Liquidity Management of US Global Banks: Internal capital markets in the Great Recession

Nicola Cetorelli
Federal Reserve Bank NY

Linda Goldberg
Federal Reserve Bank NY
and NBER

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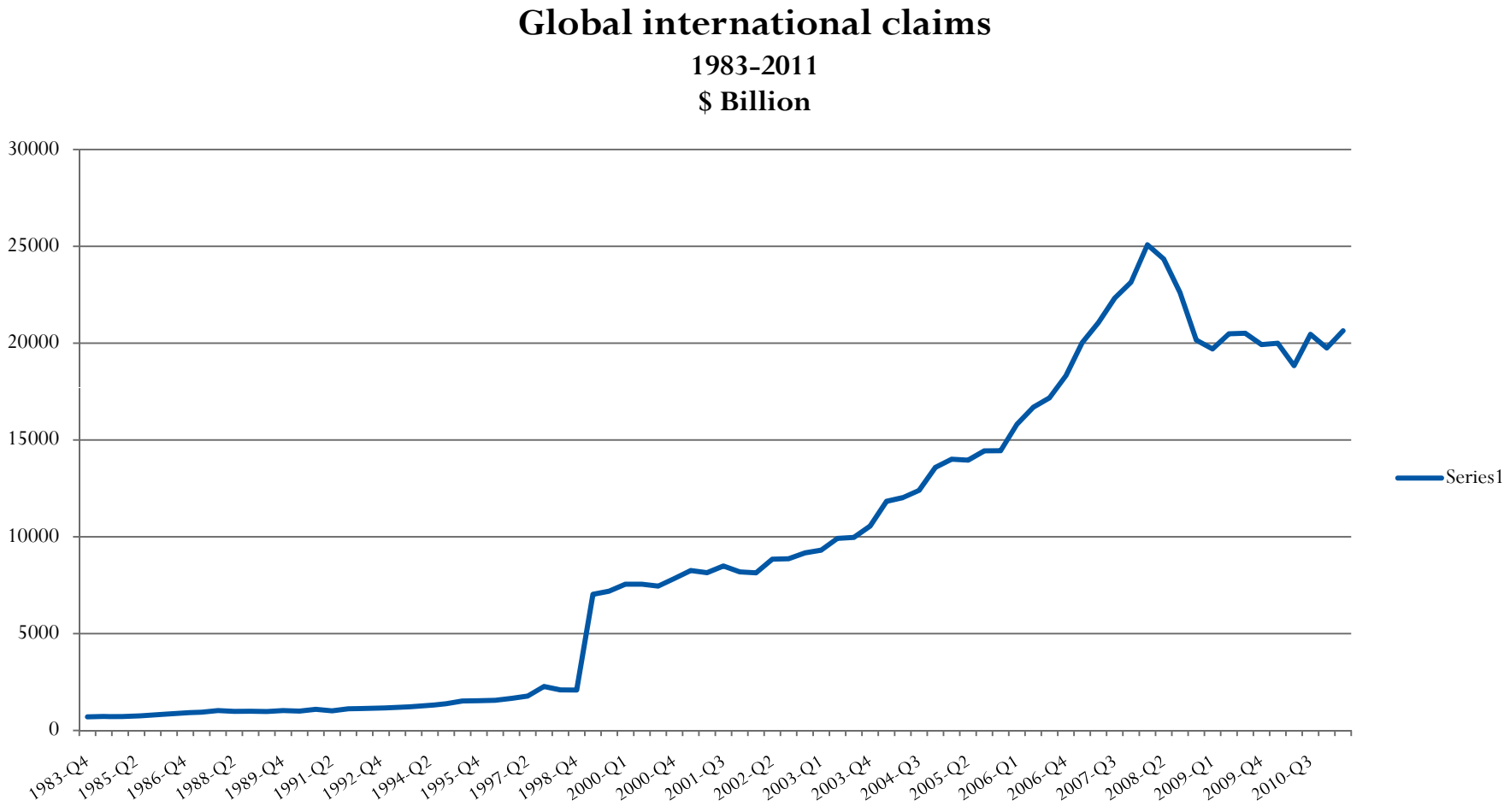
Increasing globalization of banking

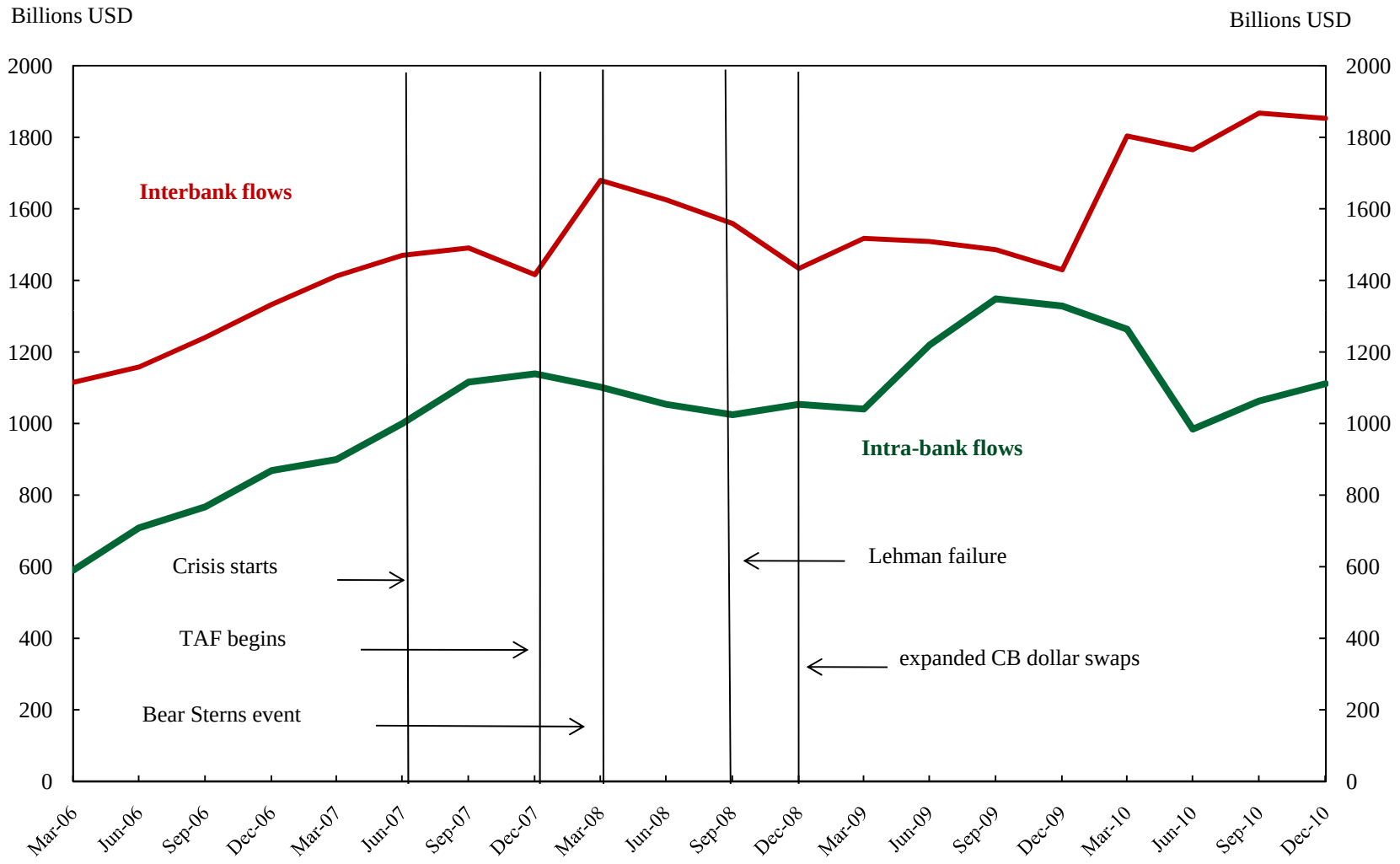


In the U.S.:

70% of total banking assets accounted by global banks

20% of total assets accounted by FBOs

Traditional links are complemented by funding through Intra-bank and Interbank Flows (of U.S. Banks)



Source: FFIEC 009 and BIS Consolidated Banking Statistics
Note: Intra-bank flows are computed as the sum of net due to (from) of affiliates (in absolute value), from FFIEC 009. Interbank flows are computed as the sum of foreign claims of the U.S. vis-a-vis rest of world and of rest of world vis-a-vis the U.S., from BIS.

Increasing globalization of banking

- Various studies examine the asset side of global banks (e.g. cross border and local lending) and international transmission / contagion.
- Relatively little is known about liability side and liquidity management.
- Evidence that global banks manage liquidity on a global scale
  - Active internal capital markets
  - Impact on effectiveness of domestic shocks
  - Mechanism of international transmission

Cetorelli and Goldberg (JF forthcoming, IMF ER 2011)

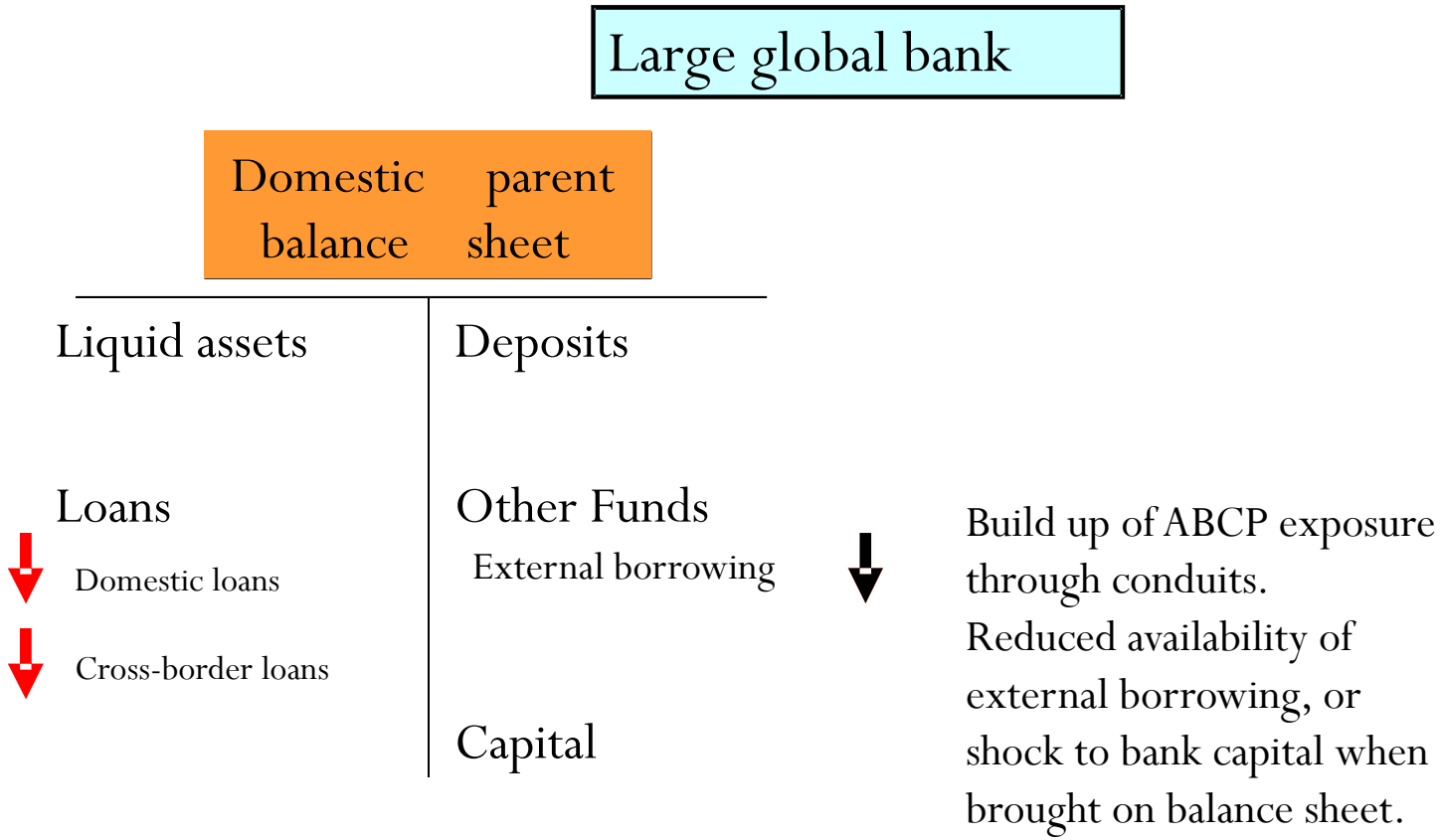
Overview of the paper

- How do global banks manage liquidity across borders?
- Conjecture that bank's own business model matters
  - "pecking order" in where exactly funds are drawn from in the event of liquidity shocks
  - "distance" from parent matters
    - Funds mainly drawn from "core" funding markets and "periphery" investment markets
- Use confidential U.S. banks reporting data
- The Great Recession provides identification opportunities

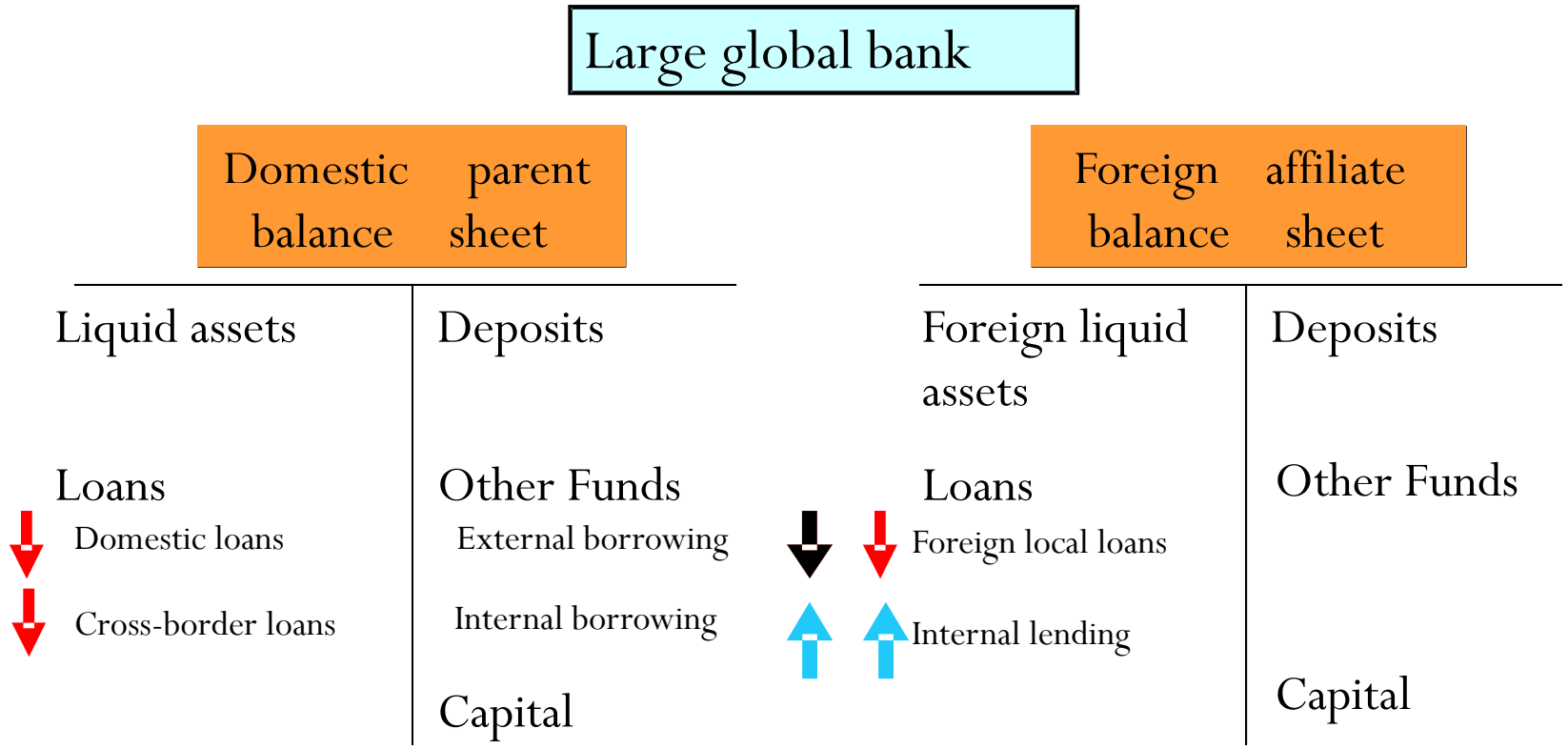
Implications

- Global banks confirmed to be a vehicle of international transmission of shocks
- First order implications for both domestic and cross-border regulation
- But "openness" in general not necessarily a bad thing
- Both bad and good shocks transmitted internationally
- Bank-to-country specific characteristics matter: Argentina may be a core funding market for Santander but a core investment market for Citi

Channels of international transmission through US global banks



Channels of international transmission through US global banks



What are the strategic priorities of banks that drive the use of internal capital markets?

Our two main conjectures

- Important dimensions of the global banking business model include:
  - 1) local (host) market funding strategies
    - Global banks differ in their reliance on local liabilities to fund (local?) investments; by bank, there is locational heterogeneity.
    - Conjecture: in the event of a shock to the parent, internal funds more likely to be drawn from locations where the global bank is more reliant on local funding pools.
      - if the parent bank has been funding a local market, it would continue to give this market relative protection.

Our two main conjectures

- Important dimensions of the global banking business model include:
  - 2) relative investments in its "portfolio" of local markets.
    - Global banks also differ in their foreign "investment" strategies, reflected in the relative amount of lending (claims) extended in each foreign location.
    - Heterogeneity captures an overall strategy of business expansion and market penetration specific.
    - Conjecture: in response to a shock to the parent, funds are drawn more intensely from "periphery" locations – those representing a smaller share of total foreign claims - than from "core" locations.

Preview of main findings

- In early stages of Great Recession, funding shock to bank balance sheets through ex ante ABCP exposure.
- Extensive related response of internal capital markets by global banks
- Given an adverse parent bank shock, affiliate markets:
  - If "core" investments, supported relative to "periphery".
  - If higher ex ante reliance on host market deposits/local funds, more funds flow back to the parent
  - Other traditional metrics of "distance" between parent and affiliate markets are less important drivers
  - Economic significance of results can be large

The bank-specific data

- Federal Financial Institutions Examinations Council Country Exposure Report (FFIEC 009) confidential data:
  - Quarterly. Filed by every U.S bank or its holding company, and foreign bank subsidiaries in U.S.
    - claims, assets, and liabilities by country
    - internal borrowing and lending between the affiliates in various locations and the parent organizations.
- Add in parent bank characteristics from *Federal Financial Institutions Examinations Council (FFIEC)* 031 "Call Reports".
- 2006Q1 to 2010Q4.

Table 1 Counts of U.S. Banks With Foreign Affiliates

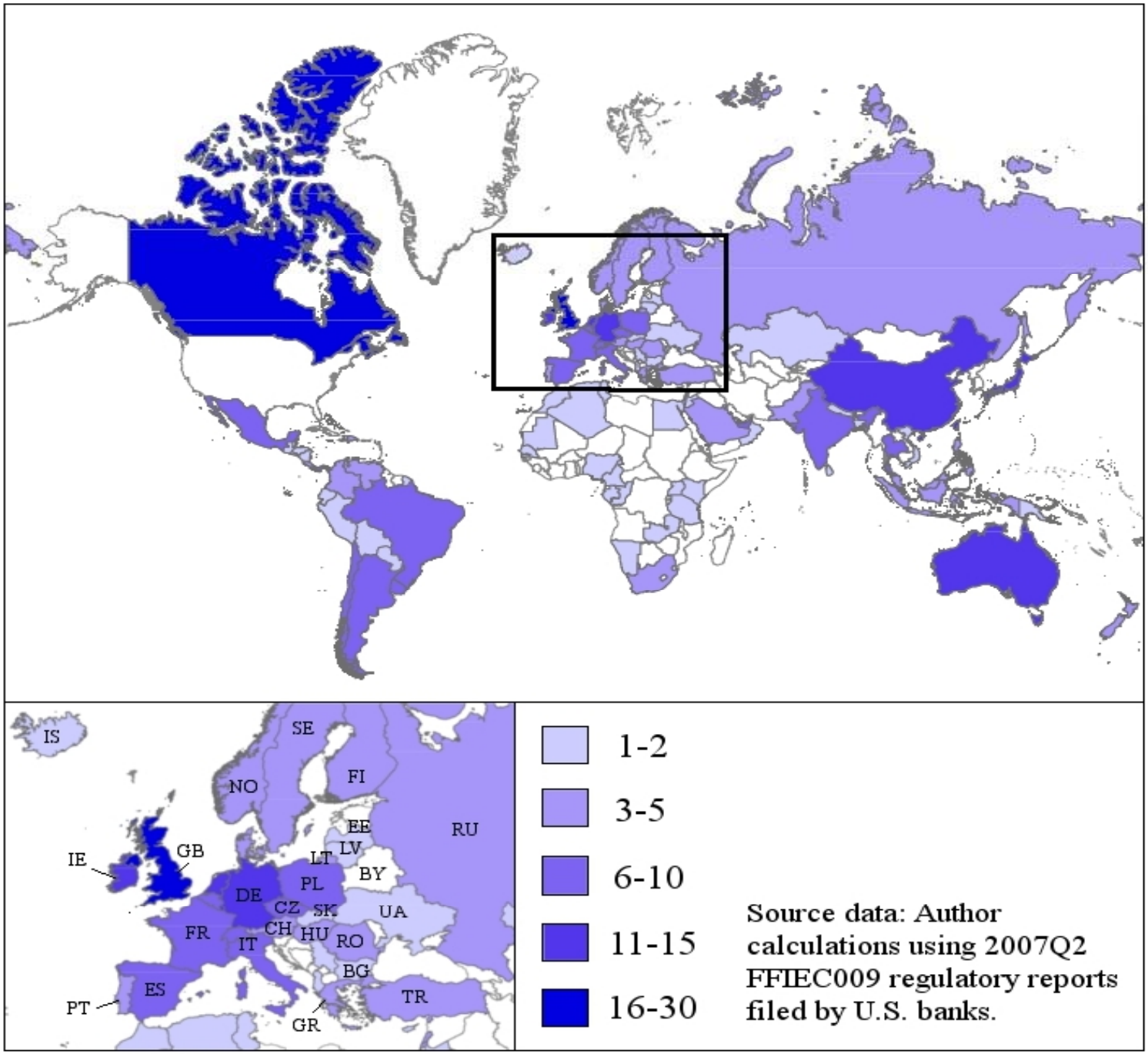
	2006q1	2007q1	2008q1	2009q1	2010q1
ALL banks					
Total	42	41	39	43	44
US-owned	27	26	26	25	25
foreign-owned	15	15	13	18	19

Source: Authors' computations based on FFIEC 009 reporting by quarter.

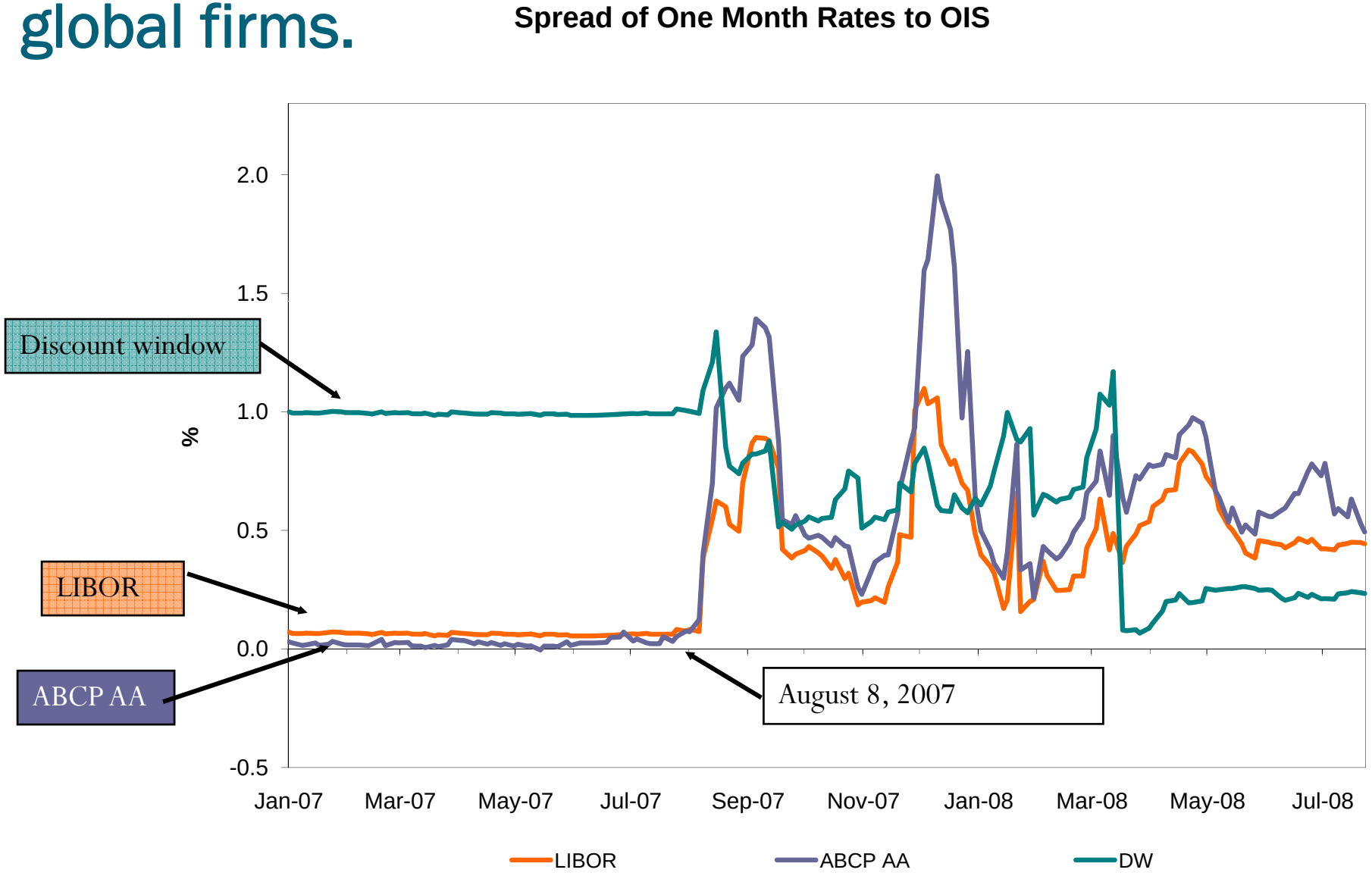
All of these banks have at least one affiliate abroad.

A larger number of U.S. banks borrow and lend internationally, without having foreign branches or subsidiaries.

Figure 2: Number of U.S. Banks with Affiliates in Countries



The crisis provided a natural experiment for testing changes in liquidity allocation across global firms.



We use two clean bank funding shocks

- **Pre-crisis period**: Begins in **2006Q1 through mid 2007**.
- **Shock 1**: **2007Q3 to 2007Q4**. Dollar funding pressure resulted from the subprime market collapse. Adverse balance sheet shock.
- **Shock 2**: **2008Q1 through 2008Q2.** Federal Reserve institutes the Term Auction Facility (late December 2007) to provide emergency funding to banks. Positive balance sheet shock.

Construct **Net Due** (by bank, affiliate borrowing from the rest of the banking organization) average over quarters, by period.

Initial shock by bank: Asset Backed Commercial Paper issuance by related conduits/parent bank equity (2007Q1).

Acharya & Schnabl *IMF Economic Review* (2010)

Econometric methodology (1)

$$\Delta L_{ij} = \beta_0 + \beta_1 \cdot \Delta D_i + \varepsilon_{ij}$$

$$\beta_1 = \beta_0 + \bar{\beta}_i \bar{X}_i + \bar{\beta}_j \bar{X}_j + \bar{\beta}_{ij} \bar{X}_{ij},$$

$$\Delta D_i \sim ABCP_i$$

- Parent banks denoted by *i*, affiliate locations by *j*.

- Conjectures: Decisions to alter internal capital flows depend on bank-affiliate features
  - 1 Funding structure of foreign affiliate, by bank
  - 2 Importance of each foreign affiliate to the parent bank

Econometric methodology (2)

- Additional forces at work
  - Parent bank characteristics: size, liquidity, solvency, foreign ownership, overall importance of foreign, diversification of foreign portfolios
  - Distance between parent and affiliate country markets: geographic, monetary policy, CA openness.
  - Role of offshore financial centers.
  - No controls for branches versus subsidiaries.

- Methodology: Khwaja and Mian (*AER* 2008), Cetorelli and Goldberg (2011 *IMF Economic Review*). *Fixed effects to deal with source (parent bank) effects versus unobservable affiliate market effects.*

Table 3 Change in Net Internal Borrowing by Affiliates - Shock1, All U.S. Reporting Banks.

Significant role of bank-affiliate features

	(3) OLS	(4) Country FEs
ABCP exposure$_i$	-8.134	-23.52
Exp$_i$**Local finance*$_{ij}$	**-400.6*****	**-465.1*****
Exp$_i$**Loan share*$_{ij}$	**8,955*****	**9,405*****
Constant	-7.915	
Observations	546	512
R-squared	0.174	0.298

Similar pattern of results for only U.S. owned sample of banks

Range of specifications show robustness of results, joint role of other controls. Mainly bank size as additional driver early in crisis.

	(1) OLS Country controls	(2) OLS Bank controls	(3) OLS Country and Bank controls	(4) Country FE Country and Bank controls	(5) OLS Level controls included
ABCP exposure$_i$	-535.0	-406.2	-1,615	-1,392	**-4,223***
Exp$_i$**Local finance*$_{ij}$	**-313.6****	**-849.2*****	**-890.3*****	**-811.6*****	**-908.4*****
Exp$_i$**Loan share*$_{ij}$	**8,865*****	**10,603*****	**10,863*****	**10,483*****	**10,866*****
Country variables					
Exp$_i$**OFC*$_j$	-92.80		20.27	59.38	**88.08****
Exp$_i$**kaopen*$_j$	-6.343		-0.0642	20.51	5.486
Exp$_i$**ldistnyc*$_j$	62.21		158.2	100.7	108.6
Exp$_i$**exrate*$_j$	**80.73***		-80.40	34.24	-39.86
Bank variables					
Exp$_i$**Total asset*$_i$		**0.304****	**0.457*****	**0.376***	0.0791
Exp$_i$**Liquidity*$_i$		1,171	762.5	1,114	13,844
Exp$_i$**Solvency*$_i$		5,344	3,567	5,476	**32,642***
Exp$_i$**Loan Herf*$_i$		-709.4	-680.4	-185.5	-391.7
Constant	-6.103	**-89.85***	-90.88		-381.6
Observations	500	546	500	475	500
R-squared	0.193	0.202	0.234	0.332	0.244

Table 7 Change in Net Internal Borrowing by Affiliates – Shock 2, All U.S. Reporting Banks

Second shock a positive funding shock due to TAF, which reverses some of the prior internal flows.

	(3) OLS	(4) Country FEs
ABCP exposure$_i$	-13.74	59.21
Exp$_i$**Local finance*$_{ij}$	**780.0****	**872.4*****
Exp$_i$**Loan share*$_{ij}$	**-6,333*****	**-7,912*****
Constant	14.07	
Observations	559	525
R-squared	0.118	0.218

As crisis proceeds, additional roles for differentiating across affiliates by distance and across parents by solvency

	(1) OLS Country controls	(2) OLS Bank controls	(3) OLS Country and Bank controls	(4) Country FE Country and Bank controls	(5) OLS Level controls
ABCP exposure$_i$	**3,757*** **	**-1,384*** **	**2,895***	**3,269***	**4,827*** **
Exp$_i$**Local finance*$_{ij}$	**646.4***	**1,122*** **	**1,104*** **	**1,072*** **	**1,123*** **
Exp$_i$**Loan share*$_{ij}$	**-6,275*** **	**-7,096*** **	**-7,279*** **	**-8,283*** **	**-7,310*** **
Country variables					
Exp$_i$**OFC*$_j$	337.2		187.0	157.5	164.1
Exp$_i$**kaopen*$_j$	-71.98		-85.16	-117.3	-94.13
Exp$_i$**ldistnyc*$_j$	**-432.9*** **		**-502.4*** **	**-553.8*** **	**-472.7*** **
Exp$_i$**exrate*$_j$	-9.296		79.07	181.3	144.3
Bank variables					
Exp$_i$**Total asset*$_i$		**-0.229** **	**-0.287** **	**-0.242** **	**-0.693*** **
Exp$_i$**Liquidity*$_i$		**2,545***	2,483	2,945	-3,194
Exp$_i$**Solvency*$_i$		**9,922*** **	**11,540*** **	**14,074** **	-3,435
Exp$_i$**Loan Herfindhal*$_i$		**1,677*** **	**1,642*** **	1,003	-30.68
Constant	0.456	**73.33***	**68.03***		120.9
Observations	513	559	513	488	513
R-squared	0.154	0.140	0.186	0.267	0.195

Gauging the economic significance of core v. periphery features of affiliates

Difference in Change in Net Borrowing Across Affiliates: Core v. periphery comparisons in Financing and Lending High ABCP exposed parents ($mil)

	Negative parent funding (shock1)		Positive parent funding (Shock 2)	
	Local Finance	Loan Share	Local Finance	Loan Share
Diff High v. Low	-345	+163	+634	-141
% change of initial net due	-32%	+8.5%	-25%	-3%

From Table 6 , column 4. US banks only. Note: ABCP low 0.2, high 0.78. Percent change of initial net due of 75th percentile ABCP exposed bank, high local finance or high loan share.

Main Findings

- We provide first evidence of liquidity management strategies by global banks
- Contagion / transmission driven by

1) Parent bank ex ante vulnerabilities
2) Business models in affiliate markets, which can differ substantially even for the same parent. "core" versus "periphery" defined over
   - Affiliate financing structure
   - Relative importance of affiliate in lending activities
3) Additional roles of
   - Parent bank size
   - Parent liquidity and solvency later in crisis

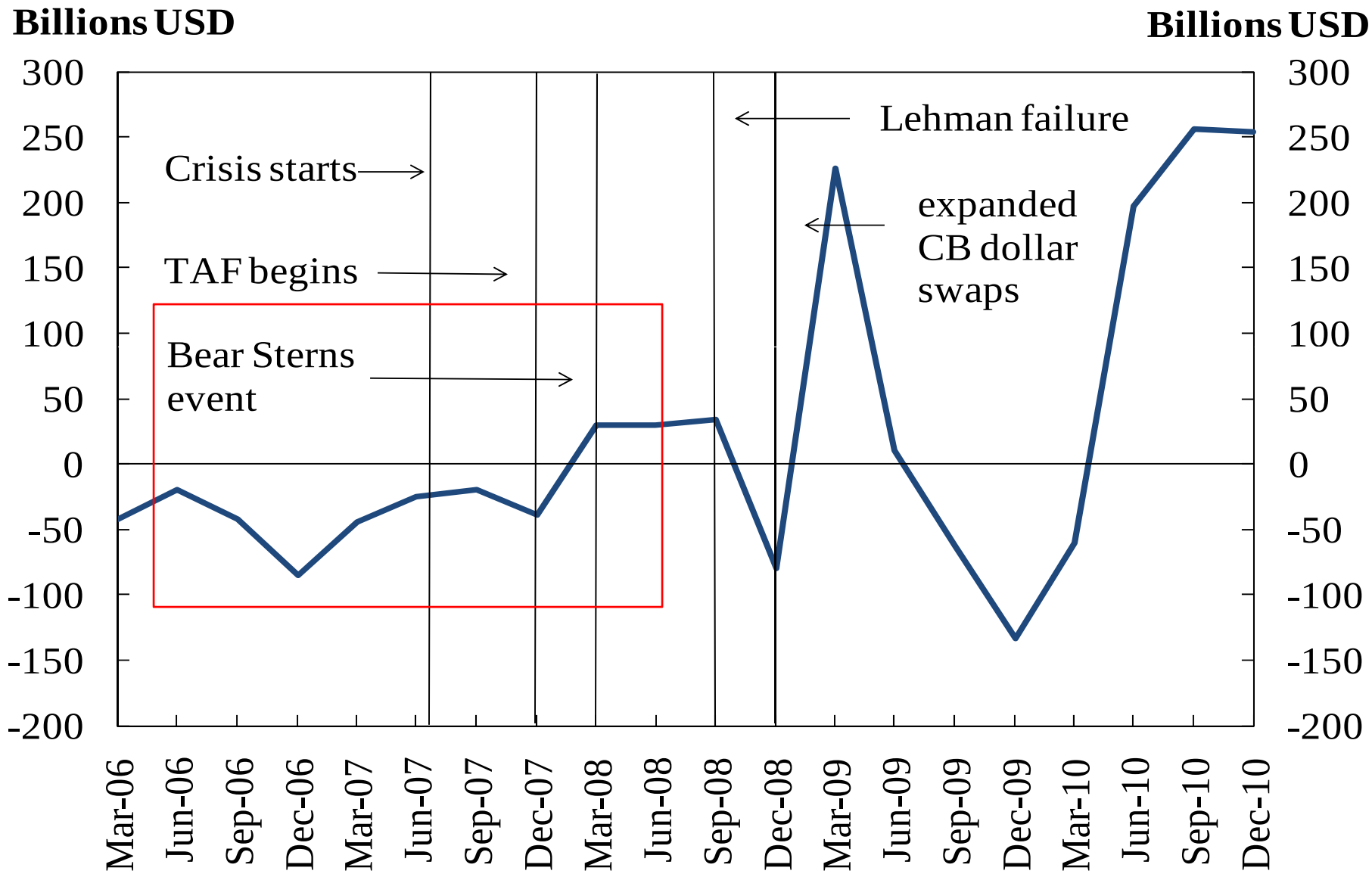
Policy relevance

- Supervision needs to be on top of parent bank vulnerabilities
- There are distinctions across host countries, even given same parent

1) Be aware of role as a "core" versus "periphery" location
2) Likely that branch / subsidiary distinction not key
3) Composition of "core" lending (x-border v. local claims) may matter, but not yet tested.

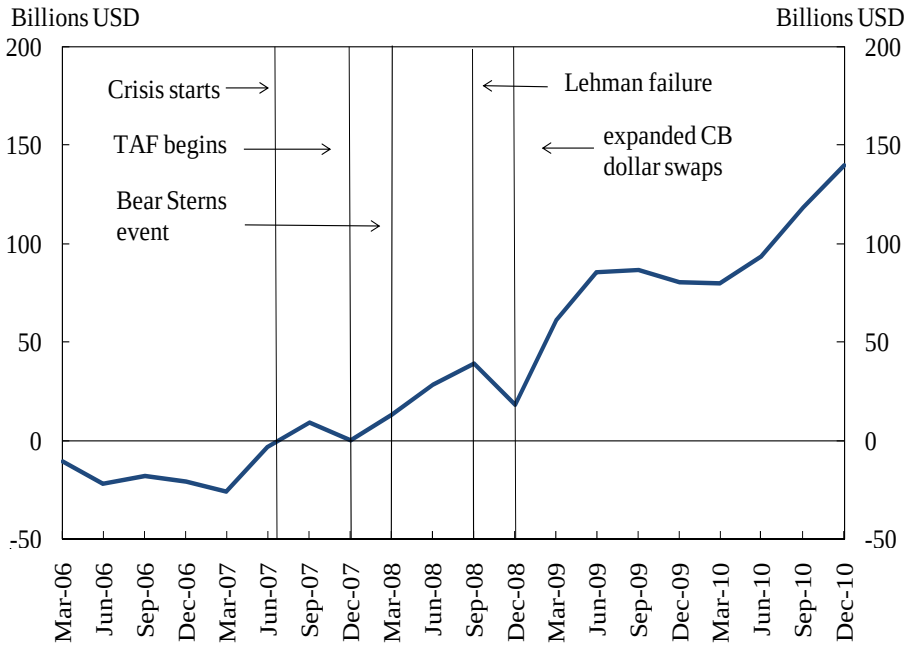
- There are also distinctions across parents, with same host country
- Hosts could consider what alternative sources of liquidity are available to the parent
- As these dimensions of bank globalization change, so will international transmission.

Net Related Borrowing by Overseas Affiliates of U.S. Banks

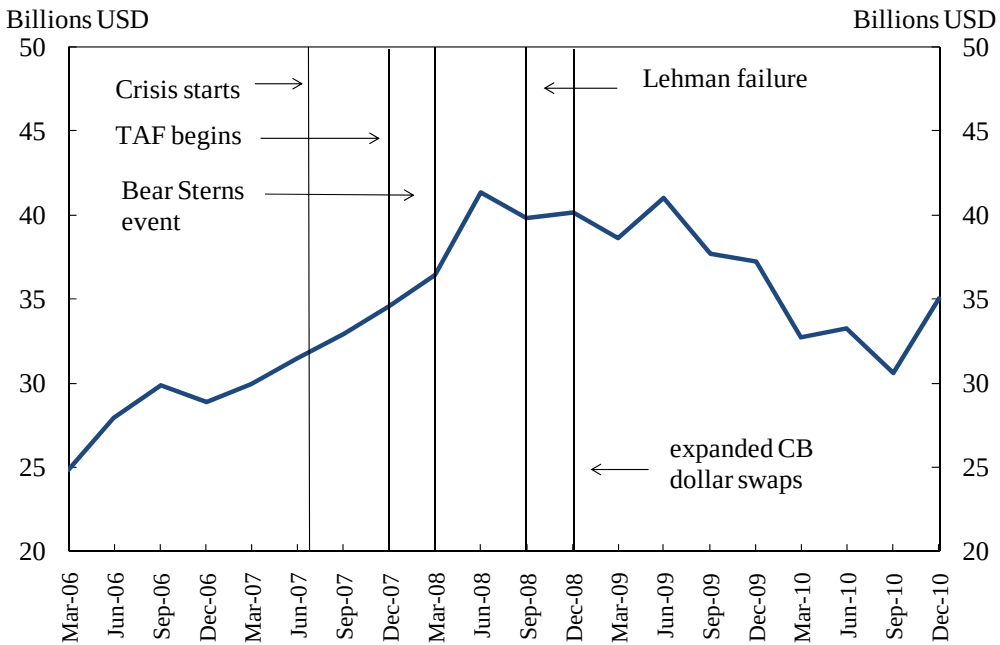


Source: Authors' computation using FFIEC 009 data

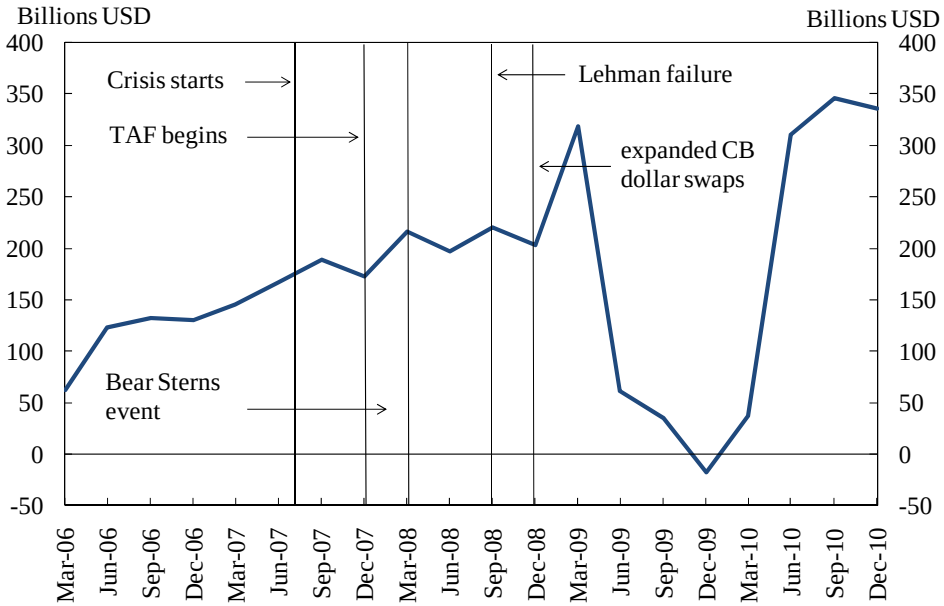
i) Africa, Asia, and Australia



ii) North America



iii) Europe



iv) Central and South America

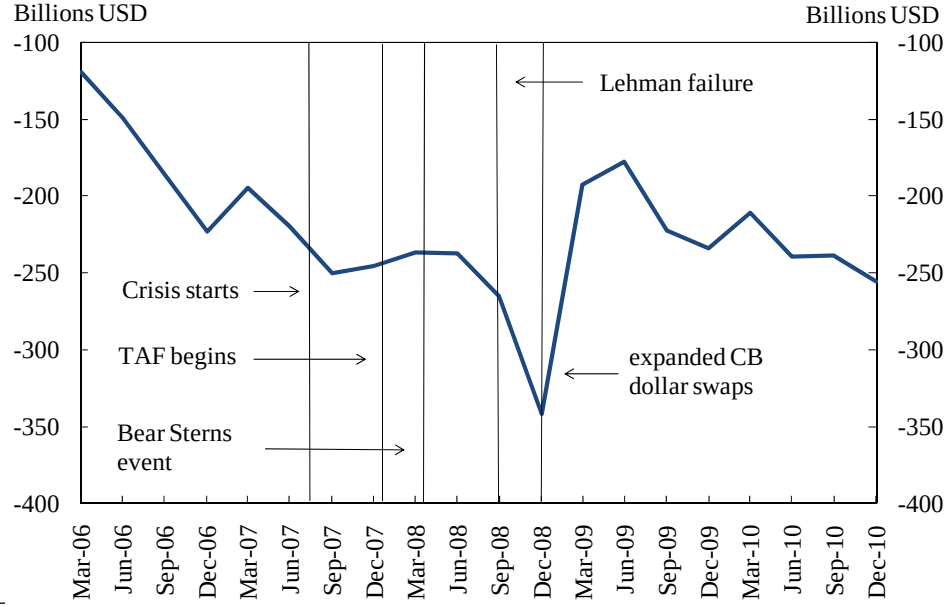


Table 2 Basic Balance Sheet Information of U.S. Banks with Foreign Affiliates (2007Q2 unless otherwise indicated)

Statistics on U.S. Banking Organization		All Banks	Lower LL	Higher LL	Lower IC	Higher IC
Number of parent banks (2006Q1-2010Q4 average quarterly)	median	42	23	25	32	33
Bank asset size (billions USD)	median	552.56	552.56	1395.62	552.56	539.87
Total Net Due From / assets (%)	median	0.74	0.88	1.77	0.74	0.74
Foreign loans / assets (%)	median	4.11	4.11	4.11	4.11	4.30
Bank liquid assets / total assets (%)	median	7.75	7.75	24.24	7.75	7.45
Bank solvency ratio (%)	median	7.61	7.61	6.07	6.95	7.91

Source: Authors' computation using FFIEC 009 data

Table 2 (cont.) Basic Balance Sheet Information of U.S. Banks with Foreign Affiliates (2007Q2 unless otherwise indicated)

Statistics by Affiliated Banking Organizations		**All Banks**	**Lower LL**	**Higher LL**	**Lower IC**	**Higher IC**
Number of bank-affiliate observations (2006Q1-2010Q4 average quarterly)	median	550	180	180	264	264
Local liabilities / total affiliate liabilities [LL] (%)	median	77.63	20.45	100.00	79.86	60.56
Local and cross border claims / total affiliate local and cross border claims (immediate counterparty basis) [IC] (%)	median	0.50	1.04	0.85	0.05	2.19

Source: Authors' computation using FFIEC 009 data

Explanatory variables

Table 3 Summary of Explanatory Variables

	By Banking Organization	By Affiliate Location	By Bank-Affiliate Country	Initial shock scaling
Regression Sample	$\overline{X}_i$	$\overline{X}_j$	$\overline{X}_{ij}$	
	$Solv_i$ $Liquid_i$ $FMshare_i$ $Herf_i$ $Fowner_i$ $Size$	$Distance_j$ $Polity_j$ $Dollarpeg_j$ $ChinnKC_j$ OFC_j	$Localshare_{ij}$ $Loanshare_{ij}$	$ABCP_i$

Figure 3: Value of U.S. Bank Affiliate Liabilities in Countries Worldwide (Million US $)