

Discussion: Measures of Financial Network Complexity A Topological Approach

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Main aspects

- The authors propose a definition of complexity adequate in the context of financial counterparty networks.
- The authors propose some relevant and useful complexity metrics using algebraic topology.
- The paper focus on networks of positions and transactions in financial markets.
 - *“The network is a set of counterparties engaging in bilateral exchanges. Each agreement consists of one party transferring collateral to the other party in exchange of cash, the deal will be unwound at a later agreed time.”*

Main aspects

- Metric characteristics:
 - Focus on financial markets
 - Statistics at the network level
 - Financially meaningful
 - Intuitive representation
 - Sensitive to local interactions
 - Capture complexity
- Some metrics:
 - Cycles are netting opportunities
 - Cycle Rank, measures how close a digraph is to a directed acyclic graph (meaning no additional netting opportunities)
- The authors also provide some relevant measures in line graphs and they also provide the financial intuition:

Main aspects

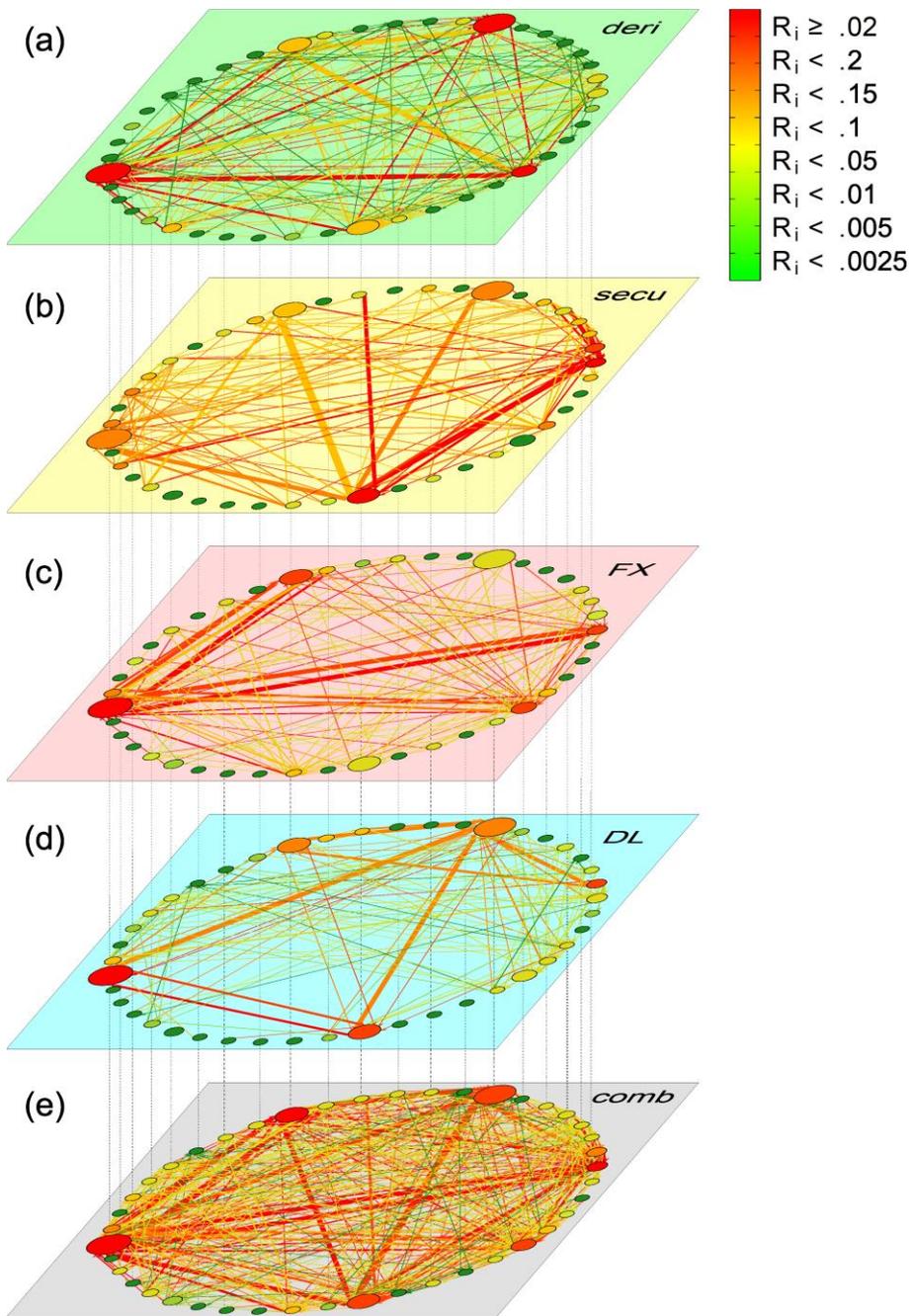
- The proposed measures also contain useful information, beyond complexity.
- The paper shows again that we should care more about CCPs.
- The main numerical results of the paper are based on simulations using random graphs with the promise of getting more empirical in the near future by applying the proposed metrics to CDs networks.
- By resorting to these complexity measures, the paper also proposes an optimal size (in terms of complexity) for the core of a core-periphery network.

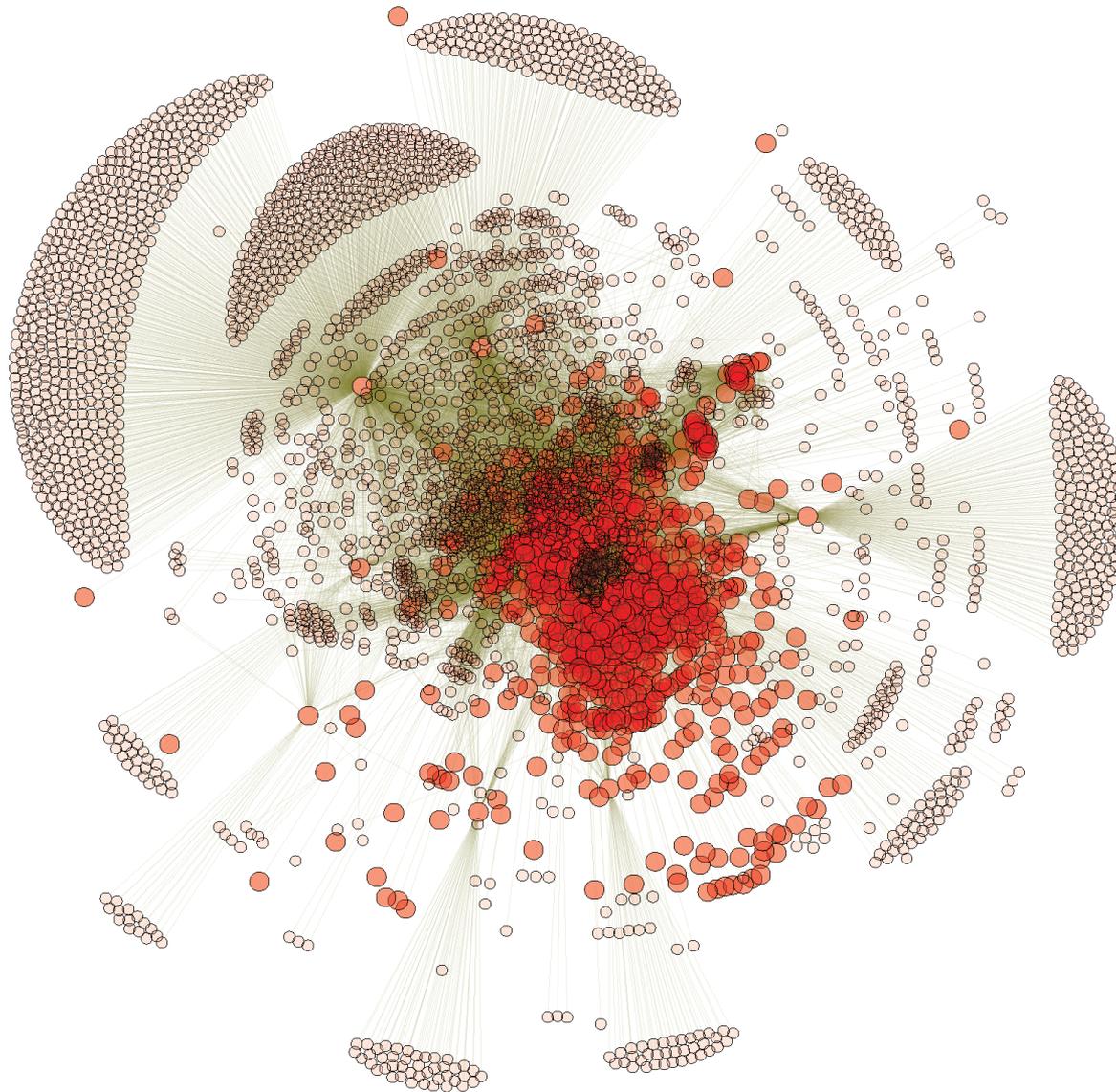
Main comments

- Have the authors thought about complexity in the multiplex network?
 - The study of complexity of single layers of the financial network might not be the same as the complexity of the multilayer network.
 - The financial system is more complexly connected than one might think...
- It is clear that the authors have done a good work on the proposed metrics and their economic intuition
- The authors should discuss more about possible policy implications
 - Does the last result of the paper indicates that we should set the incentives in order to get a certain (optimal) core-periphery structure?
 - What if we detect that there are netting opportunities?

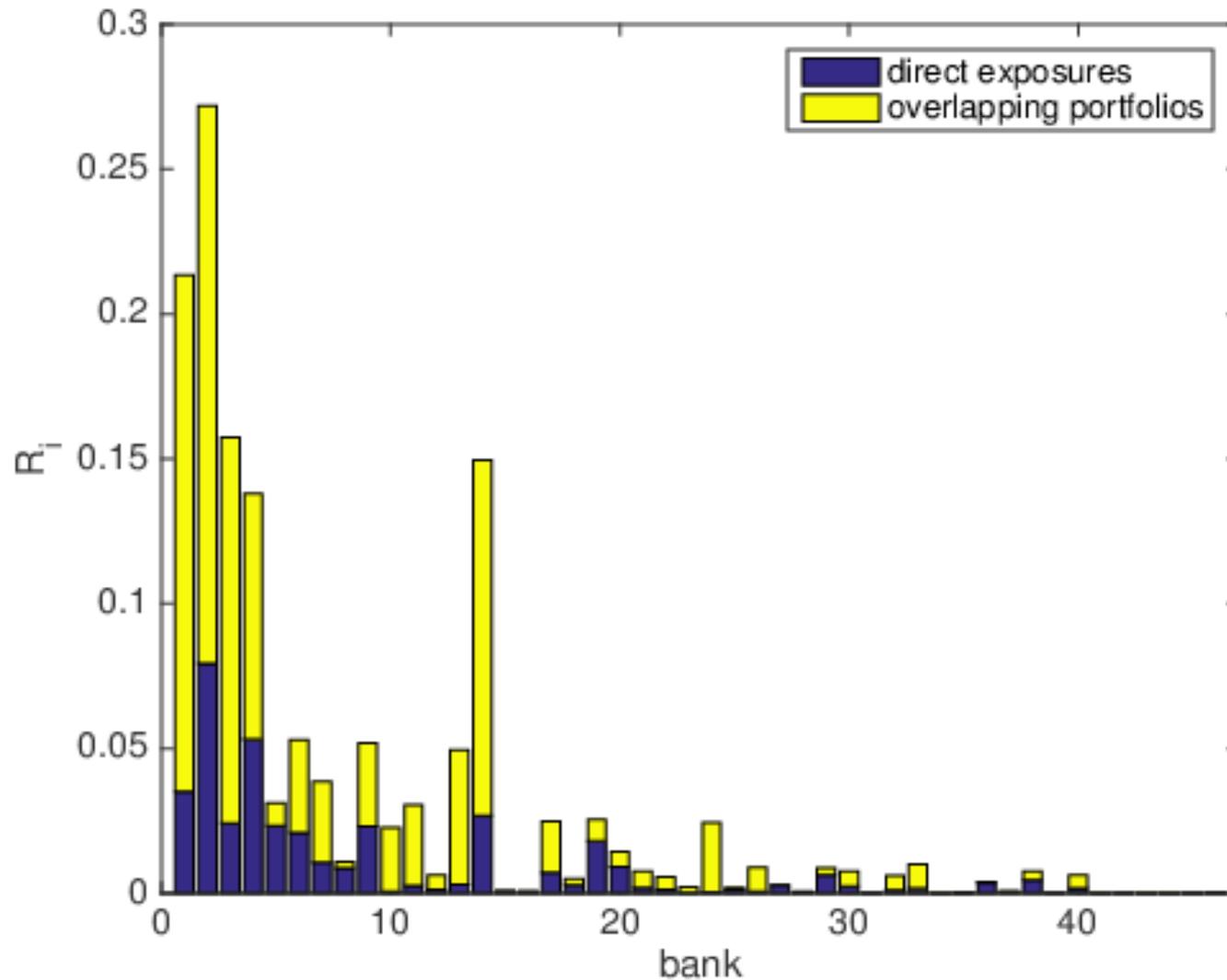
Main comments

- What about the computational complexity of the algorithms to compute the metrics? There is no mention on the paper about this.
 - For example , the decision problem for the cycle rank computation is NP-complete.
 - For big networks this could be a problem.
- The simulations used for the numerical exercises are rather small and I am afraid that we would like to see some serious networks, in absence of real financial networks. At least one would like to see core-periphery structures and some classes of scale free networks.
- CDs networks are interesting and important networks to study but how about secured lending transactions and securities lending and borrowing?





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- Thank you for listening!



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