Discussion of: A Structural Model of Interbank Network Formation and Contagion P. and J. Coen

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Paper's objective

- Consider a model where banks choose the intensity of the linkages (exposures) to and from other banks.
- Linkages allow to capture gains from trade but also affect banks' default risk.
  Network externalities $\Longrightarrow$ inefficiencies.
- Estimate model based on data on interbank exposures for a set of large global banks.

$$\Downarrow$$

- quantify inefficiency, study effects of regulatory interventions.

Very ambitious and interesting paper!

Model: default risk

- Network: C_{ij} exposure of bank i to (loans made, .. to) bank j
  - Following relationship is assumed between default probability of bank i and network structure:

$$p_i = \sum_k X_{ik}\beta_k - \omega \sum_j C_{ji} + \sum_j \Gamma_{ij} C_{ij} p_j$$

- ω: "hedging benefit" (of firm i's borrowing from other firms)
- Γ_{ij} : "contagion intensity" (of firm's loans to other firms), via counterparty risk

Model: default risk

- What is the rationale? From Eisenberg and Noé (2011) we know:

$$p_i = \Pr\left\{\sum_{j\neq i} C_{ji} + I > \sum_{j\neq i} d_j\left(\mathbf{r}\right) C_{ij} + r_i\right\}$$

with r_i yield of i's external assets (fundamental) and:

$$d_i\left(\mathbf{r}\right)\left(\sum_{j\neq i} C_{ji} + I\right) = \min\left\{\sum_{j\neq i} C_{ji} + I; \sum_{j\neq i} d_j\left(\mathbf{r}\right) C_{ij} + r_i\right\},\ i = 1, .., N$$

Thus p_i is: increasing in i's borrowing $\sum_{j\neq i} C_{ji}$,
decreasing in i's lending to other banks C_{ij} - *opposite to the above* -
and increasing in p_j

Model: net benefits of linkages (per unit)

- of i's loans to j:

$$r_{ij} - \lambda_{ij}\phi p_i$$

cost of funds proportional to i's default risk (assumed increasing in loans made).

How should we think of this? Shouldn't j's default risk - and network structure - affect i's expected revenue?

Model: net benefits of linkages (per unit)

- of i's borrowing from j: net gains from trade, decreasing in size of exposure

$$\zeta_{ji} - \frac{1}{2} C_{ji} - r_{ji}$$

minus additional cost of overall borrowing, dependent on interaction with other exposures of i
(*what does this capture? what is substitutability between exposure to i and k?*):

$$\sum_{k \neq j} \theta_{jk} C_{ki}$$

plus reduction of default probability (see above)

Equilibrium

- r_{ij} : market clearing price for linkages between i and j: competitive approach to network formation (*interesting!*).

- network externalities (within the model):
  bank i ignores effects of its linkage choices (borrowing from $(-)$, lending to $(+)$) on other firms' default probabilities p_j, $j \neq i$.

  Excessive lending?

Key Estimation Results and Counterfactuals

- Estimate contagion coefficients Γ_{ij}, on this basis identify systemically important banks
- Quantify efficiency loss of network externality.
  What do we learn on qualitative features of inefficiencies (within the model) in linkage formation?
- Regulatory interventions:
  - caps on largest exposure: Why should we think inefficiency in the model take the form of concentrating exposure on some linkages?
  - cap on total exposures: *how to differentiate across banks?*
  - capital requirements: modelled as increase in cost of funds λ_{ij} targeted to size of Γ_{ij} : *why target lending, rather than borrowing (equity)?*

To sum up

- Very stimulating, ambitious paper
- Importance of model's microfoundation based on banks' behavior: how sensitive results to model features?
- What can say on properties of equilibrium network?
- Can aim to understand specific nature of externalities in interbank networks
- On this basis, can aim to design more targeted regulatory interventions