBS)	0.0000	0.0006		0.0010	0.0000		0.0003	0.0010 ***		0.0011 *	-0.0004	**
bond flows	*QE I Announcements (AN1)*	-0.0512 ***	-0.0068		-0.0963 ***	-0.0155	**	-0.0120	-0.0780 ***		-0.1079 ***	0.0332	***
	QE II Announcements (AN2)	-0.0153	-0.0873 ***	*	0.0071	-0.0548 ***		-0.0351	-0.0420		0.0144	-0.0939 ***	***
	Liquidity (LQ)	-0.0011 ***	-0.0006 **		-0.0013 ***	-0.0008 ***		-0.0007 ***	-0.0011 ***		-0.0017 ***	-0.0001	***
	QE1 Treasuries (TR1)	-0.0030 ***	-0.0016 *		-0.0029 ***	-0.0025 ***		-0.0022 ***	-0.0027 ***		-0.0041 ***	-0.0008	***
	QE2 Treasuries (TR2)	-0.0217 ***	-0.0201 ***		-0.0236 ***	-0.0199 ***	***	-0.0183 ***	-0.0206 ***		-0.0239 ***	-0.0170 ***	***
	MBS (MBS)	-0.0034 ***	-0.0025 ***		-0.0035 ***	-0.0031 ***		-0.0031 ***	-0.0034 ***		-0.0033 ***	-0.0032 ***	
equity prices	*QE I Announcements (AN1)*	0.8999 ***	1.2013 ***		0.4706	1.2209 ***	**	0.9863 ***	1.2286 ***		1.2322 ***	0.7568 ***	
	QE II Announcements (AN2)	0.4005 ***	0.5209 ***		0.6453 ***	0.4349 ***		0.6046 ***	0.4177 ***		0.6146 ***	0.3743 ***	
	Liquidity (LQ)	-0.0041 ***	-0.0037 **		-0.0041 **	-0.0036 ***		-0.0026 *	-0.0043 **		-0.0048 ***	-0.0026 **	
	QE1 Treasuries (TR1)	0.0049	-0.0204 ***	**	0.0165	-0.0081	*	0.0030	-0.0139		0.0021	-0.0051	
	QE2 Treasuries (TR2)	0.0243 ***	0.0167 ***		0.0168 ***	0.0228 ***		0.0153 ***	0.0231 ***		0.0242 ***	0.0168 ***	
	MBS (MBS)	0.0145 ***	0.0149 ***		0.0160 ***	0.0138 ***		0.0155 ***	0.0128 ***		0.0109 ***	0.0187 ***	**
bond yields	*QE I Announcements (AN1)*	-0.2774 **	-0.0747 ***		-0.3423	-0.1528 **		-0.1939	-0.2173 *		-0.2472 **	-0.1594	
	QE II Announcements (AN2)	0.0246	0.0136		0.0118	0.0239		0.0308 ***	-0.0128	***	0.0382	0.0043	
	Liquidity (LQ)	0.0001	-0.0002		-0.0001	0.0000		0.0001	-0.0002		-0.0003	0.0001	
	QE1 Treasuries (TR1)	0.0087 *	0.0016 **		0.0118	0.0036 ***		0.0073	0.0049 **		0.0039 *	0.0070	
	QE2 Treasuries (TR2)	0.0005	0.0008 **		0.0001	0.0008 ***		0.0006	0.0006 *		0.0006	0.0007 **	
	MBS (MBS)	-0.0008	0.0002		-0.0014	0.0000		-0.0003	-0.0006		-0.0008	0.0000	
FX	*QE I Announcements (AN1)*	-0.6564 ***	-1.0287 ***	*	-0.4684 **	-0.9678 ***	*	-1.0805 ***	-0.5428 ***	**	-0.2915 *	-1.1365 ***	***
	QE II Announcements (AN2)	-0.1093 ***	-0.2795 ***	*	-0.1824 **	-0.1664 ***		-0.1944 ***	-0.1604 ***		-0.1269 ***	-0.1912 ***	
	Liquidity (LQ)	0.0033 ***	0.0024 **		0.0020 *	0.0034 ***		0.0037 ***	0.0021 **		0.0020 **	0.0036 ***	
	QE1 Treasuries (TR1)	-0.0013	0.0155 **	**	0.0091	0.0023		0.0084	0.0021		0.0101 **	-0.0004	*
	QE2 Treasuries (TR2)	0.0028 **	-0.0094 ***	***	-0.0018	-0.0016		-0.0012	-0.0013		-0.0009	-0.0017	
	MBS (MBS)	-0.0028 **	-0.0100 ***	**	-0.0082 ***	-0.0032 **	*	-0.0066 ***	-0.0045 **		-0.0066 ***	-0.0040 ***	

Third set of conclusions

Policy implications

- Domestic policy mix could mitigate/exacerbate spillovers
- Low exchange rate flexibility / bad institutions magnify the pro-cyclicality of the impact of QE on flows

List of QE announcements

	Date	Event	Gagnon	Wright
QE I	(1) Tuesday 25/11/2008	FOMC statement	-22	0.75
QE I	(2) Monday 01/12/2008	Bernanke's Speech	-19	0.84
QE I	(3) Tuesday 16/12/2008	FOMC statement	-26	2.22
QE I	(4) Wednesday 28/01/2009	FOMC statement	14	-0.23
QE I	(5) Wednesday 18/03/2009	FOMC statement	-47	3.41
QE I	(6) Wednesday 12/08/2009	FOMC statement	5	0.15
QE I	(7) Wednesday 23/09/2009	FOMC statement	-3	0.85
QE I	(8) Wednesday 04/11/2009	FOMC statement	6	0.12
QE II	(9) Tuesday 10/08/2010	FOMC statement	NA	0.57
QE II	(10) Friday 27/08/2010	Bernanke's Speech	NA	-0.83
QE II	(11) Friday 15/10/2010	Bernanke's Speech	NA	-0.21
QE II	(12) Wednesday 03/11/2010	FOMC Statement	NA	-0.05