

*Cross-border bank flows and monetary policy**

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Motivation

- Cross-border bank claims have grown markedly over the past two decades.
- For a few advanced economies, banks' cross-border claims are currently as large as outstanding domestic bank credit to the non-bank sector.
- The purpose of this paper is to analyze the main determinants of cross-border bank flows, especially the factors driving the supply of cross-border bank credit.
- In particular, we study the effect of monetary policy on these flows.

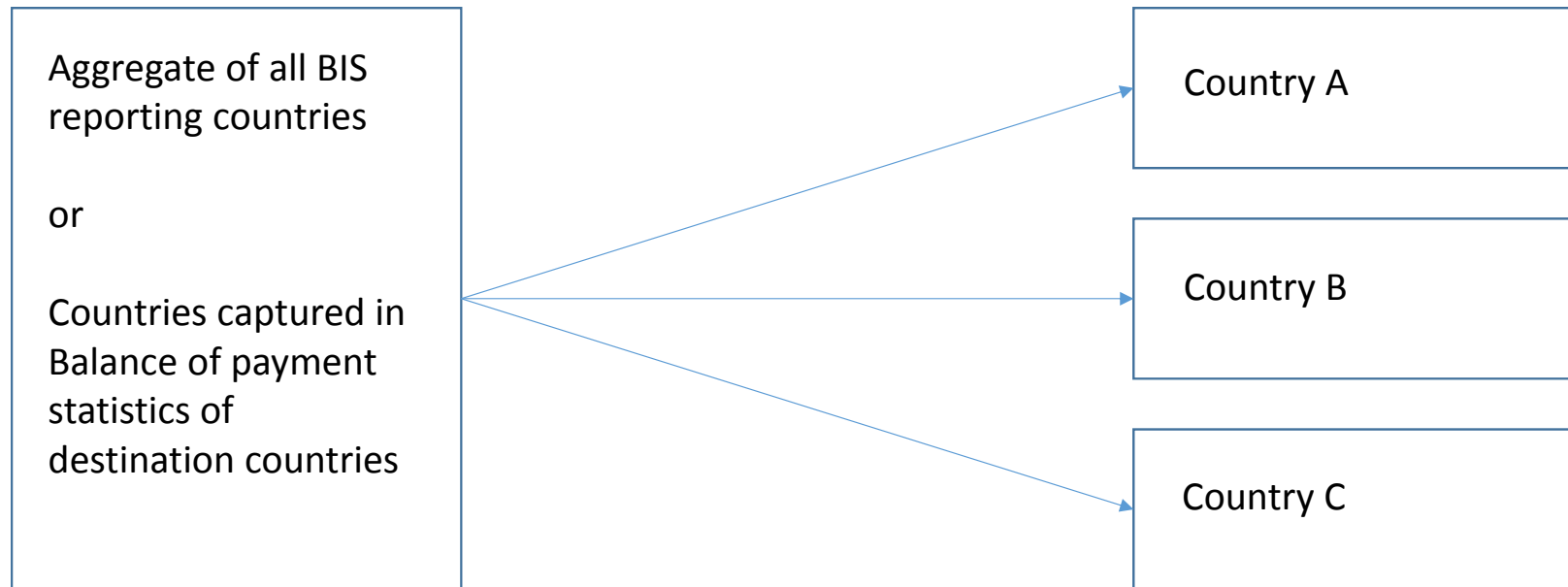
Contribution

- We identify changes in banks' supply of cross-border credit due to the monetary policy stance of the domestic central bank using dyadic data.
- Evaluate the importance of country-specific monetary policy, as opposed to global factors, in determining bank flows (Bruno and Shin, 2014; Cerutti, Claessens and Ratnovski, 2014).
- Identify and novel channel of domestic monetary policy on foreign credit.

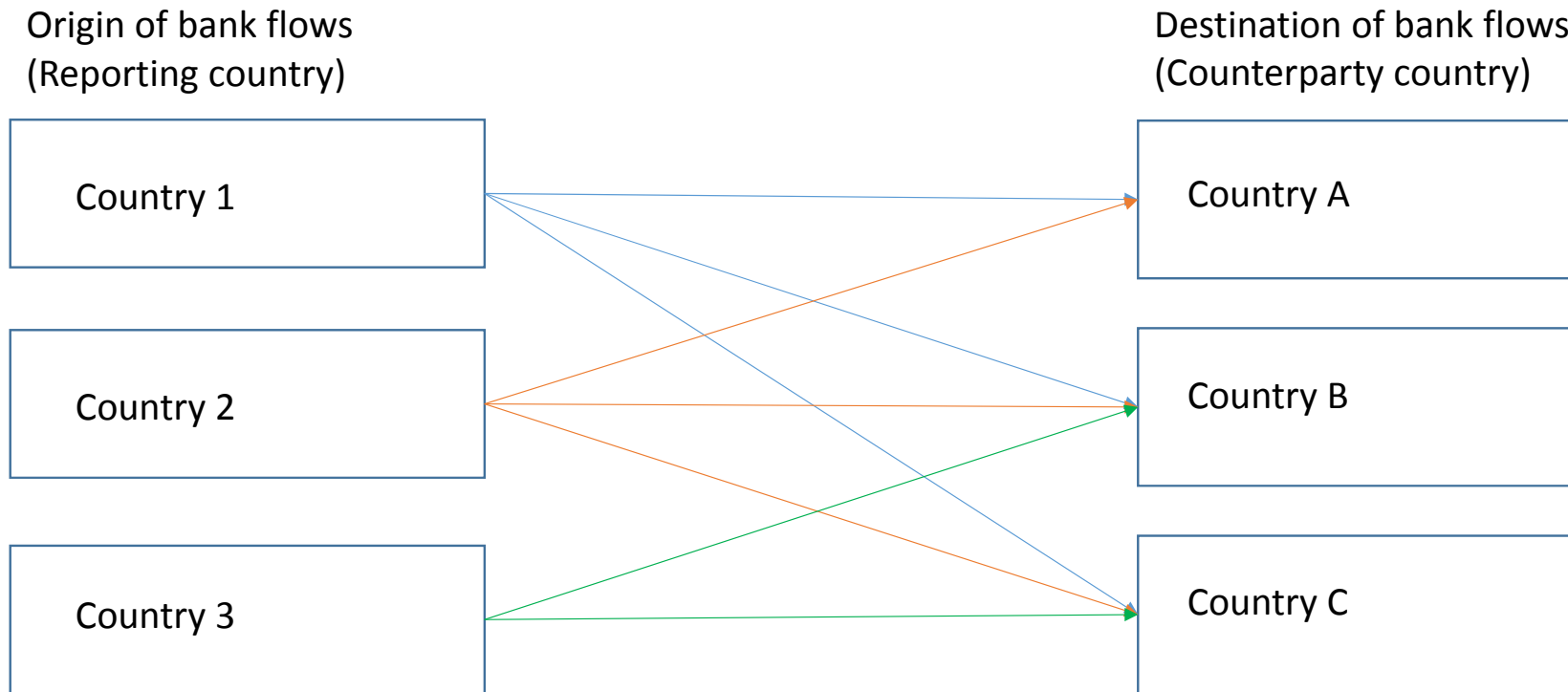
Data and estimation setup: Most studies

Origin of bank flows

Destination of bank flows



Data and estimation setup: This study



Dyadic Data

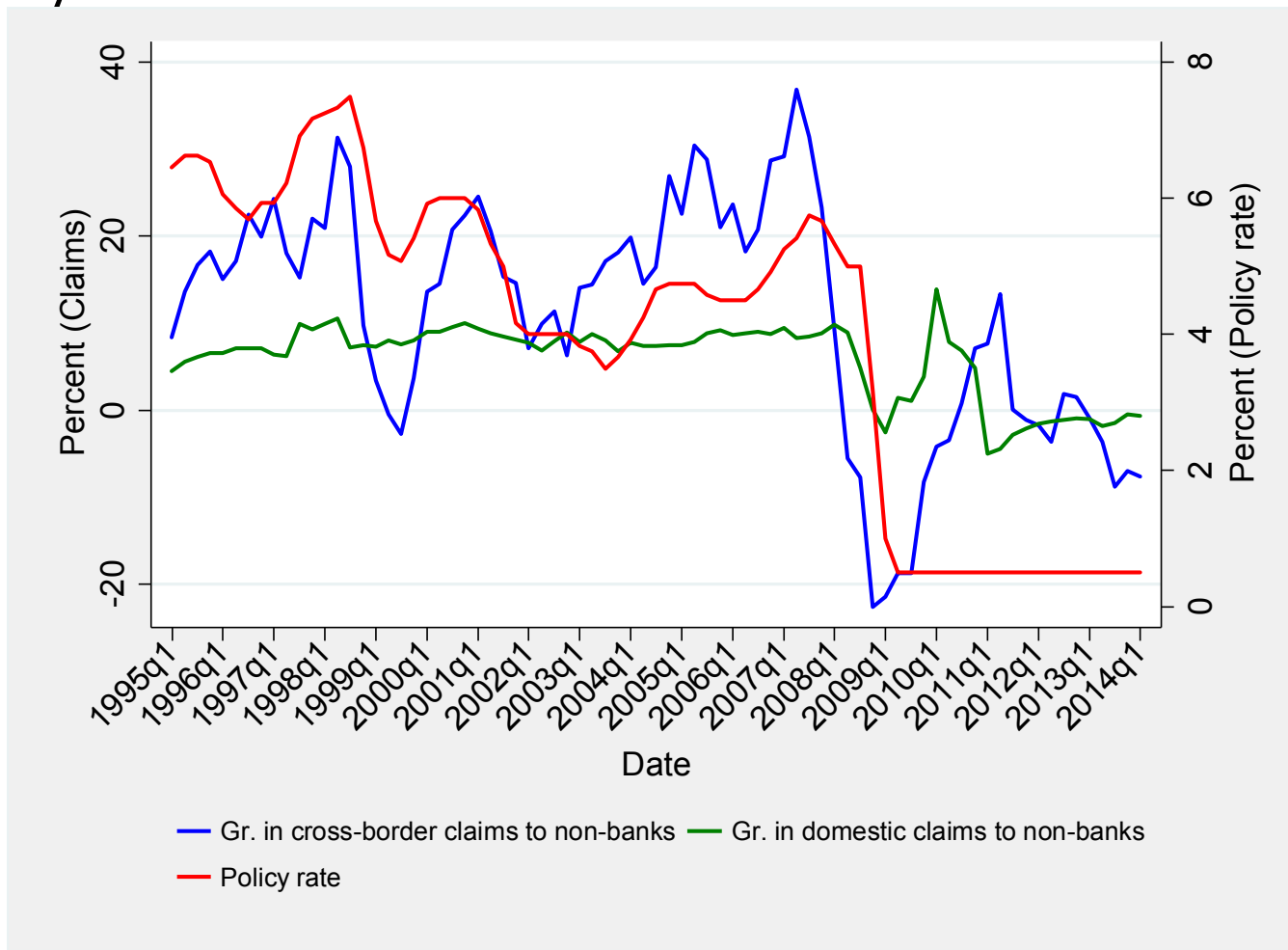
Main Findings

- The supply of cross-border bank flows increases with the monetary policy rate in the country of origin (in contrast to the traditional bank lending channel).
- When the monetary policy rate in the country of origin rises (relative to other countries), there is a portfolio rebalancing effect (Den Haan, Sumner and Yamashiro, 2007): banks' cross-border claims grow faster than domestic credit.
- When monetary policy rates increase, cross-border bank flows are mainly directed toward advanced economies and investment grade countries.

Data - BIS Locational Banking Statistics (LBS)

- Sample: 1995Q1 – 2014Q1
- Country coverage: exclude offshore centers
- Outliers: exclude country pairs if outstanding bilateral is below \$5 million in any quarter
- Winsorize dependent variables 2.5 percentile

U.K. bank flows to non-banks and the monetary policy rate



Does the reporting country's monetary rate affect cross-border bank flows?

$$Y_{ijt} = \gamma_{jt} + \alpha r_{it-1} + \beta X_{it-1} + \varepsilon_{ijt}$$

Where:

- r : nominal monetary policy rate for reporting country
- X : vector of control variables for the reporting country
- γ_{jt} : counterparty country x time fixed effects (controls for changes in the demand for bank flows)
- i : reporting country
- j : counterparty country
- t : time (quarterly frequency)

Identification

- The policy rate is a good reflection of the overall policy stance (Bernanke and Mihov, 1998).
- We identify the effect of the relative, to other reporting countries, monetary policy stance on cross-border flows.
- Is the policy rate exogenous to cross-border bank flows?
 - Central banks adjust monetary policy to achieve their mandate of price stability, and in some cases, maximum employment.
 - Cross-border bank flows are important for monetary policy if they are a threat to financial stability (reporting country) or if they have a significant effect on global output growth.
 - We consider these as second-order effects for a central bank's monetary policy reaction function.

Result 1 – Main specification

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Lag policy rate rep	0.276*** [0.091]	0.321*** [0.116]	0.443*** [0.106]
Lag credit growth dom.private sector rep	0.050 [0.050]	0.138* [0.079]	0.084 [0.062]
Lag bank equity returns rep	-0.002 [0.011]	0.000 [0.021]	-0.003 [0.013]
Lag real GDP growth rep	0.299** [0.133]	0.036 [0.265]	0.356* [0.190]
Lag Debt/GDP rep	-0.006 [0.005]	-0.014 [0.009]	-0.003 [0.006]
Lag inflation rep	-0.072 [0.239]	0.294 [0.553]	0.192 [0.310]
QE indicator rep	0.911 [0.827]	-0.574 [1.335]	1.262 [1.372]
Observations	73,879	71,426	72,223
R-squared	0.11	0.12	0.11
FE	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	29	29	29

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Result 1 – Robustness: Sample restrictions

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Lag policy rate rep	0.188** [0.083]	0.238* [0.125]	0.410*** [0.137]
Lag credit growth dom.private sector rep	0.027 [0.080]	0.021 [0.160]	0.118 [0.112]
Lag bank equity returns rep	-0.025* [0.014]	-0.043 [0.032]	-0.003 [0.017]
Lag real GDP growth rep	0.212 [0.202]	-0.098 [0.522]	0.190 [0.202]
Lag Debt/GDP rep	-0.009 [0.007]	-0.014 [0.016]	0.005 [0.009]
Lag inflation rep	0.561* [0.283]	0.980 [0.671]	0.374 [0.297]
QE indicator rep	1.891** [0.802]	-1.954 [1.945]	2.105* [1.192]
Observations	37,423	36,097	36,485
R-squared	0.12	0.13	0.12
Sample	Before 2007q3	Before 2007q3	Before 2007q3
FE	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	24	24	24

- Use data between 1995q1 and 2007q2.

- Exclude reporting financial centers: United States, United Kingdom, and Singapore.

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Result 1 – Robustness: Eurozone effect

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Eurozone dummy	-2.619** [1.113]	-5.097** [2.013]	-3.198** [1.238]
Lag policy rate rep	0.253*** [0.078]	0.304*** [0.091]	0.380*** [0.095]
Eurozone dummy*Lag policy rate rep	0.668*** [0.200]	1.153*** [0.359]	0.496* [0.264]
Lag credit growth dom.private sector rep	0.043 [0.050]	0.133 [0.084]	0.103* [0.058]
Eurozone dummy*Lag credit growth dom.private sector rep	-0.024 [0.062]	-0.052 [0.104]	-0.068 [0.065]
Observations	73,879	71,426	72,223
R-squared	0.11	0.12	0.11
FE	Cp.Ctry. x time	Cp.Ctry. x time	Cp.Ctry. x time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	29	29	29
Coef. Policy Rate EZ	0.921	1.456	0.876
t-statistic	4.615	4.036	3.180

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Result 1 – Robustness: Shadow policy rates

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Lag policy shadow rate	0.248*** [0.071]	0.348*** [0.108]	0.398*** [0.082]
Lag credit growth dom.private sector rep	0.040 [0.052]	0.134* [0.077]	0.068 [0.065]
Lag bank equity returns rep	-0.001 [0.011]	-0.000 [0.021]	-0.001 [0.012]
Lag real GDP growth rep	0.321** [0.129]	0.027 [0.260]	0.388* [0.193]
Lag Debt/GDP rep	-0.002 [0.004]	-0.011 [0.008]	0.004 [0.005]
Lag inflation rep	-0.020 [0.236]	0.187 [0.530]	0.251 [0.347]
Observations	73,879	71,426	72,223
R-squared	0.11	0.12	0.11
FE	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	29	29	29

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

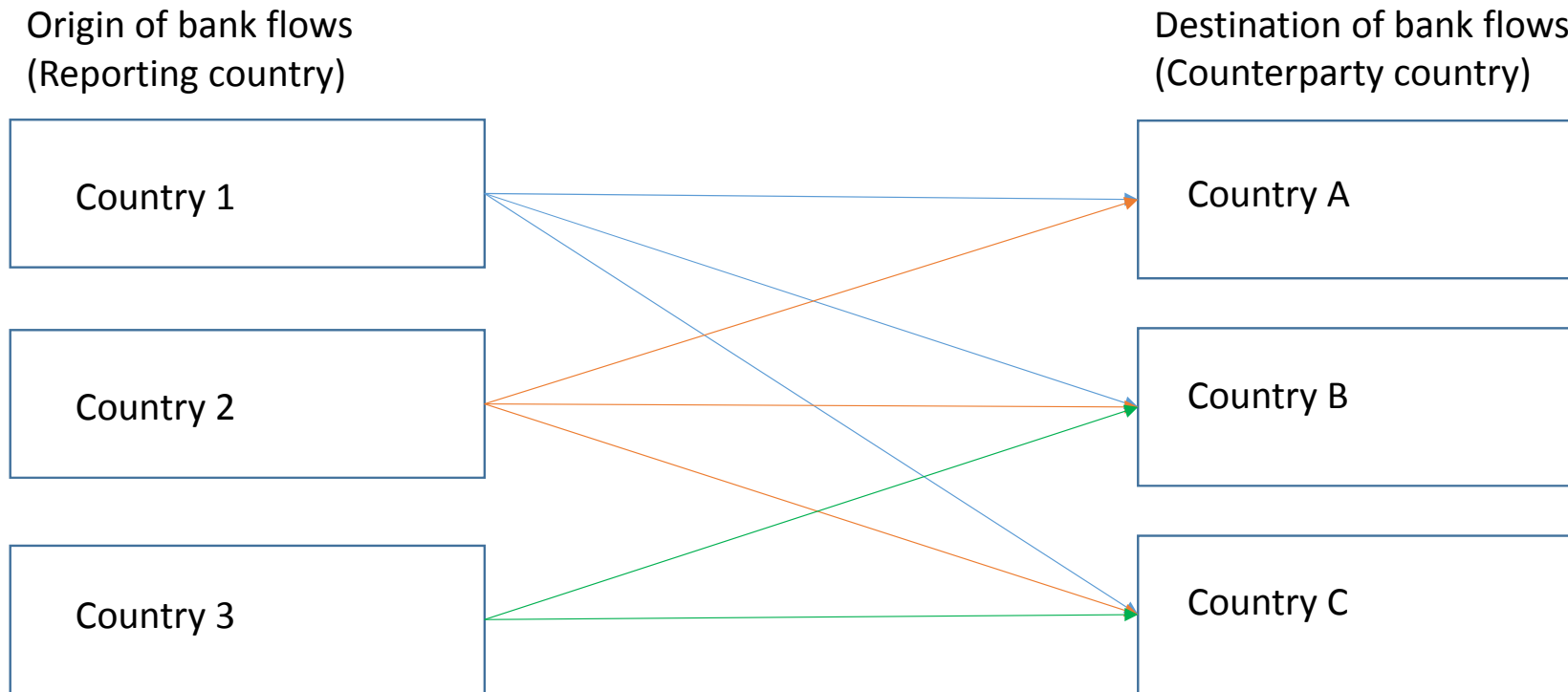
- We use shadow policy rates from Krippner (2015) computed using a two factor model.
- Countries covered: United States, Euro area, Japan, and United Kingdom.

Result 2 – Is it a global factor?

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Lag policy rate rep	0.168** [0.081]	0.210* [0.117]	0.214*** [0.070]
QE indicator rep	1.921** [0.792]	2.708 [1.596]	2.759*** [0.856]
Lag credit growth dom.private sector rep	0.035 [0.053]	0.110 [0.078]	0.037 [0.065]
Lag bank equity returns rep	-0.009 [0.014]	-0.007 [0.024]	-0.006 [0.014]
Lag real GDP growth rep	0.072 [0.188]	-0.108 [0.339]	0.147 [0.239]
Lag Debt/GDP rep	-0.022 [0.021]	-0.028 [0.025]	-0.025 [0.020]
Lag inflation rep	-0.333 [0.324]	-0.214 [0.550]	0.008 [0.392]
Lag policy rate cp	-0.074 [0.063]	-0.244** [0.097]	-0.024 [0.070]
Lag credit growth dom.private sector cp	0.202*** [0.049]	0.343*** [0.063]	0.093* [0.052]
Lag bank equity returns cp	0.012 [0.010]	0.024 [0.015]	0.003 [0.011]
Lag real GDP growth cp	0.459** [0.175]	0.702** [0.282]	0.222 [0.135]
Lag Debt/GDP cp	-0.018 [0.018]	0.011 [0.020]	-0.045*** [0.013]
Lag inflation cp	0.246 [0.271]	0.172 [0.435]	0.216 [0.296]
Observations	45,387	44,641	44,241
R-squared	0.02	0.02	0.02

Reporting,
counterparty, and
time fixed effects
included in the
regression

Result 3 – Portfolio channel (Domestic vs. cross-border claims)



Country 1 = Country A ; Country 2 = Country B ; Country 3 = Country C

Result 3 – Portfolio channel (Domestic vs. cross-border claims)

VARIABLES	(1) Credit to non-banks	(2) Credit to non-banks	(3) Credit to non-banks
Lag policy rate	0.406*** [0.099]	0.459*** [0.106]	0.389*** [0.115]
Lag policy rate X Domestic ind.		-0.584*** [0.155]	-0.607*** [0.212]
QE indicator	1.131 [1.370]	1.164 [1.376]	1.590 [0.973]
Lag bank equity returns	-0.003 [0.012]	-0.003 [0.012]	0.001 [0.015]
Lag real GDP growth	0.363* [0.188]	0.357* [0.186]	0.120 [0.239]
Lag Debt/GDP	-0.004 [0.006]	-0.004 [0.006]	0.005 [0.009]
Lag inflation	0.072 [0.063]	0.070 [0.065]	0.117* [0.063]
Observations	77,731	77,731	45,052
R-squared	0.10	0.10	0.11
Sample	All	All	Before 2007Q3
FE	Cp. Ctry. X time	Cp. Ctry. X time	Cp. Ctry. X time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	32	32	28
Coef. Dom. Credit		-0.125	-0.218
t-statistic		-1.262	-1.539

Robust standard errors in brackets

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Result 4 – Portfolio channel – reaching for risk (EMEs and AEs)?

	(1)	(2)	(3)
VARIABLES	Flows to all	Flows to banks	Flows to non-banks
Lag policy rate rep	0.347*** [0.087]	0.509*** [0.126]	0.408*** [0.130]
Lag policy rate rep x EME dummy	-0.207* [0.104]	-0.669*** [0.188]	0.119 [0.190]
Observations	73,879	71,426	72,223
R-squared	0.11	0.12	0.11
FE	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	29	29	29
Coef. EME	0.140	-0.160	0.526
t-statistic	0.892	-0.696	3.950

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Result 4 – Portfolio channel – reaching for risk (Speculative grade vs Investment grade)?

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Lag policy rate rep	0.308*** [0.093]	0.402*** [0.127]	0.461*** [0.128]
Lag policy rate rep x Speculative grade dummy	-0.160 [0.105]	-0.477** [0.207]	-0.063 [0.153]
Observations	70,670	68,447	69,039
R-squared	0.11	0.11	0.10
FE	Cp.Ctry. Rep.Ctry. time	Cp.Ctry. Rep.Ctry. time	Cp.Ctry. Rep.Ctry. time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	29	29	29
Coef. Spec. Grade	0.148	-0.0742	0.398
t-statistic	0.952	-0.333	3.359

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Summary of results

For higher policy rates:

Geography - Sector	Effect
Domestic (non-banks)	↔
Foreign (banks and non-banks)	↑
EME (non-banks)	↑
EME (banks)	↔
AE (banks and non-banks)	↑
Speculative grade (non-banks)	↑
Speculative grade (banks)	↔
Investment grade (banks and non-banks)	↑

Additional slides

Why do we care?

- Cross-border bank flows may be a risk to financial stability for those countries receiving the flows.
- It is important to assess whether monetary policy actions lead to changes in bank flows that potentially could affect foreign economies.
- There is pressing need to understand the interaction between monetary policy and financial stability, as it has implications for the use of macroprudential policies.

Related Literature

- Monetary policy and domestic credit
 - Bank lending channel: Bernanke and Gertler (JEP 1995)
 - Balance sheet channel
- International transmission of shocks and global banks
 - Cetorelli and Goldberg (JIE 2012, JF 2012)
- Cross border banking flows
 - Bruno and Shin (RES 2014); Cerutti, Claessens and Ratnovski (IMF 2014); Cerutti and Claessens (IMF 2014)

Data source: BIS Locational Banking Statistics (LBS)

- Cross-border bank flows.
- Relevant concept: geographic location (residence), not the nationality of either party involved in the operation.
- Similar concept to balance of payments (BOP) data.

Data – BIS reporting countries

Reporting countries	Obs.
AUSTRALIA	1,467
AUSTRIA	3,832
BELGIUM	4,034
BRAZIL	819
CANADA	2,333
DENMARK	2,238
FINLAND	1,581
FRANCE	5,228
GERMANY	5,318
GREECE	845
HONG KONG	2,184
INDIA	1,764
INDONESIA	274
IRELAND	2,265
ITALY	3,348
JAPAN	3,410
KOREA	2,160
LUXEMBOURG	2,549
MALAYSIA	866
MEXICO	170
NETHERLANDS	4,094
PORTUGAL	1,479
SOUTH AFRICA	373
SPAIN	3,285
SWEDEN	2,227
SWITZERLAND	5,236
TURKEY	794
UNITED KINGDOM	5,236
UNITED STATES	3,889

29 Countries

Data – BIS counterparty countries

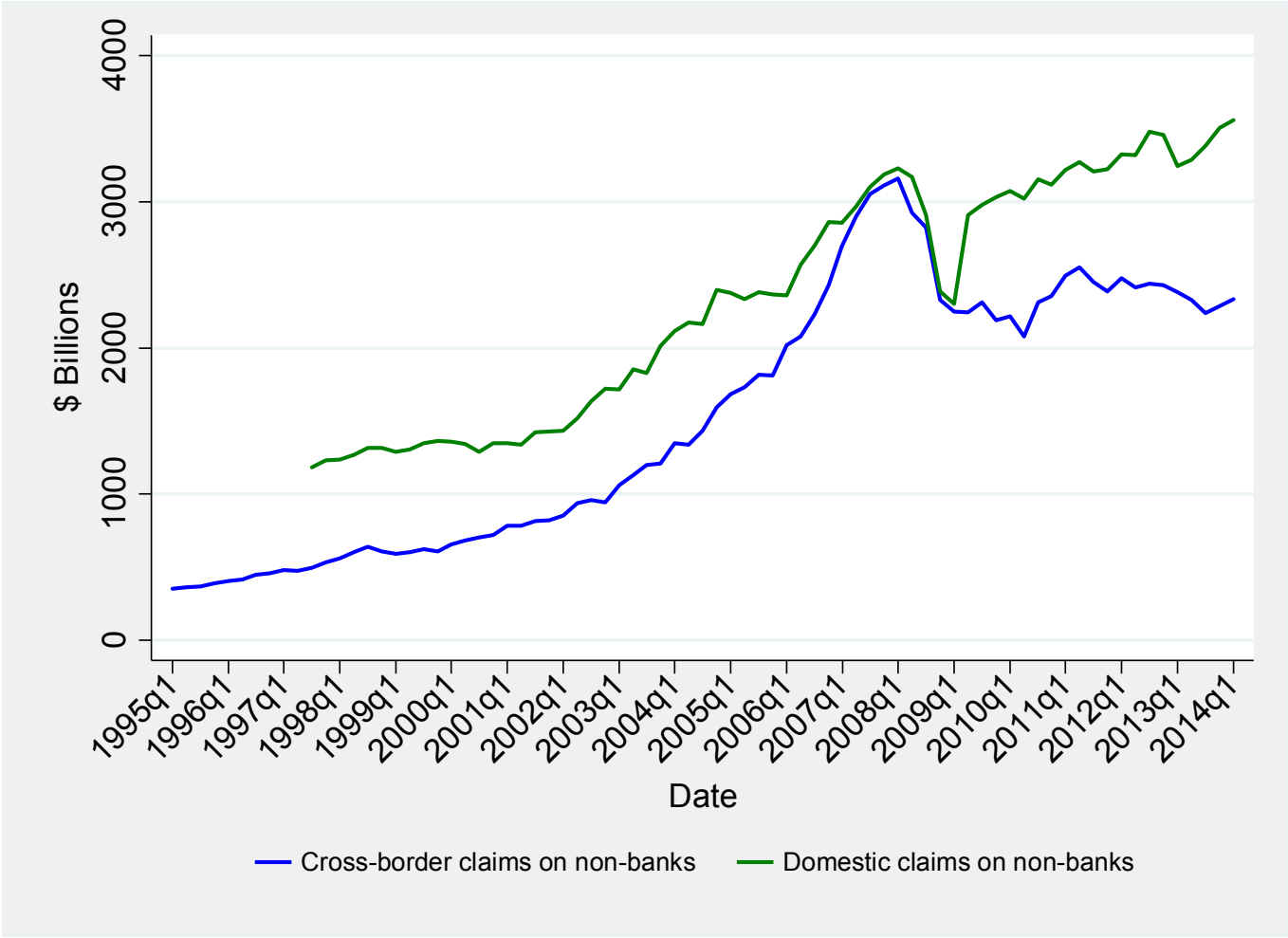
Cp. Countries	Obs.	Cp. Countries	Obs.	Cp. Countries	Obs.
AUSTRALIA	1,316	ITALY	1,508	Russia	1,314
AUSTRIA	1,389	Iceland	838	SINGAPORE	1,483
Algeria	456	Israel	1,017	SOUTH AFRICA	1,195
Argentina	1,014	JAPAN	1,561	SPAIN	1,406
BELGIUM	1,498	Jamaica	231	SWEDEN	1,393
BRAZIL	1,276	Jordan	406	SWITZERLAND	1,595
Bolivia	123	KOREA	1,134	Saudi Arabia	1,004
Bulgaria	672	Kuwait	557	Senegal	172
CANADA	1,402	LUXEMBOURG	1,487	Slovak Republic	555
CHILE	1,171	Latvia	73	Slovenia	582
CYPRUS	777	Libya	169	Sri Lanka	538
China	1,376	Lithuania	270	TAIWAN	946
Colombia	700	MALAYSIA	933	TURKEY	1,317
Cote d'Ivoire	231	MEXICO	1,219	Thailand	940
Croatia	473	Mauritius	388	Tunisia	635
Czech Republic	951	Morocco	892	UNITED KINGDOM	1,652
DENMARK	1,394	NETHERLANDS	1,612	UNITED STATES	1,647
Estonia	122	NORWAY	1,391	Ukraine	309
FINLAND	1,270	New Zealand	901	Venezuela	963
FRANCE	1,636	Oman	500		
GERMANY	1,598	PANAMA	1,097		
GREECE	1,143	PORTUGAL	1,295		
Ghana	346	Pakistan	707		
Guatemala	345	Paraguay	341		
HONG KONG	1,362	Peru	918		
Hungary	936	Philippines	1,004		
INDIA	1,074	Poland	1,128		
INDONESIA	1,308	Qatar	564		
IRELAND	1,505	Romania	647		

77 Countries

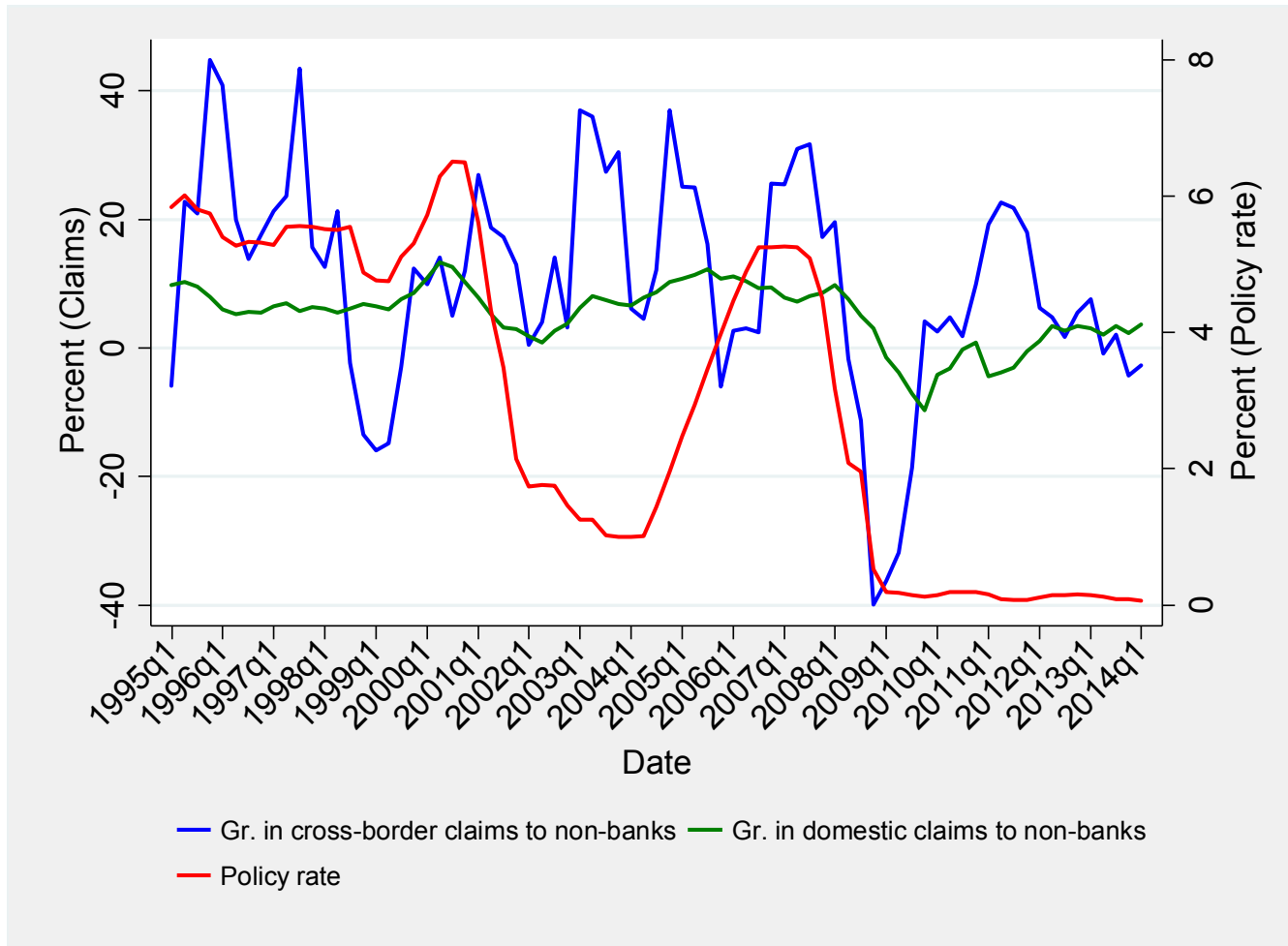
Summary stats

	Observations	Mean	Median	StDev	Min	Max
Cross-Border Flows (CBF)						
CBF to Banks and Non-Banks	73879	4.02	0.85	24.19	-44.10	89.25
CBF to Banks	71426	8.92	0.52	46.82	-66.59	195.74
CBF to Non-Banks	72223	4.79	0.57	26.99	-47.58	107.35
Reporting Country						
MPrate_rep	73879	3.07	2.61	3.23	0.00	61.00
CRgr_rep	73879	1.89	1.76	5.01	-18.99	20.97
Bankret_rep	73879	2.63	3.00	16.98	-83.43	90.74
GDPgr_rep	73879	0.53	0.57	1.03	-6.90	7.33
Debt/GDP_rep	73879	68.35	62.83	39.01	3.08	244.25
Infl_rep	73879	0.54	0.49	0.68	-3.42	9.79
QE_rep	73879	0.05	0.00	0.22	0.00	1.00
Counterparty Country						
MPrate_cp	67271	5.60	3.83	9.70	0.00	284.00
CRgr_cp	67271	2.31	2.19	5.57	-37.97	22.89
Bankret_cp	67271	3.56	3.13	19.21	-83.43	232.17
GDPgr_cp	67271	0.73	0.76	1.39	-13.13	13.33
Debt/GDP_cp	67271	56.25	48.70	35.23	1.85	244.25
Infl_cp	67271	1.19	0.67	5.07	-7.38	387.80

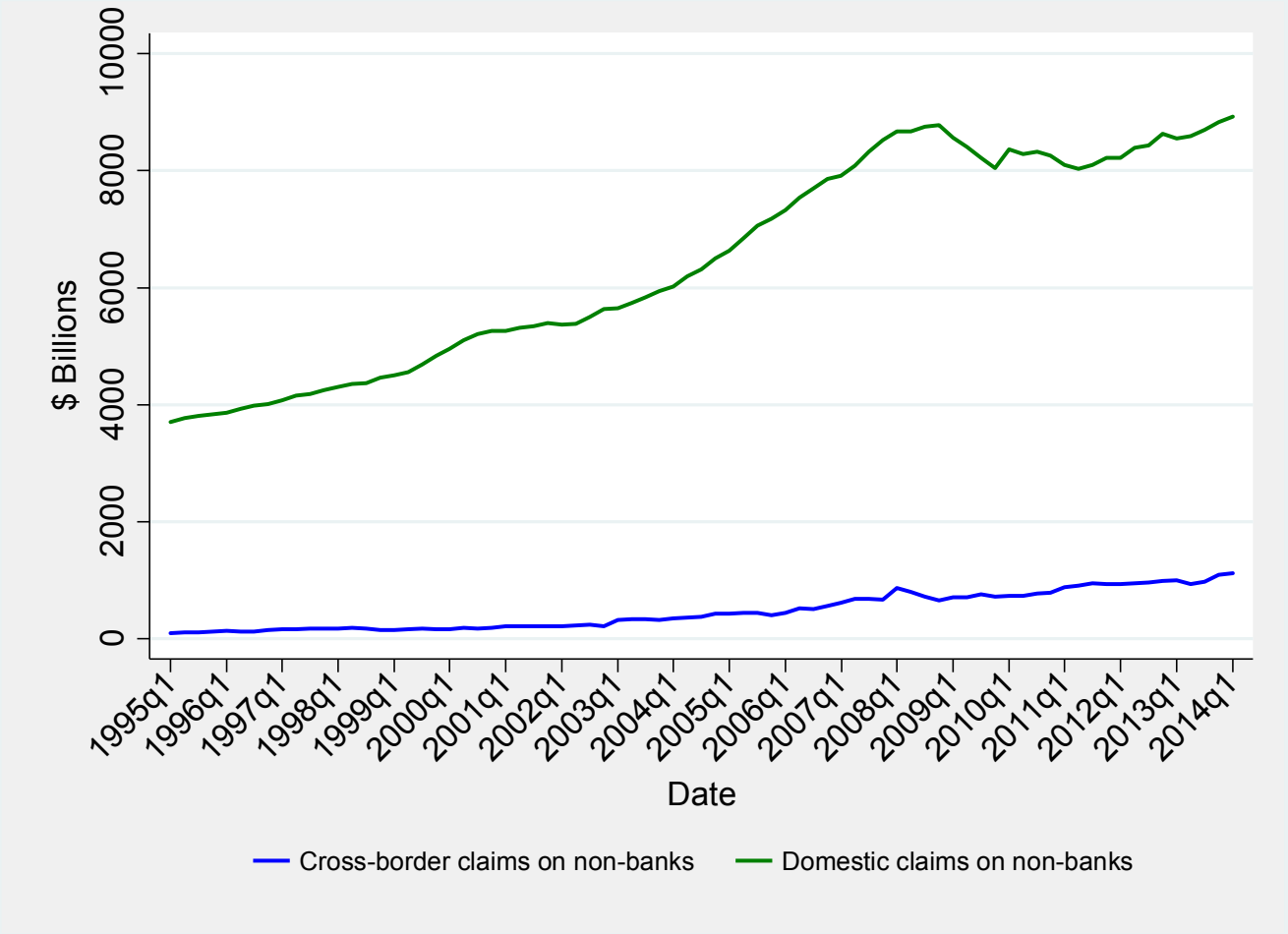
U.K. cross-border and domestic claims



U.S. bank flows to non-banks and the monetary policy rate



U.S. cross-border and domestic claims



Results – Main specification (Before and after GFC)

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks	(4) Flows to all	(5) Flows to banks	(6) Flows to non-banks
Lag policy rate rep	0.181** [0.078]	0.215** [0.104]	0.379*** [0.115]	0.565*** [0.124]	0.766*** [0.209]	0.669*** [0.196]
Lag credit growth dom. private sector rep	0.020 [0.068]	0.046 [0.131]	0.107 [0.090]	0.074 [0.083]	0.219 [0.129]	0.071 [0.073]
Lag bank equity returns rep	-0.013 [0.017]	-0.010 [0.036]	0.003 [0.017]	0.008 [0.013]	0.009 [0.028]	-0.006 [0.019]
Lag real GDP growth rep	0.193 [0.192]	0.011 [0.498]	0.139 [0.195]	0.371* [0.185]	0.035 [0.311]	0.526* [0.265]
Lag Debt/GDP rep	-0.005 [0.007]	-0.005 [0.016]	0.007 [0.008]	-0.005 [0.004]	-0.014** [0.006]	-0.009 [0.006]
Lag inflation rep	0.489 [0.287]	0.606 [0.650]	0.349 [0.297]	-0.663* [0.345]	-0.268 [0.690]	-0.091 [0.536]
QE indicator rep	1.452* [0.724]	-2.847 [1.865]	1.822* [1.042]	1.004 [1.044]	0.443 [1.625]	1.002 [1.690]
Observations	43,460	42,161	42,474	30,419	29,265	29,749
R-squared	0.11	0.12	0.11	0.11	0.11	0.09
Sample	Before 2007q3	Before 2007q3	Before 2007q3	After 2007q3	After 2007q3	After 2007q3
FE	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time	Cp.Ctry. x Time
Cluster	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.	Rep. & Cp. Ctry.
Countries	26	26	26	29	29	29

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Results – Are flows going where policy rates are relatively less tight?

VARIABLES	(1) Flows to all	(2) Flows to banks	(3) Flows to non-banks
Lag policy rate difference	0.119** [0.049]	0.222** [0.083]	0.113 [0.067]
QE indicator rep	1.749** [0.737]	2.614 [1.576]	2.551*** [0.884]
Lag credit growth dom.private sector rep	0.033 [0.053]	0.106 [0.079]	0.031 [0.064]
Lag bank equity returns rep	-0.010 [0.013]	-0.007 [0.024]	-0.006 [0.014]
Lag real GDP growth rep	0.067 [0.188]	-0.131 [0.349]	0.129 [0.235]
Lag Debt/GDP rep	-0.024 [0.019]	-0.028 [0.027]	-0.025 [0.018]
Lag inflation rep	-0.298 [0.274]	-0.296 [0.465]	0.136 [0.371]
Lag credit growth dom.private sector cp	0.200*** [0.048]	0.347*** [0.062]	0.092* [0.052]
Lag bank equity returns cp	0.012 [0.010]	0.025* [0.015]	0.004 [0.011]
Lag real GDP growth cp	0.447** [0.175]	0.708** [0.278]	0.221 [0.141]
Lag Debt/GDP cp	-0.018 [0.018]	0.017 [0.021]	-0.048*** [0.013]
Lag inflation cp	0.284 [0.254]	0.180 [0.437]	0.321 [0.276]
Observations	45,386	44,638	44,239
R-squared	0.04	0.04	0.04

Reporting x
counterparty, and
time fixed effects
included in the
regression

Shadow rates from Krippner (2015)

