

Financially Constrained Fluctuations in an Evolving Network Economy

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Characteristics of the model

- The authors study the properties of a credit-network economy, which is modelled by credit relationships.
- A network structure is a natural representation of these kind of relationships:
 - Agents are presented as nodes and
 - debt contracts as links
- There are two types of links in the model:
 - between downstream and upstream firms (trade credit)
 - and between those firms and banks (bank credit).
- The network topology changes over time due to an endogenous process of partner selection in an imperfect information decisional context.

The bankruptcy effect

- In such network economy, the bankruptcy of one agent (solo effect) can bring about the bankruptcy of one or more other agents possibly leading to avalanches of bankruptcies (domino effect).
- In the paper the authors investigate the bankruptcy propagation
 - In other words the interplay between network evolution and business fluctuations
- The main argument is that “The high rate of bankruptcy is a cause of the high interest rate as much as a consequence of it” (Stiglitz and Greenwald, 2003: 145)
 - The starting point is the agents' defaults -> bad loans -> deterioration of lenders' financial conditions -> credit restriction (increase of the interest rate) -> deterioration of borrowers' financial conditions -> agents' defaults

The environment

- The model is settled in a discrete time steps ($t = 1, 2, \dots, T$)
- It represent a multi-sector network economy:
 - Downstream sector ($i = 1, 2, \dots, I$ firms), which produce a perishable consumption good using labour and intermediate goods
 - Upstream sector ($j = 1, 2, \dots, J$ firms), produce intermediate goods “on demand” using only labour as input
 - Banking sector ($z = 1, 2, \dots, Z$ banks)
- The core assumption of the model is that the scale of activity of the i -th D firms at time t is an increasing concave function of its financial robustness, proxied by net worth (A_{it})

Partner choice

- Each element of D has a productive and credit relationship with one element of U firm.
- At the beginning, links are established at random.
- In subsequent periods the network changes endogenously according to a preferred-partner choice rule
- The same rule also applies to the relationships between firms (both D and U) and banks

Questions

- Regarding the partner choice rule, firms decide who their partner will be from a randomly selected subset of agents
 - Is this random selection performed on each time period or once the subset is selected is kept the same for the whole simulation?
 - Even if partners are not changed at every period, the decision to change a partner is revised at every time t . What is the motivation behind this frequency?

Questions

- The amount of consumption and intermediate goods produced depend on the financial conditions of the agents involved
 - What would be the output if the production of those goods is limited due to a threshold on the level of consumption?
- Additionally, the financially robust lenders can supply credit at better conditions and therefore increase their market share, whereas the opposite is true for financially fragile agents. This condition makes the network vulnerable to targeted shocks.
 - In your opinion is there any other constraint required (apart from the financial robustness) that will make the network less vulnerable?

Questions

- Regarding the *preferred-partner choice rule*:
 - Have you performed a comparison with the *preferential attachment rule*?
 - Have you explored or is it on your research agenda to model more sophisticated agent behaviour?
 - **Thomas Brenner “Agent Learning Representation: Advice on Modelling Economic Learning”**, Leigh Tesfatsion & Kenneth L. Judd (ed.), *Handbook of Computational Economics*, 2006