

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

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**Network models, stress testing, and other tools for financial stability monitoring and macroprudential policy design and implementation.**

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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

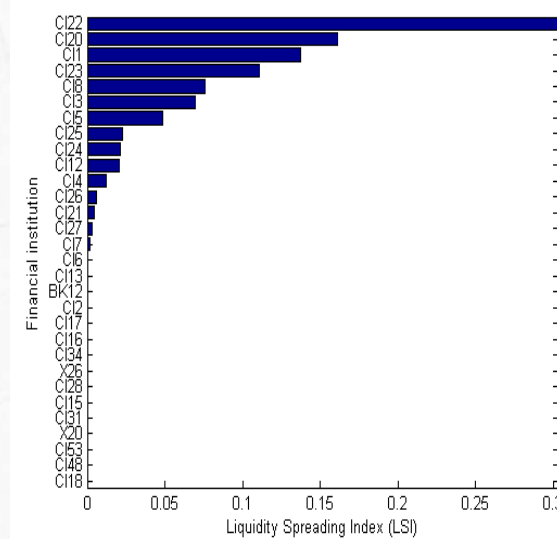
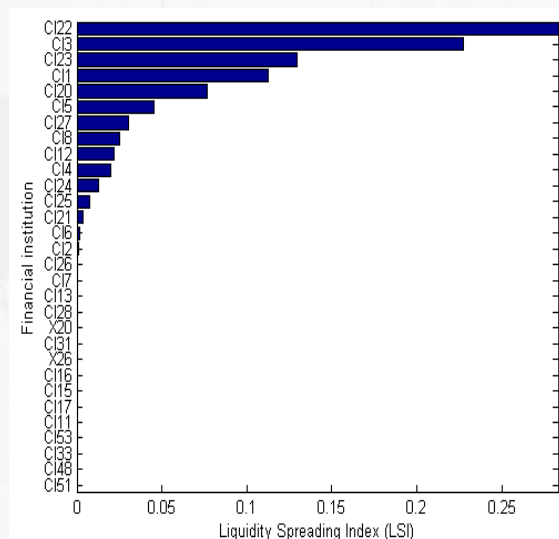
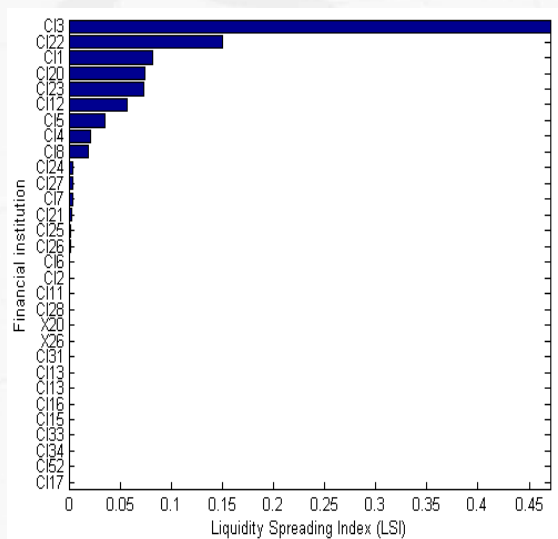
- 28,393 lending transactions from January 2 to December 17 2013 to match legs of interbank contracts.
- POINTS OF DISCUSSION
  - Which algorithm did you use? Furfine?
  - Accuracy of Furfine/based algorithms
    - Maturity structure?
    - Partial repayments, roll overs, etc
  - Annual aggregation
  - Deeper analysis overtime

# LSI in 2011-12-13

2011

2012

2013



**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

Statistic	Including the central bank	Excluding the central bank
Participants	92	91
Density	0.07 <sup>a</sup>	0.07
Mean geodesic distance	2.04	2.05
Degree	(In   Out)	(In   Out)
<i>Mean</i>	6.62   6.62	6.16   6.16
<i>Standard deviation</i>	8.35   10.68	8.17   10.00
<i>Skewness</i>	1.59   2.55	1.59   2.64
<i>Kurtosis</i>	4.78   11.33	4.81   13.11
<i>Power-law exponent</i>	1.60   3.50 <sup>b</sup>	1.60   1.71
<i>Assortativity index</i>	0.54   0.06	0.57   0.15
Strength	(In   Out)	(In   Out)
<i>Mean</i>	1.09   1.09	1.10   1.10
<i>Standard deviation</i>	3.35   8.49	3.16   3.02
<i>Skewness</i>	5.37   9.37	6.40   4.29
<i>Kurtosis</i>	37.24   89.24	51.32   24.99
<i>Power-law exponent</i>	1.43   2.00 <sup>b</sup>	3.14 <sup>b</sup>   1.41
<i>Assortativity index</i>	0.04   -0.05	0.05   -0.01

# Spectral decomposition

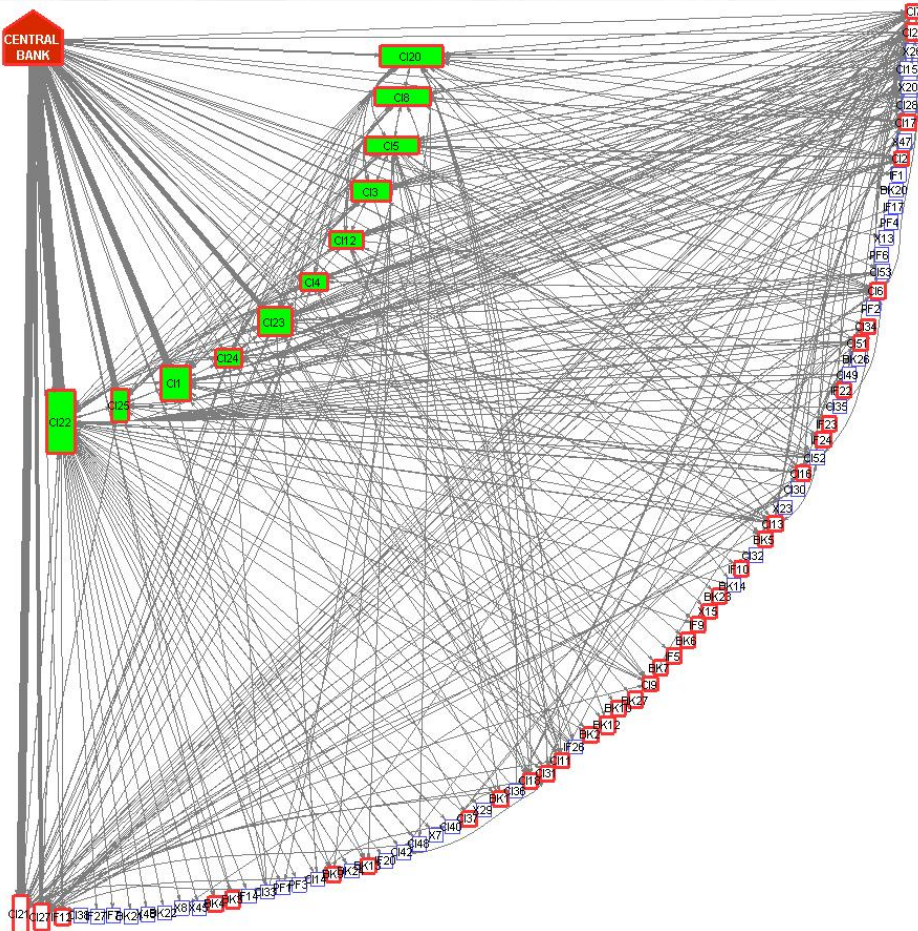
- HITS used to assess Liquidity Super Spreaders
- POINTS OF DISCUSSION:
  - What is a super-spreader? Is the HITS approach really capturing SS, or those equally balanced active players?
  - General eigen-decomposition  $A=VDV^{-1}$  can be used as long as  $A$  is diagonalizable. Further generalization 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)*

