Cross-border bank flows, funding liquidity and house prices

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Overview

- Developments during the financial crisis and the policy responses of governments across the main financial centers have highlighted the need to understand global liquidity and its dynamics; That is, liquidity that crosses the border and affects, directly or indirectly, financing conditions abroad. Attention has focused on:

  - ➤ How to define global liquidity
  - ➤ How it transmits to the local economies
  - ➤ How it impacts on the local economies
  - ➤ Whether it fuels asset price bubbles in financial markets

- In our paper we examine its impact on the real estate sector and the role of the banking sector as a channel of transmission

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Bank flows and house prices
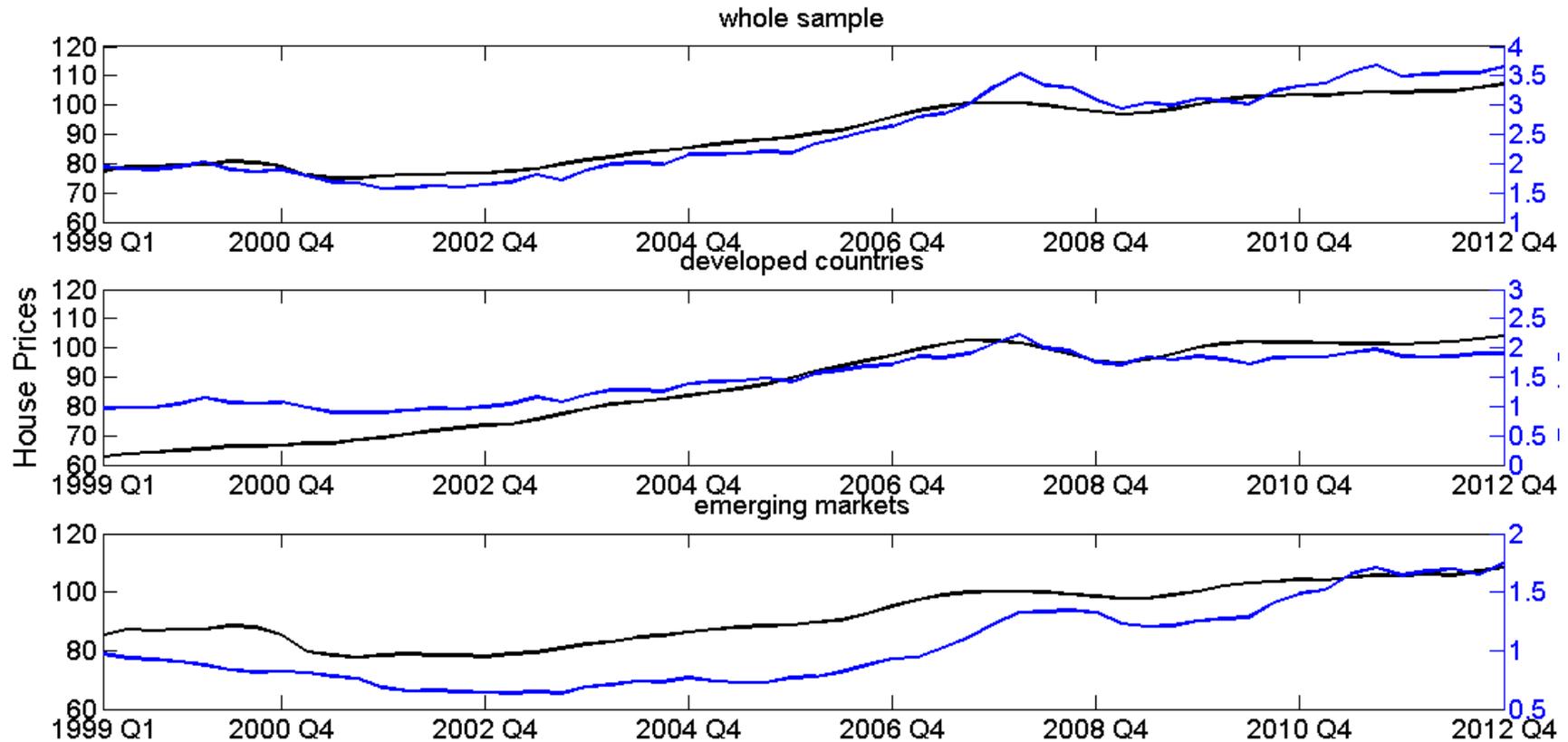
Global liquidity

- Although global liquidity comprises monetary, market and funding components, most of the attention has traditionally been on monetary aggregates (Baks and Kramer, 1999)

- More recently, the focus has shifted to credit aggregates

- But, these proxies measure the outcomes of liquidity and are likely to be affected by other factors, unrelated to global liquidity (Domanski, BIS 2011)

- In this paper, we propose to employ a liquidity variable that is related not only to funding, but also to market conditions to capture global liquidity

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Bank flows and funding liquidity
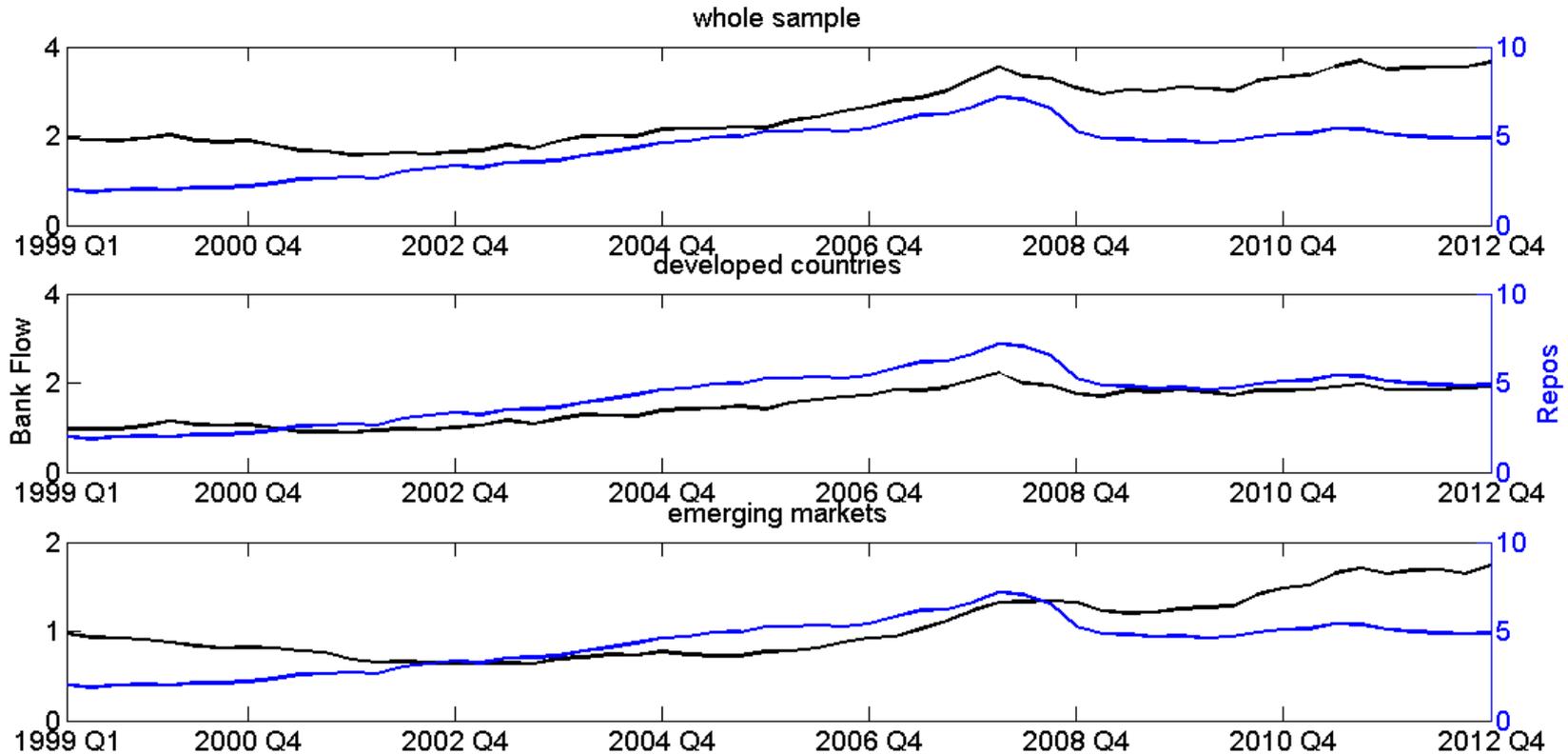
Research questions

- **Do changes in the funding availability of financial institutions in main financial centers affect cross-border bank flows?**

- **If so, are these changes transmitted to housing markets around the world?**
  - ➤ Are local banks the main transmission channel?
  - ➤ What is the role of financial markets?

- **Finally, are countries able to mitigate this effect by employing certain policies?**

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Literature Review: global liquidity and local banks

- **Cetorelli and Goldberg (2011):** find that shock transmission across banks in developed to emerging countries is mostly related to the funding

- **Bruno and Shin (2015):** In their model of international banking system, show that global bank leverage is a key determinant of liquidity flowing towards local banks

- **Cerutti et al (2014):** find that cross-border bank debt is determined by a set of global factors, not only from the US, and investigate the effect of country characteristics on this impact

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Literature Review: global liquidity and house prices

- **Chudik and Fratzscher (2011):** In a global VAR and weekly data, study shock transmission from US during the crisis and document most emerging markets were affected by shifts in risk appetite, rather than funding liquidity

- **Tillman (2012):** find an overall positive effect of capital flows on Asian house prices

- **Cesa-Bianchi et al (2015**): document strong impact of credit supply on house prices in a set of emerging markets in a panel VAR framework with a US-based set of instruments

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Contributions

- **Introduce a new proxy for global liquidity based on funding and market liquidity**
  - ➢ Funding liquidity measured by US TED spread in Chudik and Fratzscher (2011) and Cesa-Bianchi et al. (2015)
  - ➢ Bank leverage in Bruno and Shin (2015)
- **Extend the investigation to the international aspect of global liquidity and consider changes in funding conditions not only in the US, but also in Europe, UK, and Japan**
  - ➢ Cerutti et al (2014) document importance of international factors
- **Focus on regional groups within emerging markets**
- **Role of country characteristics and policies on the impact of global liquidity on house prices**

Measuring global liquidity

- Funding liquidity is measured by the amount outstanding of repurchase agreements of the financial sectors in US, UK, EU, and JP
  - US data reported by primary dealers collected weekly by the FRBNY
  - UK monthly amounts of MFIs' repos with private and public sectors by the BoE
  - Euro area monthly amounts of credit institutions repos by the ECB
  - Japanese monthly payable under repos in the A/L of domestically licensed banks by BoJ
- All data is converted in USD via IFS monthly exchange rates

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Why repos?

- Repos are a main source of wholesale funding for financial institutions

- Given the presence of collateral, repos are a relatively cheap and stable source of funding

- In crisis, severe uncertainty in the future value of collateral led to a near collapse of the repo market in the US (Gorton and Metrick 2012)

- Aggregated amount instead of costs better captures the actual availability of financing

- We account for asymmetric effects of increases/decreases and interaction with funding costs (repo rates proxied by Libor-OIS spreads)

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Funding liquidity and costs
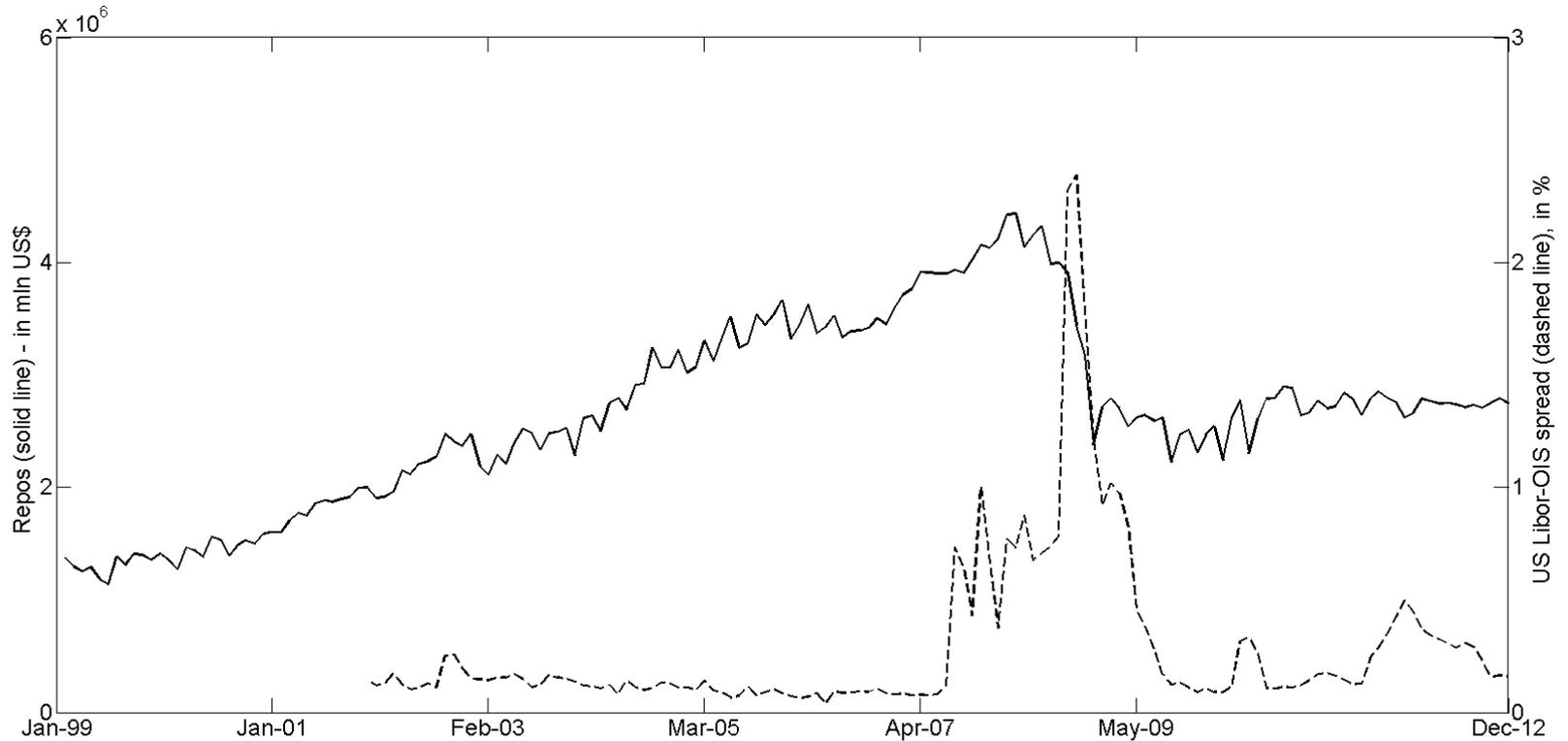
Funding liquidity – some descriptive statistics

	US	UK	EU	JP
Levels ($mil)				
mean	2,662,258	241,557	1,323,496	77,564
median	2,679,457	245,023	1,473,637	72,533
st dev	806,829	108,470	587,204	31,970
max	4,433,581	421,795	2,464,076	144,303
min	1,136,616	63,188	440,076	16,811
Changes				
mean	0.0041	0.0086	0.0058	0.0141
median	0.0077	0.0153	0.0094	0.0070
st dev	0.0629	0.0882	0.0524	0.1629
max	0.1992	0.3025	0.1137	1.1660
min	-0.2870	-0.4133	-0.1831	-0.6201

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Cross border bank flows

- **Measure cross-border bank flows as changes in banks' foreign liabilities in each country from IFS (Shin et al, IMF 2014)**
    - ➤ Higher frequency than BIS banking dataset, but highly correlated with it
    - ➤ We acknowledge limitations with non-standardize reporting of some advanced countries
- Countries included are:
    - ➤ DM: Denmark, Norway, Sweden, Switzerland, New Zealand, Australia, and Canada
    - ➤ Asia: Hong Kong, Indonesia, Philippines, Singapore, Thailand, Malaysia, and China
    - ➤ Europe (&co): Czech Republic, Hungary, Poland, Russia, South Africa, and Israel
    - ➤ Americas: Chile, Argentina, Mexico, and Brazil

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Do funding liquidity affect cross-border flows?

$$\Delta Bank_{i,t} = \beta \Delta Fund_t^s + \delta vix_t + \theta \Delta M_t^s + \gamma_i + \epsilon_t$$

$$\Delta Bank_{i,t} = \beta_1(\Delta Fund_t^s * d_t^{s,+}) + \beta_2(\Delta Fund_t^s * d_t^{s,-}) + \delta vix_t + \theta \Delta M_t^s + \gamma_i + \epsilon_t$$

$$s = [US, UK, EU, JP],$$

	US			UK			EU			JP		
Δ Fund	0.041***			0.038*			0.115***			0.007		
Funding available:												
Δ Fund * d^+		0.051*			-0.015			0.144***			-0.014*	
Δ Fund * d^-		0.032			0.084**			0.087			0.05***	
Funding cost:												
Δ Fund * d^+			0.119***			0.004			0.092***			0.041**
Δ Fund * d^-			0.017			0.07*			0.138***			0.069***
vix	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	0.000***	-0.001***	-0.001***	-0.001***
ΔM	0.46*	0.452*	0.157	0.196	0.128	0.253*	-0.691**	-0.667**	-0.611**	0.784	0.736	0.944
R_{bar}	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01

- ## Advanced economies:

	US			UK			EU			JP		
Δ Fund	0.076***			0.103***			0.225***			-0.00		
Funding available:												
Δ Fund * d^+		0.039			0.101***			0.263***			-0.045***	
Δ Fund * d^-		0.111***			0.105*			0.186**			0.067***	
Funding cost:												
Δ Fund * d^+			0.205***			0.095***			0.157***			-0.008
Δ Fund * d^-			0.065			0.128***			0.286***			0.064**
vix	-0.00***	-0.00***	-0.00***	-0.001***	-0.001***	-0.001***	-0.00***	-0.00***	-0.00***	-0.001***	-0.001***	-0.001***
ΔM	-0.318	-0.288	-0.498**	-0.099	-0.102	-0.055	-0.97**	-0.942**	-0.904**	-0.028	-0.059	0.967
R_{bar}	0.02	0.02	0.04	0.04	0.04	0.04	0.06	0.06	0.07	0.01	0.03	0.02

- ## Emerging markets:

	US			UK			EU			JP		
Δ Fund	0.029**			0.015			0.079**			0.013*		
Funding available:												
Δ Fund * d^+		0.054			-0.054**			0.103**			-0.003	
Δ Fund * d^-		0.006			0.075			0.056			0.044***	
Funding cost:												
Δ Fund * d^+			0.092***			-0.026			0.071***			0.058***
Δ Fund * d^-			0.001			0.051			0.091*			0.071***
vix	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
ΔM	0.698**	0.679**	0.355	0.292*	0.201	0.354**	-0.586	-0.565	-0.496	1.05*	1.007*	0.927
R_{bar}	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

- # Emerging Asia:

	US			UK			EU			JP		
Δ Fund	0.009			-0.004			0.018			0.031**		
Funding available:												
Δ Fund * d^+		-0.021			-0.05			0.063*			0.002	
Δ Fund * d^-		0.036			0.036			-0.026			0.089***	
Funding cost:												
Δ Fund * d^+			0.126***			-0.048			0.042			0.106***
Δ Fund * d^-			-0.013			-0.012			0.001			0.078*
vix	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001***	-0.001**	-0.001**	-0.001**	-0.001***	-0.001**	-0.001***
ΔM	1.489***	1.512***	0.992***	0.466*	0.406*	0.405	-0.517	-0.476	-0.458	0.114	0.038	-0.804
R_{bar}	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04

- # Emerging Europe:

	US			UK			EU			JP		
Δ Fund	0.025			-0.033			0.049			0.004		
Funding available:												
Δ Fund * d^+		0.036			-0.064*			0.17			-0.002	
Δ Fund * d^-		0.016			-0.006			-0.069			0.019	
Funding cost:												
Δ Fund * d^+			0.028			-0.022			0.079***			0.064***
Δ Fund * d^-			-0.006			0.003			0.029			0.067
vix	-0.001**	-0.001**	-0.001**	-0.001*	-0.001*	-0.001	-0.001	-0.001*	-0.001	-0.001	-0.001	-0.001*
ΔM	-0.594	-0.602	-0.621*	0.01	-0.03	0.164	-1.239**	-1.127*	-1.157*	2.81***	2.791***	3.721***
R_{bar}	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.03

- # Emerging Americas:

	US			UK			EU			JP		
Δ Fund	0.07***			0.118			0.231***			-0.00		
Funding available:												
Δ Fund * d^+		0.211**			-0.044			0.072			-0.012	
Δ Fund * d^-		-0.06			0.258*			0.385**			0.005	
Funding cost:												
Δ Fund * d^+			0.129***			0.008			0.109***			-0.034
Δ Fund * d^-			0.035			0.234*			0.338**			0.066
vix	-0.001***	-0.001***	-0.001**	-0.001**	0.00	-0.001	-0.001*	0.00	-0.001*	-0.001***	-0.001***	-0.001**
ΔM	1.212***	1.107***	0.675	0.4	0.187	0.55	0.208	0.075	0.372	0.064	0.05	-0.187
R_{bar}	0.00	0.01	0.00	0.01	0.02	0.01	0.01	0.02	0.02	0.00	0.00	0.00

Impact of global liquidity on house prices

- Having documented the impact of liquidity on bank flows, we now investigate **whether banks channel funding shocks into the local housing market**

- Data on house prices available at quarterly frequency up to 2012 from Cesa Bianchi et al (2015)

- PVAR of liquidity, GDP growth, short term interest rates and house prices

- We estimate each country VAR via OLS and then employ the mean group estimator for the aggregated responses of house prices to liquidity shocks across countries (Pesaran and Smith, 1995)

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Bank channel

- To identify **if bank flows are transmission mechanisms for global liquidity on house prices**, we estimate the PVAR with and without bank flows

- If banks are channel, then the impact of global liquidity on house prices is reduced when bank flows are in the VAR

- Graphically, the response of house prices to global liquidity shocks with bank flows (**red line**) should be below the response without bank flows (**black line**)

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Impact of <u>US</u> liquidity on house prices with (red) and without (black) bank flows
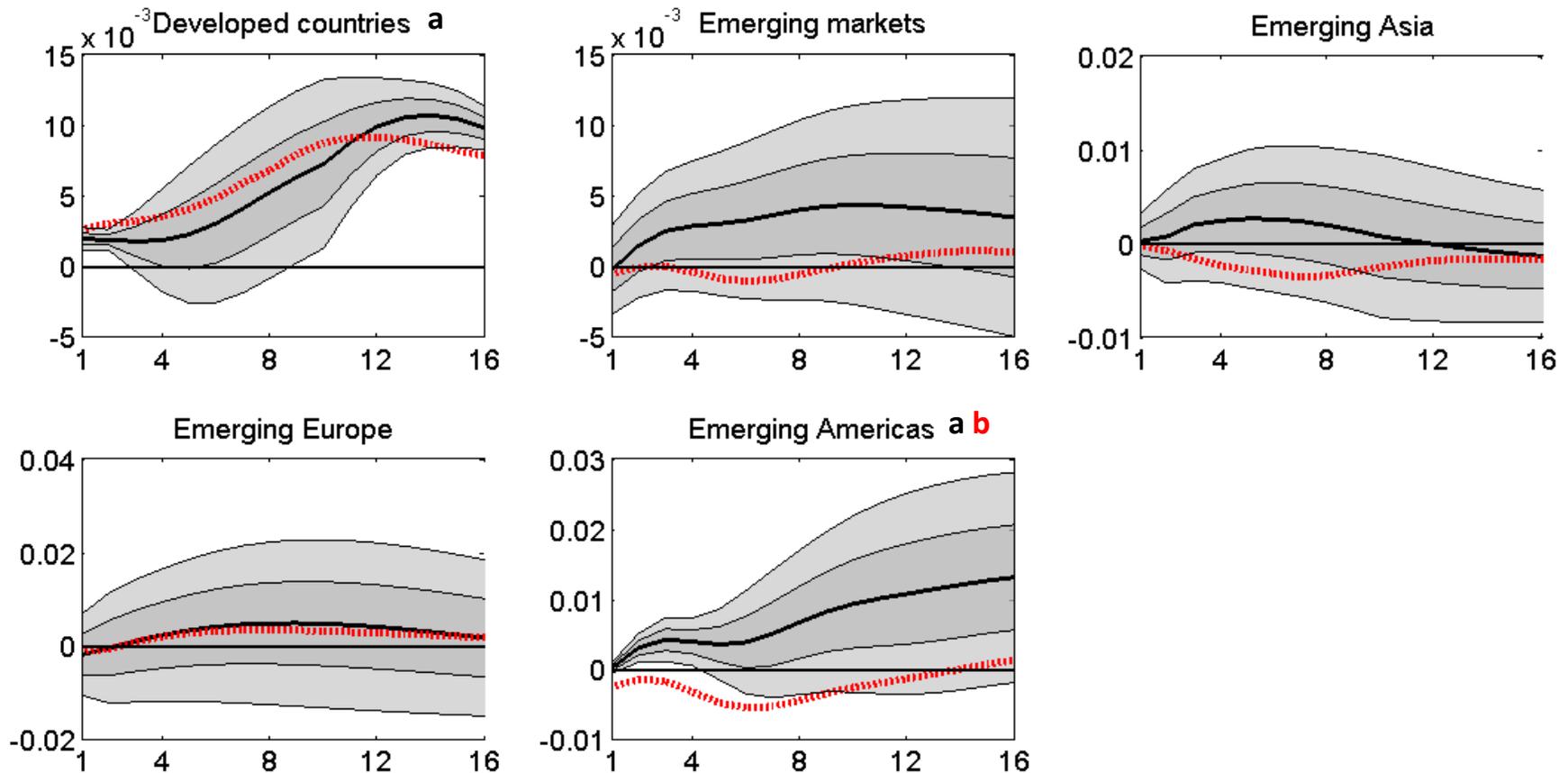
Impact of <u>UK</u> liquidity on house prices with (red) and without (black) bank flows
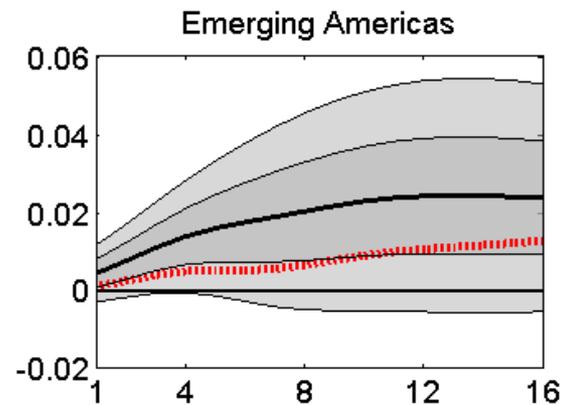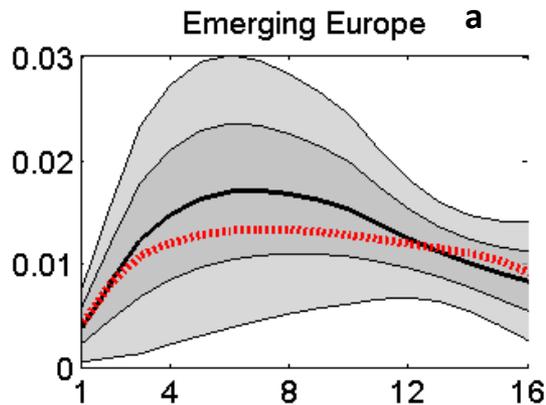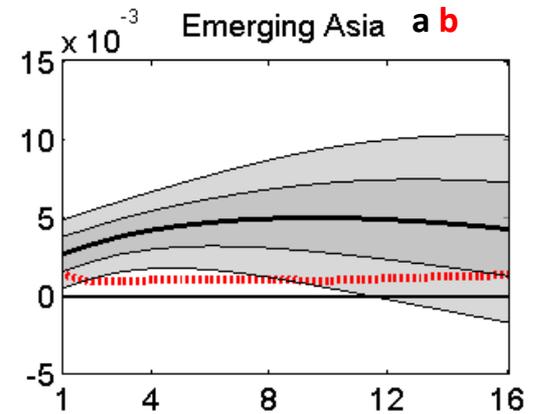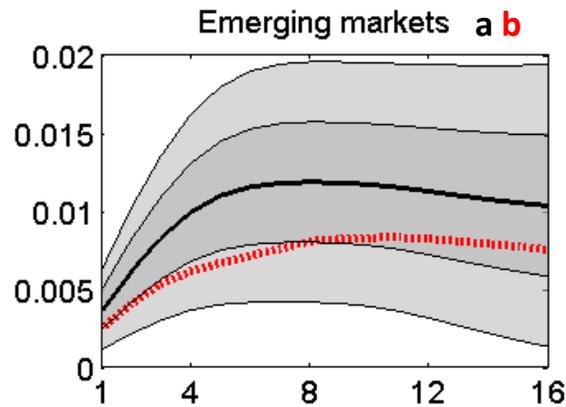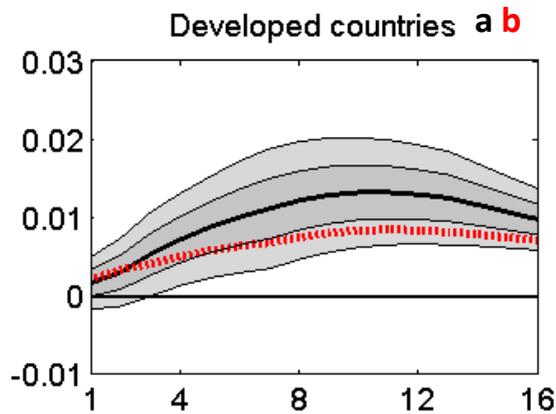
Impact of <u>EU</u> liquidity on house prices with (red) and without (black) bank flows
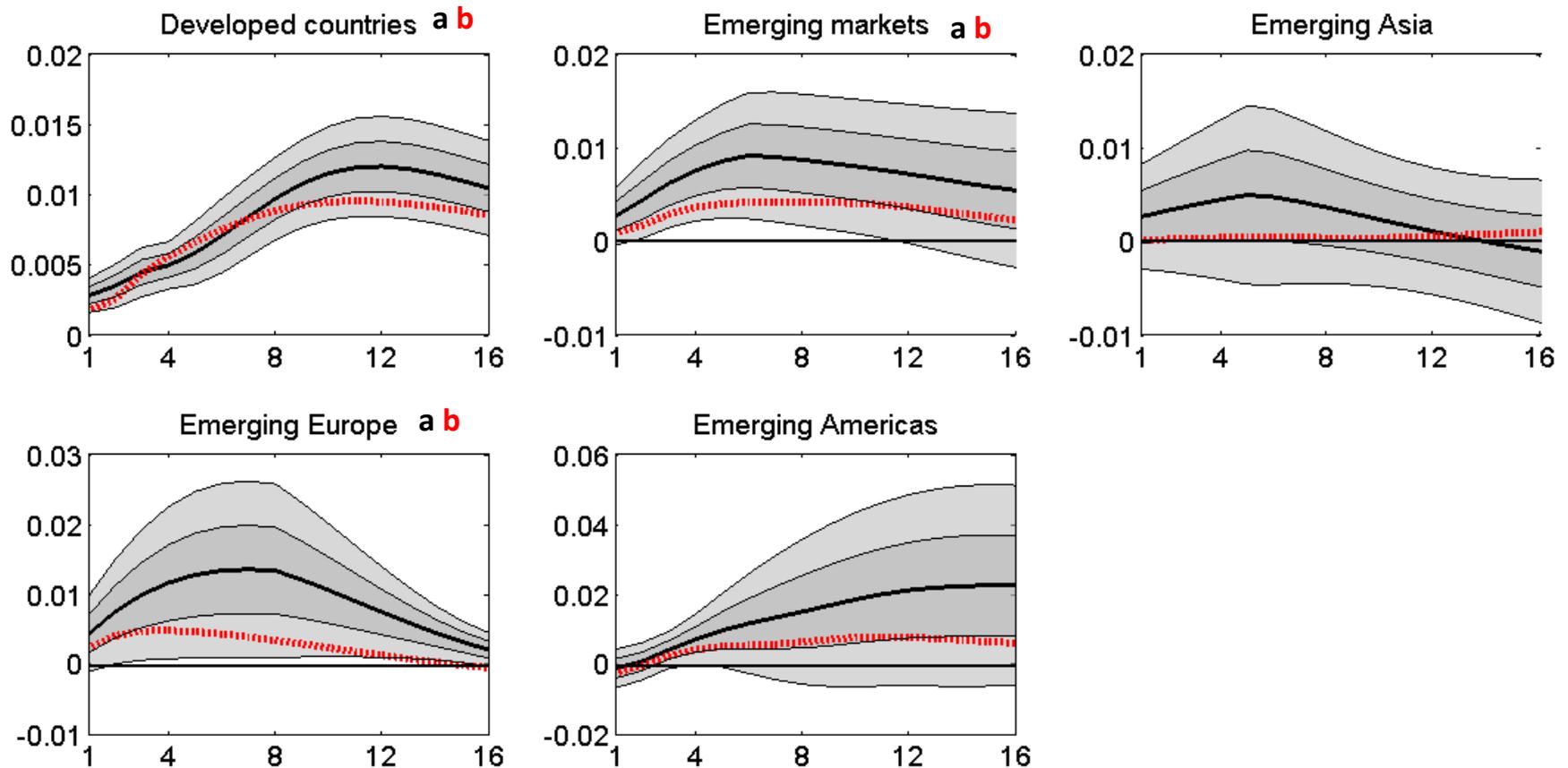
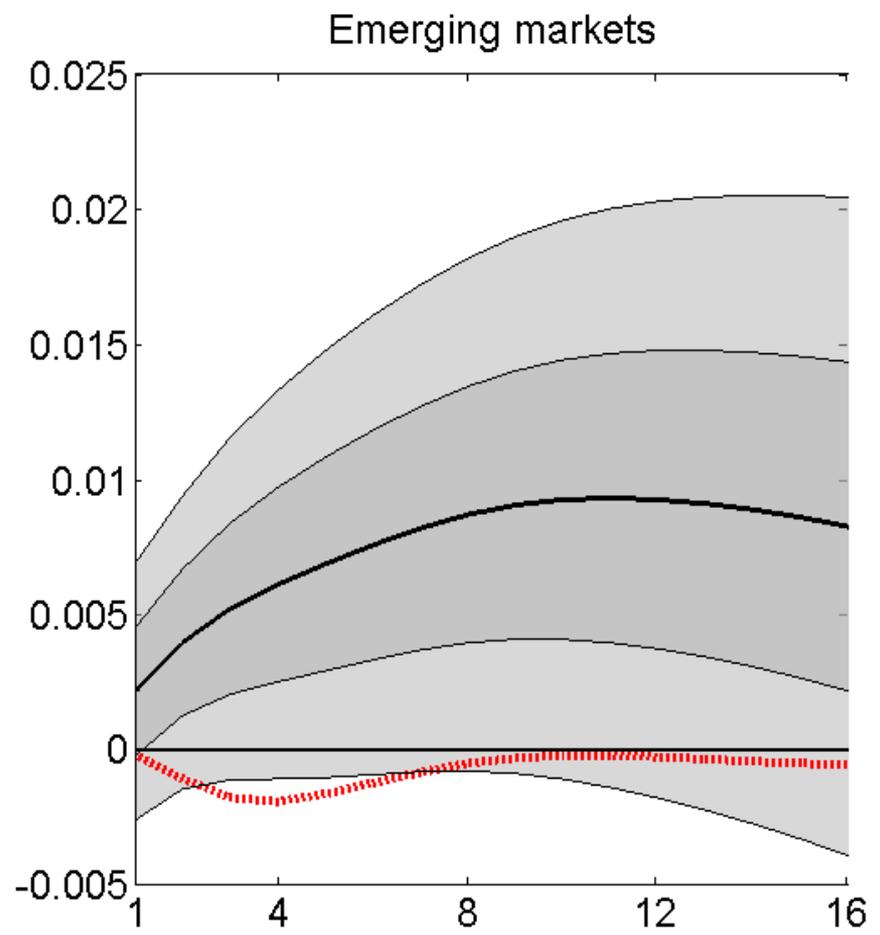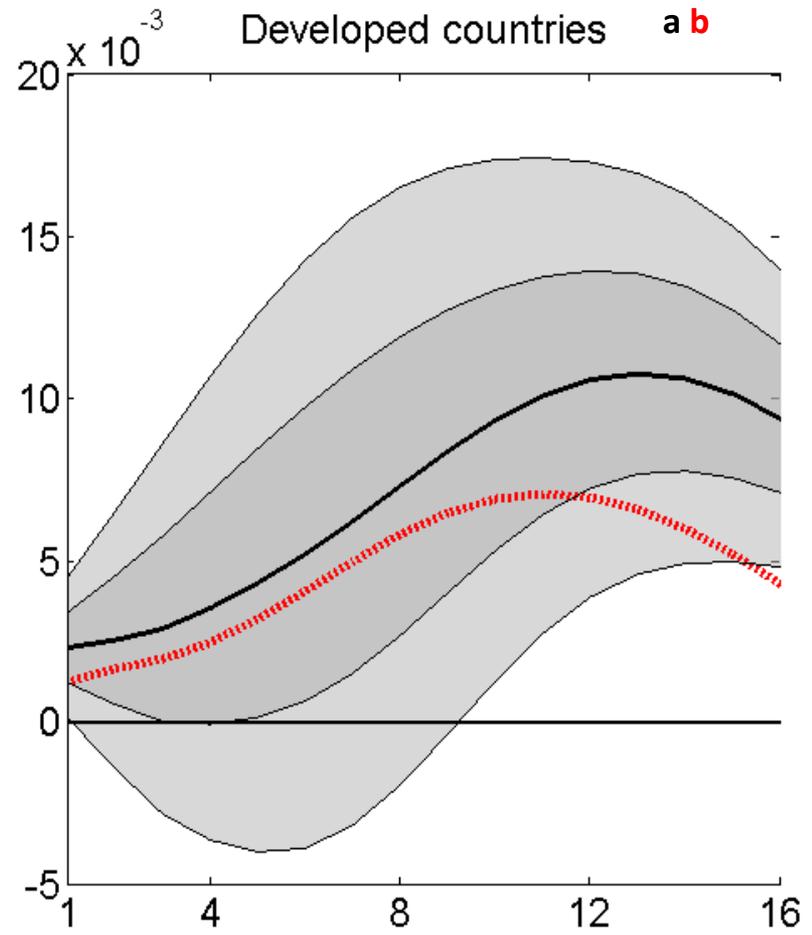# Impact of <u>JP</u> liquidity on house prices with (red) and without (black) bank flows
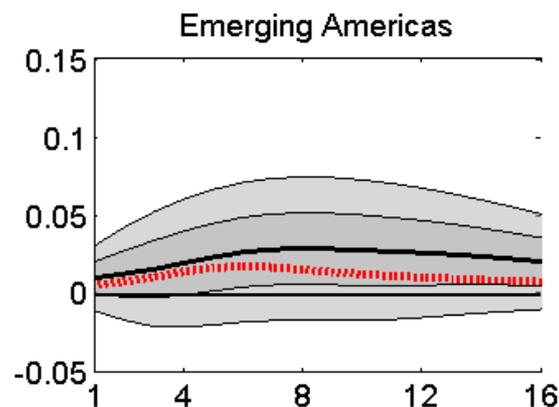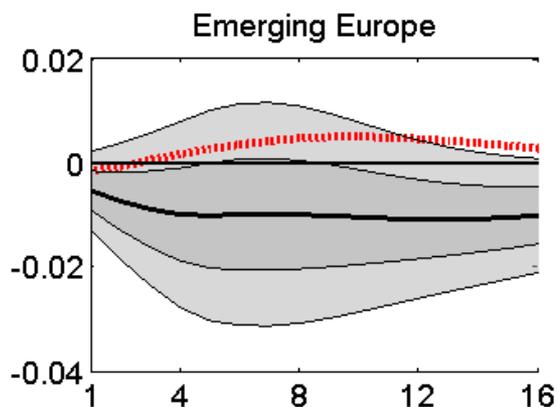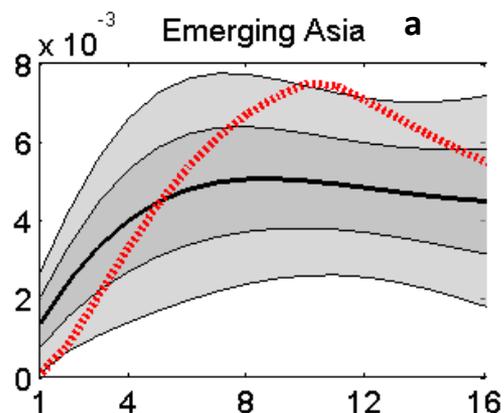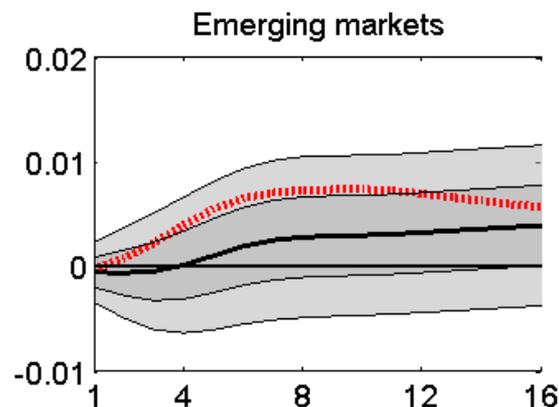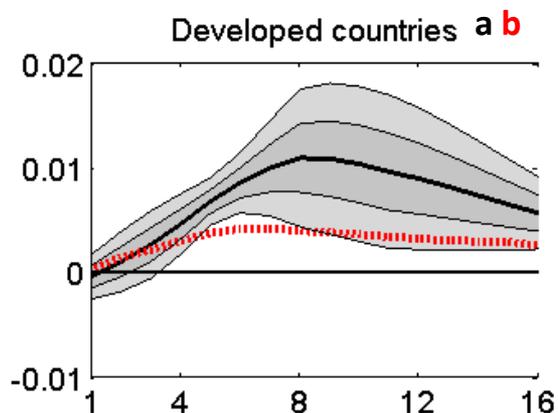
Financial market channel

- Similarly to bank channel, to identify **if financial markets are transmission mechanisms for global liquidity on house prices**, we estimate the PVAR with and without real estate companies stock price index

  ➢ GPR index available for the majority of the sample of countries

- If the financial market is channel, then the impact of global liquidity on house prices is reduced when the real estate index is in the VAR

- Graphically, the response of house prices to global liquidity shocks with real estate index (**red line**) should be below the response without real estate index (**black line**)
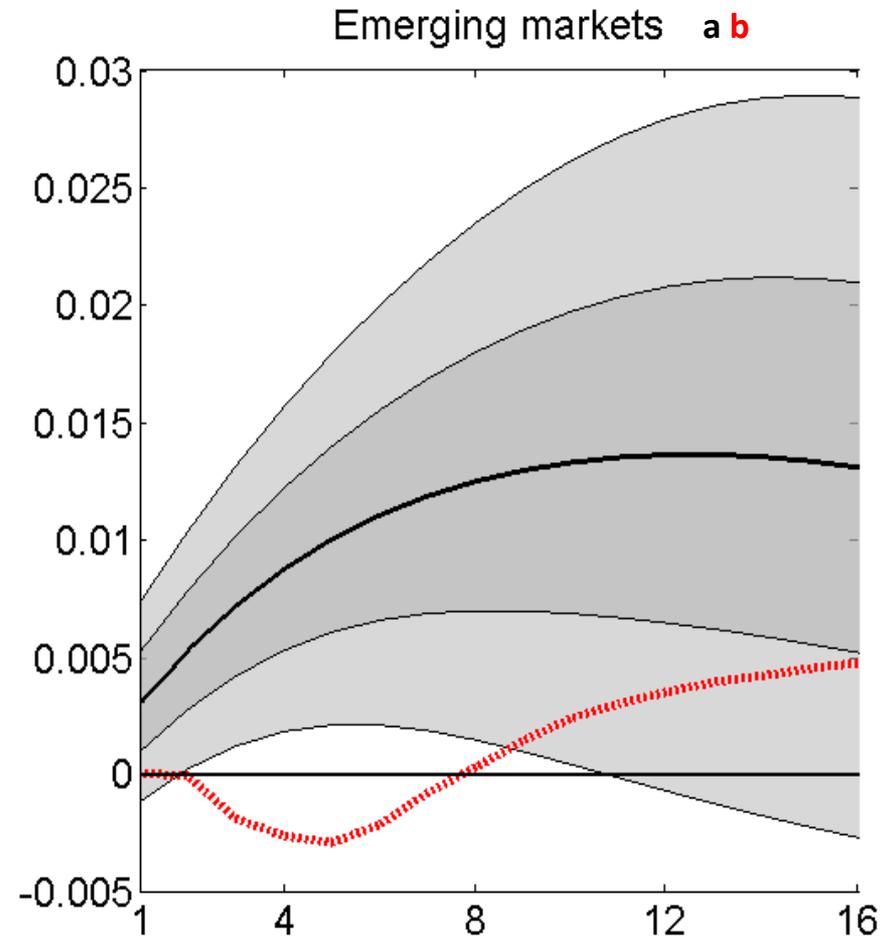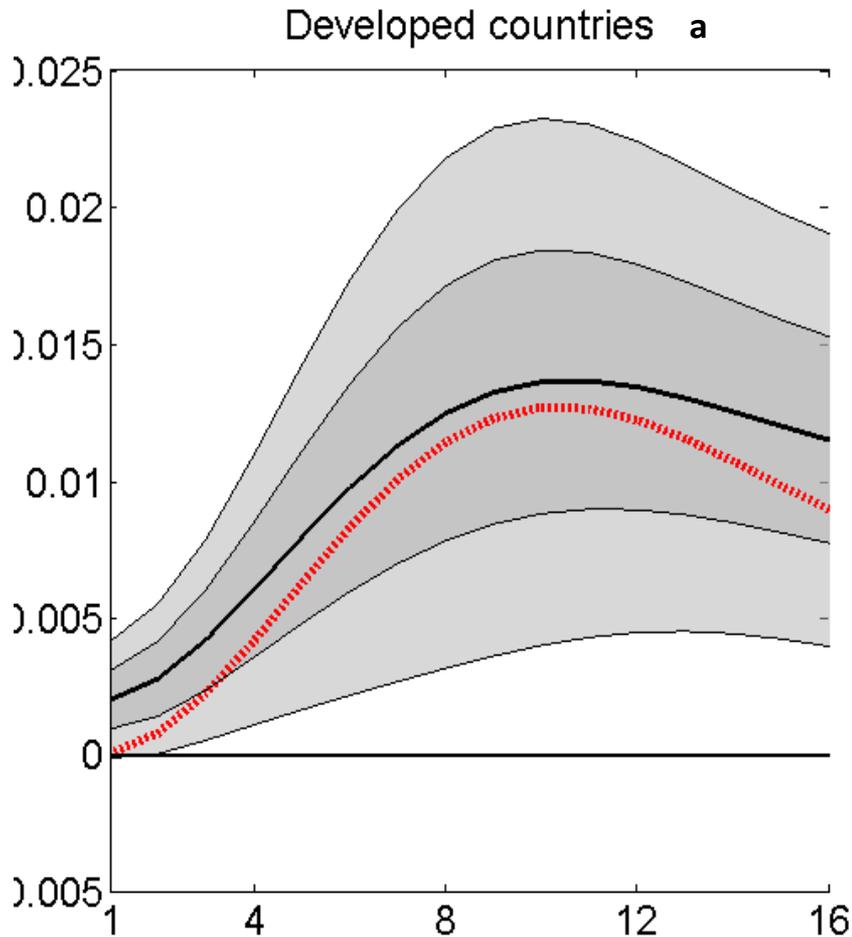
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Impact of <u>US</u> liquidity on house prices with (red) and without (black) real estate index

Impact of UK liquidity on house prices with (red) and without (black) real estate index
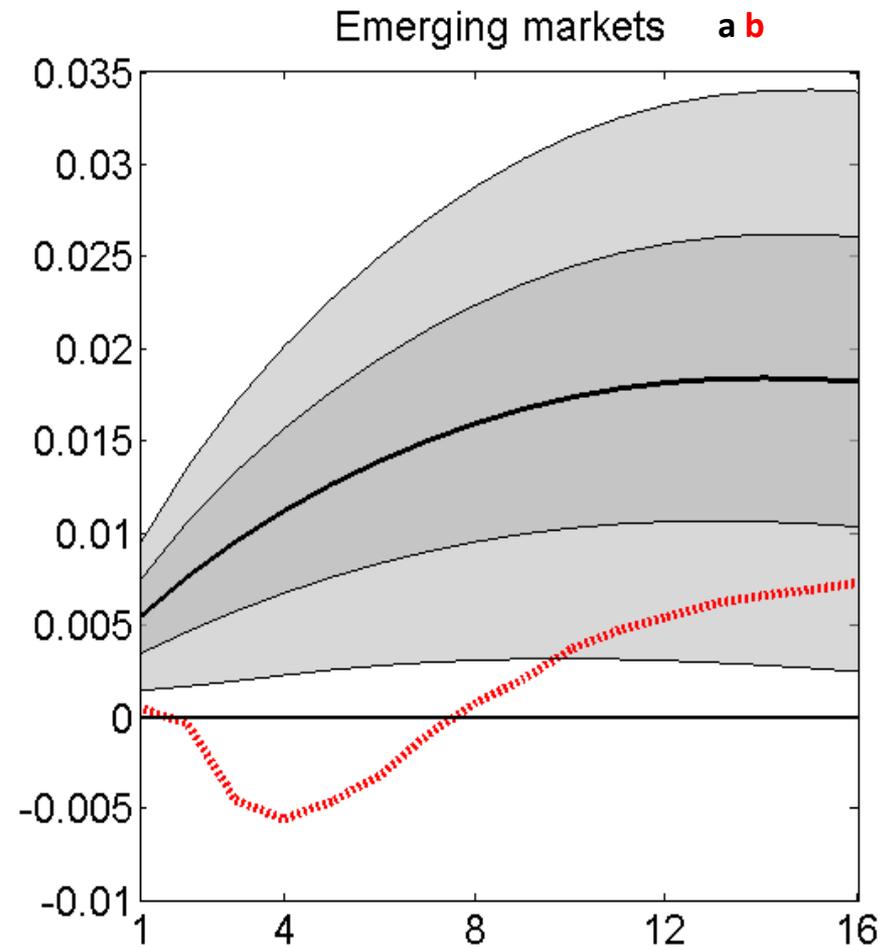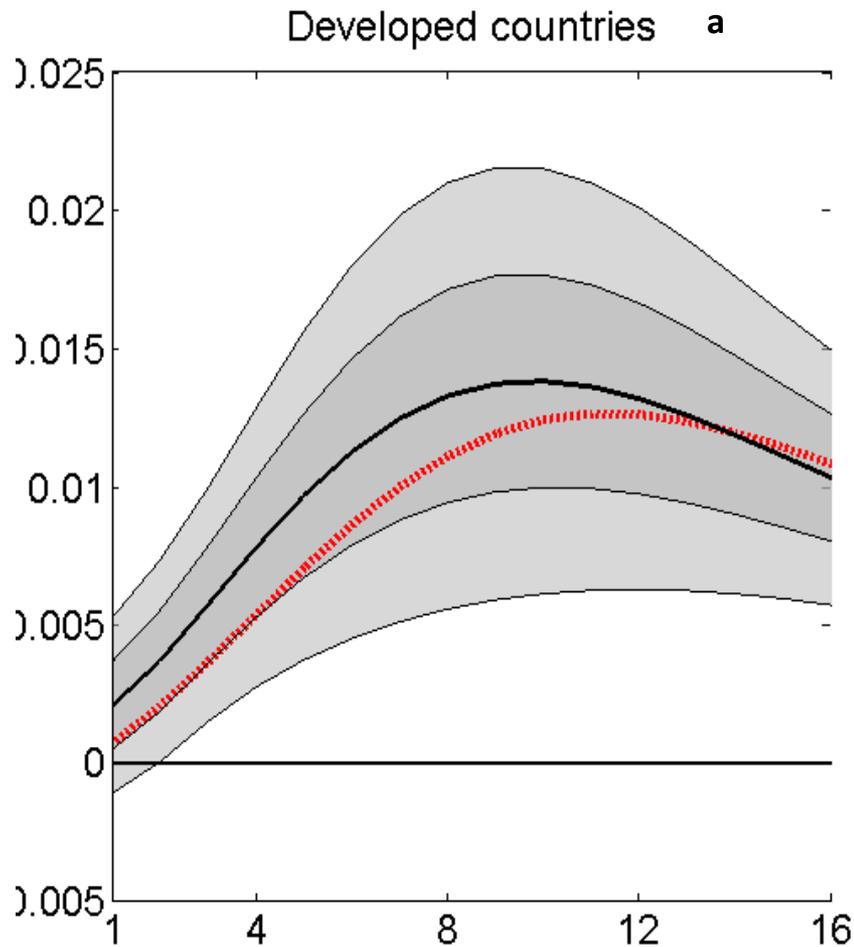
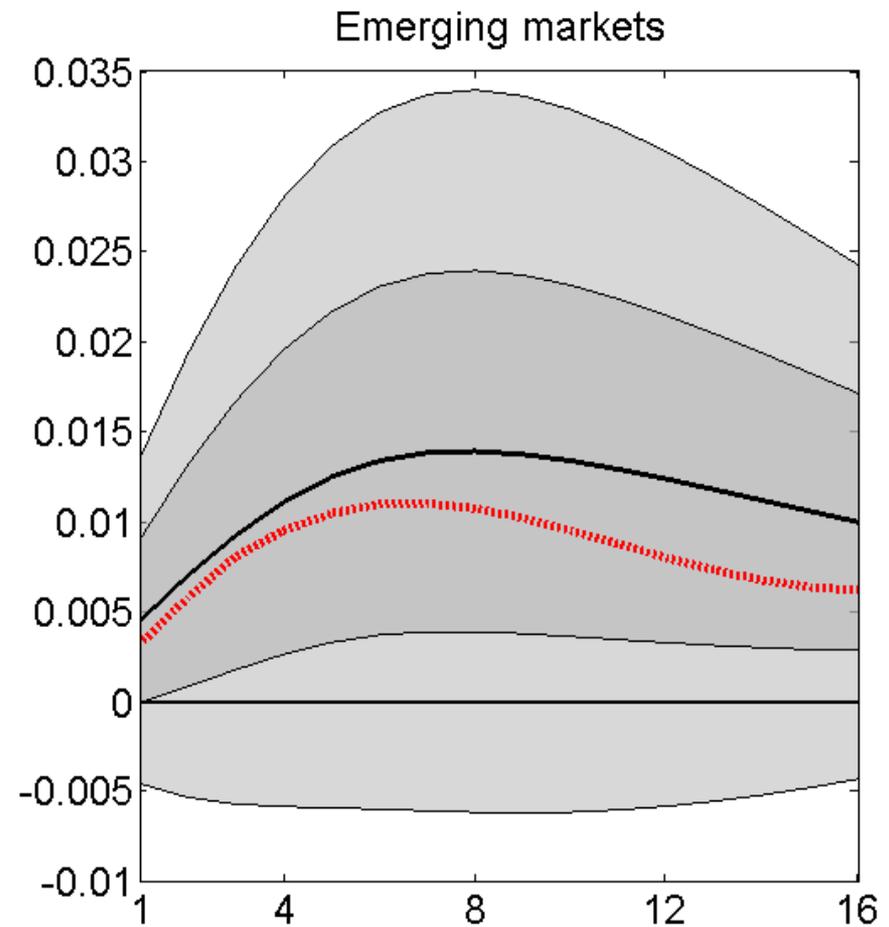# Impact of <u>EU</u> liquidity on house prices with (red) and without (black) real estate index
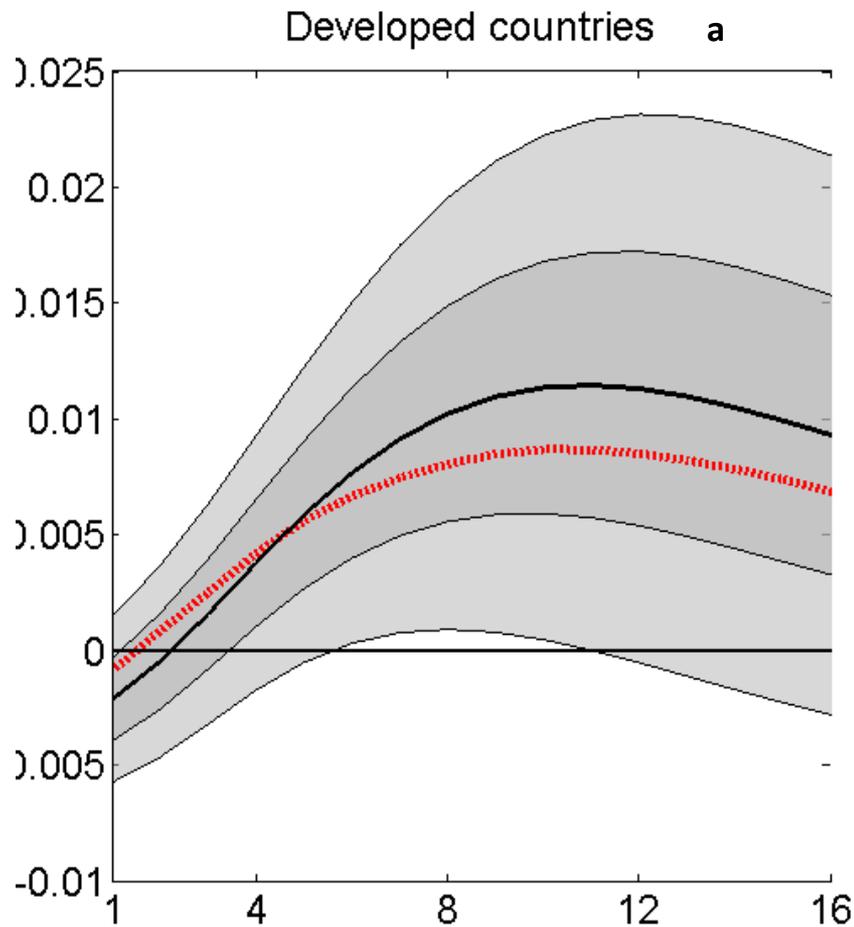
Impact of <u>JP</u> liquidity on house prices with (red) and without (black) real estate index

Developed countries   a   Emerging markets

Summary of the impact of liquidity shocks on house prices

- **Impact of liquidity on house prices:**
  - ➤ a strong impact of liquidity on house prices in **DCs** irrespective of its origin.
  - ➤ For **EMs**, the origin is instead very important.
- **Bank channel:**
  - ➤ bank flows are relevant channels for the transmission of liquidity shocks to house prices, especially in **EMs**.
  - ➤ some evidence of the role of bank flows with respect to **DCs** when the shocks originate in the UK and Japan.
- **Financial channel:**
  - ➤ financial market is an important transmission channel for US liquidity shocks to house prices in **DCs**. Important for EMs when shocks originate in UK and EU.

Role of domestic monetary policy

- To identify **if countries can mitigate the impact of liquidity shocks on house prices by altering their short term interest rates**, we estimate the forecast error variance decomposition of the PVAR

quarters	Developed countries		Emerging markets	
	Liquidity shock	Rate shock	Liquidity shock	Rate shock
1	6.94	2.12	4.01	4.91
4	6.70	17.44	8.96	14.23
8	8.46	27.67	14.11	19.08
16	11.01	26.22	22.09	20.87

quarters	Emerging Asia		Emerging Europe		Emerging Americas	
	Liquidity shock	Rate shock	Liquidity shock	Rate shock	Liquidity shock	Rate shock
1	3.99	1.84	3.35	4.61	5.03	10.74
4	6.04	11.14	8.87	13.51	14.22	20.73
8	11.01	18.51	15.28	16.95	17.80	23.26
16	17.00	23.80	22.73	17.94	30.04	20.12

Impact of liquidity on house prices of country with more (blue) and less (red) of the characteristics
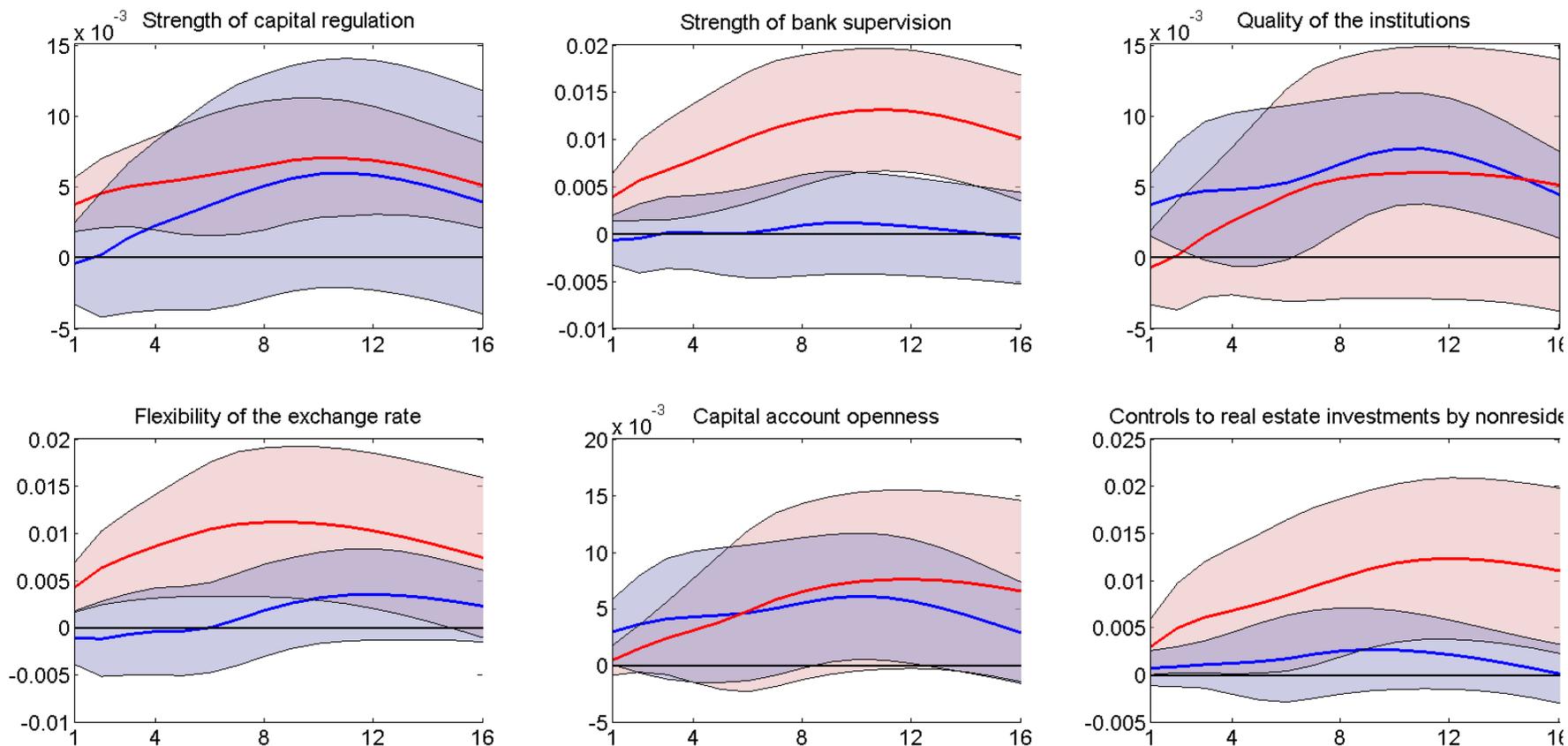
Robustness tests

- **The role of bank channel with alternative measure of bank flows- BIS data on cross-border bank flows**

- Similar to our main results

  ➢ Banks transmit the US liquidity to LA house prices

  ➢ Banks transmit UK liquidity shocks to both DM and EM

  ➢ Banks transmit JP liquidity shocks to DM

- Different from our main results

  ➢ A stronger role for bank flows on DM from shocks originating in all financial centres

- **The recent financial crisis**

  ➢ We test for a structural break during the GFC and conclude that the crisis did not cause a structural break

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Conclusions

➤ We find that **global liquidity drives house prices around the world**, controlling for domestic factors

➤ This impact is strong **irrespective of the origins of liquidity for developed countries**, whereas it is more **regional for emerging markets**

➤ We document that **bank and financial markets channels** are important for the transmission of global liquidity shocks on house prices in emerging markets

➤ Also, **financial markets** transmit liquidity shocks from the US on house prices in developed countries

➤ Finally, we show that **monetary policy and certain country characteristics, such as bank regulation and real estate investment restrictions for non-residents, mitigate the impact of global liquidity** on house prices

➤ Our paper has highlighted the importance of looking beyond the US as a source of global liquidity. At times of dried up liquidity, such as GFC, policy action is required by all fin centres

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