The shifting drivers of international capital flows

Stefan Avdjiev, Leonardo Gambacorta, Linda S. Goldberg and Stefano Schiaffi

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The Big Picture

- Pre-Global Financial Crisis
  - Sharp growth in International capital flows.
  - Strong international co-movement of prices, flows
  - Broad-based growth in bank-to-bank lending

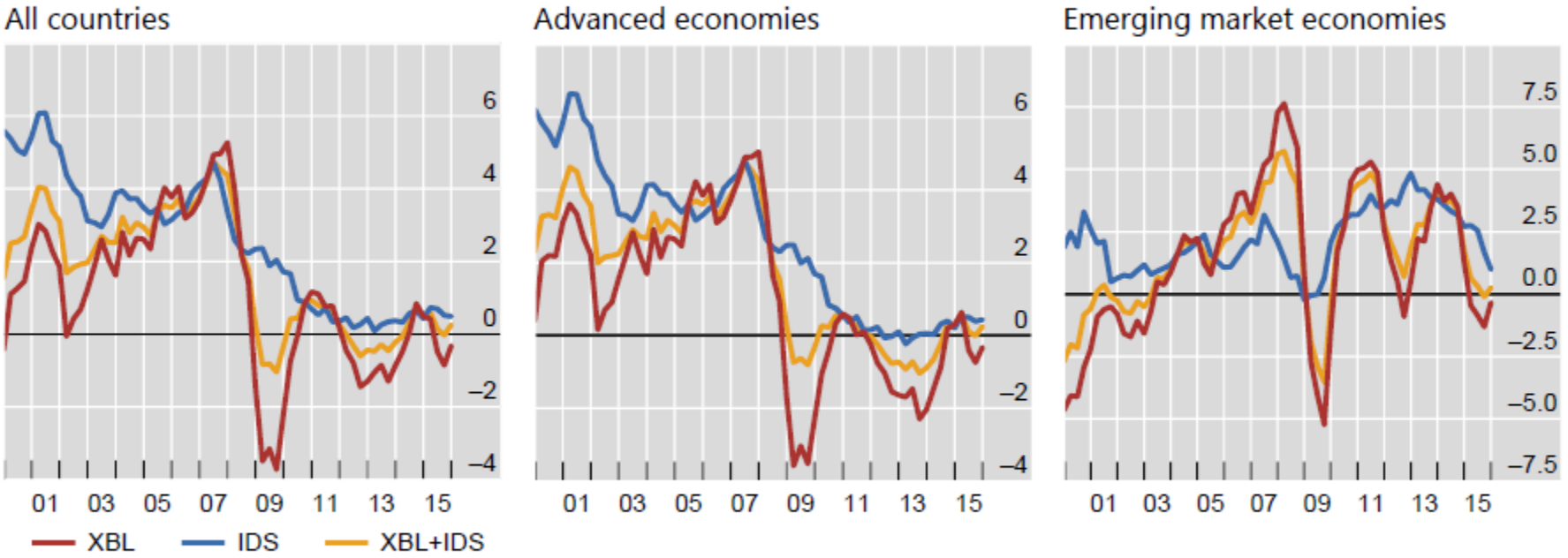
- Post-crisis, sharply different patterns
  - Cross-border bank lending retrenched (Bussiere et al 2016)
  - Some rebalancing of participating countries
  - Increase in international bond market financing
    - ✓ “The Second Phase of Global Liquidity” (Shin 2013)
    - ✓ Overall increase in roles of Nonbanks (IMF GFSR 2016)

- Policies environment has changed
  - Financial stability: stress tests, macro-prudential instruments
  - Monetary policy: Unconventional, ZLB

Cross border loan and international debt securities growth, AE and EM borrowers

External debt flows, all borrowers

Four-quarter moving average of quarterly growth rates, in per cent



XBL = Cross-border loans: Quarterly Growth Rate$_t$ = Adjusted Flows$_t$ / Outstanding Stock$_{t-1}$; IDS = International Debt Securities: Quarterly Growth Rate$_t$ = Net Issuance$_t$ / Outstanding Stock$_{t-1}$.

Sources: BIS Locational Banking Statistics by residence; BIS International Debt Securities Statistics.

Main Questions Posed in Paper

With all the changes, **are capital flows safer and less prone to sharp reversals**?

Perhaps should be? banks are less leveraged and better capitalized than previously; pension funds, insurance companies, money market mutual funds and hedge funds less leveraged than banks.

Particular questions examined:

- Do **drivers** of international bank flows **differ** from those of bond flows?
- Have **main drivers** of these international capital flows **changed**?
- What are the **reasons** behind the observed changes in sensitivities?
- Is it the **composition** of borrowers / lenders, or the **behavior** of the creditors?
- What role of **prudential policies** and bank **balance sheet** characteristics?

Preview of Key findings (preliminary)

1. Confirm global liquidity drivers (AE monetary policy, risk conditions)
2. Document changes in sensitivities post-crisis
   - AE monetary policy: stronger in loan and bond flows
   - Global risk conditions
     - International Loan flows through banks: weaker
     - International Bond flows through nonbanks: stronger
       - ✓ convergence in sensitivities between loan and bond flows
       - ✓ total flows: remain highly risk sensitive
3. Role of changes in composition of borrowers and lenders (extensive margin), which had distinct sensitivities, or changes in behaviors (intensive)? In loans:
   - Creditors have changed their pattern of responses to global liquidity.
   - Flows safer with VIX; more flighty with FFR; less change if banks “stronger”

Lots of Prior Literature

- GFSR, BIS QRs, Financial Stability Reports….
- Determinants of AE and EM capital flows
  - Forbes and Warnock (2012)
  - Fratzscher (2012)
  - Cerutti, Claessens and Ratnovski (2014)
  - Bruno and Shin (2015)
  - Correa, Paligorova, Sapriza and Zlate (2015)
  - Miranda-Agrippino and Rey (2015)
  - McCauley, McGuire, Sushko (2015)

….adds to long literature concentrated on EM capital flows

- Main drivers of the “Global financial cycle”:
  - **Global Risk** Conditions (VIX)
  - **Monetary policy** in advanced economies

Estimation: global and local drivers of capital flow

Part 1

- Two main international components of the BIS **Global Liquidity Indicators** (CGFS, 2011) from the **borrowing country perspective**
  - Cross-border **loans** (from the BIS LBSR dataset)
  - International **debt securities** (from the BIS IDSS dataset)
  - 2000:Q1 to 2013:Q4, 64 destination countries
- Estimate the impact of global (VIX, FFR) and local drivers of capital flows
- Test for structural change dates, pattern of changes

Part 2

- Introduce lending **bank nationality** dimension (BIS CBS data)
- Control for **heterogeneity across lenders**

Part 3

- Explain changes in the sensitivities
  - changed weights of countries in types of credit, versus changes in behaviors of types of creditors?
  - Can these changes be attributed to prudential policies in creditor countries, or ex ante balance sheet conditions of banks ?

XBL and IDS, typical lenders and borrowers

	Typical Lenders	Typical Borrowers	*Notes*
XB loans to banks	Internationally-active banks	Banks (all sizes)	*Interbank market (unsecured and repo)*
XB loans to nonbanks	Internationally-active banks	Large non-financial corporates; exporting/importing firms; Leveraged non-bank financials	*Syndicated loan market; trade credit; project financing*
IDS issued by banks	Pension funds; Insurance companies; Money Market Mutual Funds; Hedge funds	Large and mid-sized banks	*Smaller investor base than for IDS issued by non-banks*
IDS issued by non-banks	Pension funds; Insurance companies; Mutual Funds; Hedge funds	Non-financial corporates; governments; Insurance companies	*Broader investor base than for IDS issued by banks*

Empirical Methodology: Part 1

- Baseline estimation by borrowing country j:
  - $GrRateY_t^j =$
    $\boldsymbol{\beta_1}\Delta FFR_t + \boldsymbol{\beta_2} logVIX_t + \beta_3 \Delta logGDP_t^j + \beta_4 \Delta SovRating_t^j +$
    $\beta_5 ChinnIto_t^j + \beta_6 \Delta logGlobalGDP_t + \mu^j + \varepsilon_t^j$

  where Wu-Xia shadow rate is used fir 2009:q1-2013:Q4 (others used in robustness checks)

- Endogenously identify potential **structural break points** and test for their significance [Bai (1997) and Kurozumi (2002)]
  - Strong evidence of a structural break in Q1/2009 for both:
    - ❖ Cross-border loans and International debt securities

- Benchmark estimation with structural breaks:
  - $GrRateY_t^j = \beta' X_t^j + \mu^j + I\left(t \geq T_{break}^Y\right)\left(\kappa + \gamma' X_t^j\right) + \varepsilon_t^j$

Baseline model confirms prior literature

	Dependent variable: **ΔCross-border loans**			Dependent variable: **ΔInternational debt securities**		
Explanatory variables	All	to banks	to non-banks	All	by banks	by non-banks
ΔFed funds rate	**-1.88*** **	**-2.07*** **	**-2.11*** **	**-1.35***	**-1.34**	**-1.05**
Log(VIX)	**-4.46*** **	**-4.29*** **	**-4.90*** **	**-3.28*** **	**-7.26*** **	**-2.49*** **
ΔReal GDP	0.57***	0.60***	0.52***	0.19*	0.25	0.18
ΔSovereign rating	2.49**	4.21***	-0.57	1.46*	-1.83	1.15
Chinn-Ito index	-0.12	-1.08	1.34	8.71***	13.45***	5.19
ΔReal global GDP	0.22	0.47*	0.10	-0.32	-0.62	-0.48
Observations	2,903	2,903	2,903	2,903	2,572	2,902
R-squared	0.12	0.08	0.08	0.06	0.03	0.04

Benchmark model with structural breaks: post-crisis increase in FFR sensitivity; VIX sensitivity weaker on loans, stronger for IDS

	Dependent variable: ΔCross-border loans		Dependent variable: ΔInternational debt securities	
Explanatory variables	to banks	to non-banks	by banks	by non-banks
Pre-break				
Log(VIX)	-4.36***	-4.32***	-5.58**	-0.23
ΔFed funds rate	-3.36***	-3.39***	-1.19	-0.94
Post-break				
Log(VIX)	-0.22	-2.52***	-3.39	-2.31*
ΔFed funds rate	-8.36***	-5.19***	-14.67	-6.37***

Changes in sensitivities, pre- versus post- crisis. Some convergence in bonds versus loans.

β_1

Fed Funds Rate	Borrower	
	Banks	Non-banks
Loans (LBS)	Strengthens	Strengthens
Bonds (IDS)	Strengthens	Strengthens

β_2

VIX	Borrower	
	Banks	Non-banks
Loans (LBS)	Weakens	Weakens
Bonds (IDS)	Weakens	Strengthens

Some convergence between XBL and IDS patterns. Good or bad development? Diverse business models now more similar?

	Borrower sector		
	ΔCross-border loans		
Coefficients(XBL)-Coefficients(IDS)	All	Banks	Non-banks
Pre-break			
Log(VIX)	-2.82***	1.22	-4.09**
ΔFed funds rate	-1.70*	-2.17*	-2.46**
Post-break			
Log(VIX)	1.41	3.17	-0.21
ΔFed funds rate	0.07	6.31	1.19

From borrower perspective, aggregated flows less flighty? Banks borrowers: Weaker sensitivity to VIX, stronger FFR. Nonbanks: Similar VIX, stronger FFR.

	Dependent variable: ΔTotal cross-border flows (loans and debt securities)	
Explanatory variables	**to banks**	**to non-banks**
Pre-break		
Log(VIX)	-3.24**	-2.69***
ΔFed funds rate	-2.75***	-2.10***
Post-break		
Log(VIX)	-0.84	-2.26***
ΔFed funds rate	-7.69***	-5.67***
Observations	2,572	2,902
R-squared	0.128	0.121

Disentangling the effects across advanced and emerging market economies: similar for both in x-border; differ for IDS.

Explanatory variables	Dependent variable: ΔCross-border loans		Dependent variable: ΔInternational debt securities	
	Advanced economies	Emerging economies	Advanced economies	Emerging economies
Pre-break				
Log(VIX)	-4.02***	-4.18***	1.05	-3.90***
ΔFed funds rate	-2.18***	-4.56***	-2.54	-0.65
Post-break				
Log(VIX)	-1.70	-1.97	-0.63	-4.82***
ΔFed funds rate	-6.41***	-5.87***	-10.22***	-2.91*
Observations	1,479	1,424	1,479	1,424
R-squared	0.22	0.16	0.07	0.12

Part 2. Controlling for heterogeneity among lending banking systems

- The BIS Consolidated Banking Statistics (CBS) contains bilateral data which has information on both:
  - The country of the borrower
  - The nationality of the lending banking system

- Re-estimate all specifications using the bilateral CBS data.
  - $GrRateY_t^{ij} =$

$$\boldsymbol{\beta_1}\Delta FFR_t + \boldsymbol{\beta_2} logVIX_t + \beta_3 \Delta logGDP_t^j + \beta_4 \Delta SovRating_t^j + \beta_5 ChinnIto_t^j + \beta_6 \Delta logGlobalGDP_t + \theta^i + \mu^j + \varepsilon_t^{ij}$$

  - $GrRateY_t^{ij} =$

$$\beta' X_t^j + \delta^{i\prime} Int_t^i + \delta^{j\prime} Int_t^j + \theta^i + \mu^j + I\left(t \geq T_{break}^Y\right)\left(\kappa + \gamma' X_t^j + \eta^{i\prime} Int_t^i + \eta^{j\prime} Int_t^j\right) + \varphi^i Pru_t^i + \varphi^j Pru_t^j + \varepsilon_t^{ij}$$

CBS in benchmark model controls for lender fixed effects. Structural breaks are similar to LBS

	Dependent variable: Bank lending (LBS)		Dependent variable: Bank lending (CBS)		
Explanatory variables	to banks	to non-banks	to banks	to non-banks (private)	to the public sector
Pre-break					
Log(VIX)	-4.36***	-4.32***	-4.99***	-2.96***	-1.30
ΔFed funds rate	-3.36***	-3.39***	-0.31	-1.82***	-0.87*
Post-break					
Log(VIX)	-0.22	-2.52***	-3.57***	-2.67***	-4.77***
ΔFed funds rate	-8.36***	-5.19***	-5.72***	-4.35***	-8.51***

Changes in sensitivities, pre- vs post-crisis

β_1

Fed Funds rate	Borrower	
	Banks	Non-banks
Bank lending (LBS)	Strengthens	Strengthens
Bank lending (CBS)	Strengthens	Strengthens
Bonds (IDS)	Strengthens	Strengthens

β_2

VIX	Borrower	
	Banks	Non-banks
Bank lending (LBS)	Weakens	Weakens
Bank lending (CBS)	Weakens	Constant
Bonds (IDS)	Weakens	Strengthens

Part 3. What can account for the post-crisis changes?

Lending national banking systems have distinct betas. Sensitivities from a borrower perspective may be driven by change in country composition of lenders. Already document shift from bank to non-banks.

Lenders may have changed their sensitivities.

Perhaps role for prudential policies or ex ante balance sheet advantage.

$$GrRateY_t^{i,j} = \beta_1 \Delta FFR_t + \beta_2 logVIX_t + \cdots$$

- $\Delta\beta_k$ has a structural component and a compositional component

$$\beta_k = \sum_i \left\{ w_{t-1}^{i,j} \beta_t^{i,j} \right\}$$

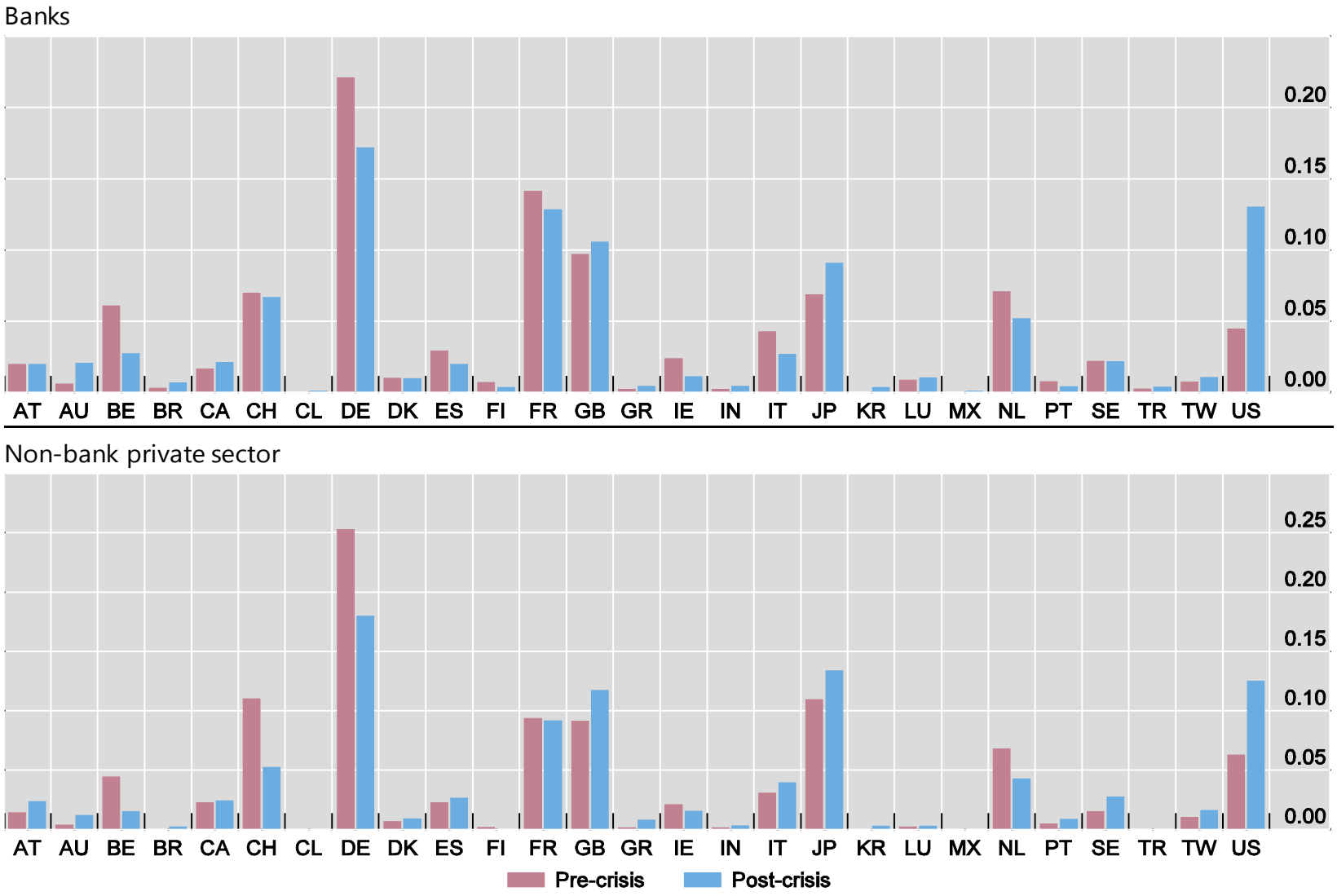
- where i = individual lending national banking systems and $w_{t-1}^{i,j}$ = share of outstanding stock of loans of lenders from i to borrowers in j

$$\Delta\beta_k = \sum_i \left(\Delta\beta_k^i\right) \cdot w_{post}^i + \beta^i \cdot (\Delta w^i)$$

- Relate each change component to ex ante capital ratios of banking systems, prudential policies

Lending national banking system weights

Graph 7

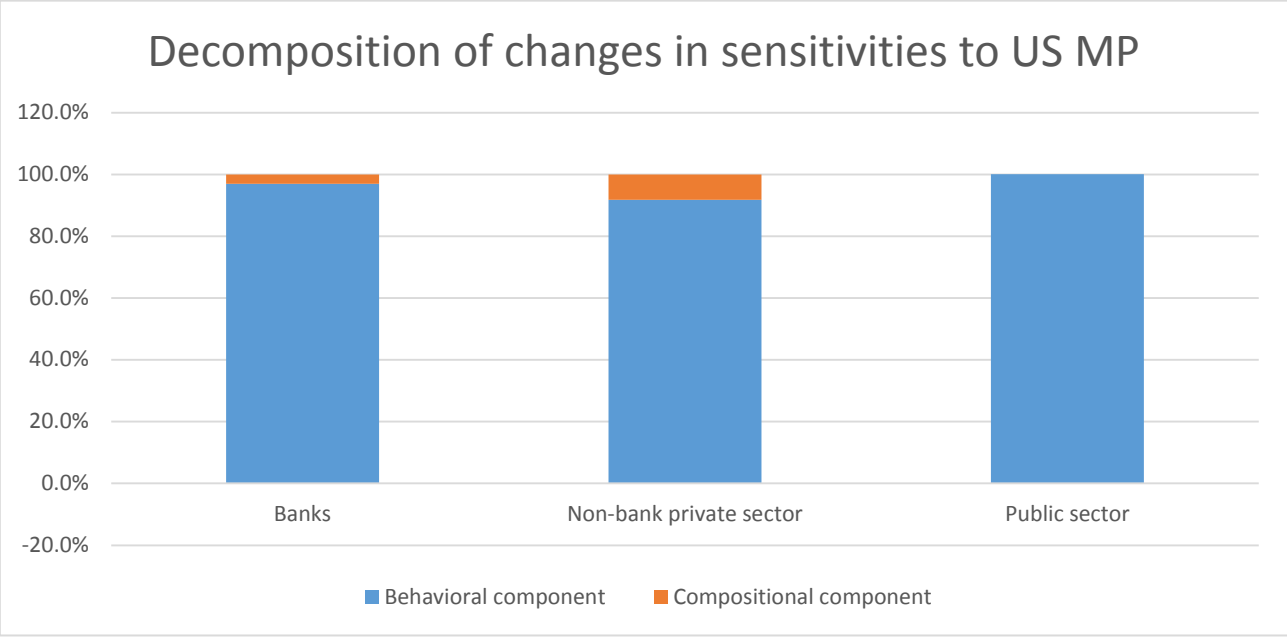


Sources: BIS consolidated banking statistics; authors' calculations.

Decomposing the shifts in sensitivities to US MP

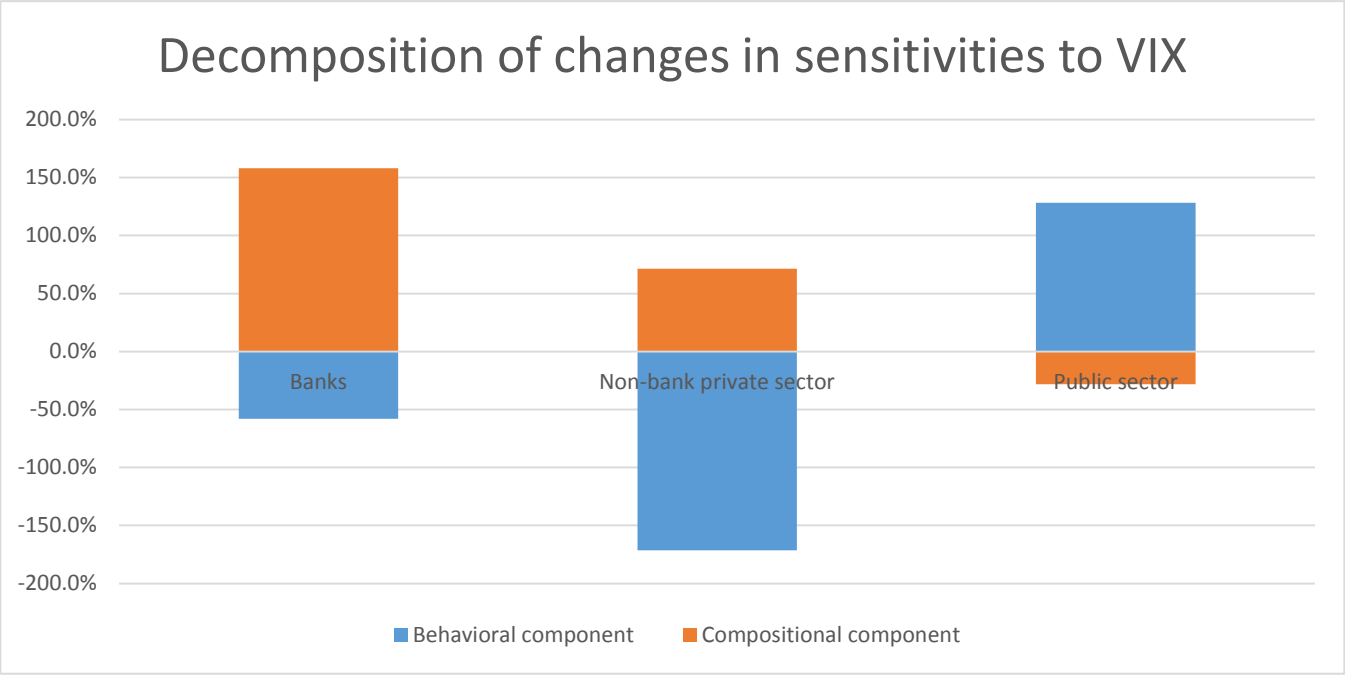
- In XBL, the **behavioural component** accounts for the overwhelming majority of the shifts in sensitivities to US monetary policy based on pre- and post-crisis averages

- The pattern holds **across all borrowing sectors**



Decomposing the shifts in sensitivities to the VIX

- Behavioural and compositional components **tend to offset** each other.
  - **Behavioural** component dominates for lending to the **public** and the **non-bank private** sectors
  - **Compositional** component dominates **interbank** lending

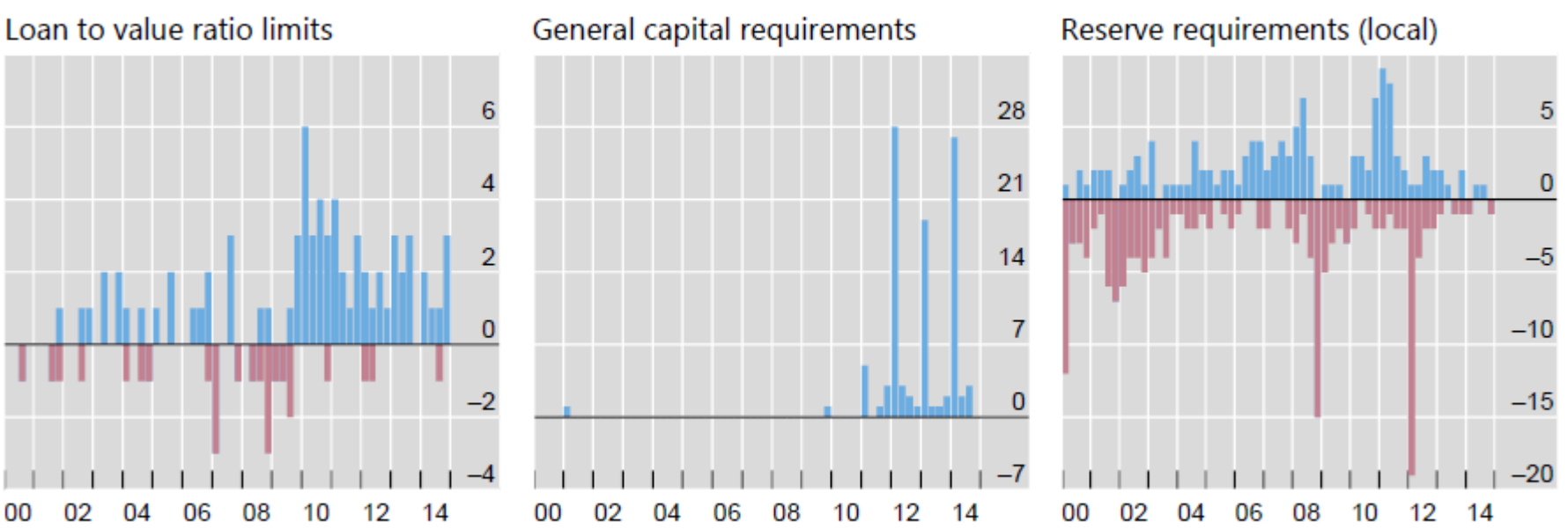


Examining the role of prudential actions

- Database on Changes in Prudential Policy Instruments – collaboration between IMF and IBRN
  - Cerutti, Correa, Fiorentino and Segalla (2015)

- We focus on three types of prudential instruments (in impulse and cumulative forms)

Changes in prudential policies



Source: Cerutti et al (2015).

Cross-border lending sensitivities: Ex ante capital ratios of lenders important for ex post changes in sensitivities

	Dependent variable: Structural change in the coefficient for ΔFed funds rate $\beta_1^{PostBreak} - \beta_1^{PreBreak}$			Dependent variable: Structural change in the coefficient for Log(VIX) $\beta_2^{PostBreak} - \beta_2^{PreBreak}$		
Explanatory variables	(I)	(II)	(III)	(IV)	(V)	(VI)
Pre-break Capital ratio (2008)	0.45**	0.58***	0.40*	0.47*	0.48*	0.47*
Pre-break Prudential index (2008)	0.52			-0.32		
Pre-break LTV index (2008)		-0.64			-0.75	
Pre-break Local reserve requirement index (2008)			2.72***			-0.70
Sectoral fixed effects	yes	yes	yes	yes	yes	yes
Observations	87	87	87	87	87	87
Q	186.3	185.9	174.2	212.6	217.6	213.3
Degrees of Freedom test Q	82	82	82	82	82	81
I^2	0.56	0.56	0.53	0.61	0.62	0.62
τ^2	23.12	22.92	18.83	25.22	25.62	25.40
Adjusted R-squared	13.73	12.60	21.27	15.34	15.17	16.88

Determinants of changes in cross border lending national banking system weights: higher role for systems with ex-ante high capital ratios, deposit funding shares, local claims share.

	Dependent variable: Change in lending national banking system weights $w^{Postbreak} - w^{PreBreak}$		
Explanatory variables	(I)	(II)	(III)
Pre-break Capital ratio (2008)	0.0016*	0.0015**	0.001
Pre-break Deposits to total funding ratio (2008)	0.0002**	0.0002**	0.0001**
Pre-break Average bank size (2008)	0.004	0.004	0.004
Local claims over Foreign claims (2008)	0.02*	0.02*	0.03**
Pre-break Prudential index (2008)	-0.001		
Pre-break LTV index (2008)		-0.004	
Pre-break Local reserve requirement index (2008)			0.0054**
Sectoral fixed effects	yes	yes	yes
Observations	75	75	75
Adjusted R-squared	0.08	0.08	0.12

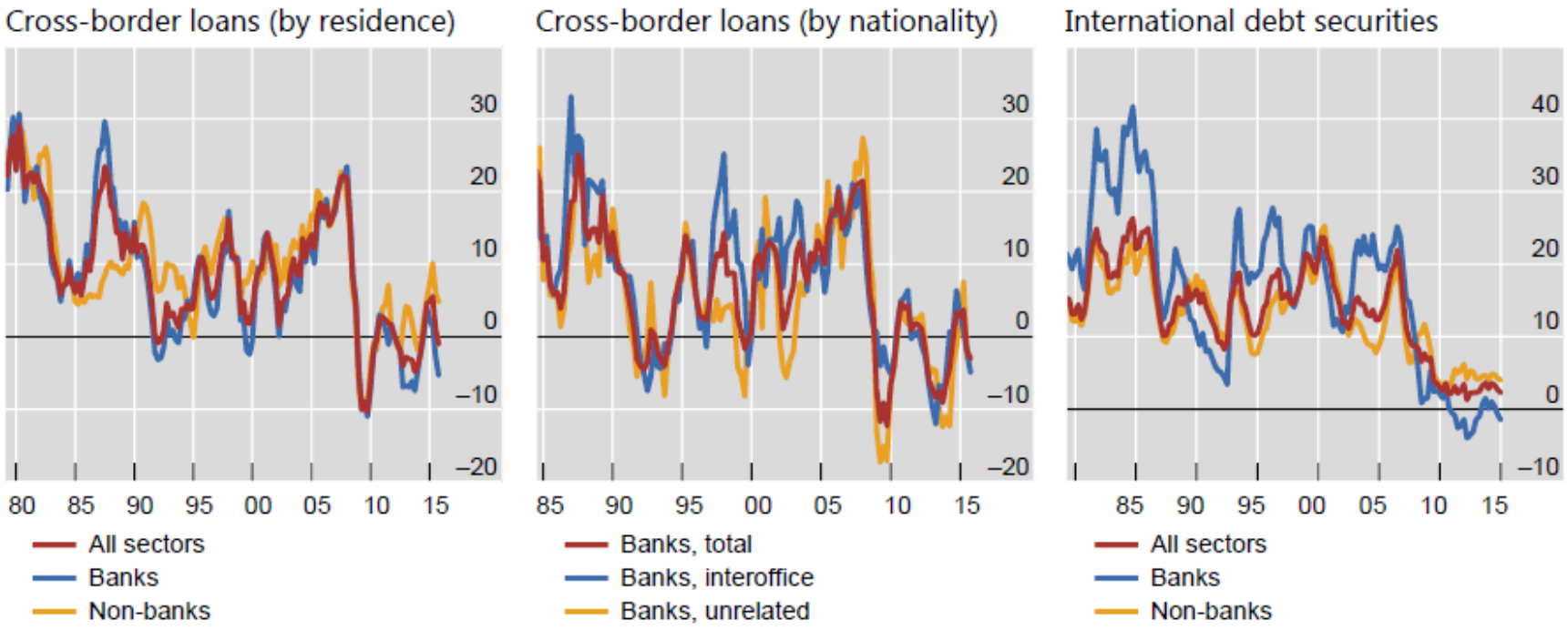
Conclusions

- After global financial crisis, shift in international capital flows
  - away from bank lending
  - toward direct market financing.
- Global liquidity drivers are the same, but loss of heterogeneity
  - Sensitivity to US monetary policy has increased dramatically.
  - Sensitivity to global risk conditions converging:
    - ✓ increased significantly for international bonds flows
    - ✓ declined for cross-border loan flows.
- Shifts due to:
  - Compositional changes across international bank creditor countries
  - Changes in behaviors
  - Ex ante balance sheet strength matters, prudential policy weaker role
- Are flows safer? Flightiness to monetary policy stronger, and risk off potential converging between bank financing to direct market financing.

Thank you!

Cross-border loans and international debt securities

Annual growth rates, in per cent



Sources: BIS locational banking statistics; BIS International Debt Securities Statistics.