Capital flows to emerging market economies: a study of unconventional monetary policy and unconventional monetary policy normalization

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EE459 Seminar in International Trade Theory and Policy

Introduction

Figure 1: Net private capital Inflows

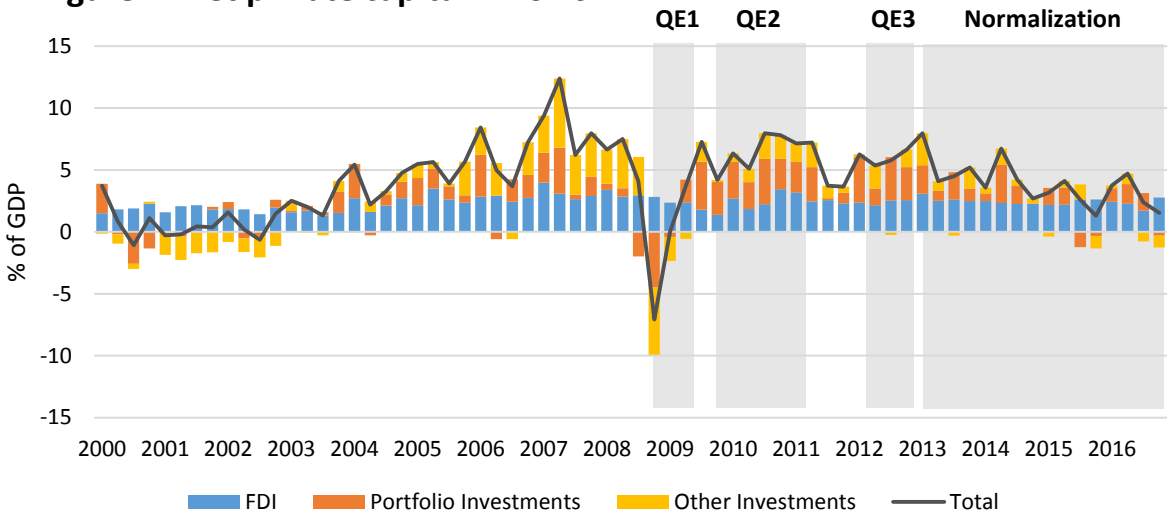
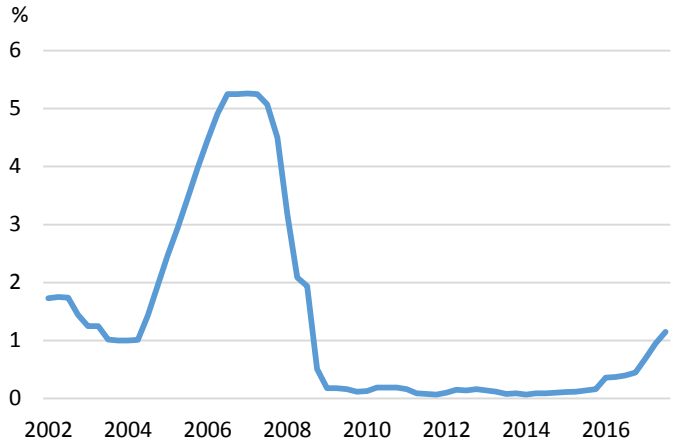


Figure 2: Effective Fed Fund Rate



* Net private capital flow of 14 EMEs is weighted by percentage share of the world calculated from GDP based on purchasing power parity (PPP). Data for PPP are available from IMF World Economic Outlook Database.

The recent data demonstrates the immediate surge in capital flows to Emerging Market Economies (EMEs) after the occurrence of Global financial crisis in 2008. The proportion of portfolio investment has increase significantly during the period where QEs were implement. Not so long, EMEs then experience sharp withdrawal of capital in the second half of 2013 where balance sheet normalization has began.

QE episodes

1. QE1
2. QE2
3. QE3
4. Normalization

Introduction : Why Emerging Market Economies?

Emerging market characteristics

1. Progressing toward becoming more advanced
2. Faster economic growth and industrialization
3. High returns due to higher risks relevant
4. Still have low to middle per capita income

Easing policy in AEs have pushed funds out while higher growth and higher interest rate in Emerging Market Economies have pulled funds in.

Figure 3: interest rate

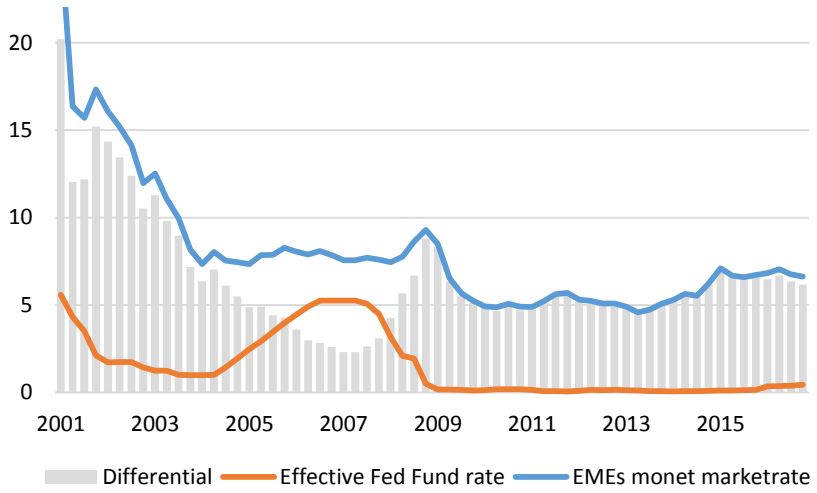
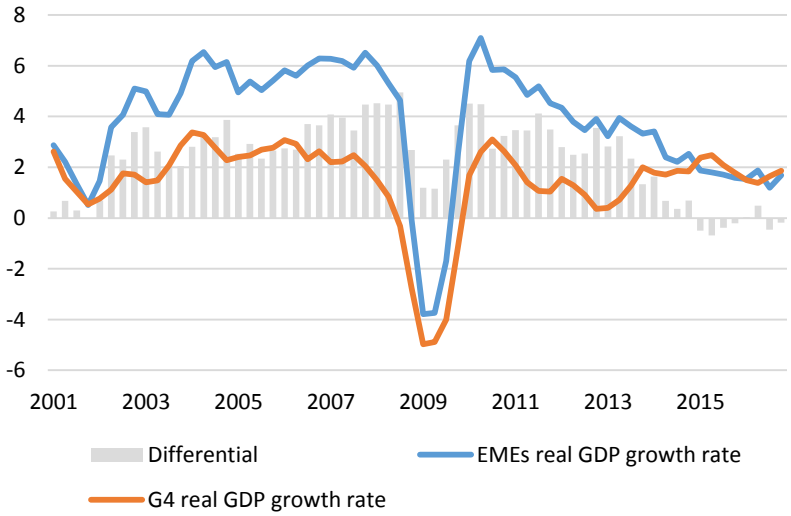


Figure 4: real GDP growth rate



Literature Review: Global financial crisis & U.S. Policy

Paper	Key questions	Data & Methodology	Results
The impact of U.S. Monetary Policy Normalization on Capital Flows to Emerging market Economies (Dahlhaus, Vasishtha, 2014)	• Explain the monetary policy shock to capital flows and other related variables	VAR model 7 endogenous variables	• The impact of monetary policy normalization shock on capital flows to EMEs is economically small. • But small change in capital flows can lead to significant financial market volatility
Emerging Market Capital Flows and U.S. Monetary Policy (Clark, Converse, Coulibaly, and Kamin, 2016)	• How large a role of U.S. policy have played in the surge of capital flows to EMEs? • Why these capital flows started to decline recently?	Panel regression 19 EMEs, quarterly data	• Declining capital flows is dominantly due to lower EMEs growth and commodity prices. • Normalization policy appear not to have significant role
Gross Private Capital Flows to Emerging Markets (Nier, Sedik, and Mondino, 2014)	• Can the Global Financial Cycle be tamed?	Panel regression 29 EMEs, quarterly data 6 non-G4 Advanced Economies	• When VIX is high, change in VIX have a large marginal effect on flows • There is little policymaker can do to tame the effect of the global financial cycle on gross capital flows such as keeping interest rate high to stop outflows
Fed Policy Expectations and Portfolio Flows to Emerging Markets (Keopke, 2014)	• Is impact of shifts in monetary policy expectations symmetric?	Panel regression 30 EMEs, quarterly	• The result shows an asymmetric impact of shifts in policy expectation. In post-crisis period, the effect of a shift to tightening is twice higher than the effect of a shift to expansionary.

Literature Review: Capital Flows Determinants

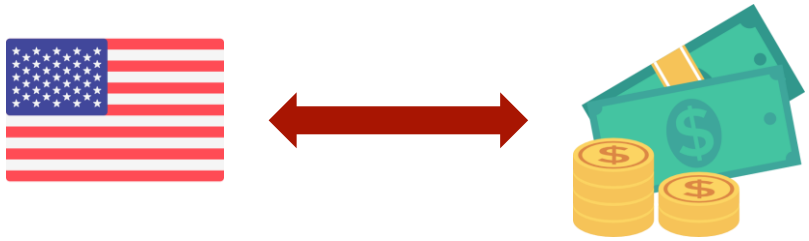
Paper	Key questions	Data & Methodology	Results
Capital flows, push versus pull factors and the global financial crisis (Fratzscher, 2012)	• What is the role of different drivers of global capital flows?	Factor model with 2 types of factor (global and domestic factor)	• The drivers of capital flow are strongly related to pull factors • Common shocks (global liquidity and risk) have large effect on global capital flows
Capital flows to EMEs: A brave new world? (Ahmed, and Zlate, 2014)	• Main driver of capital flow? • Is pot-crisis period different? • Effect of unconventional U.S. monetary policy?	Panel regression 12 EMEs, quarterly data	• Capital flows are determined by several factors and ensitivity of flows to policy rate differential has increased • Significant effect of policy expansion
Unconventional Monetary Policy Normalization in High-Income Countries (burns, Kida, Lim, Mohapatra, and Stocker, 2014)	• Evaluate main flows determinants • Explore impact of normalization policy of high-income countries	• Dynamic Panel regression 60 developing countries, quarterly data • VAR • Probit model	• In general, global condition play an important role • Capital flows to individual countries are strongly influenced by pull factors • The effect of QE diminish with each new QE use
Capital flows to Emerging Market Economies (Suttle, 2013)	• Push versus Pull factors in EME flow	Panel Regression 30 EMEs, quarterly data	• Both push and pull factors are important in driving flows especially GDP growth, risk aversion, U.S. liquidity growth
Quantitative Easing by the Fed and International Capital Flows (Khatiwada, 2017)	• QE led to significant inflows and tapering was associated with a period of severe retrenchment.	Panel regression	• Capital inflows is associated to with U.S. unsensational monetary policy • The magnitude of inflows varied by the asset types

Motivation & Research Question

Motivations

- Speculative and volatile capital flows after crisis raise concern for recipient countries.
- Policy challenges for EMEs: appropriate policy responses and balancing the real effect of policies
- Normalization is still in issue.

"Phase II of Fed policy normalization is coming"



Research Gap

- Support for the argument of existing literature
- The asymmetric size of policy impact on the net total capital flow is still being less mentioned.
- The effect of policy on each flow compositions

Research Questions

1. Is there any sensitivity change of main determinants of capital flows to EMEs in post global financial crisis period?
2. Is there an asymmetric effect on capital inflows and outflows of EMEs due to Fed's unconventional policy and policy normalization?
3. Do these associations vary across net capital flows compositions?

Data & Methodology

Country list for panel data model

Argentina		Mexico	
Brazil		Philippines	
Chile		Poland	
Colombia		Russia	
Indonesia		South Africa	
South Korea		Thailand	
Malaysia		Turkey	

Methodology

1. Baseline Model
2. Structural break test
3. Extended Model with QE variables
4. Decomposition of capital flows

Estimation Techniques

1. Pooled OLS
2. Fixed Effects
3. Random Effects

Baseline Model

$$CF_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + v_i + \varepsilon_{it}$$

Capital Flows
(net flows ex. FDI)

Chicago Board Options Exchange
Market Volatility Index

Post-crisis
Dummy variable

Note

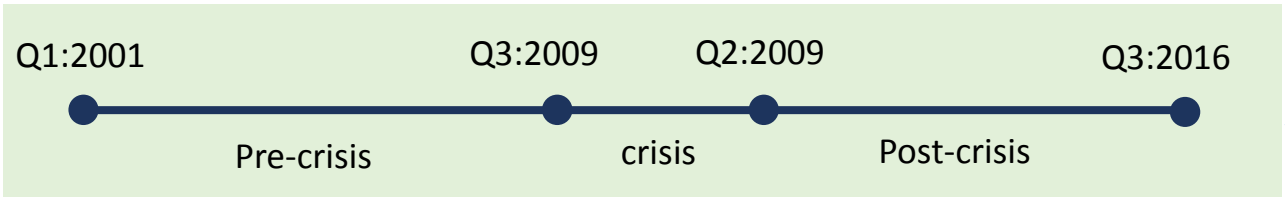
FDI is excluded due to
1. Relatively stable
2. Likely depends on other country specific factors

Control Variables

$$X_{it} = \begin{bmatrix} rGDP_{it} - rGDP_t^{AE} \\ r_{it} - r_t^{US} \\ CA_{it} \\ REER_{it} \\ Rating_{it} \end{bmatrix}$$

Country Fixed Effect

$$v_i = \sum_{i=1}^{n-1} \alpha_i D_i$$



Source of Data & Variables Measurement

Variable	Unit	Description	Expected impact
CF	percent of GDP	Net capital flow less FDI in liability taken from financial account, Balance of payments Source: IMF IFS	NA
gdp	percent	Real GDP growth differential of country i with U.S.; measured as a percentage change from the same quarter a year ago Source: IMF IFS	+
rate	percent	Short-term interest differential with U.S.; using overnight interbank rate for EMEs and effective fed fund rate for U.S. Source: IMF IFS, FRED	+
reer	percent	Real effective exchange rate; measured as a percentage change from the same quarter a year ago (higher value indicates real appreciation) Source: BIS	+
ca	percent of GDP	Current account balance Source: IMF IFS	+/-
rating	Unit	Credit rating score (1 for AAA and 10 for D) Source: Fitch Rating Inc.	-
vix	percent	Chicago Board Options Exchange Market Volatility Index (higher value indicates higher risk aversion) Source: FRED	-

Extended Model with QE variables

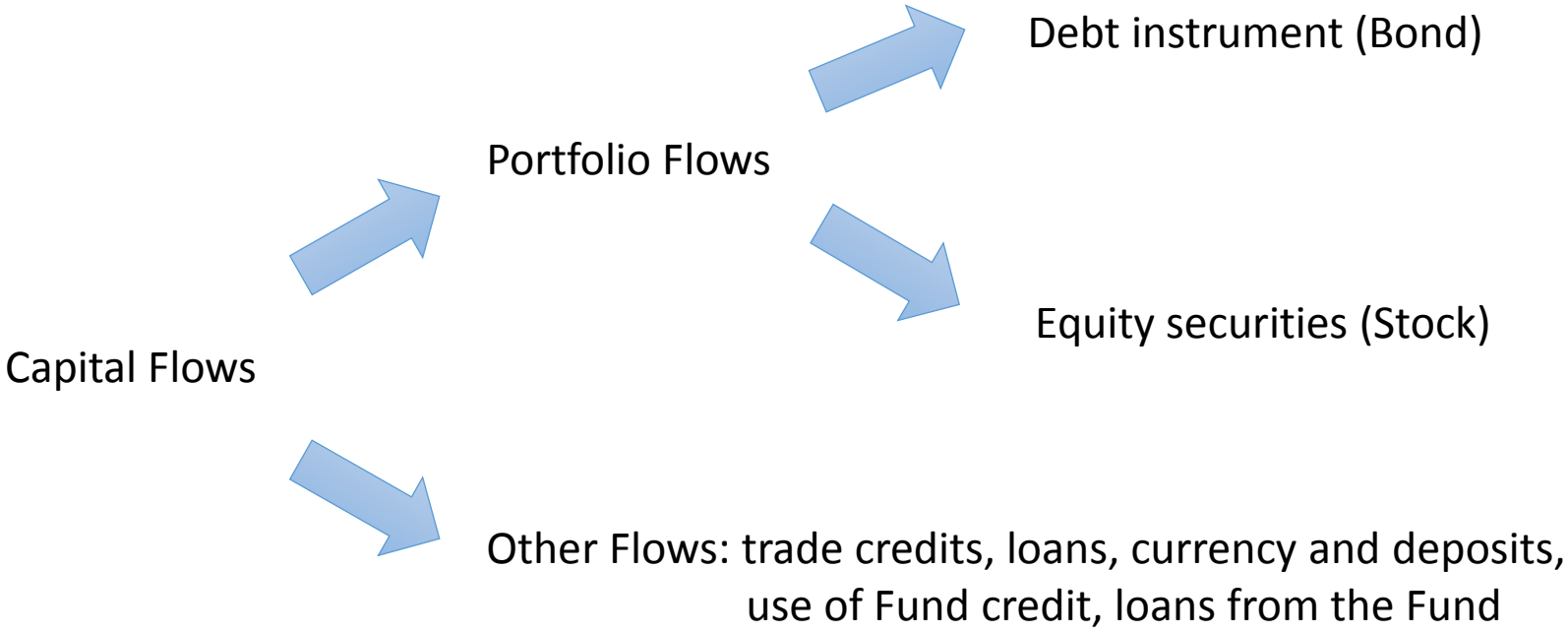
$$CF_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + USMP_t + v_i + \varepsilon_{it}$$

where $USMP_t = \begin{bmatrix} QE1 \\ QE2 \\ QE3 \\ QET \end{bmatrix}$

Variable	Description	Expected impact
qe1	dummy variable equal to 1 for the entire duration of QE1 policy (2008Q4 – 2010Q1)	+
qe2	dummy variable equal to 1 for the entire duration of QE2 policy (2010Q3 – 2011Q1)	+
qe3	dummy variable equal to 1 for the entire duration of QE3 policy (2012Q3 – 2013Q4)	+
qet	dummy variable equal to 1 for the entire after actual announcement of phase I tapering (2013Q4 – 2016Q3)	-

Decomposition of Capital Flows

$$CF_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + v_i + \varepsilon_{it}$$



Note: Due to unavailability of data of other flows composition. Hence, other flows is grouped in to only 1 dependent variables.

Decomposition

$$PORT_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + v_i + \varepsilon_{it}$$

$$BOND_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + v_i + \varepsilon_{it}$$

$$EQUITY_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + v_i + \varepsilon_{it}$$

$$OTHER_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 VIX_t + (\gamma_0 + \gamma_1 X_{it} + \gamma_2 VIX_t)\, PCRS_t + v_i + \varepsilon_{it}$$

Variable	Unit	Description
Port	percent of GDP	Portfolio flow in liability taken from financial account, Balance of payments Source: IMF
Bond	percent of GDP	Bond flow, a component of portfolio flows, in liability taken from financial account, Balance of payments Source: IMF
Equity	percent of GDP	Equity flow, a component of portfolio flows, in liability taken from financial account, Balance of payments Source: IMF
Other	percent of GDP	Other investment flow in liability taken from financial account, Balance of payments Source: IMF

Results: Structural Break Tests

Table 1: Structural Break test

VARIABLES	(1) OLS	(2) FE	(3) RE	(4) OLS	(5) FE	(6) RE
gdp	0.375***	0.381***	0.378***	0.420***	0.384***	0.420***
	(0.0584)	(0.0575)	(0.0560)	(0.0741)	(0.0750)	(0.0741)
rate	-0.0384**	-0.0407*	-0.0424**	-0.0354*	-0.0446**	-0.0354*
	(0.0183)	(0.0213)	(0.0204)	(0.0202)	(0.0222)	(0.0202)
vix	-0.189***	-0.188***	-0.188***	-0.219***	-0.219***	-0.219***
	(0.0268)	(0.0187)	(0.0188)	(0.0210)	(0.0206)	(0.0210)
ca	-0.255***	-0.300***	-0.270***	-0.255***	-0.277***	-0.255***
	(0.0481)	(0.0475)	(0.0377)	(0.0396)	(0.0538)	(0.0396)
reer	-8.74e-05***	-8.97e-05	-8.83e-05	-8.46e-05	-9.58e-05	-8.46e-05
	(1.04e-05)	(7.79e-05)	(7.80e-05)	(7.78e-05)	(7.67e-05)	(7.78e-05)
rating	-0.213*	-0.0324	-0.131**	-0.206***	-0.0269	-0.206***
	(0.117)	(0.0745)	(0.0661)	(0.0650)	(0.0735)	(0.0650)
pcrsgdp				-0.142	-0.0639	-0.142
				(0.116)	(0.117)	(0.116)
pcrsrate				0.0838	0.116	0.0838
				(0.0773)	(0.0863)	(0.0773)
pcrsvix				0.265***	0.253***	0.265***
				(0.0526)	(0.0521)	(0.0526)
pcrsca				0.0255	0.0544	0.0255
				(0.0649)	(0.0664)	(0.0649)
pcrslreer				0.000310	-7.58e-05	0.000310
				(0.00105)	(0.00104)	(0.00105)
pcrsrating				-0.129	0.255	-0.129
				(0.165)	(0.192)	(0.165)
pcrs				-3.687***	-5.401***	-3.687***
				(1.170)	(1.206)	(1.170)
Constant	6.174***	5.397***	5.827***	6.279***	5.635***	6.279***
	(0.693)	(0.521)	(0.532)	(0.622)	(0.637)	(0.622)
Observations	896	896	896	896	896	896
R-squared	0.231	0.214	0.2125	0.262	0.253	0.2410
Number of country	14	14	14	14	14	14

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Key findings

- Real GDP growth differential, VIX and current account are the main determinants of capital flows.
- Structural Break Test shows that the interaction term are jointly different from zero.
- Capital flows determinants seem to have less sensitive after the crisis confirming the search for higher yield behavior of investors.

Issues

- Even though Hausman test suggest to use Fixed Effect model, Fixed Effects diminishes the significance of country credit rating while increases the significance of interest rate differential
- Interest rate differential shows adverse sign from literature.

Table 2: Extended model with QE variables

	Fixed Effect					Random Effect				
VARIABLES	(1) QE 1	(2) QE 2	(3) QE 3	(4) QET	(5) All QEs	(6) QE 1	(7) QE 2	(8) QE 3	(9) QET	(10) All QEs
gdp	0.384***	0.383***	0.384***	0.379***	0.379***	0.420***	0.420***	0.420***	0.420***	0.420***
	(0.0746)	(0.0742)	(0.0750)	(0.0744)	(0.0735)	(0.0738)	(0.0734)	(0.0742)	(0.0735)	(0.0727)
rate	-0.0367*	-0.0453**	-0.0447**	-0.0480**	-0.0391*	-0.0307	-0.0354*	-0.0354*	-0.0354*	-0.0307
	(0.0223)	(0.0220)	(0.0223)	(0.0221)	(0.0220)	(0.0202)	(0.0200)	(0.0202)	(0.0200)	(0.0199)
vix	-0.260***	-0.219***	-0.219***	-0.218***	-0.261***	-0.259***	-0.219***	-0.219***	-0.219***	-0.259***
	(0.0246)	(0.0204)	(0.0206)	(0.0204)	(0.0249)	(0.0248)	(0.0208)	(0.0210)	(0.0208)	(0.0252)
ca	-0.293***	-0.278***	-0.277***	-0.274***	-0.294***	-0.256***	-0.255***	-0.255***	-0.255***	-0.256***
	(0.0538)	(0.0532)	(0.0538)	(0.0533)	(0.0530)	(0.0394)	(0.0392)	(0.0396)	(0.0392)	(0.0388)
reer	-9.47e-05	-9.53e-05	-9.59e-05	-9.59e-05	-9.40e-05	-8.47e-05	-8.46e-05	-8.46e-05	-8.46e-05	-8.47e-05
	(7.63e-05)	(7.59e-05)	(7.67e-05)	(7.60e-05)	(7.51e-05)	(7.75e-05)	(7.71e-05)	(7.79e-05)	(7.71e-05)	(7.63e-05)
rating	-0.0237	-0.0292	-0.0270	-0.0308	-0.0285	-0.206***	-0.206***	-0.206***	-0.206***	-0.206***
	(0.0732)	(0.0728)	(0.0736)	(0.0729)	(0.0721)	(0.0647)	(0.0643)	(0.0650)	(0.0644)	(0.0637)
pcrsgdp	-0.0874	-0.103	-0.0666	-0.192	-0.208*	-0.159	-0.178	-0.145	-0.265**	-0.275**
	(0.117)	(0.116)	(0.119)	(0.120)	(0.119)	(0.116)	(0.115)	(0.118)	(0.119)	(0.118)
pcrsrate	0.102	0.124	0.116	0.121	0.112	0.0774	0.0861	0.0834	0.0747	0.0742
	(0.0861)	(0.0855)	(0.0864)	(0.0856)	(0.0848)	(0.0770)	(0.0765)	(0.0774)	(0.0766)	(0.0758)
pcrsvix	0.264***	0.236***	0.256***	0.173***	0.149*	0.272***	0.246***	0.268***	0.180***	0.146*
	(0.0519)	(0.0517)	(0.0559)	(0.0554)	(0.0809)	(0.0524)	(0.0523)	(0.0565)	(0.0561)	(0.0823)
pcrsca	0.0356	0.0533	0.0550	0.0652	0.0374	0.0127	0.0242	0.0261	0.0325	0.0128
	(0.0663)	(0.0657)	(0.0666)	(0.0658)	(0.0655)	(0.0647)	(0.0642)	(0.0650)	(0.0643)	(0.0638)
pcrslreer	-0.000100	-0.000237	-8.35e-05	3.82e-05	-4.91e-05	0.000280	0.000146	0.000299	0.000402	0.000331
	(0.00103)	(0.00103)	(0.00104)	(0.00103)	(0.00103)	(0.00105)	(0.00104)	(0.00105)	(0.00104)	(0.00105)
pcrsrating	0.253	0.232	0.255	0.230	0.211	-0.137	-0.141	-0.128	-0.132	-0.154
	(0.191)	(0.190)	(0.192)	(0.190)	(0.188)	(0.165)	(0.164)	(0.165)	(0.164)	(0.162)
pcrs	-5.648***	-5.305***	-5.459***	-2.702**	-2.537	-3.876***	-3.600***	-3.771***	-0.925	-0.517
	(1.203)	(1.194)	(1.287)	(1.371)	(2.175)	(1.167)	(1.159)	(1.256)	(1.342)	(2.182)
qe1	1.914***				1.965***	1.892***				1.906***
	(0.626)				(0.677)	(0.633)				(0.685)
qe2		2.744***			2.256***		2.788***			2.205**
		(0.640)			(0.840)		(0.654)			(0.858)
qe3			0.0779		-0.820			0.113		-0.923
			(0.600)		(0.998)			(0.609)		(1.021)
qet				-2.160***	-1.943**				-2.216***	-2.085**
				(0.538)	(0.929)				(0.542)	(0.944)
Constant	6.323***	5.654***	5.635***	5.674***	6.388***	6.956***	6.279***	6.279***	6.279***	6.961***
	(0.673)	(0.631)	(0.638)	(0.632)	(0.670)	(0.659)	(0.616)	(0.622)	(0.616)	(0.657)
Observations	896	896	896	896	896	896	896	896	896	896
R-squared	0.261	0.269	0.253	0.267	0.286	0.2485	0.2567	0.2410	0.2550	0.2741
Number of country	14	14	14	14	14	14	14	14	14	14

Table 2: Extended model with QE variables

VARIABLES	Fixed Effect (1) QE 1	(2) QE 2	(3) QE 3	(4) QET	(5) All QEs	Random Effect (6) QE 1	(7) QE 2	(8) QE 3	(9) QET	(10) All QEs
gdp	0.384***	0.383***	0.384***	0.379***	0.379***	0.420***	0.420***	0.420***	0.420***	0.420***
	(0.0746)	(0.0742)	(0.0750)	(0.0744)	(0.0735)	(0.0738)	(0.0734)	(0.0742)	(0.0735)	(0.0727)
rate	-0.0367*	-0.0453**	-0.0447**	-0.0480**	-0.0391*	-0.0307	-0.0354*	-0.0354*	-0.0354*	-0.0307
	(0.0223)	(0.0220)	(0.0223)	(0.0221)	(0.0220)	(0.0202)	(0.0200)	(0.0202)	(0.0200)	(0.0199)
vix	-0.260***	-0.219***	-0.219***	-0.218***	-0.261***	-0.259***	-0.219***	-0.219***	-0.219***	-0.259***
	(0.0246)	(0.0204)	(0.0206)	(0.0204)	(0.0249)	(0.0248)	(0.0208)	(0.0210)	(0.0208)	(0.0252)
ca	-0.293***	-0.278***	-0.277***	-0.274***	-0.294***	-0.256***	-0.255***	-0.255***	-0.255***	-0.256***
	(0.0538)	(0.0532)	(0.0538)	(0.0533)	(0.0530)	(0.0394)	(0.0392)	(0.0396)	(0.0392)	(0.0388)
reer	-9.47e-05	-9.53e-05	-9.59e-05	-9.59e-05	-9.40e-05	-8.47e-05	-8.46e-05	-8.46e-05	-8.46e-05	-8.47e-05
	(7.63e-05)	(7.59e-05)	(7.67e-05)	(7.60e-05)	(7.51e-05)	(7.75e-05)	(7.71e-05)	(7.79e-05)	(7.71e-05)	(7.63e-05)
rating	-0.0237	-0.0292	-0.0270	-0.0308	-0.0285	-0.206***	-0.206***	-0.206***	-0.206***	-0.206***
	(0.0732)	(0.0728)	(0.0736)	(0.0729)	(0.0721)	(0.0647)	(0.0643)	(0.0650)	(0.0644)	(0.0637)
pcrsgdp	-0.0874	-0.103	-0.0666	-0.192	-0.208*	-0.159	-0.178	-0.145	-0.265**	-0.275**
	(0.117)	(0.116)	(0.119)	(0.120)	(0.119)	(0.116)	(0.115)	(0.118)	(0.119)	(0.118)
pcrsrate	0.102	0.124	0.116	0.121	0.112	0.0774	0.0861	0.0834	0.0747	0.0742
	(0.0861)	(0.0855)	(0.0864)	(0.0856)	(0.0848)	(0.0770)	(0.0765)	(0.0774)	(0.0766)	(0.0758)
pcrsvix	0.264***	0.236***	0.256***	0.173***	0.149*	0.272***	0.246***	0.268***	0.180***	0.146*
	(0.0519)	(0.0517)	(0.0559)	(0.0554)	(0.0809)	(0.0524)	(0.0523)	(0.0565)	(0.0561)	(0.0823)
p										
p										
p										
p										
q										
q										
		(0.640)			(0.840)		(0.654)			(0.858)
qe3			0.0779		-0.820			0.113		-0.923
			(0.600)		(0.998)			(0.609)		(1.021)
qet				-2.160***	-1.943**				-2.216***	-2.085**
				(0.538)	(0.929)				(0.542)	(0.944)
Constant	6.323***	5.654***	5.635***	5.674***	6.388***	6.956***	6.279***	6.279***	6.279***	6.961***
	(0.673)	(0.631)	(0.638)	(0.632)	(0.670)	(0.659)	(0.616)	(0.622)	(0.616)	(0.657)
Observations	896	896	896	896	896	896	896	896	896	896
R-squared	0.261	0.269	0.253	0.267	0.286	0.2485	0.2567	0.2410	0.2550	0.2741
Number of country	14	14	14	14	14	14	14	14	14	14

Key findings

- Control variables do not change much after adding QE dummy variables
- Fixed Effects model still diminishes the significance of country credit rating while increases the significance of interest rate differential.

Table 2: Extended model with QE variables

	Fixed Effect					Random Effect				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	(0.00103)	(0.00103)	(0.00104)	(0.00103)	(0.00103)	(0.00105)	(0.00104)	(0.00105)	(0.00104)	(0.00105)
pcrsrating	0.253	0.232	0.255	0.230	0.211	-0.137	-0.141	-0.128	-0.132	-0.154
	(0.191)	(0.190)	(0.192)	(0.190)	(0.188)	(0.165)	(0.164)	(0.165)	(0.164)	(0.162)
pcrs	-5.648***	-5.305***	-5.459***	-2.702**	-2.537	-3.876***	-3.600***	-3.771***	-0.925	-0.517
	(1.203)	(1.194)	(1.287)	(1.371)	(2.175)	(1.167)	(1.159)	(1.256)	(1.342)	(2.182)
qe1	1.914***				1.965***	1.892***				1.906***
	(0.626)				(0.677)	(0.633)				(0.685)
qe2		2.744***			2.256***		2.788***			2.205**
		(0.640)			(0.840)		(0.654)			(0.858)
qe3			0.0779		-0.820			0.113		-0.923
			(0.600)		(0.998)			(0.609)		(1.021)
qet				-2.160***	-1.943**				-2.216***	-2.085**
				(0.538)	(0.929)				(0.542)	(0.944)
Constant	6.323***	5.654***	5.635***	5.674***	6.388***	6.956***	6.279***	6.279***	6.279***	6.961***
	(0.673)	(0.631)	(0.638)	(0.632)	(0.670)	(0.659)	(0.616)	(0.622)	(0.616)	(0.657)
Observations	896	896	896	896	896	896	896	896	896	896
R-squared	0.261	0.269	0.253	0.267	0.286	0.2485	0.2567	0.2410	0.2550	0.2741
Number of country	14	14	14	14	14	14	14	14	14	14

Key findings

- The result contradicts to some literature that there will be diminishing effect of QE when new QE is used since the asset purchase in QE2 is in smaller scale than QE1.
- However, it is reasonable to alternatively interpret as QE1 is done with the attention to calm down market right after crisis but later QE is done to boost domestic economy. With Fed's intention to keep low interest rate, investors seem to search for higher yield in EMEs.
- QE3 is insignificantly affect capital flows due to the fact that investor get used to the situation and yield spread is relatively stable
- It seems to have asymmetric effect of the policy has the coefficient of QE tapering is relatively lower than QE expansion variable.

Table 3: decomposition of capital flows

	Fixed Effect					Random Effect				
VARIABLES	(1) CF	(2) Port	(3) Equity	(4) Bond	(5) Other	(6) CF	(7) Port	(8) Equity	(9) Bond	(10) Other
gdp	0.379***	0.0460	-0.0280	0.0716*	0.333***	0.420***	0.0426	-0.0280	0.0700*	0.367***
	(0.0735)	(0.0538)	(0.0250)	(0.0405)	(0.0503)	(0.0727)	(0.0530)	(0.0248)	(0.0403)	(0.0501)
rate	-0.0391*	-0.00779	-0.00246	-0.00494	-0.0313**	-0.0307	-0.0173	-0.00289	-0.0106	-0.0183
	(0.0220)	(0.0161)	(0.00747)	(0.0121)	(0.0150)	(0.0199)	(0.0146)	(0.00722)	(0.0114)	(0.0139)
vix	-0.261***	-0.151***	-0.0694***	-0.0830***	-0.109***	-0.259***	-0.148***	-0.0694***	-0.0816***	-0.111***
	(0.0249)	(0.0182)	(0.00847)	(0.0137)	(0.0170)	(0.0252)	(0.0183)	(0.00841)	(0.0138)	(0.0172)
ca	-0.294***	-0.115***	-0.0226	-0.0520*	-0.179***	-0.256***	-0.109***	-0.0251	-0.0678***	-0.154***
	(0.0530)	(0.0388)	(0.0180)	(0.0292)	(0.0363)	(0.0388)	(0.0289)	(0.0162)	(0.0238)	(0.0280)
lreer	-9.40e-05	-5.89e-05	-1.10e-05	-5.29e-05	-3.51e-05	-8.47e-05	-5.56e-05	-1.07e-05	-4.68e-05	-2.94e-05
	(7.51e-05)	(5.50e-05)	(2.55e-05)	(4.14e-05)	(5.14e-05)	(7.63e-05)	(5.55e-05)	(2.54e-05)	(4.18e-05)	(5.23e-05)
rating	-0.0285	0.00569	0.0154	-0.00625	-0.0342	-0.206***	-0.0872*	0.0126	-0.0728**	-0.101**
	(0.0721)	(0.0528)	(0.0245)	(0.0397)	(0.0493)	(0.0637)	(0.0467)	(0.0233)	(0.0364)	(0.0445)
pcrsgdp	-0.208*	-0.00479	0.0355	-0.0490	-0.203**	-0.275**	0.0185	0.0309	-0.0446	-0.273***
	(0.119)	(0.0870)	(0.0404)	(0.0655)	(0.0813)	(0.118)	(0.0858)	(0.0400)	(0.0652)	(0.0811)
pcrsrate	0.112	0.209***	0.0392	0.149***	-0.0975*	0.0742	0.162***	0.0387	0.111**	-0.0818
	(0.0848)	(0.0620)	(0.0288)	(0.0467)	(0.0580)	(0.0758)	(0.0558)	(0.0278)	(0.0437)	(0.0533)
pcrsvix	0.149*	0.0195	0.0426	0.0281	0.130**	0.146*	0.0154	0.0428	0.0284	0.130**
	(0.0809)	(0.0592)	(0.0275)	(0.0446)	(0.0553)	(0.0823)	(0.0598)	(0.0274)	(0.0450)	(0.0563)
pcrsca	0.0374	-0.00227	-0.0340	-0.0778**	0.0396	0.0128	0.00592	-0.0327	-0.0683*	0.0165
	(0.0655)	(0.0479)	(0.0223)	(0.0361)	(0.0448)	(0.0638)	(0.0466)	(0.0219)	(0.0355)	(0.0441)
pcrslreer	-4.91e-05	9.93e-05	-0.000360	0.000347	-0.000148	0.000331	0.000137	-0.000352	0.000327	9.58e-05
	(0.00103)	(0.000757)	(0.000352)	(0.000571)	(0.000708)	(0.00105)	(0.000761)	(0.000350)	(0.000574)	(0.000717)
pcrsrating	0.211	-0.265*	-0.170***	-0.00860	0.476***	-0.154	-0.412***	-0.174***	-0.124	0.293**
	(0.188)	(0.138)	(0.0639)	(0.104)	(0.129)	(0.162)	(0.119)	(0.0606)	(0.0940)	(0.114)
pcrs	-2.537	1.126	-0.444	-0.0175	-3.664**	-0.517	1.957	-0.420	0.571	-2.715*
	(2.175)	(1.592)	(0.739)	(1.200)	(1.489)	(2.182)	(1.587)	(0.733)	(1.197)	(1.496)
qe1	1.965***	1.833***	1.007***	0.905**	0.132	1.906***	1.746***	1.008***	0.880**	0.151
	(0.677)	(0.495)	(0.230)	(0.373)	(0.463)	(0.685)	(0.498)	(0.229)	(0.375)	(0.469)
qe2	2.256***	1.178*	0.103	0.579	1.078*	2.205**	1.139*	0.102	0.566	1.071*
	(0.840)	(0.615)	(0.285)	(0.463)	(0.575)	(0.858)	(0.623)	(0.285)	(0.468)	(0.587)
qe3	-0.820	-0.788	-0.199	-0.435	-0.0326	-0.923	-0.821	-0.203	-0.456	-0.0850
	(0.998)	(0.731)	(0.339)	(0.551)	(0.683)	(1.021)	(0.741)	(0.339)	(0.557)	(0.698)
qet	-1.943**	-2.045***	-0.347	-1.044**	0.102	-2.085**	-1.990***	-0.358	-1.009*	-0.0598
	(0.929)	(0.680)	(0.316)	(0.512)	(0.636)	(0.944)	(0.686)	(0.315)	(0.516)	(0.646)
Constant	6.388***	3.952***	1.836***	2.073***	2.436***	6.961***	4.373***	1.854***	2.414***	2.559***
	(0.670)	(0.490)	(0.228)	(0.369)	(0.458)	(0.657)	(0.481)	(0.248)	(0.373)	(0.456)
Observations	896	896	896	896	896	896	896	896	896	896
R-squared	0.286	0.179	0.098	0.150	0.215	0.2741	0.1700	0.0980	0.1410	0.2096
Number of country	14	14	14	14	14	14	14	14	14	14

Table 3: decomposition of capital flows

	Fixed Effect					Random Effect				
VARIABLES	(1) CF	(2) Port	(3) Equity	(4) Bond	(5) Other	(6) CF	(7) Port	(8) Equity	(9) Bond	(10) Other
gdp	0.379***	0.0460	-0.0280	0.0716*	0.333***	0.420***	0.0426	-0.0280	0.0700*	0.367***
	(0.0735)	(0.0538)	(0.0250)	(0.0405)	(0.0503)	(0.0727)	(0.0530)	(0.0248)	(0.0403)	(0.0501)
rate	-0.0391*	-0.00779	-0.00246	-0.00494	-0.0313**	-0.0307	-0.0173	-0.00289	-0.0106	-0.0183
	(0.0220)	(0.0161)	(0.00747)	(0.0121)	(0.0150)	(0.0199)	(0.0146)	(0.00722)	(0.0114)	(0.0139)
vix	-0.261***	-0.151***	-0.0694***	-0.0830***	-0.109***	-0.259***	-0.148***	-0.0694***	-0.0816***	-0.111***
	(0.0249)	(0.0182)	(0.00847)	(0.0137)	(0.0170)	(0.0252)	(0.0183)	(0.00841)	(0.0138)	(0.0172)
ca	-0.294***	-0.115***	-0.0226	-0.0520*	-0.179***	-0.256***	-0.109***	-0.0251	-0.0678***	-0.154***
	(0.0530)	(0.0388)	(0.0180)	(0.0292)	(0.0363)	(0.0388)	(0.0289)	(0.0162)	(0.0238)	(0.0280)
lreer	-9.40e-05	-5.89e-05	-1.10e-05	-5.29e-05	-3.51e-05	-8.47e-05	-5.56e-05	-1.07e-05	-4.68e-05	-2.94e-05
	(7.51e-05)	(5.50e-05)	(2.55e-05)	(4.14e-05)	(5.14e-05)	(7.63e-05)	(5.55e-05)	(2.54e-05)	(4.18e-05)	(5.23e-05)
rating	-0.0285	0.00569	0.0154	-0.00625	-0.0342	-0.206***	-0.0872*	0.0126	-0.0728**	-0.101**
	(0.0721)	(0.0528)	(0.0245)	(0.0397)	(0.0493)	(0.0637)	(0.0467)	(0.0233)	(0.0364)	(0.0445)
pcrsgdp	-0.208*	-0.00479	0.0355	-0.0490	-0.203**	-0.275**	0.0185	0.0309	-0.0446	-0.273***
	(0.119)	(0.0870)	(0.0404)	(0.0655)	(0.0813)	(0.118)	(0.0858)	(0.0400)	(0.0652)	(0.0811)
pcrsrate	0.112	0.209***	0.0392	0.149***	-0.0975*	0.0742	0.162***	0.0387	0.111**	-0.0818
	(0.0848)	(0.0620)	(0.0288)	(0.0467)	(0.0580)	(0.0758)	(0.0558)	(0.0278)	(0.0437)	(0.0533)
pcrsvix	0.149*	0.0195	0.0426	0.0281	0.130**	0.146*	0.0154	0.0428	0.0284	0.130**
	(0.0809)	(0.0592)	(0.0275)	(0.0446)	(0.0553)	(0.0823)	(0.0598)	(0.0274)	(0.0450)	(0.0563)
Observations	896	896	896	896	896	896	896	896	896	896
R-squared	0.286	0.179	0.098	0.150	0.215	0.2741	0.1700	0.0980	0.1410	0.2096
Number of country	14	14	14	14	14	14	14	14	14	14

Key findings

- The significance of each determinants vary across each type of flows composition
- Growth differential is significant for only bond and other investment which is reasonable to say that higher country income increase the ability to pay debt of borrower so that investor is willing to lend more.
- Overall portfolio flows are the most sensitive to risk aversion. Also, bond is more sensitive than equity. It implies that when the risk increase, investors tends to lowering the investment in bond.
- Country rating affects bond and other investment while it shows insignificant with equity.

Table 3: decomposition of capital flows

	Fixed Effect					Random Effect				
VARIABLES	(1) CF	(2) Port	(3) Equity	(4) Bond	(5) Other	(6) CF	(7) Port	(8) Equity	(9) Bond	(10) Other
gdp	0.379***	0.0460	-0.0280	0.0716*	0.333***	0.420***	0.0426	-0.0280	0.0700*	0.367***
	(0.0735)	(0.0538)	(0.0250)	(0.0405)	(0.0503)	(0.0727)	(0.0530)	(0.0248)	(0.0403)	(0.0501)
rate	-0.0391*	-0.00779	-0.00246	-0.00494	-0.0313**	-0.0307	-0.0173	-0.00289	-0.0106	-0.0183
	(0.0220)	(0.0161)	(0.00747)	(0.0121)	(0.0150)	(0.0199)	(0.0146)	(0.00722)	(0.0114)	(0.0139)
	(0.0655)	(0.0479)	(0.0223)	(0.030	(0.0448)	(0.0638)	(0.0466)	(0.0219)	(0.0355)	(0.0441)
pcrslreer	-4.91e-05	9.93e-05	-0.000360	0.000 7	-0.000148	0.000331	0.000137	-0.000352	0.000327	9.58e-05
	(0.00103)	(0.000757)	(0.000352)	(0.000 71)	(0.000708)	(0.00105)	(0.000761)	(0.000350)	(0.000574)	(0.000717)
pcrsrating	0.211	-0.265*	-0.170***	-0.0 60	0.476***	-0.154	-0.412***	-0.174***	-0.124	0.293**
	(0.188)	(0.138)	(0.0639)	(0 94)	(0.129)	(0.162)	(0.119)	(0.0606)	(0.0940)	(0.114)
pcrs	-2.537	1.126	-0.444	- 175	-3.664**	-0.517	1.957	-0.420	0.571	-2.715*
	(2.175)	(1.592)	(0.739)	200)	(1.489)	(2.182)	(1.587)	(0.733)	(1.197)	(1.496)
qe1	1.965***	1.833***	1.007***	0.905**	0.132	1.906***	1.746***	1.008***	0.880**	0.151
	(0.677)	(0.495)	(0.230)	(0.373)	(0.463)	(0.685)	(0.498)	(0.229)	(0.375)	(0.469)
qe2	2.256***	1.178*	0.103	0.579	1.078*	2.205**	1.139*	0.102	0.566	1.071*
	(0.840)	(0.615)	(0.285)	(0.463)	(0.575)	(0.858)	(0.623)	(0.285)	(0.468)	(0.587)
qe3	-0.820	-0.788	-0.199	-0.435	-0.0326	-0.923	-0.821	-0.203	-0.456	-0.0850
	(0.998)	(0.731)	(0.339)	(0.551)	(0.683)	(1.021)	(0.741)	(0.339)	(0.557)	(0.698)
qet	-1.943**	-2.045***	-0.347	-1.044**	0.102	-2.085**	-1.990***	-0.358	-1.009*	-0.0598
	(0.929)	(0.680)	(0.316)	(0.512)	(0.636)	(0.944)	(0.686)	(0.315)	(0.516)	(0.646)
Constant	6.388***	3.952***	1.836***	2.073***	2.436***	6.961***	4.373***	1.854***	2.414***	2.559***
	(0.670)	(0.490)	(0.228)	(0.369)	(0.458)	(0.657)	(0.481)	(0.248)	(0.373)	(0.456)
Observations	896	896	896	896	896	896	896	896	896	896
R-squared	0.286	0.179	0.098	0.150	0.215	0.2741	0.1700	0.0980	0.1410	0.2096
Number of country	14	14	14	14	14	14	14	14	14	14

Key findings

- QE1 affects only portfolio flows as well as its composition
- QE2 affects only other investment and portfolio flows, but not the sub-components
- No composition is likely affected by QE3 which is the same as total capital flows
- QE tapering affects only portfolio flows and bond
- In sum, other investment is least likely get impact from U.S. unconventional policy and bond is the most one

Comparing the prediction of model

Figure 5: Prediction comparison (post crisis dummy)

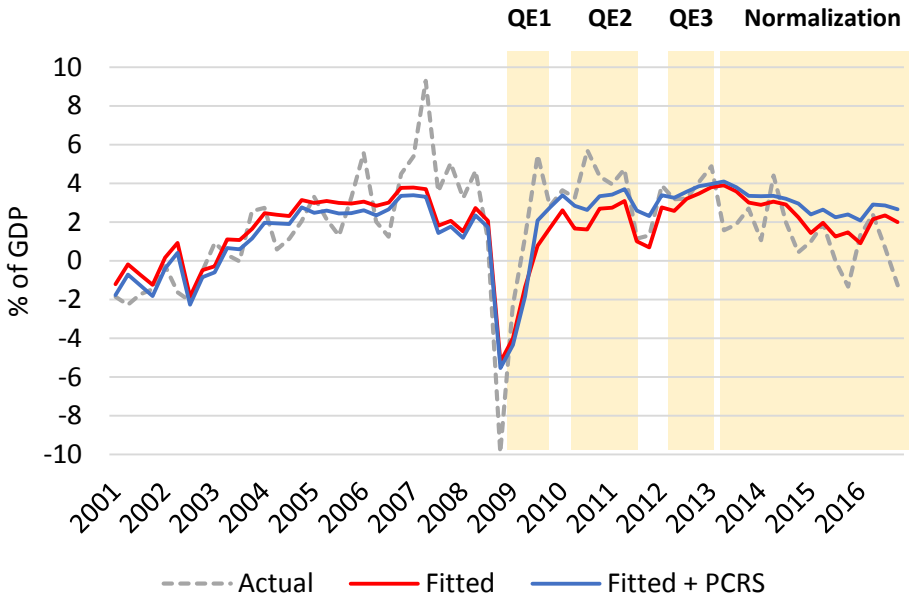
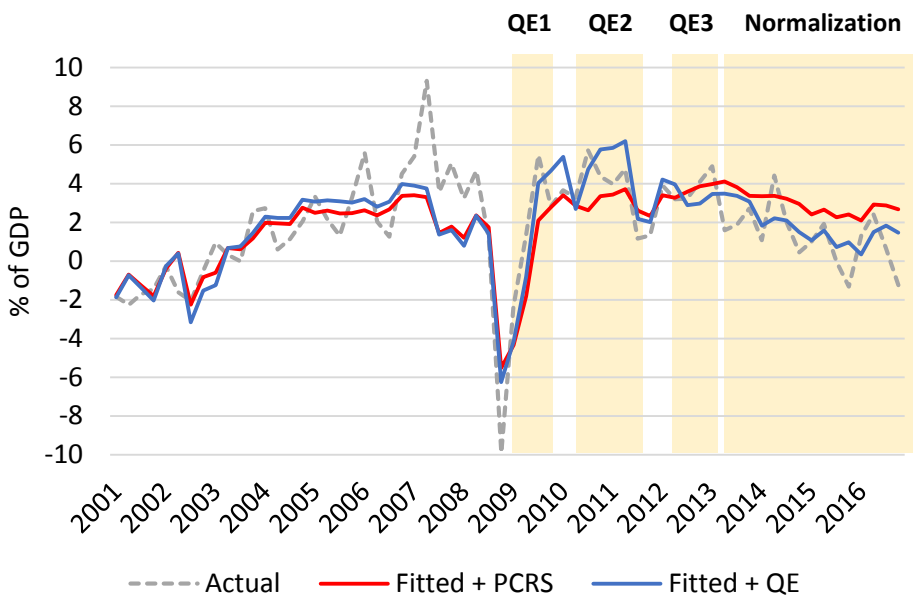


Figure 6: Prediction comparison (QE dummy variable



Between Fitted & Fitted+PCRS

Predicted value of model with post-crisis dummy is better to explain capital flows which confirms that the main determinants of capital flows have sensitivity change

Between Fitted+PCRS & Fitted+QE

Predicted value of model adding QE dummy variable is better to explain capital flows which confirms that there will be an effect of U.S. policy on capital flows

Paper Limitations

Limited data available

Only selected 14 EMEs are collected which may not be enough to infer to a group of actual EMEs. Also, selected EMEs are from different region such that capital flows may be captured by region's specific events such as oil price shock in Latin America during 2014-2015, debt crisis in Europe, etc.

Insufficient model specification

Control variables (Matrix X) may not fully capture the whole capital flows

Underlying assumptions

1. The QE variables are generated based on the period of policy implementation of US only with the assumption that many advanced economy imposed policy simultaneously.
2. The model captures only the effect of US policy through the interest differential between EMEs money market rate and effective fed fund rate. It is under the assumption that U.S interest rate is a proxy of global interest rate.

Policy Recommendations

ISSUE 1

The money comes in form of large and volatile flows with the purpose of short term speculation on yield spread

- Economic fluctuation
- negative effect on economic growth

ISSUE 2

Normalization is still on going meaning that there will be more capital outflows from these countries back to its original.

- Sudden stop
- Financial crisis

Challenge policy makers

- Appropriate policy response
- Balancing the real effect of policies
- Smooth the adjustments

Signaling market	Raising interest rates	Domestic reformation	Temporary capital control
Signaling through conference statement or speech of central bank	Raising through monetary policy	Investing in infrastructure, increase government transparency	Increase controls on outflows and remove control on inflows
↓	↓	↓	↓
Calm down and restore market confidence	Attract more investors and smooth adjustment	Boosting economies and increase countries' attractiveness	Stopping outflows and prevent the occurrence of sudden stop

Conclusion

Topic

Capital flows to emerging market economies: a study of unconventional monetary policy and unconventional monetary policy normalization

Research questions

1. Sensitivity change of main determinants in post crisis period?
2. Asymmetric effect of Fed's unconventional policy and policy normalization?
3. Do these associations vary across net capital flows compositions?

Method

Baseline model	Structural Break test	Extended model with QE	Decomposition capital flows

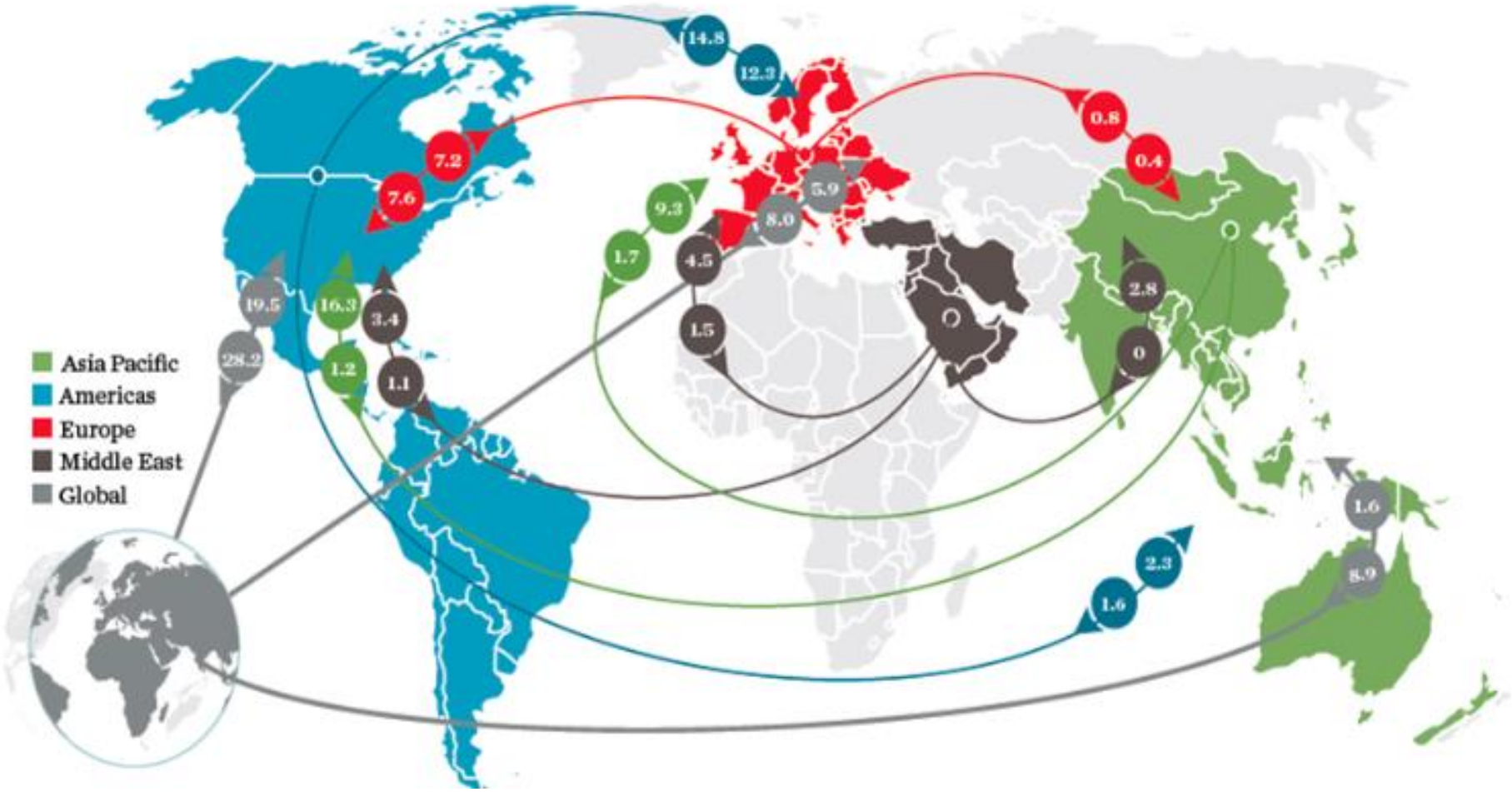
Key findings

Structural Break test	Asymmetric effects	Decomposition
Capital flows become less sensitive to determinants in post-crisis period	QE expansion tends to have stronger effect on capital flows	The effect of U.S. policy varies across each compositions

Policy Recommendations

Signaling market	Raising interest rates	Domestic reformation	Temporary capital control

Q & A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Americas
Europe
Middle East
Global
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12.3
0.8
0.4
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7.6
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9.3
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