Liquidity Management of Global Banks
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The views expressed in this presentation are those of the author and do not necessarily represent those of the Federal Reserve Bank of New York or the Federal Reserve System.
Global banks much in the news recently

Mainly getting a pretty bad rap.

Argument:
- Instrumental to the propagation on a global scale of the 2007 crisis.
- More recently, mechanisms of contagion of the European sovereign crisis.

There is substance to this argument.
- The balance sheet of global banks have acted as a specific channel of international propagation of the crisis.
Regulatory backlash

- Negative subtext places global banking at the center of numerous discussions of future regulatory changes to their operations.

- The discussion is one sided: should global banking operations be curbed?

- Examples: “subsidiarization”, “local funding pools”, “ring fencing”.
Global banks as channel of transmission not new discovery but growing in importance

**Global international claims**

1983-2011

$ Billion

Cetorelli and Goldberg
How do banks transmit shocks?

**Global bank**

- **Domestic parent balance sheet**
  - Liquid assets
    - Loans
      - Domestic loans
      - Cross-border loans
  - Deposits
    - Other Funds
      - External borrowing
  - Capital
How do banks transmit shocks?

Global bank

Domestic parent balance sheet

- Liquid assets
  - Loans: Domestic loans, Cross-border loans
  - Deposits
  - Other Funds: External borrowing, Internal borrowing
  - Capital

Foreign affiliate balance sheet

- Foreign liquid assets
  - Loans: Foreign local loans
  - Deposits
  - Other Funds: Internal lending
  - Capital
Global banks manage liquidity globally

- Funding rebalancing achieved through active internal capital market channels.
- Cross-border internal reallocation of funds.
- This is NOT a crisis-specific feature
  - Cetorelli and Goldberg (Journal of Finance, Forthcoming)
Internal funding flows are large

Gross U.S. International inter-bank and intra-bank flows

Inter-bank flows

Intra-bank flows

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.
During crisis very big as well

Source: Federal Reserve Board 2011
Little is known of drivers of global banks liquidity management

- What are the factors determining actual cross border, internal funds dynamics?
- Deeper understanding has crucial normative implications
  - Are foreign banks a source of concern?
  - Should entry and/or mode of operations subject to restrictions?
- These themes on our research agenda
Two conjectures

1. *Organizational pecking order*

Foreign offices balance sheets subordinated to head office

Funds move in ebb and flow

A shock at home means a repatriation of funds across locations

Application of “home bias” hypothesis
Organizational pecking order

Domestic head office

Foreign operations
Organizational pecking order

Domestic head office

Foreign operations

Internal funding flows
Two conjectures

2. Locational pecking order

Each bank manages liquidity needs taking into account relative costs and benefits from pulling and allocating a marginal dollar across each location of operation.

No obvious organizational subordination
Two bank-specific dimensions driving liquidity management strategies

- Local Funding. Each foreign location different in terms of importance in raising local funds

- Local Investment. Each foreign location different in terms of contribution to total foreign claims
Global bank more likely to …

Draw funds from core *local funding sources*

Shield core *investment sinks*
Locational pecking order

Domestic head office

Foreign operations
Locational pecking order
Locational pecking order

- Domestic head office
- Foreign operations
- Funding sources
- Internal funding flows
- Investment sinks
Locational pecking order

Domestic head office

Funding sources

Foreign operations

Internal funding flows

Investment sinks
Data description

- FFIEC 009. Confidential data.
  - Quarterly. Filed by every U.S bank or its holding company, and foreign bank subsidiaries in U.S.
  - For each bank, data by each country in the world
    - cross border claims and claims and liabilities where bank has local offices
    - Net internal borrowing/credit for each location

- Add in parent bank characteristics (Call Report).
- Plus characteristics of destination countries

Cetorelli and Goldberg
Identification strategy

- **Dependent variable**: $\Delta (\text{Net internal borrowing})_{ij}$

- **Business model variables**:
  - Core funding locations:
    $$(\text{Local liabilities} / \text{Internal + Local liabilities})_{ij}$$
  - Core investment locations:
    $$\frac{\text{Total claims}_{ij}}{\text{Total claims}_i}$$
Identification strategy

- **Pre-crisis period**: 2006Q1 – 2007Q2

- **Shock 1**: 2007Q3 to 2007Q4. Dollar funding pressure resulted from the subprime market collapse. Adverse shock on balance sheet of the parent banks.

- **“Pre-existing condition”**: Ex-ante exposure of bank $i$ to ABCP programs (Acharya, Schnabl and Suarez, Journal of Financial Economics, Forthcoming)

- **Shock 2**: 2008Q1 - 2008Q2. Federal Reserve institutes the Term Auction Facility (late December 2007) to provide emergency funding to banks. Positive balance sheet shock.
Econometric methodology

\[ \Delta \text{NetDueTo}^p_{ij} = \beta_0 + \beta_1 \cdot \text{Shock}_i + \beta_2 \cdot X_{it} + \beta_3 \cdot X_j + \beta_4 \cdot X_{ijt} + \varepsilon_{ijt} \]

\[ \beta_1 = \gamma_0 + \gamma_1 \cdot X_{it} + \gamma_2 \cdot X_j + \gamma_3 \cdot X_{ijt} \]

- Conjectures:
  - Organization pecking order \( \gamma_0 \neq 0 \) \( \gamma_3 = 0 \)
  - Locational pecking order \( \gamma_0 \neq 0 \) \( \gamma_3 \neq 0 \)
Identification strategy

- Location \( j \) Fixed Effects (local demand conditions)
- Bank \( i \) Fixed Effects
- Vector of bank characteristics
- Vector of location characteristics
- Exploit both intra- and inter-bank heterogeneity
Change in Net Internal Borrowing by Affiliates
Shock 1 and Shock 2
All U.S. Reporting Banks

Shock 1

ABCP Exposure\textsubscript{i} \* Core funding\textsubscript{ij} \hspace{1cm} \textbf{Negative***}

ABCP Exposure\textsubscript{i} \* Core investment\textsubscript{ij} \hspace{1cm} \textbf{Positive***}
<table>
<thead>
<tr>
<th></th>
<th>Shock 1</th>
<th>Shock 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ABCP \text{ Exposure}<em>i \times \text{Core funding}</em>{ij}$</td>
<td>Negative***</td>
<td>Positive***</td>
</tr>
<tr>
<td>$ABCP \text{ Exposure}<em>i \times \text{Core investment}</em>{ij}$</td>
<td>Positive***</td>
<td>Negative***</td>
</tr>
</tbody>
</table>

Evidence in support of the locational pecking order hypothesis
Economic significance of core v. periphery features of affiliates

<table>
<thead>
<tr>
<th>Difference in Change in Net Borrowing of Affiliates from Parents: Core v. periphery comparisons in Financing and Lending High ABCP exposed parents ($mil)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Shock1</th>
<th>Shock 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core funding</td>
<td>-$586 M</td>
<td>$1148 M</td>
</tr>
<tr>
<td>Core investment</td>
<td>$236 M</td>
<td>-$154 M</td>
</tr>
<tr>
<td>Diff High v. Low</td>
<td>-$586 M</td>
<td>$236 M</td>
</tr>
<tr>
<td>% change of initial net due</td>
<td>-53</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>-3</td>
</tr>
</tbody>
</table>
Normative considerations

- Host country perspective on foreign shock transmission
  - less about overall “openness” to international banking
  - more about the specific characteristics of individual foreign banks engaged in its economy.
  - Bank-to-country specific characteristics matter: Argentina may be a core funding market for Santander but a core investment market for Citi
Predicted internal borrowing and lending from/to foreign locations
First shock event

By country, share of total gross flows

- Inflows
- Outflows

Total inflows as a share of total gross flows
Total outflows as a share of total gross flows
Reference slides

Cetorelli and Goldberg
## Explanatory variables

### Table 3 Summary of Explanatory Variables

<table>
<thead>
<tr>
<th>Regression Sample</th>
<th>By Banking Organization</th>
<th>By Affiliate Location</th>
<th>By Bank-Affiliate Location</th>
<th>Initial shock scaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \bar{X}_i )</td>
<td>( \bar{X}_j )</td>
<td>( \bar{X}_{ij} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{Solv}_i)</td>
<td>(\text{Distance}_j)</td>
<td>(\text{Localshare}_{ij})</td>
<td>(\text{ABCP}_i)</td>
<td></td>
</tr>
<tr>
<td>(\text{Liquid}_i)</td>
<td>(\text{Polity}_j)</td>
<td>(\text{Loanshare}_{ij})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{FMshare}_i)</td>
<td>(\text{Dollarpeg}_j)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{Herf}_i)</td>
<td>(\text{ChinnKC}_j)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{Fowner}_i)</td>
<td>(\text{OFC}_j)</td>
<td></td>
<td></td>
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<tr>
<td>(\text{Size})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>$\text{Shock}_i$</td>
<td>-5695.7*</td>
<td>-7156</td>
<td>-2219.9</td>
<td></td>
</tr>
<tr>
<td>$\text{Shock}<em>i \times \text{CoreFunding}</em>{ij}$</td>
<td>-1157.5***</td>
<td>-1158.6***</td>
<td>-569.9**</td>
<td>-1312.9***</td>
</tr>
<tr>
<td>$\text{Shock}<em>i \times \text{CoreInvestment}</em>{ij}$</td>
<td>14120.8***</td>
<td>13215.8***</td>
<td>8867.6***</td>
<td>16755.3***</td>
</tr>
<tr>
<td>$\text{Constant}$</td>
<td>-770.2</td>
<td>-753.3</td>
<td>-1680.4</td>
<td>-1460.8</td>
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</table>

<table>
<thead>
<tr>
<th>Control Variables</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
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<tbody>
<tr>
<td>Bank Controls</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Country Controls</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
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<td>No</td>
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<td>Observations</td>
<td>509</td>
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<td>480</td>
<td>509</td>
<td>432</td>
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<tr>
<td>$R^2$</td>
<td>0.24</td>
<td>0.32</td>
<td>0.29</td>
<td>0.33</td>
<td>0.31</td>
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</tbody>
</table>

Table 3: Change in Affiliate Borrowing from Parents Testing Organizational v. Locational Pecking Order – Shock 1

* Full sample, OLS
* Drop Caymens, OLS
* US Only
<table>
<thead>
<tr>
<th></th>
<th>Column (a)</th>
<th>Column (b)</th>
<th>Column (c)</th>
<th>Column (d)</th>
<th>Column (e)</th>
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</thead>
<tbody>
<tr>
<td><strong>Shock_i</strong></td>
<td>3806***</td>
<td>4266.2***</td>
<td>2162*</td>
<td>6086***</td>
<td></td>
</tr>
<tr>
<td><strong>Shock_i_CoreFunding_ij</strong></td>
<td>1147.8***</td>
<td>1101.1***</td>
<td>308.5***</td>
<td>1218.7***</td>
<td>1520.3***</td>
</tr>
<tr>
<td><strong>Shock_i_CoreInvestment_ij</strong></td>
<td>-6600.5**</td>
<td>-5732.8*</td>
<td>-1526</td>
<td>-7509.8**</td>
<td>-11760.6***</td>
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<tr>
<td><strong>Constant</strong></td>
<td>-1341.1</td>
<td>-6.6</td>
<td>-713.7</td>
<td>14411***</td>
<td>-1775.6</td>
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<td>No</td>
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<tr>
<td><strong>Country Controls</strong></td>
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<td>No</td>
<td>Yes</td>
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<td><strong>Foreign Office Controls</strong></td>
<td>Yes</td>
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<td><strong>Country FE</strong></td>
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<tr>
<td><strong>Bank FE</strong></td>
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<td>No</td>
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<td>No</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>517</td>
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<td>489</td>
<td>517</td>
<td>442</td>
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<tr>
<td><strong>R-squared</strong></td>
<td>0.23</td>
<td>0.30</td>
<td>0.26</td>
<td>0.25</td>
<td>0.27</td>
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</table>
The crisis provided a natural experiment for testing changes in liquidity allocation across global firms.

Spread of One Month Rates to OIS

August 8, 2007
Table 1 Counts of U.S. Banks With Foreign Affiliates

<table>
<thead>
<tr>
<th>ALL banks</th>
<th>2006q1</th>
<th>2007q1</th>
<th>2008q1</th>
<th>2009q1</th>
<th>2010q1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>42</td>
<td>41</td>
<td>39</td>
<td>43</td>
<td>44</td>
</tr>
<tr>
<td>US-owned</td>
<td>27</td>
<td>26</td>
<td>26</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>foreign-owned</td>
<td>15</td>
<td>15</td>
<td>13</td>
<td>18</td>
<td>19</td>
</tr>
</tbody>
</table>

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

Source data: Author calculations using 2007Q2 FFTEC009 regulatory reports filed by U.S. banks.