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Mapping the Shadow Banking System through a Global Flow of Funds Analysis

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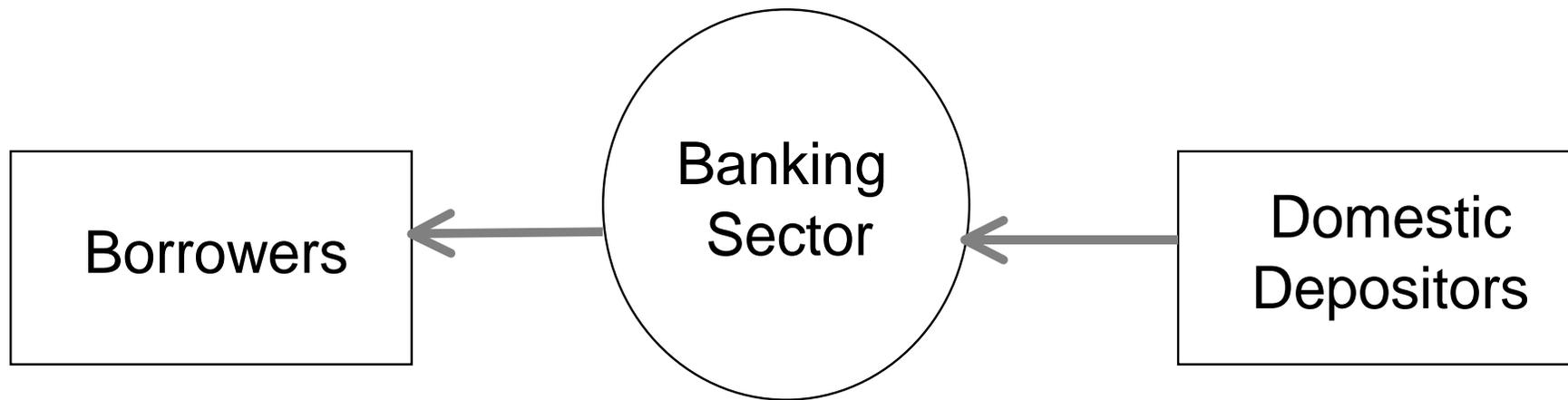
“Global Liquidity”: Two Phases

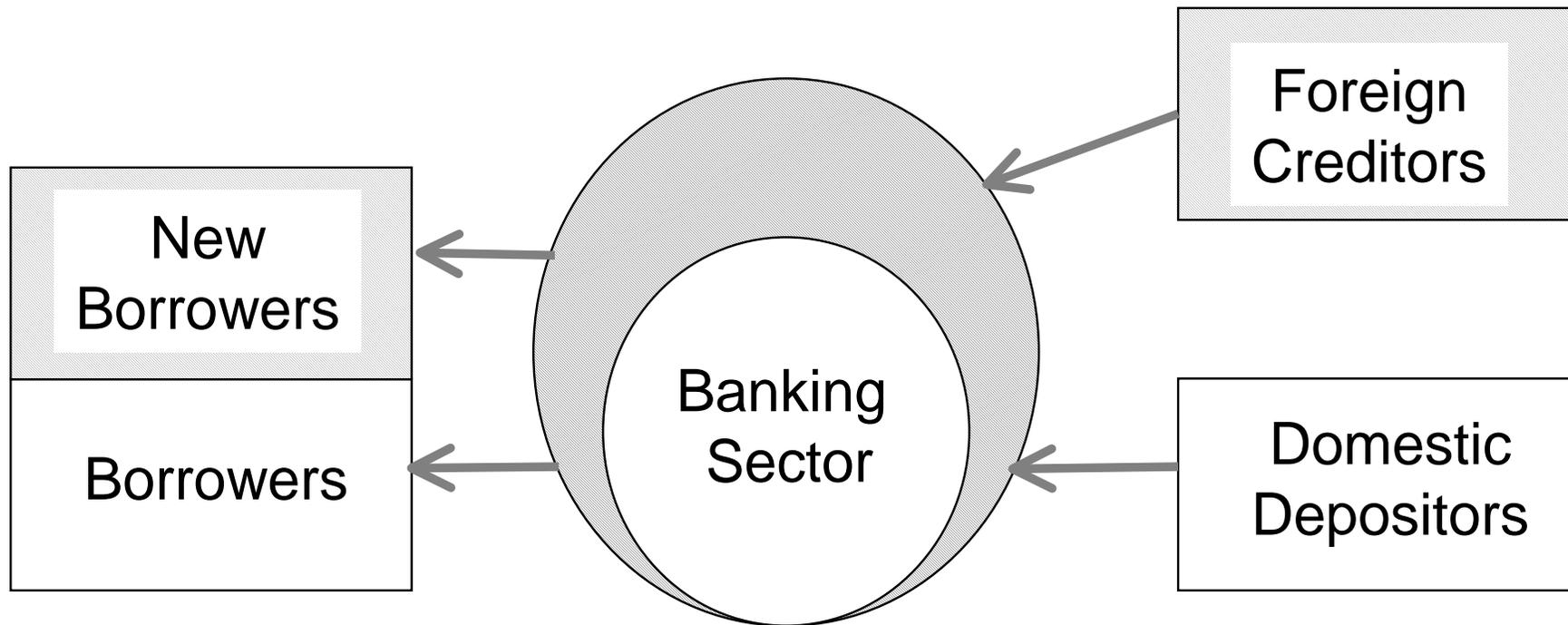
- **First Phase of Global Liquidity (2003 - 2008)**
 - Bank-driven
 - Key theme is **leverage**
 - Main actors: global banks intermediating US dollar credit
- **Second Phase of Global Liquidity (2010 -)**
 - Bond market-driven
 - Key theme is **search for yield**
 - Main actors: Asset managers with global reach

This paper is a look back at the First Phase

Financial Intermediation and Capital Flows

- During periods of rapid credit growth, the marginal source of funding is capital inflows via financial intermediaries
- **Core:** Liabilities to domestic household and non-financial claim holders
- **Non-Core:** Liabilities to financial intermediaries and foreign creditors
- Ratio of non-core to core liabilities is **procyclical** and mirrors **lowering credit standards**
- Shadow banking system is one channel for non-core funding





Global Flow of Funds Approach

Application of IMF Statistics Department's global flow of funds (GFF) framework

- Domestic BSA (Balance Sheet Approach) flow of funds matrix across (coarsely) aggregated sectors of 25 jurisdictions
- External positions of each country according to (a) counterparty and (b) instrument

⇒ **Global flow of funds matrix**, mapping domestic and external financial positions broken down bilaterally

Global Flow of Funds Approach

- Balance Sheet Approach (BSA) matrix from Standardized Report Forms (SRFs) reported by IMF member countries

- Sectors
 - Central bank
 - Other depository corporations (ODC)
 - Other financial corporations (OFC)

- Instruments
 - Shares and other equity
 - Securities other than shares
 - Loans
 - etc.

UNITED STATES – BSA MATRIX

Holder of claim (debtor)	Central bank			Central government			State and Local Government			Public Nonfinancial Corporations			Other Depository Corporations			Other Financial Corporations			Nonfinancial Corporations			Other resident sectors			Nonresident		
	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP
Central bank				93	1,672	-1,579	0	0	0	0	0	0	1,571	4	1,562	71	139	-68	0	0	0	0	837	-837	143	248	-105
Currency and deposits																											
...																											
Central government	1,672	93	1,579										725	27	668	1,594	43	1,551							3,124	79	3,043
Currency and deposits																											
...																											
State and Local Government	0	0	0										682	519	143	1,185	398	786									
Currency and deposits																											
...																											
Public Nonfinancial Corps.	0	0	0										0	4	0	0	0	0							1,398	863	535
Currency and deposits																											
...																											
Other depository corporations	9	1,571	-1,562	57	725	-668	539	682	-143	0	0	0				2,373	3,850	-1,477	2,102	1,229	873	6,436	6,633	1,783	2,023	2,097	-74
Currency and deposits																											
...																											
Other financial corporations	139	71	68	43	1,594	-1,551	398	1,185	-786	0	0	0	3,850	2,373	1,477												
Currency and deposits																											
...																											
Nonfinancial corporations	0	0	0										1,229	2,102	-873												
Currency and deposits																											
...																											
Other resident sectors	837	0	837													6,633	6,436	-1,783									
Currency and deposits																											
...																											
Nonresidents	248	143	105	79	3,124	-3,043	0	0	0	863	1,398	-535	2,097	2,023	74												
Currency and deposits																											
...																											

Other financial corporations		
Assets	Liabilities	Net position
2,372.97	3,850.22	-1,477.25
2,372.97	3,850.22	-1,477.25
1,629.05	0.00	1,629.05
191.14	3,119.71	-2,928.57
552.78	641.48	-88.70
	80.03	
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
	0.00	

sectoral/instrumental breakdowns not fully available

Figure 1. United States: 2011 BSA Matrix

UNITED STATES – EXTERNAL FLOW OF FUNDS MATRIX

<i>Issuer of liability (debtor)</i> <i>Holder of claim (creditor)</i>	Nonresidents			Mexico			Euro Area			Switzerland			United Kingdom			France			Germany			Rest of the World					
	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP	A	L	NP			
Central bank	343	248	-105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Currency and deposits																											
General government	6522	942	5580	14	76	-62	220	245	-25	29	102	-73	134	626	-492	71	198	-127	34	163	-129	759	3258	-2499			
Currency and deposits																											
Other depository corporations	2023	2097	-74	59	14	45	1257	724	533	95	59	36	919	842	77	40	24	17	39	22	17	2893	1533	1359			
Currency and deposits																											
Other financial corporations	4479	6805	-2327	133	52	81	2537	6	2537	287	6	281	1445	146	1299	758	1045	-287	291	218	73	8775	789	8006			
Currency and deposits																											
Non-financial corporations	9757	9938	3819	105	121	-16	1530	1256	274	171	487	-316	1053	1478	-425	464	813	-348	192	309	-117	4852	5607	-755			
Currency and deposits																											

	Mexico		
	Assets	Liabilities	Net positions
Other depository corporations	58.66	13.78	44.88
Currency and deposits	42.08	8.17	33.90
Securities other than shares	3.59	0.51	3.08
Short-term	0.01	0.04	-0.03
Long-term	3.58	0.47	3.11
Loans	0.00	1.09	-1.09
Shares and Other Equity	4.71	1.76	2.95
of which DI	4.71	1.76	2.95
Insurance technical reserves			
Financial derivatives			
Other accounts receivable			

sectoral/instrumental breakdowns not fully available

Figure 2. United States: External Flow of Funds Matrix

Background to the US Intermediary Sector

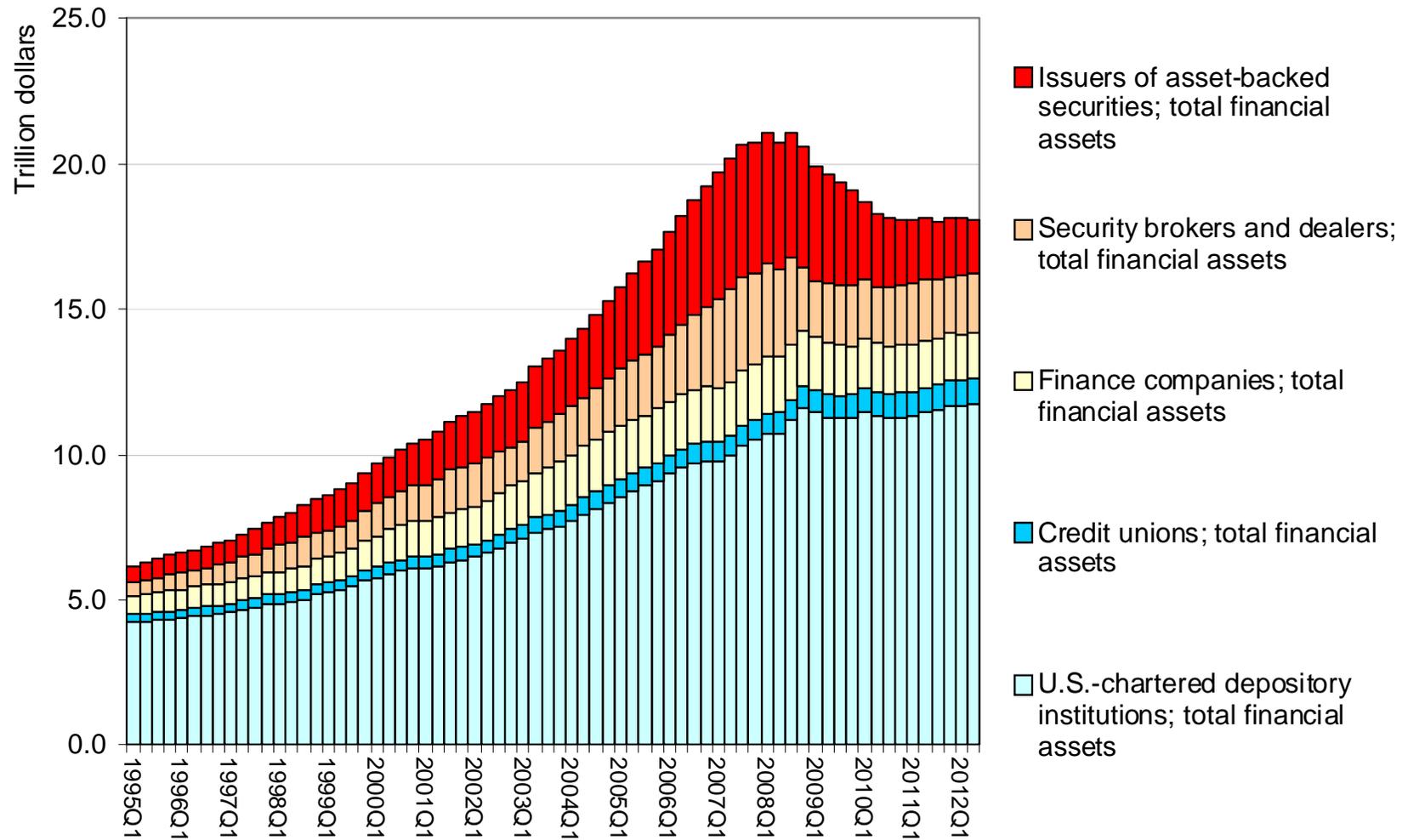


Figure 3. Total financial assets of US financial intermediaries (Source: Federal Reserve, Flow of Funds)

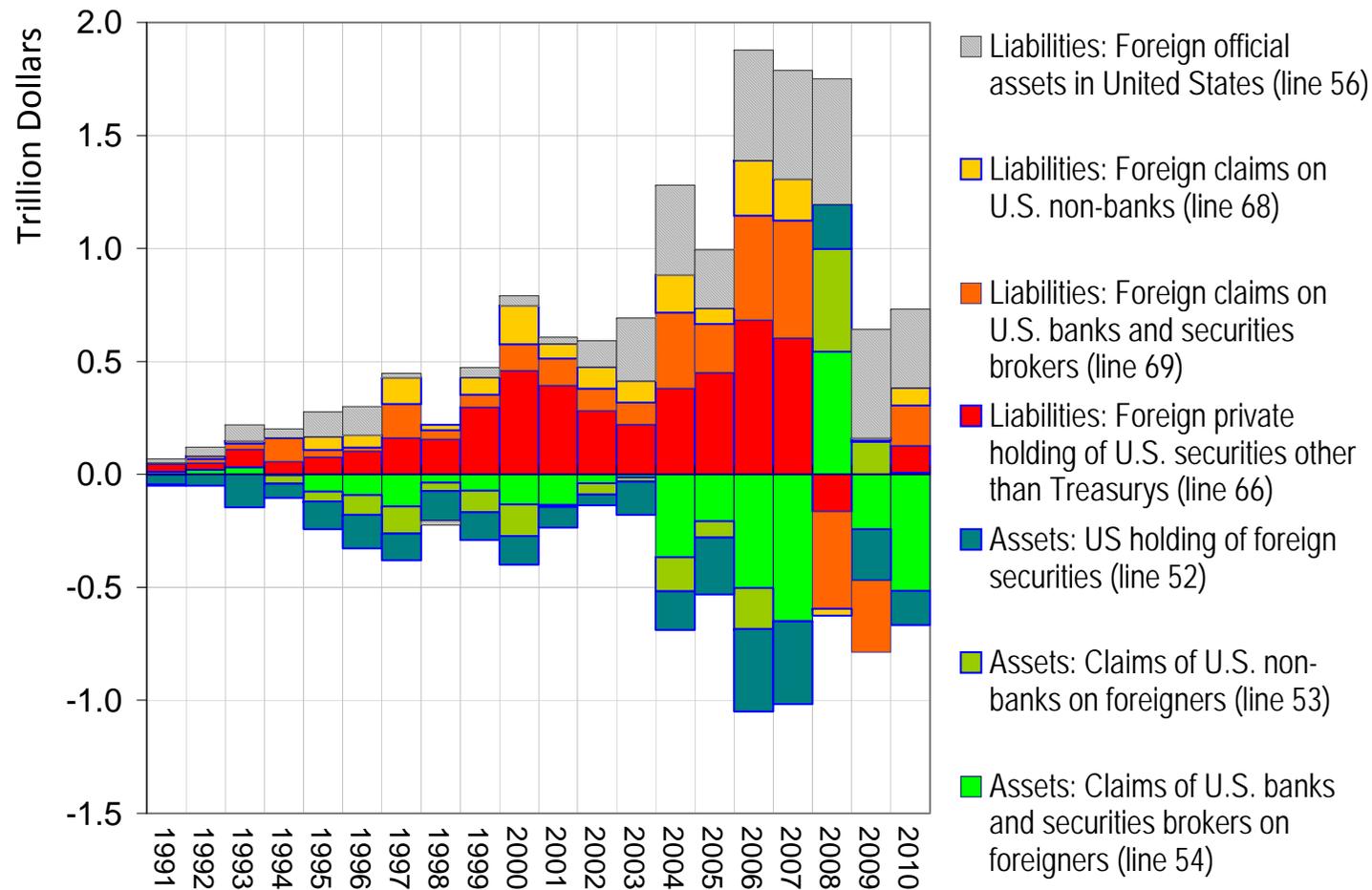


Figure 4. US gross capital flows by category (Source: US Bureau of Economic Analysis). Increase in US liability to foreigners is indicated by positive bar, increase in US claims on foreigners is indicated by negative bar.

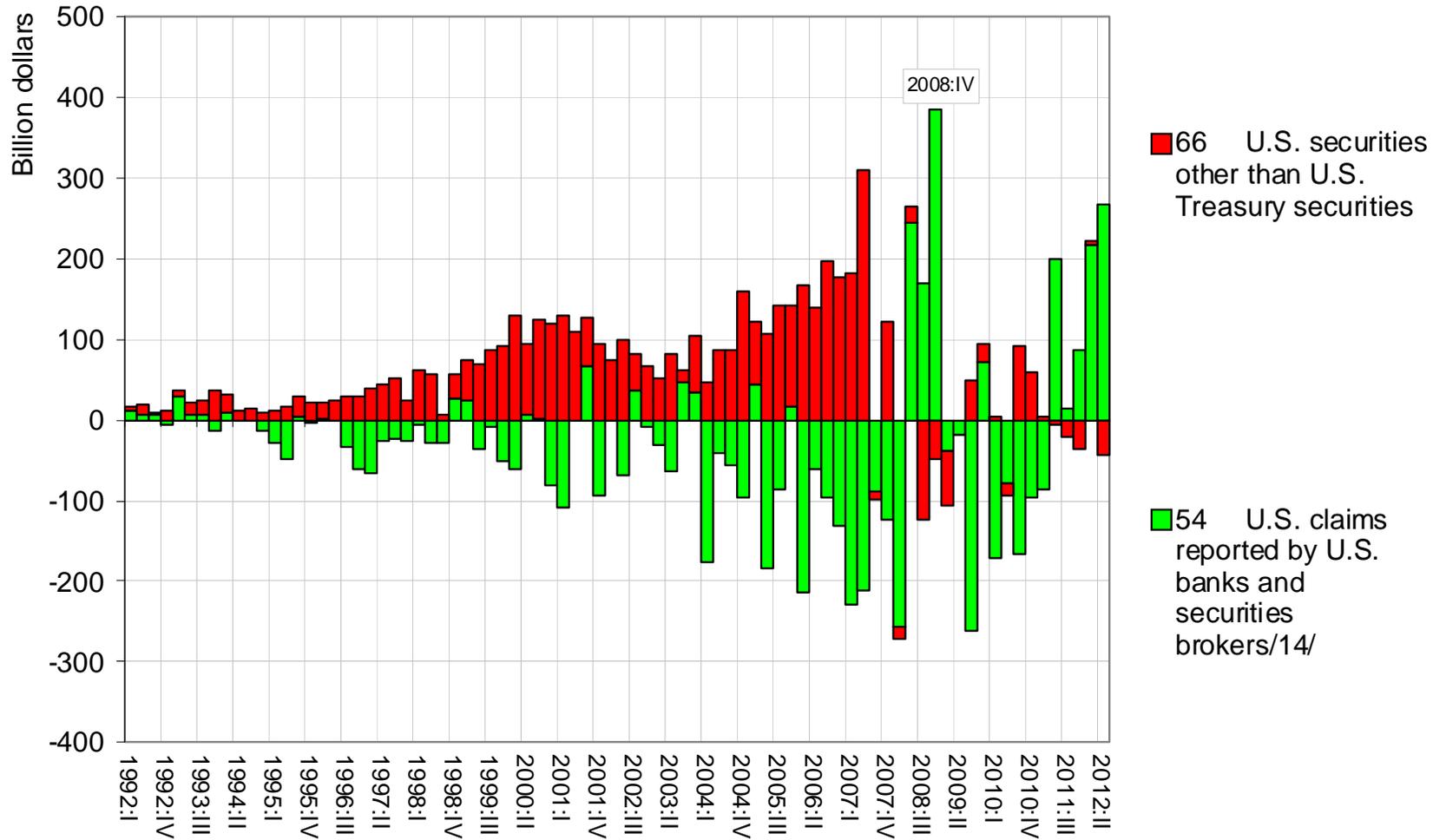


Figure 5. Capital flows associated with US banking sector (by residence, including European offices). (Source: US Bureau of Economic Analysis)

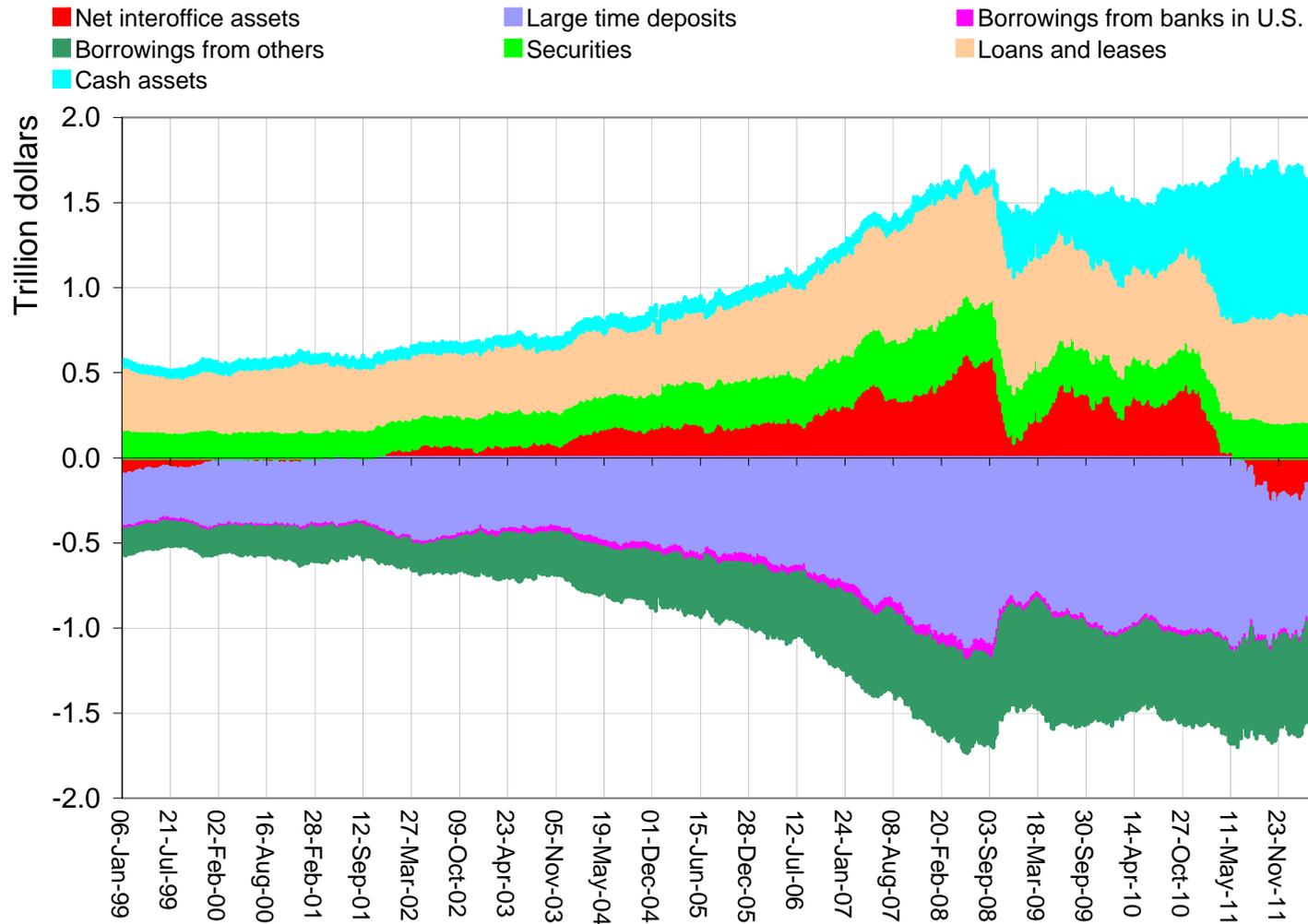


Figure 6. Assets and liabilities of foreign banks in the U.S. (Source: Federal Reserve H8 weekly series on assets and liabilities of foreign-related institutions)

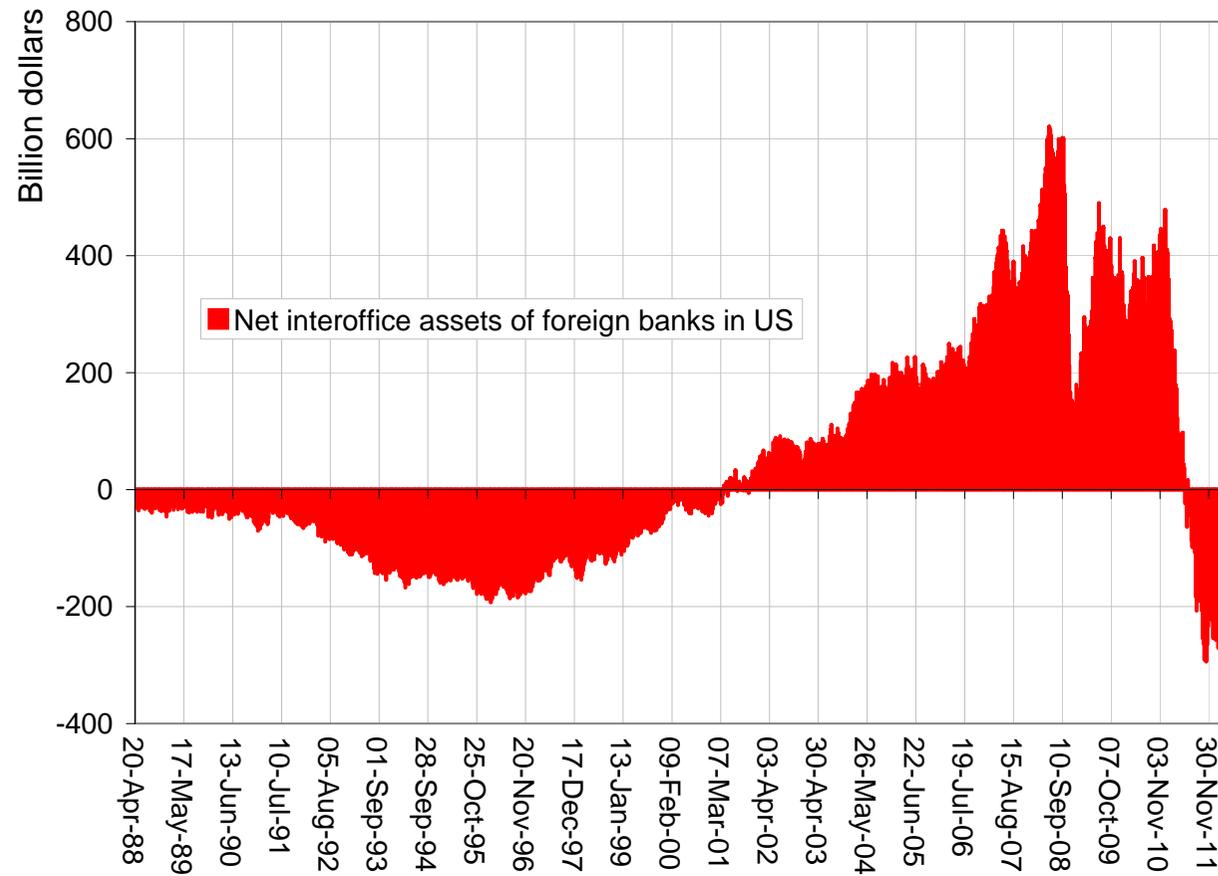


Figure 7. Net interoffice assets of foreign banks in U.S. given by negative of Federal Reserve weekly H8 series on “net due to related foreign offices of foreign-related institutions”

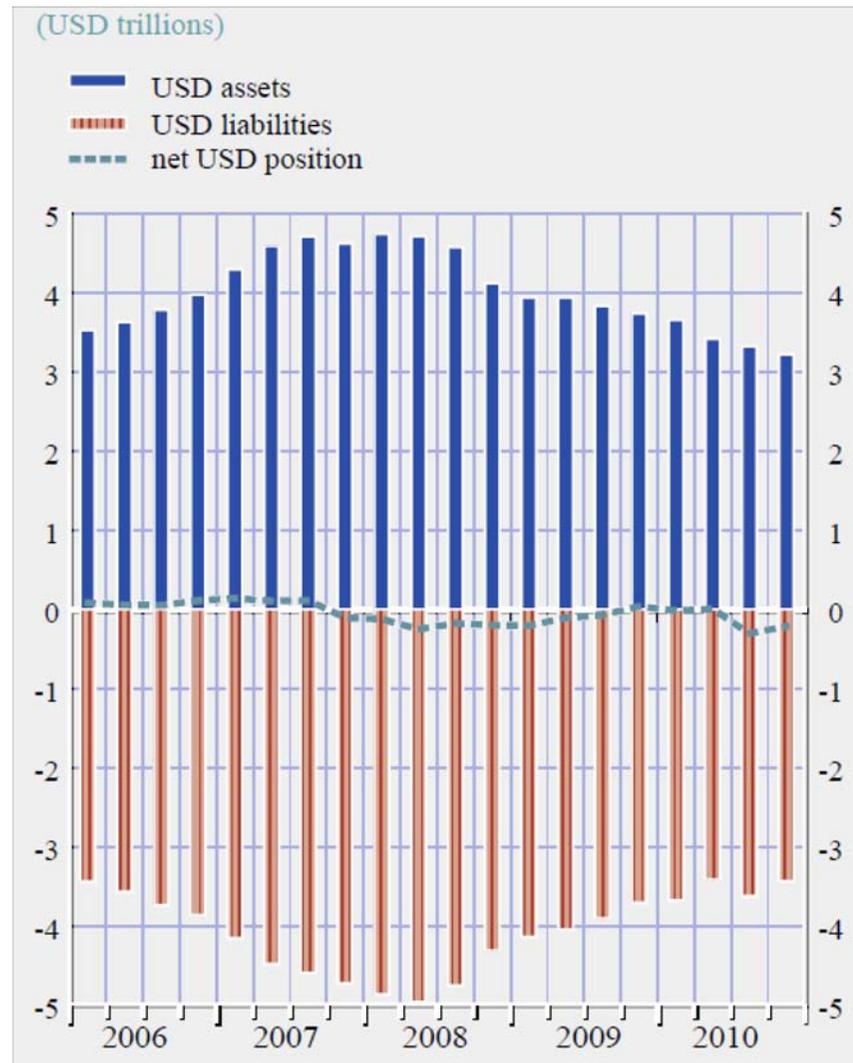


Figure 8. US Dollar-denominated assets and liabilities of euro area banks (Source: ECB Financial Stability Review, June 2011, p. 102)

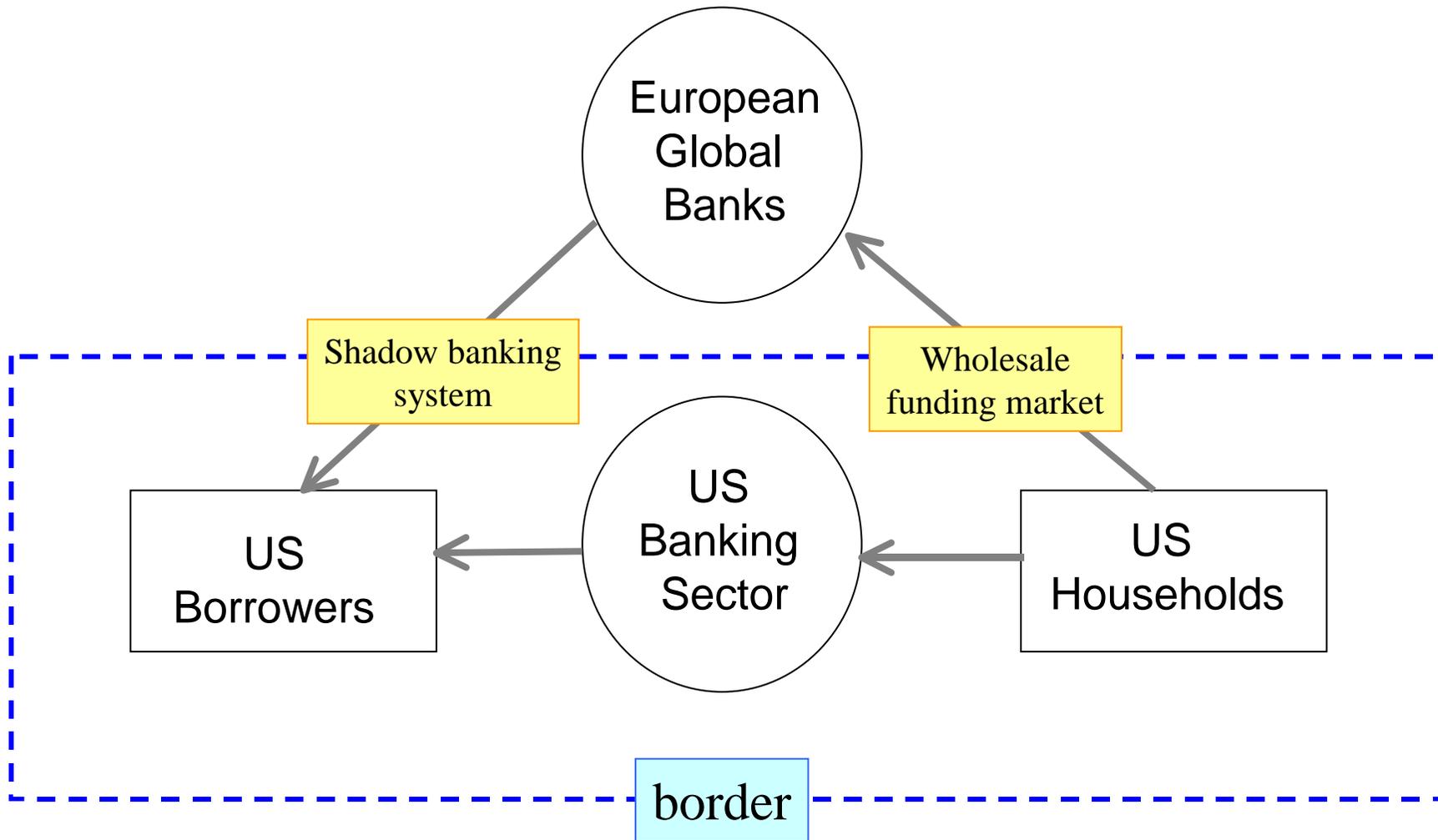


Figure 9. European global banks add intermediation capacity for connecting US savers and borrowers

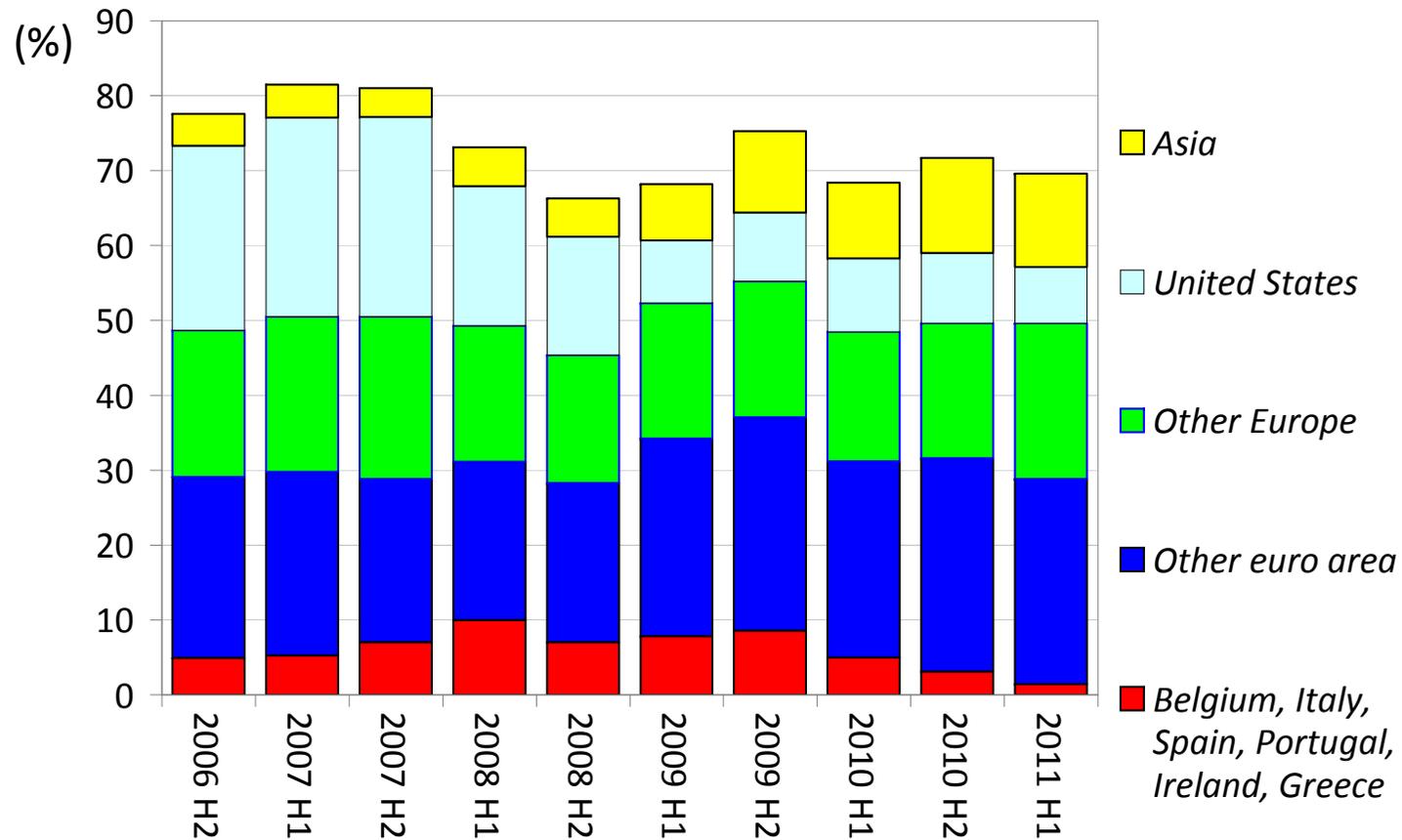


Figure 10. Amount owed by banks to US prime money market funds (% of total), based on top 10 prime MMFs, representing \$755 bn of \$1.66 trn total prime MMF assets (Source: IMF GFSR Sept 2011, data from Fitch).

Preliminary Findings from Global Flow of Funds Analysis

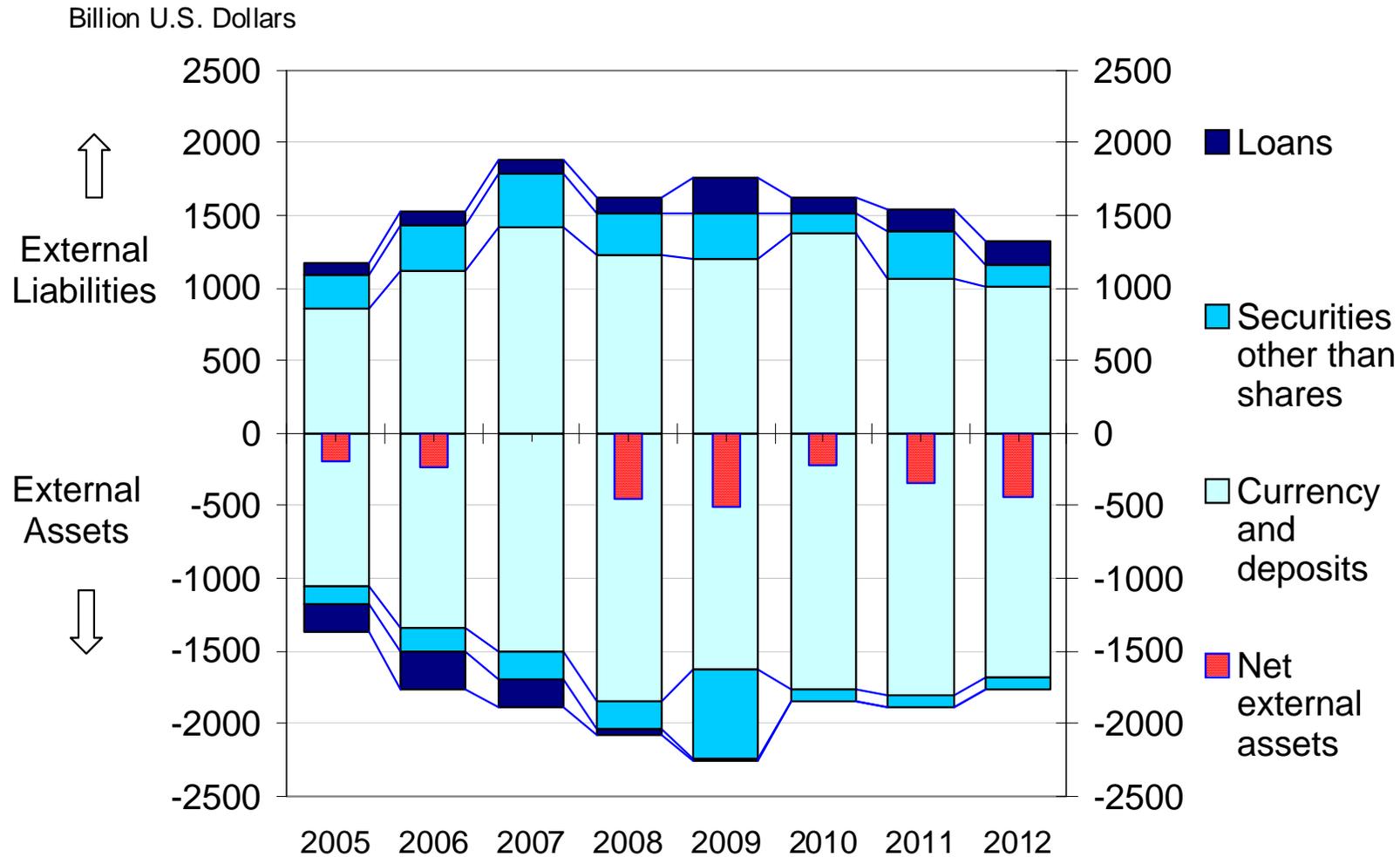


Figure 11. United States: external position of the Other Depository Corporations (ODC) sector by instrument

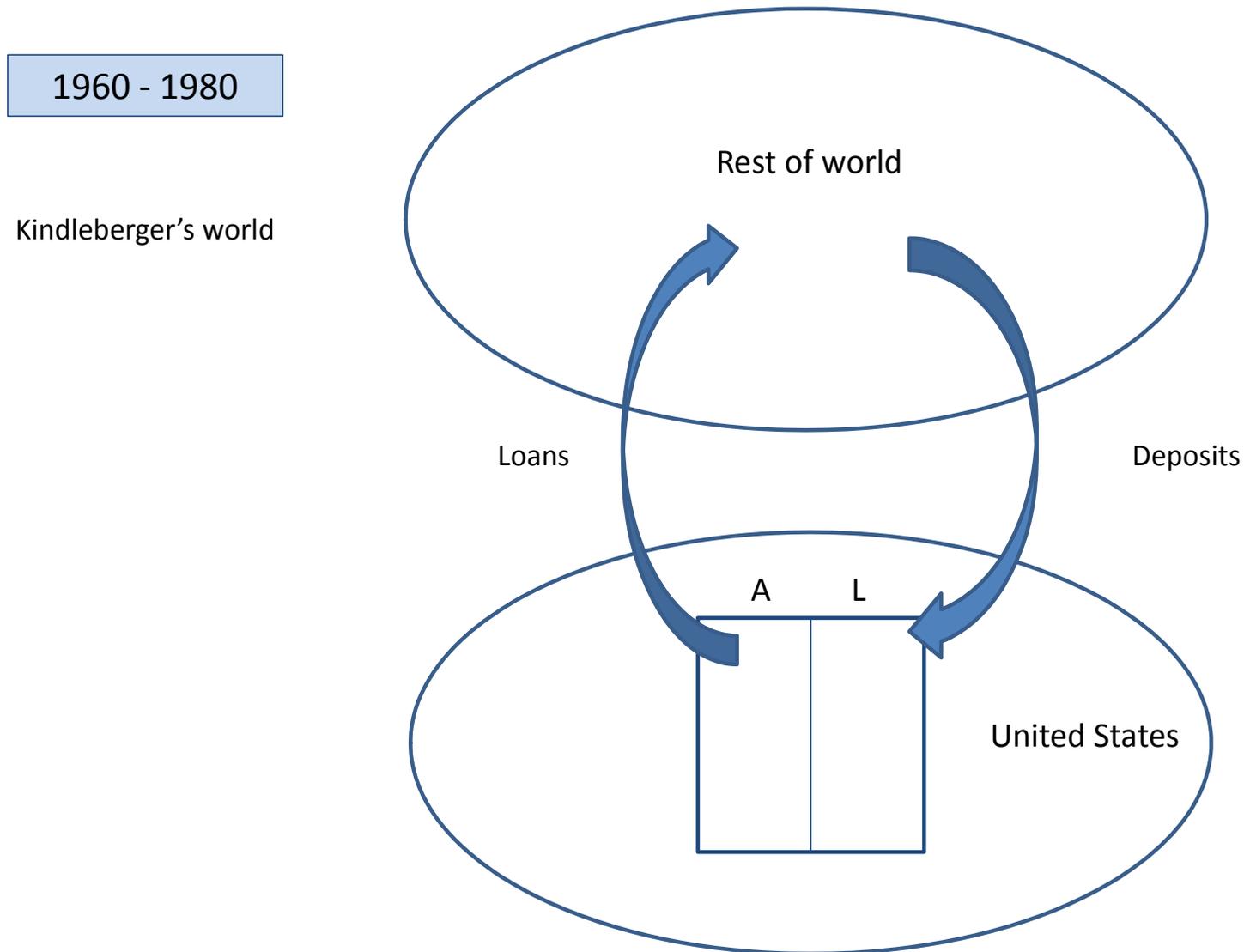


Figure 12. Banks in United States receive deposits from rest of the world (e.g. oil exporters) and lends out to borrowers outside the U.S. (e.g. Latin American sovereigns)

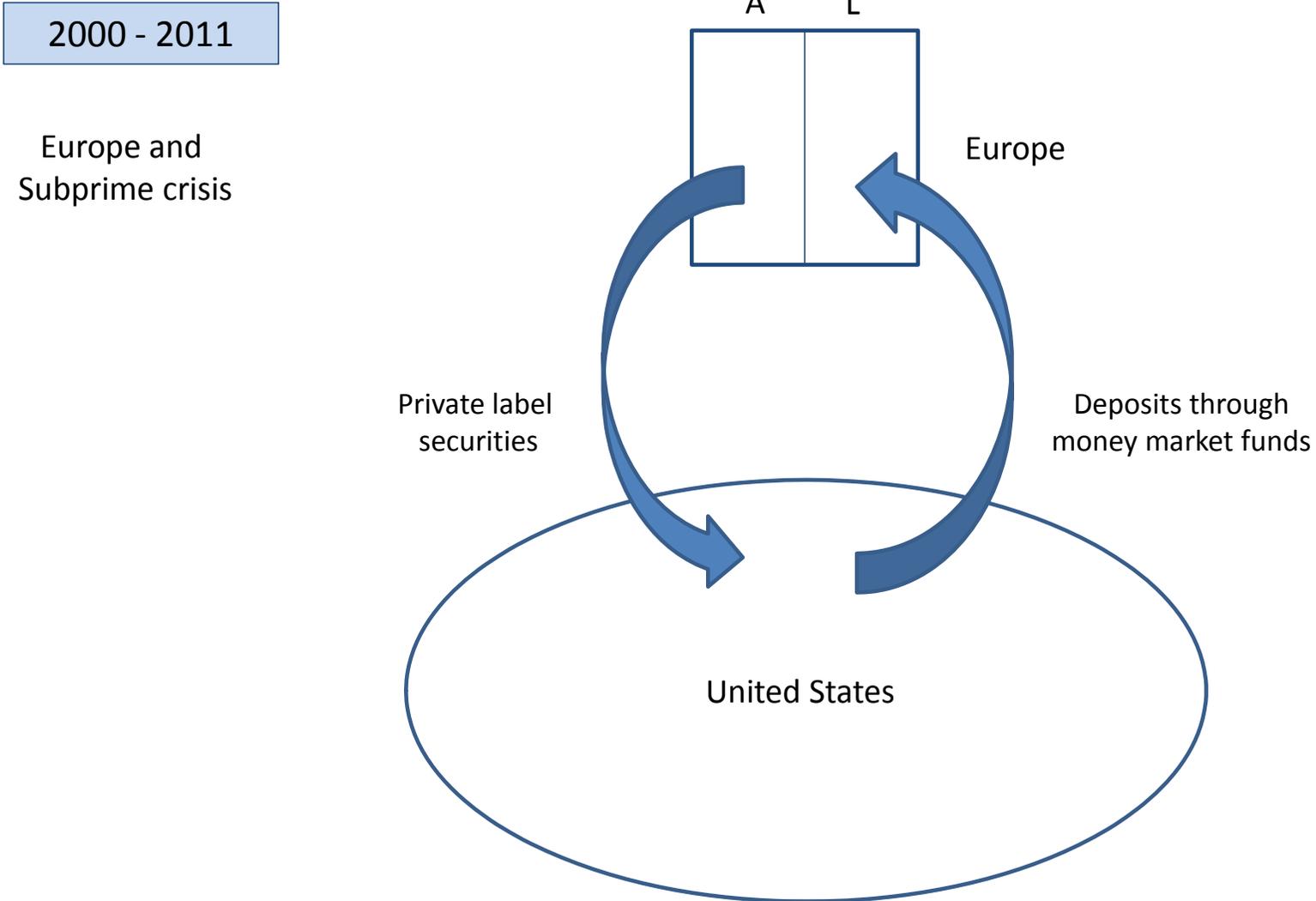


Figure 13. During 2000s banks in United States hold deposit claims on rest of the world, especially on European banks

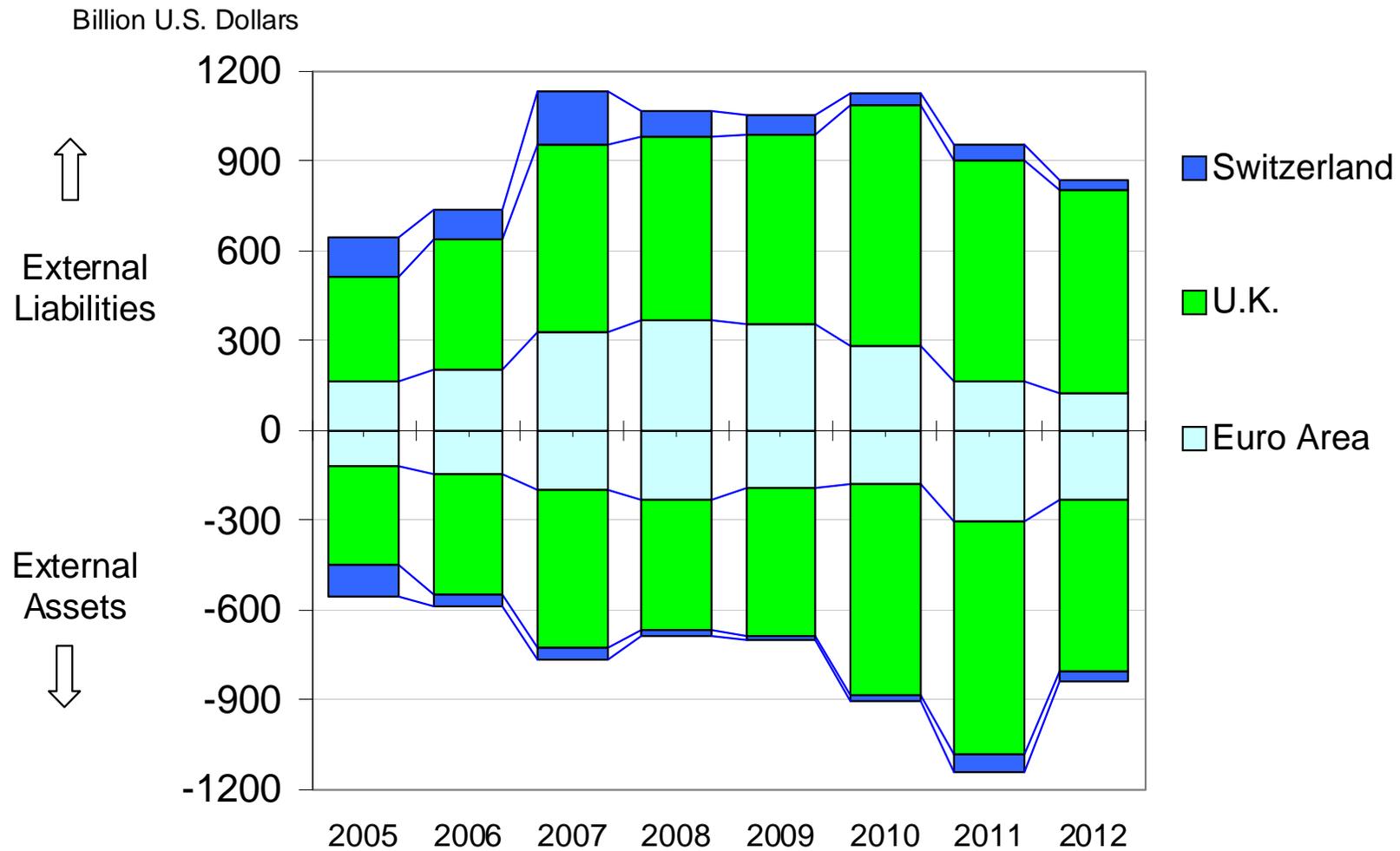


Figure 14. United States: external position of the Other Depository Corporations (ODC) sector "cash and deposits" category by counterparty

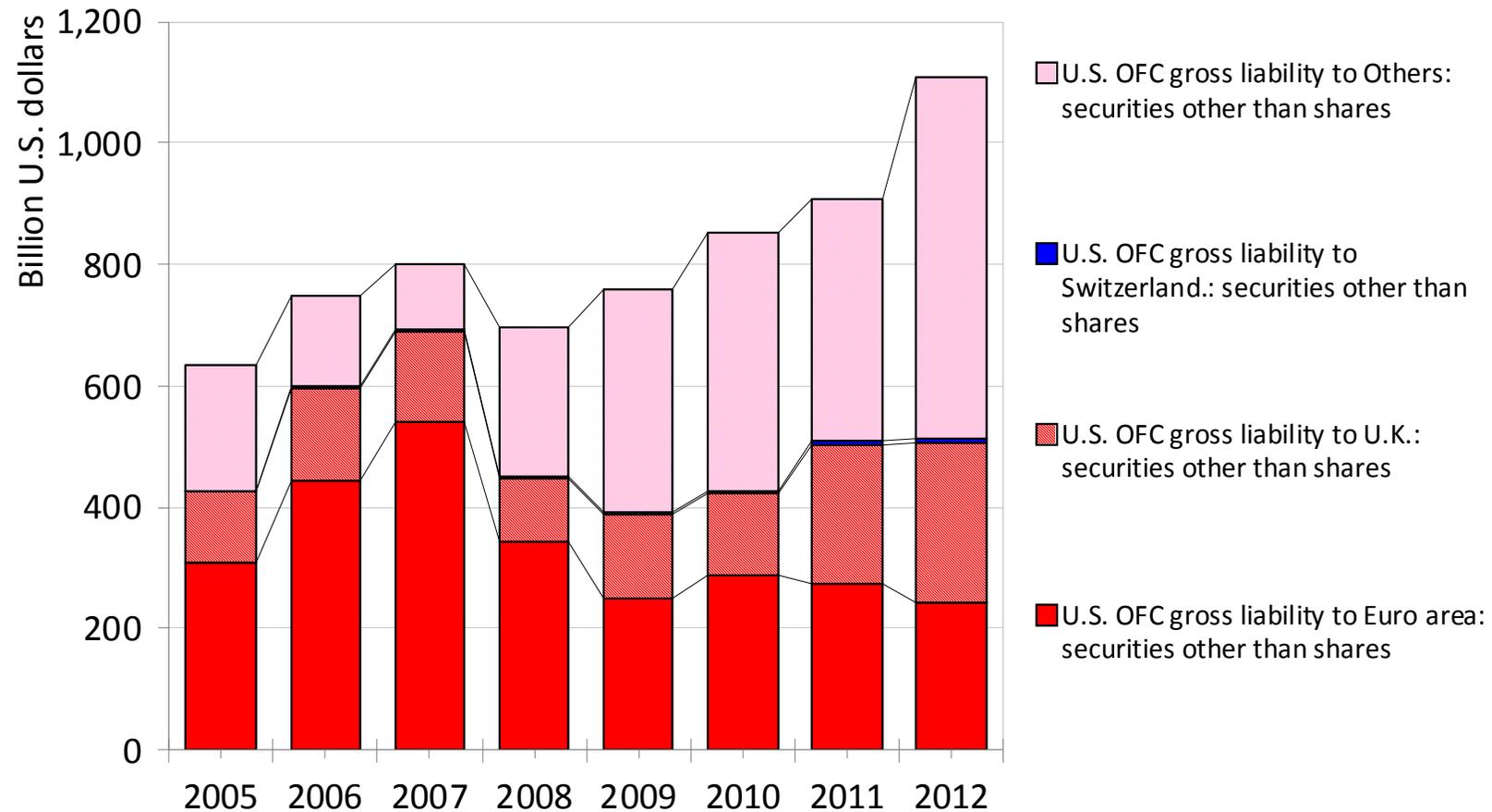


Figure 15. United States: external position of the Other Financial Corporations (OFC) sector "securities other than shares" category by counterparty

Table 2. Determinants of Domestic Growth of Loans to Non-Financial Sector

VARIABLES	ODCs+OFCs	ODCs+OFCs	ODCs+OFCs	ODCs loans to	ODCs loans to	ODCs loans to	OFCs loans to	OFCs loans to	OFCs loans to
	s loans to corporates (1)	loans to ONFCs (2)	loans to PNFCs (3)	corporates (4)	ONFCs (5)	PNFCs (6)	corporates (7)	ONFCs (8)	PNFCs (9)
	loantops_dlg	loantoofnc_dlg	loantopnfc_dlg	r2_loantops_dlg	r2_loantoofnc_dlg	r2_loantopnfc_dlg	r4_loantops_dlg	r4_loantoofnc_dlg	r4_loantopnfc_dlg
L.reer_dlg	-0.0115 [0.741]	0.000865 [0.979]	0.0238 [0.936]	-0.0149 [0.668]	-0.00167 [0.959]	-0.0295 [0.922]	0.0180 [0.908]	0.198 [0.241]	0.0919 [0.837]
L.vix	-0.00253 [0.882]	-0.00137 [0.938]	-0.183 [0.417]	-0.00629 [0.721]	-0.00329 [0.855]	-0.193 [0.399]	0.0861 [0.657]	0.153 [0.509]	0.578 [0.219]
L.interoffice_pch	0.00242 [0.242]	0.000982 [0.633]	-0.0307 [0.445]	0.00287 [0.155]	0.00139 [0.486]	-0.0329 [0.420]	0.00389 [0.753]	-0.00775 [0.454]	-0.0163 [0.555]
L.qe	0.00240 [0.764]	-0.00133 [0.869]	-0.0675 [0.539]	0.00420 [0.596]	0.00102 [0.897]	-0.0711 [0.522]	0.0183 [0.761]	-0.0176 [0.759]	0.413 [0.101]
L.qe_vix	-0.0451 [0.192]	-0.0384 [0.262]	0.345 [0.426]	-0.0486 [0.158]	-0.0435 [0.197]	0.352 [0.422]	-0.122 [0.498]	-0.0448 [0.801]	-1.302* [0.0577]
L.rgdp_pch	0.131*** [0.00460]	0.161*** [0.000195]	-0.0562 [0.748]	0.132*** [0.00461]	0.162*** [0.000200]	-0.00966 [0.956]	-0.826** [0.0322]	-0.450 [0.260]	-0.365 [0.698]
L.acpi_pch	-0.0250 [0.557]	-0.0404 [0.300]	-0.0269 [0.883]	-0.0258 [0.544]	-0.0419 [0.280]	-0.0332 [0.857]	0.161 [0.427]	0.134 [0.524]	-0.0446 [0.966]
L.dgdp	-0.0442*** [1.56e-05]	-0.0374*** [0.000313]	-0.0160 [0.697]	-0.0420*** [2.89e-05]	-0.0354*** [0.000557]	-0.0161 [0.698]	-0.172* [0.0905]	-0.198* [0.0871]	0.687 [0.119]
L.noncore_liab_dlg	0.0169*** [0.00224]	0.0143*** [0.00617]	-0.00151 [0.975]	0.0176*** [0.00137]	0.0149*** [0.00426]	0.00443 [0.929]	0.0327 [0.459]	0.0704 [0.206]	-0.0835 [0.416]
L.anb_stock_allfx_rcallrcwrld_dlg	0.147*** [0.00332]	0.109** [0.0267]	0.0247 [0.950]	0.153*** [0.00213]	0.117** [0.0180]	0.0400 [0.921]	-0.104 [0.808]	-0.126 [0.766]	-0.0550 [0.968]
L.dep_rate	-0.0249 [0.682]	0.0103 [0.834]	-0.102 [0.658]	-0.0337 [0.599]	0.00265 [0.959]	-0.127 [0.597]	0.364 [0.524]	0.259 [0.599]	-1.156 [0.469]
Constant	0.0540*** [0]	0.0504*** [0]	0.0811 [0.241]	0.0539*** [0]	0.0499*** [5.94e-11]	0.0842 [0.229]	0.0854 [0.219]	0.0783 [0.356]	-0.330* [0.0617]
Number of observations	3,295	3,295	3,062	3,295	3,295	3,039	700	699	302
R-squared	0.048	0.045	0.002	0.049	0.045	0.002	0.017	0.012	0.020
Number of country_code	88	88	82	88	88	82	25	25	15

Robust pval in brackets

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

Figure 16. Determinants of domestic loan growth to non-financial sector

Further Steps

- Construct the external GFF matrices for the Euro area and the U.K. and examine the gross external claims and liabilities of the banking (OTC) sector
- Compare “roundtrip” U.S. dollar (gross) flows versus (net) flows mirroring current account imbalances
- Construct directed graph over ordered pairs:

(location, sector)

Given dimensionality of the problem, any measurement exercise will need to be guided by careful selection of the pairwise relations between the (location, sector) nodes in the network