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

Hyun Song Shin
Princeton University

Paper presented at the First IMF Statistical Forum

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Hanan AbuShanab    Goran Amidzic    Luca Errico
Artak Harutyunyan    Yevgeniya Korniyenko    Elena Loukoianova
Hyun Song Shin    Richard Walton

First IMF Statistical Forum

Washington DC, November 12-13, 2013
“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

- Banking Sector
- New Borrowers
- Foreign Creditors
- Domestic Depositors
- Borrowers
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.
### Figure 1. United States: 2011 BSA Matrix

**Global Flow of Funds**

The table below represents the United States Balance of Payments (BSA) for the year 2011. It details the financial transactions between various sectors and shows the assets and liabilities for each transaction. The net position is also indicated for each sector.

**Table - United States BSA Matrix**

<table>
<thead>
<tr>
<th>Sector/Instrument</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Net Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Bank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currency and deposits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State and Local Government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Nonfinancial Corporations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Depository Corporations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Financial Corporations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonfinancial Corporations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other resident sectors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonresidents</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table includes various subcategories such as currency and deposits, central bank, state and local government, and other financial corporations, among others. Each entry denotes the flow of funds between these sectors.

Source: Global Flow of Funds.
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.
Figure 16. Determinants of domestic loan growth to non-financial sector

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

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) ODCs+OFCS loans to corporates</th>
<th>(2) ODCs+OFCS loans to ONFCs</th>
<th>(3) ODCs+OFCS loans to PNFCs</th>
<th>(4) ODCs loans to corporates</th>
<th>(5) ODCs loans to ONFCs</th>
<th>(6) ODCs loans to PNFCs</th>
<th>(7) OFCs loans to corporates</th>
<th>(8) OFCs loans to ONFCs</th>
<th>(9) OFCs loans to PNFCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.reer_dig</td>
<td>-0.0115 (0.741)</td>
<td>0.000066 (0.974)</td>
<td>-0.0238 (0.936)</td>
<td>-0.0149 (0.668)</td>
<td>-0.00167 (0.959)</td>
<td>-0.00295 (0.922)</td>
<td>0.0180 (0.908)</td>
<td>0.0196 (0.241)</td>
<td>0.0919 (0.837)</td>
</tr>
<tr>
<td>L.vix</td>
<td>-0.00253 (0.862)</td>
<td>-0.00137 (0.938)</td>
<td>-0.183 (0.417)</td>
<td>-0.00629 (0.721)</td>
<td>-0.00329 (0.865)</td>
<td>-0.193 (0.389)</td>
<td>0.0861 (0.657)</td>
<td>0.153 (0.509)</td>
<td>0.578 (0.219)</td>
</tr>
<tr>
<td>L.interoffice_pch</td>
<td>0.00242 (0.242)</td>
<td>0.000962 (0.633)</td>
<td>-0.0307 (0.445)</td>
<td>0.00287 (0.155)</td>
<td>0.00139 (0.420)</td>
<td>-0.0329 (0.753)</td>
<td>0.00389 (0.454)</td>
<td>-0.00775 (0.555)</td>
<td>-0.0163 (0.555)</td>
</tr>
<tr>
<td>L.qe</td>
<td>0.00240 (0.764)</td>
<td>-0.00133 (0.869)</td>
<td>-0.0675 (0.533)</td>
<td>0.00420 (0.445)</td>
<td>0.00102 (0.420)</td>
<td>-0.0711 (0.522)</td>
<td>0.0183 (0.761)</td>
<td>-0.0176 (0.759)</td>
<td>0.413 (0.101)</td>
</tr>
<tr>
<td>L.qe_vix</td>
<td>-0.0451 (0.192)</td>
<td>-0.0384 (0.262)</td>
<td>0.345 (0.426)</td>
<td>-0.0486 (0.158)</td>
<td>0.0435 (0.158)</td>
<td>0.352 (0.422)</td>
<td>-0.122 (0.498)</td>
<td>-0.0448 (0.801)</td>
<td>-1.302* (0.0577)</td>
</tr>
<tr>
<td>L.rgdp_pch</td>
<td>0.131*** (0.00460)</td>
<td>0.164*** (0.000195)</td>
<td>-0.0562 (0.748)</td>
<td>0.132*** (0.000461)</td>
<td>0.162*** (0.000200)</td>
<td>-0.00966 (0.795)</td>
<td>-0.826*** (0.00322)</td>
<td>-0.450 (0.260)</td>
<td>-0.365 (0.698)</td>
</tr>
<tr>
<td>L.acpi_pch</td>
<td>-0.0250 (0.557)</td>
<td>-0.0404 (0.300)</td>
<td>-0.0269 (0.883)</td>
<td>-0.0258 (0.544)</td>
<td>-0.0419 (0.260)</td>
<td>-0.0332 (0.857)</td>
<td>0.161 (0.524)</td>
<td>0.134 (0.966)</td>
<td>-0.0446 (0.696)</td>
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<tr>
<td>L.dgp</td>
<td>-0.0442*** (1.50e-05)</td>
<td>-0.0374*** (0.000313)</td>
<td>-0.0160 (0.687)</td>
<td>-0.0420*** (2.86e-05)</td>
<td>-0.0364*** (0.000557)</td>
<td>-0.0161 (0.688)</td>
<td>-0.172*** (0.0905)</td>
<td>-0.196* (0.0671)</td>
<td>0.687 (0.119)</td>
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<tr>
<td>L.noncore_liab_dig</td>
<td>0.0169*** (0.00224)</td>
<td>0.0143*** (0.000617)</td>
<td>-0.00315 (0.975)</td>
<td>0.0176*** (0.00137)</td>
<td>0.0145*** (0.00426)</td>
<td>0.05443 (0.0692)</td>
<td>0.0327 (0.0206)</td>
<td>0.0704 (0.416)</td>
<td>-0.0835 (0.416)</td>
</tr>
<tr>
<td>L.anb_stock_allfcs_rallrcwtd_dig</td>
<td>0.147*** (0.00332)</td>
<td>0.169*** (0.0267)</td>
<td>0.02347 (0.950)</td>
<td>0.153*** (0.00213)</td>
<td>0.117*** (0.0180)</td>
<td>0.0401 (0.931)</td>
<td>0.609 (0.769)</td>
<td>0.505 (0.989)</td>
<td>-0.0550 (0.989)</td>
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<tr>
<td>L.dep_rate</td>
<td>-0.0249 (0.682)</td>
<td>0.0103 (0.834)</td>
<td>-0.102 (0.668)</td>
<td>-0.0337 (0.599)</td>
<td>0.00265 (0.956)</td>
<td>-0.127 (0.597)</td>
<td>0.364 (0.524)</td>
<td>-0.259 (0.599)</td>
<td>-1.156 (0.469)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0540*** (0)</td>
<td>0.0564*** (0.0481)</td>
<td>0.05811 (0.566)</td>
<td>0.0539*** (0.587)</td>
<td>0.0486*** (0.540)</td>
<td>0.0842 (0.394)</td>
<td>0.0854 (0.278)</td>
<td>0.0783 (0.239)</td>
<td>-0.330* (0.0617)</td>
</tr>
<tr>
<td>Number of obs</td>
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<td>3,295</td>
<td>3,062</td>
<td>3,295</td>
<td>3,062</td>
<td>3,295</td>
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<td>699</td>
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<tr>
<td>R-squared</td>
<td>0.048</td>
<td>0.045</td>
<td>0.002</td>
<td>0.049</td>
<td>0.045</td>
<td>0.002</td>
<td>0.017</td>
<td>0.012</td>
<td>0.200</td>
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<td>Number of country_code</td>
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<td>25</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>

Robust p value in brackets
*** p<0.01, ** p<0.05, * p<0.1
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:

\[(\text{location}, \text{sector})\]

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