Networks in Finance

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Networks at Tepper Research Seminar
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• Importance of network theory

• How economists have modeled various phenomena using network theory

• Applications to Finance:
  - Systemic risk
  - How network theory can be used to explain freezes in the inter-bank market (August 2007)
  - How social networks affect investment decisions and corporate governance?
  - What is the role of social networks in investment banking?
Importance of network theory

- Provided the high degree of interdependence of modern financial systems use of network theory can enrich our understanding of them
  - The dependencies between financial institutions arise from both the asset and the liability side of their balance sheet
- General concept of a network: Collection of nodes and the links between them
  - Nodes can be individuals, firms, countries, or even a collection of them
  - Links can be: friendship ties (in a social context), financial exposure to the same assets (in the context of financial systems), or trade agreements (in case of countries)
- Network theory may provide a conceptual framework within which one can analyze how connections arise and how a decentralized market evolves.
Network theory in Economics I

- Issue: Imperfections in the matching process on labor markets
  - 50% of workers obtain jobs through their personal contacts
  - 40 to 50% of employers use social networks of their current employees to fill their job openings

- Effect of social networks on:
Network theory in Economics II

• Issue: Standard Arrow-Debreu model assumes agents interact anonymously in centralized markets, and prices are formed following their independent decisions

• Alternative view: Markets are not centralized, but rather consist of a complex structure of bilateral trades
  - Bargaining power: When transactions occur only between buyers and sellers that are connected, the network structure determines the bargaining power (Coromillas-Boch, 2004; and Kranton and Minehart, 2001)
  - Imperfect risk-sharing: Interpersonal relationships shapes the formation of the network of risk-sharing agreements (Fafchamps and Lund, 2003; de Weerdt, 2004; Fafchamps and Gubert, 2006).
Network research in Finance

Most of the existing research using network theory concentrates on issues such as financial stability and contagion.

Moreover, most of the research done in financial networks studies network effects rather than network formation.

**Example 1: Systemic Risk - Contagion**
The theoretical literature on contagion takes two approaches.

- **On the one hand**, papers look for contagious effects via direct linkages. Most of them follow from Allen and Gale (2000)

- **The second approach** focuses on indirect balance-sheet linkages. Lagunoff and Schreft (2001) construct a model where agents are linked in the sense that the return on an agent’s portfolio depends on the portfolio allocations of other agents.
Example 2: Freezes in the interbank market
Why after August 2007 did interbank markets dry up? Interest rates were high however it was not possible for many banks to borrow.

- One way to understand market freezes is through a network formation game, where the empty network (collection of nodes with no links) emerges as equilibrium.

- Babus (2007) analyzes the endogenous formation of networks. Including frictions in such analysis it may be possible to generate empty networks as equilibrium. Small exogenous changes in risk may have large effects since agents withdraw from the network.
Example 3: Networks effects on investment decisions and corporate governance

- Social networks may be an important mechanism for information flow and price informativeness
  - Cohen et al. (2007) find that portfolio managers place larger bets on firms they are connected to through their network, and perform significantly better on these holdings relative to their non-connected holdings.

- Firm’s network position should be an important strategic consideration for an incumbent venture capital (VC).
  - Hochberg et al. (2007) find that better-networked VC firms experience significantly better fund performance.
Network research in Finance

- Corporate governance and directors networks.
  - Nguyen-Dang (2007) studies the impact of social ties between CEOs and directors on the effectiveness of board monitoring.

Example 4: Social networks in distributing primary issues of securities

- There is a large literature on the reason for the existence of commercial banks. In contrast there is not much work done on the reason for the existence of investment banks.

- Morrison and Wilhelm (2007) argue that investment banks exist because they create networks. They suggest that the central role of investment banks is to issue and underwrite securities.