Interconnectedness of the banking sector as a vulnerability to crises

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The views expressed herein are my own and do not reflect those of the Deutsche Bundesbank

Outline

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Authors' research question

- The "high-level" question

  To what extent did financial globalisation affect the incidence and propagation of financial crises?

- Financial globalisation $\Longleftrightarrow$ cross-border financial positions

- Interesting aside - Lane (2012) asked the same question in a paper prepared for the 11th Annual BIS Conference

- The debate is still very much alive …

Authors' research question

- The authors employ a network view of financial flows
- Consequently, the specific research question is

  How does the position of a country's banking sector, relative to other domestic and foreign sectors, affect the incidence of banking crises in that country?

- The first step to address this question is to construct the network of financial flows between various domestic and foreign institutions sectors - ***Macro-networks***

Methodology - Macro-networks

- A macro-network depicts the flow of funds between banking sectors and other institutional sectors (non-financial corporations, insurance and pension companies, households, etc)

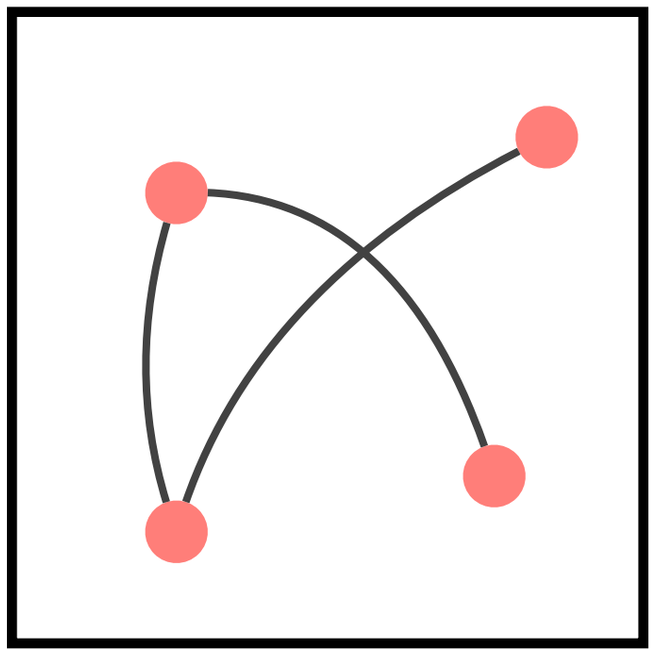
- The authors construct a macro-network for the eurozone

- Two bits of public data - from the ECB - are used:

    - Euro Area Accounts data - domestic exposures between domestic institutional sectors; data available for different financial instruments

    - Balance Sheet Items for Monetary and Financial Institutions data - cross-border exposures between the banking sectors of different eurozone countries; data is aggregated across financial instruments

Balance Sheet Items for MFIs



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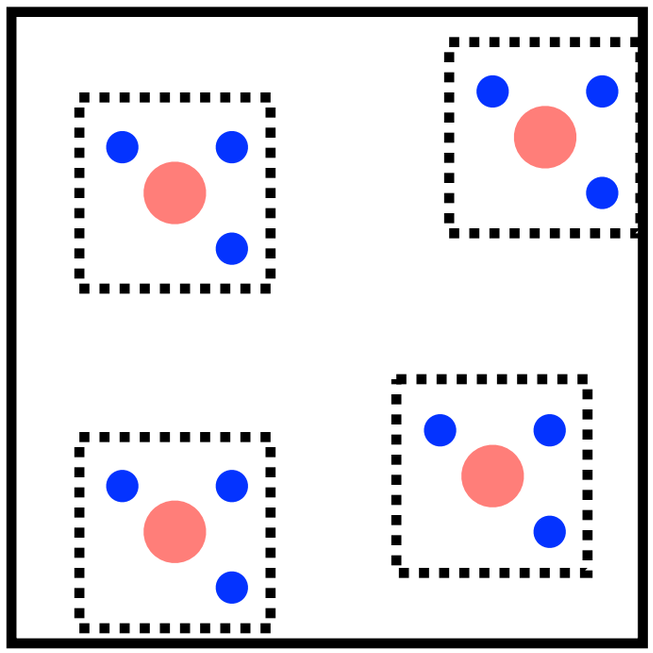
Euro Area Accounts for institutional sectors



We do not know the exposures between domestic sectors

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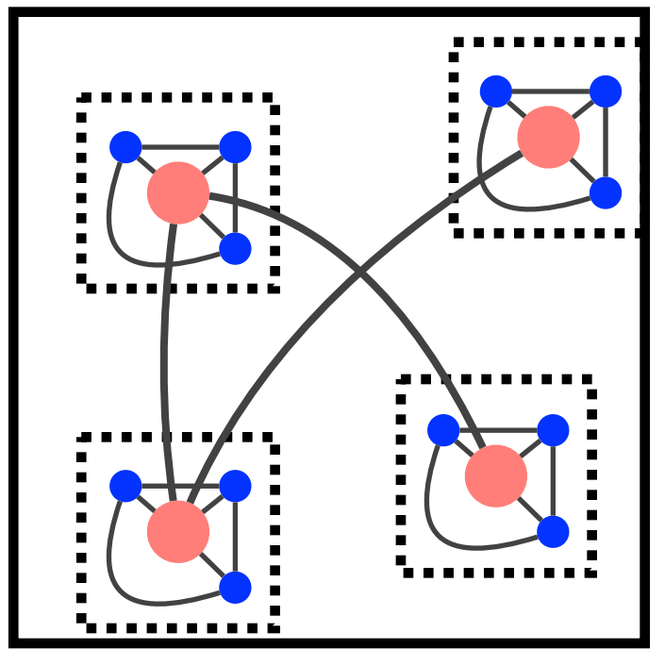
Macro-network



The Maximum-Entropy algorithm allocates exposures between all domestic sectors

we will get back to this a bit later

Methodology - Measuring centrality

- The position of the banking sector for each country, relative to all other domestic and foreign sectors is measured using four statistics:
    - In-Degree - Liabilities of the banking sector
    - Out-Degree - Assets of the banking sector
    - Betweenness - The extent to which the banking sector intermediates flow of funds between all other sectors
    - Closeness - Not sure of how best to interpret this economically
- The authors “[…] compute the above four centrality measures for four instruments available […]”
    - *If the cross-border data is only available on an aggregate basis, how can you compute the centrality measures for networks of different instruments?*

Methodology - Classifying crises

- Records of banking crises from 1970-2012 are obtained from the European System of Central Banks

- Data consists of a time-series of binary-variables $Y_{tq} \in \{0,1\}$
    - $Y_{tq} = 1$: if a crisis occurred in year ‘t’, and quarter ‘q’
    - $Y_{tq} = 0$: if there was no crisis in year ‘t’, and quarter ‘q’

- The authors say that the “[…] sample includes 128 quarters of systemic banking crises […]”
    - *What is a systemic banking crisis?*

Methodology - Classifying crises

- The authors conduct a series of logit regression
    - Left-hand variable - indicator variable for a crisis
    - Regressors - macro indicators & centrality measures

$$p_{tq} = \begin{cases} 1 & \text{if} \quad \text{Prob}\left(Y_{tq} = 1 | X\right) \geq \lambda \\ 0 & \text{otherwise} \end{cases}$$

- Optimal threshold λ minimizes type 1 and type 2 errors

The key results

- Two key results in this paper

  A more central position of the banking sector in the macro-network increases the probability of a banking crisis

  The measure of centrality should account for both cross-border and domestic exposures

The key results - Questions & queries

- To better appreciate the results, we need to dig deeper
- Construction of the macro-network
    - *Is it economically sensible to consider links between households and non-financial corporations, or households and governments?* This is, of course, a consequence of using the Maximum Entropy algorithm to allocate exposures, but the economic significance is not clear
        - One of the domestic sectors for each country is the “rest of the world”. *To what extent is there double counting between the BSI data and ROW accounts?*
- Centrality measures
    - The choice of measures capture the concentration and intermediation of banking sectors. Evidence is patchy, at best, on the link between concentration and financial stability (Beck et al., 2006 find a negative relationship, for example). *What is the intuition, if not theory, for why centrality measures matter for financial crises?*

An alternate interpretation

- Macro-networks $\Longleftrightarrow$ Leontief's input-output tables

> *The world economy can be visualized as a system of interdependent processes. Direct interdependence between two processes arises whenever the output of one becomes an input of the other [...] A network of such links constitutes a system of elements which depend upon each other directly, indirectly or both.*

Leontief (1973) - Nobel prize lecture

An alternate interpretation

- If we take a dynamical systems approach, then macro-networks can help shed light on credit cycles
    - The sign of the largest eigenvalue of the network will determine the cyclical nature of credit flows
- Can we, thus, interpret centrality measures in this context, i.e., sink or source of funds?
- Further possible applications
    - *How do non-financial sectors (shadow banks?) influence the flow of funds?*
    - *Can we use network techniques to refine notions such as money multipliers and the velocity of money?*

Concluding thoughts

- The idea of macro-networks is quite powerful
    - However, I think calling then “ecological-networks” is perhaps more accurate (one is considering an eco-system of different agents, rather than different sectors of the economy)
- If data are available (should be for some countries at least), it would be interesting to map the flows between different economic sectors into the macro-network
    - Recent IO ideas on Strategic Industry Risks (SIRS) suggests that crises originate within certain types of industries (Crean and Milne, 2015)