

Destination of Global Liquidity before the Global Financial Crisis: Role of Foreign Banks and the EU Effect

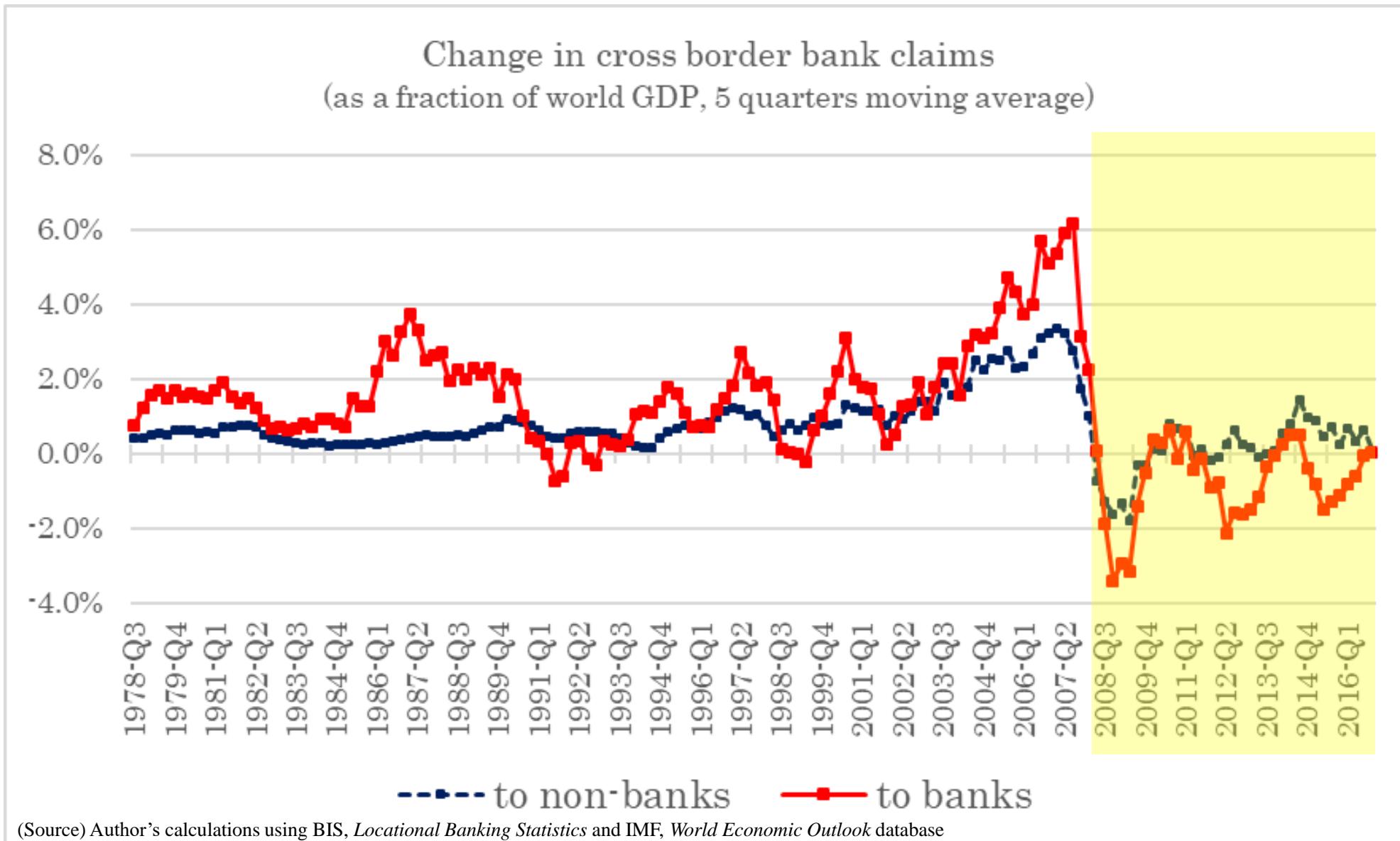
Shingo Iokibe

Doshisha University

siokibe@mail.doshisha.ac.jp

Motivation

Great de-leveraging of cross-border bank flows after GFC



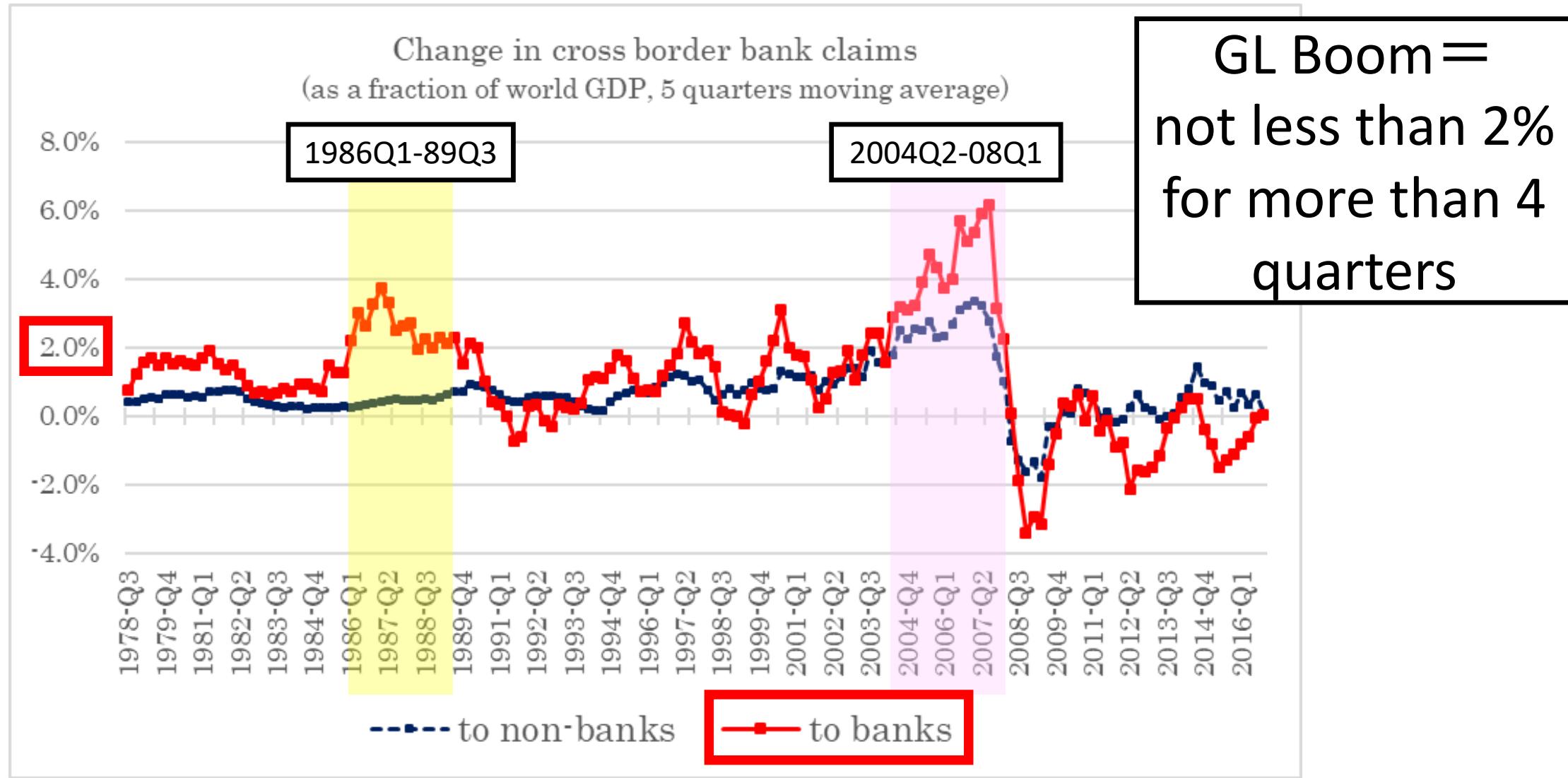
Literature on deleveraging of cross-border banking after GFC

1. **Liquidity shortage** in crisis-affected countries (*Cetorelli-Goldberg 2011, 2012*)
⇒ ① directly decreases bank-to-bank and bank-to-nonbank X-border credit.
② increases intra-group funding from foreign affiliated banks.
 2. **Instability** in domestic banking system → lower bank's capacity to extend cross-border credit
 - Rise in non-performing loans ratio (*Emter et al. 2018*)
 - Decline in capital-to-asset ratio (*Reinhardt-Riddiough 2015*)
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In a period when funding conditions for banks across the globe are extraordinary loose (like before GFC), where the global liquidity head for?

→ to test this question empirically is the goal

Definition: Booms in global liquidity



Hypothesis (1) *Higher foreign bank penetration* brought larger global liquidity inflows

1. Smaller informational asymmetry
 - Affiliate banks & branches
 - Lending records
2. “Flight abroad” effect (*Giannetti-Laeven 2012b*)
 - Loose funding conditions in domestic banking system for *parent* banks
 - ⇒ parent’s [cross-border loans / total loans] ratio ↑
 - ⇒ intra-group cross-border loans ↑

Hypothesis (2)

Global liquidity flew *unevenly into EU?*

Table 2 Cumulative changes in net cross-border bank liabilities from 2004 Q2 to 2008 Q1

	Region	Median	Average	Standard deviation	Number of observations
(1) Main regions	EU	0.24	0.25	0.31	24
	Central & eastern Europe	0.08	0.11	0.11	14
	East & south Asia	0.02	0.04	0.05	13
	Latin America	0.01	0.02	0.04	19
	Sub-Saharan Africa	0.01	0.01	0.02	26
	Other	0.05	0.07	0.19	16
	Tax havens & financial centers	0.68	0.66	0.96	8
	Whole sample	0.03	0.13	0.33	120
(2) Sub-regions	Euro area	0.24	0.16	0.29	12
	CEE all	0.18	0.23	0.26	23
	EU & CEE all	0.19	0.20	0.26	38

Main results

During the global liquidity boom period (2004:Q2-2008:Q1),
it has flown unevenly into banking systems with/in...

1. Higher ex-ante **foreign bank penetration**,
2. **EU member** before 2008,
3. Higher **real GDP growth** for preceding 5 years before the GL surge period
4. **Looser regulation** on banking activities

Contribution

1. Additional evidence on the important role of intra-group capital flows

- Significant, ***positive effect of foreign banks' penetration on bank inflows***
- The first analysis using foreign banks' asset share as a control
- *Cetorelli-Goldberg(2012a,b,c), Claessens et al.(2008), Claessens-Van Horen(2014, 2015), Giannetti-Laeven(2012a,b)*

2. Additional evidence on a unique role of EU on X-border bank flows

- After GFC ••• X-border bank flows between EU countries deleveraged most.
(Emter et al. 2018, Cerutti-Claessens 2016)
- Before GFC ••• Massive debt flows from euro-core to euro-periphery (*Hale-Obstfeld 2016*)

Cross-sectional analysis (OLS) for 97 countries

$$\Delta NCBL_{i,04Q2-08Q1} = \alpha + \beta FB_{i,04} + \gamma GR_{i,99Q1-04Q1} + \delta RD_{i,04-07}^j + \theta X_{i,00-04} + \varepsilon_i$$

$\Delta NCBL$: Cumulative changes in net X-border bank-to-bank liabilities
between 2004:Q2 - 2008:Q1

$FB_{i,04}$: Ex-ante foreign banks' asset share

$GR_{i,99Q1-04Q1}$: Average real GDP growth between 1999:Q1-2004:Q1
(a proxy for expected real GDP growth rate)

$RD_{i,04-07}^j$: Dummy for region j (j = EU, Sub-Saharan Africa, etc.)

$X_{i,00-04}$: Other pull factors for bank flows

Expected signs ... $\beta > 0$, $\gamma > 0$, $\delta(\text{EU}) > 0$,

Table 5 : Estimation result(1) without regional dummies

		The dependent variable: cumulative net changes in cross-border bank liabilities from 2004 Q2 to 2008 Q1						
		(1)	(2)	(3)	(4)	(6)	(7)	(8)
①	Foreign bank asset share 2005	0.133** (0.063)	0.125* (0.064)	0.123** (0.057)	0.117* (0.062)	0.149** (0.067)	0.143** (0.065)	0.110* (0.066)
①	Real GDP growth 2000-04	3.037*** (1.074)	2.861** (1.113)	2.664** (1.033)	2.763*** (1.042)	3.152*** (1.115)	3.051*** (1.073)	2.832*** (1.053)
Law & order 2004	②	2.556** (1.079)	2.359** (1.045)	1.219 (1.239)	3.662** (1.768)	2.552** (1.096)	2.125* (1.121)	3.387** (1.319)
Capital openness 2004		2.837* (1.476)	2.768* (1.453)	1.913 (1.300)	3.343** (1.660)	2.680* (1.491)	2.645* (1.434)	3.204** (1.554)
Trade openness 2000-04			0.042 (0.046)					
Population growth 2000-04				-4.990*** (1.556)				
GDP per capita 2000-04					-0.223 (0.312)			
ROE 2000-04						-0.156 (0.131)		
Net interest margin 2000-04							-0.471 (0.595)	
Bank assets per GDP 2000-04								-0.059 (0.060)
Constant		-25.468*** (7.646)	-26.752*** (7.563)	-10.137 (6.601)	-27.284*** (8.533)	-23.963*** (7.637)	-21.416** (8.444)	-24.640*** (7.582)
Observations		97	97	97	97	97	97	97
Adjusted R ²		0.208	0.206	0.272	0.206	0.208	0.203	0.208

(Note) Robust standard errors in parenthesis. ***, **, * correspond to 1%, 5%, 10% significant, respectively.

Table 6 : Estimation results (2) The EU effect

		The dependent variable: cumulative net changes in cross-border bank liabilities from 2004 Q2 to 2008 Q1						
	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
③	FB asset share 2005	0.153** (0.062)	0.152** (0.060)	0.132** (0.060)	0.141** (0.067)	0.113* (0.067)	0.132* (0.068)	0.104 (0.073)
③	Real GDP GR 1999-04	3.145*** (0.823)	3.184*** (0.938)	2.805*** (0.851)	3.016*** (0.841)	2.658*** (0.946)	2.986*** (0.979)	2.539** (1.012)
②	EU dummy	19.923*** (5.589)	19.485*** (5.872)	20.313*** (6.769)	20.958*** (5.651)	18.923*** (6.455)	19.350*** (5.801)	18.551*** (6.374)
②	S-Saharan Africa dummy	-8.791*** (0.007)	-8.335*** (3.106)	-7.519* (3.882)	-9.909*** (3.013)	-5.717 (4.363)	-8.944*** (2.902)	-6.422 (4.766)
Law & order 2004		①	0.078 (1.143)			1.482 (1.348)	1.099 (1.332)	1.880 (1.470)
Capital openness 2004			0.307 (1.066)			1.142 (1.210)	0.659 (1.106)	1.248 (1.259)
Constant		-12.598** (5.130)	-13.788** (5.664)	-9.208 (5.883)	-9.327 (7.825)	-15.063** (6.323)	-13.336* (7.424)	-13.463* (8.015)
Macroeconomic controls		No	No	Yes	No	Yes	No	Yes
Banking system controls		No	No	No	Yes	No	Yes	Yes
Observations		97	97	97	97	97	97	97
Adjusted R ²		④ 0.376	0.363	0.363	0.363	0.357	0.354	0.341

(Note) Robust standard errors in parenthesis. ***, **, * correspond to 1%, 5%, 10% significant, respectively.

Table 7 : Estimation results (3) Effect of bank regulation

Variable	The dependent variable: cumulative net changes in cross-border bank liabilities from 2004 Q2 to 2008 Q1							
	(1)	(2)	(3)	(4)	(5)	(6)	(8)	
Foreign bank asset share 2005	0.154** (0.063)	0.174** (0.075)	0.168* (0.092)	0.179*** (0.066)	0.183*** (0.069)	0.180** (0.076)	0.183** (0.073)	
Real GDP growth 1999-04	3.653*** (0.899)	3.675*** (1.053)	3.439*** (1.068)	3.715*** (0.917)	4.133*** (0.895)	3.315*** (1.054)	3.766*** (1.000)	
EU dummy	17.718*** (5.414)	19.110*** (5.702)	21.235*** (6.769)	18.837*** (5.388)	18.724*** (5.453)	21.472*** (6.368)	19.018*** (5.890)	
Sub-Saharan Africa dummy	-7.977** (3.234)	-8.515** (3.834)	-6.014 (4.857)	-10.271*** (3.612)	-8.224** (3.553)	-10.427** (4.449)	-7.462* (3.871)	
Bank Regulation index ①	-1.838* (0.996)	0.895 (2.159)	-0.887 (0.962)	1.829 (1.740)	2.315 (1.970)	1.273 (2.786)	-0.195 (0.073)	
Constant	-0.611 (8.853)	-17.141*** (6.094)	-23.108 (12.793)	-26.128** (12.618)	-27.754** (12.785)	-17.852 (12.697)	-16.101 (6.071)	
Type of bank regulation index	Bank_Act_Restriction	Indipendenc_e_Authority	Supervisory_Power	Strength_External_Audit	Fin_State_Transparency	Limit_FB_Operation	Government_Bank_Own	
Observations	85	78	61	88	82	63	77	
Adjusted R ²	0.406	0.395	0.36	0.398	0.417	0.388	0.388	

(Note) Robust standard errors in parenthesis. ***, **, * correspond to 1%, 5%, 10% significant, respectively.

Table 12 : Robustness test(3) Non-OECD sample

	The dependent variable: cumulative net changes in cross-border bank liabilities from 2004 Q2 to 2008 Q1					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Foreign bank asset share 2005	0.117* ② (0.066)	0.041 (0.056)	0.024 (0.055)	0.064 (0.057)	0.026 (0.050)	0.032 (0.054)
Real GDP growth 1999-2004	2.184** (1.079)	2.132** (0.829)	1.910*** (0.703)	2.233*** (0.732)	2.251*** (0.810)	2.525*** (0.708)
EU dummy	①	30.676*** (8.150)	28.462*** (8.848)	33.264*** (8.270)	30.620*** (8.094)	30.112*** (7.494)
S-S Africa dummy		-3.739 (2.922)	-0.043 (3.394)	-5.928** (2.257)	-1.953 (2.691)	-5.016* (2.653)
Law & order 2004	4.566*** (1.544)	1.622 (1.099)			0.639 (1.099)	
Capital openness 2004	3.187** (1.534)	1.505 (1.088)			1.214 (1.077)	
GDP per capita 2000-04		③	0.736*** (0.221)		0.734** (0.356)	0.503 (0.368)
Overall restrictions on bank activity					③ -2.626** (1.230)	
Constant	-27.661*** (8.613)	-13.692** (5.199)	-6.229 (5.890)	-9.952 (6.308)	-12.474** (4.857)	12.592** (9.579)
Macroeconomic controls	No	No	Yes	No	No	No
Banking system controls	No	No	No	Yes	No	No
Observations	76	76	76	76	76	64
Adjusted R ²	0.302	0.585	0.606	0.567	0.601	0.652

(Note) Robust standard errors in parenthesis. ***, **, * correspond to 1%, 5%, 10% significant, respectively.

Conclusions

Banking systems, to which larger cross-border bank credit have flown during the “global liquidity surge period” in mid-2000s, have the following characteristics:

1. **Large presence of foreign banks** (in particular among OECD)
2. **EU members** (regardless of OECD or non-OECD)
 - X-border bank-to-bank flows to EU was *20 to 30 percentage points larger*.
 - “Regional liquidity”? (Not “global liquidity”)
3. High real GDP growth rate in the preceding 5 years
 - Higher medium-run growth prospect attracts X-border bank credit.
4. **Loose banking regulation** (weakly support regulatory arbitrage)
 - Regulatory arbitrage might solve “allocation puzzle”. → future research

Thank you!



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Appendix 1 Sample countries

Region	Countries	Number
EU members	<u>OECD</u> : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Netherlands, Portugal, Spain, Sweden, United Kingdom <u>Non-OECD</u> : Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia	24
Other OECD	Australia, Canada, Japan, New Zealand, Norway, Switzerland, United States	7
East & South Asia	Bangladesh, China, India, Indonesia, Malaysia, Mongolia, Pakistan, Philippines, South Korea, Thailand, Vietnam	11
Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Uruguay, Venezuela	18
Central & Eastern Europe (not EU)	Albania, Armenia, Azerbaijan, Belarus, Croatia, Kazakhstan, Russia, Turkey, Ukraine	9
Sub-Saharan Africa	Angola, Botswana, Burkina Faso, Cameroon, Cote d'Ivoire, Ghana, Kenya, Mozambique, Mali, Madagascar, Malawi, Namibia, Niger, Nigeria, South Africa, Senegal, Sudan, Togo, Uganda, Zambia	20
Other Non-OECD	Algeria, Egypt, Hong Kong SAR, Kuwait, Jordan, Lebanon, Morocco, Tunisia	8
Total		97

Economic significance

	Effect on GL inflows	St. Dev	Coefficient
FB asset 05	4.3%	32.1%	0.13
EU dummy	19.9%	-	19.92
RGDP Grth	7.0%	2.3%	3.04

	Medeian	Average	St. Dev
GL inflows 04Q2-08Q1	3.2%	9.5%	19.5%

Appendix 2 High correlations among EU, institution, and capital openness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Cum. B-to-B inflows 2004Q2-2008Q1	1													
(2) FB asset share	0.20	1												
(3) FB number share	0.08	0.79	1											
(4) RGDP growth 99-04	0.30	-0.04	-0.09	1										
(5) EU dummy	0.45	0.05	0.04	-0.14	1									
(6) Sub-Saharan Africa dummy	-0.22	0.32	0.31	0.03	-0.29	1								
(7) Law & order 04	0.25	-0.09	-0.15	0.02	0.46	-0.33	1							
(8) Chinn-Ito index 04	0.21	0.07	-0.01	-0.28	0.46	-0.41	0.43	1						
(9) Trade openness 00-04	0.23	0.13	0.18	0.23	0.17	-0.13	0.18	0.07	1					
(10) Population growth 00-04	-0.41	-0.04	0.07	-0.09	-0.54	0.63	-0.41	-0.33	-0.20	1				
(11) GDP per capita 00-04	0.04	-0.21	-0.25	-0.30	0.46	-0.34	0.69	0.57	0.10	-0.31	1			
(12) ROE 00-04	-0.01	0.26	0.21	0.17	-0.12	0.43	-0.08	-0.15	0.16	0.27	-0.17	1		
(13) Net interest margin 00-04	-0.14	0.25	0.25	0.06	-0.41	0.48	-0.51	-0.37	-0.09	0.30	-0.60	0.39	1	
(14) Bank assets per GDP 00-04	-0.03	-0.31	-0.28	-0.23	0.30	-0.43	0.56	0.44	0.20	-0.20	0.70	-0.26	-0.70	1

Appendix 3 Basic statistics

Variables	Median	Average	St dev.	Max	Min
Net bank inflows 2004Q2-08Q1	3.2	9.5	19.5	99.7	-52.0
Foreign banks' asset share 2005	25.0	37.3	32.1	100.0	0.0
Foreing banks' number share 2004	35.0	38.0	25.2	100.0	0.0
Real GDP growth 1999-2004	4.0	4.2	2.3	10.9	-1.2
Law & order index	4.0	3.8	1.3	6.0	1.0
Chinn-Ito index	3.0	2.7	1.5	4.3	0.7
Trade openness	66.3	76.4	38.3	272.8	21.2
Population growth	1.2	1.2	1.2	4.0	-1.2
GDP per capita	2.5	8.8	12.0	45.5	0.2
ROE	12.4	13.8	12.0	62.2	-23.6
Net interest margin	4.5	5.0	3.0	14.5	0.3
Bank assets per GDP	43.0	54.4	42.2	171.0	2.8

Summary for robustness checks

As for the **non-OECD** sample;

1. FB asset share is **insignificant**.
 - The positive effect of FB penetration on bank-to-bank inflows was a phenomenon among developed countries.
2. Coefficient on EU dummy is robust and **much larger**.
 - The "collateral effect" of CCE's entry to EU (Hoffmann 2016)
3. The **allocation puzzle ?** (Gourinchas-Jeane 2013)
 - Capital flows from higher MPK to lower MPK even among emerging & developing economies.
 - ***Regulatory arbitrage might solve*** the allocation puzzle.