Identifying Central Bank Liquidity Super-Spreaders in Interbank Funds Networks
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Roadmap

• The idea
• Summary of key features
• Points of discussion:
  – CUD Data
  – HITS approach
  – Econometric test
The idea

• Analysis of the Colombian interbank fund market (uncollateralized and repos) to assess super-spreaders (both lending/borrowing) using network analysis

• Motivation:
  – Liquidity conduits can support CB monetary policy
  – They affect (pos/neg) efficiency and stability of the interbank market
  – The assessment of fund market network topology is an important monitoring tool for market resilience and systemic risk
Key Features

• Unique dataset constructed from CUD (CUD – Cuentas de Depósito) among CI, BK, IF, PF, X.

• Fund network built by merging uncollateralized interbank market with CB’s repos

• Use of HITS algo to construct LSI

• Results:
  – Kind of core-periphery structure
  – 11 super-spreaders (main CI)
  – Main determinant of being SS is size
CUD Data

- 28,393 lending transactions from January 2 to December 17 2013 to match legs of interbank contracts.

POINTS OF DISCUSSION
- Which algorithm did you use? Furfine?
- Accuracy of Furfine/based algorithms
  - Maturity structure?
  - Partial repayments, roll overs, etc
- Annual aggregation
- Deeper analysis overtime
LSI in 2011-12-13

CI22 recently became dominant in the LSI, followed by CI20.
They double their score (.15 to .3 and .1 to about .18 respectively)

CI3 moved from almost .5 to .08
Inclusion of CB

Table 1
Standard statistics for the interbank funds and central bank’s repo network

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Including the central bank</th>
<th>Excluding the central bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>92</td>
<td>91</td>
</tr>
<tr>
<td>Density</td>
<td>0.07&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.07</td>
</tr>
<tr>
<td>Mean geodesic distance</td>
<td>2.04</td>
<td>2.05</td>
</tr>
<tr>
<td>Degree</td>
<td>(In</td>
<td>Out)</td>
</tr>
<tr>
<td>Mean</td>
<td>6.62</td>
<td>6.62</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>8.35</td>
<td>10.68</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.59</td>
<td>2.55</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>4.78</td>
<td>11.33</td>
</tr>
<tr>
<td>Power-law exponent</td>
<td>1.60</td>
<td>3.50&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Assortativity index</td>
<td>0.54</td>
<td>0.06</td>
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<tr>
<td>Strength</td>
<td>(In</td>
<td>Out)</td>
</tr>
<tr>
<td>Mean</td>
<td>1.09</td>
<td>1.09</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>3.35</td>
<td>8.49</td>
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<tr>
<td>Skewness</td>
<td>5.37</td>
<td>9.37</td>
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<tr>
<td>Kurtosis</td>
<td>37.24</td>
<td>89.24</td>
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<tr>
<td>Power-law exponent</td>
<td>1.43</td>
<td>2.00&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Assortativity index</td>
<td>0.04</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

<sup>a</sup>The calculation of density is adjusted for the exclusion of financial institutions’ payback for the repo.

<sup>b</sup>Based on Clauset et al. (2009) goodness of fit tests, there is a strong case for a power law distribution with the estimated exponent.
Spectral decomposition

- HITS used to assess Liquidity Super Spreaders

- POINTS OF DISCUSSION:
  - What is a super-spreader? Is the HITS approach really capturing SS, or those equally balanced active players?
  - General eigen-decomposition $A = VDV^{-1}$ can be used as long as $A$ is diagonalizable. Further generalization using generalized eigenvalues/vectors can be used.
  - Are SS providing a positive or negative contribution? Stability analysis of the market.
Econometric test

- Probit model on a set of institution-specific variables
- Size is the main characteristic driving LSI

- POINT OF DISCUSSION
  - Within big banks analysis
Tiering in fund network

- Assess the success of monetary policy via CB’s repo
  - CI22, CI25, CI1, CI23 vs the other SS

- Why was the policy unsuccessful for CI21, CI27 (maybe also IF12)
Similarity with our work in India

banks(A-D), cooperative(E), mutual funds(MF), Insurance(H)

Source: FSR Dec 2012, RBI; Markose & Giansante project in India 2011-2014