Motivating Information Sharing in Interdependent Networks

1st Workshop on Information Sharing for Financial IT
Infrastructure: Barriers and Opportunities

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Universita di Roma "La Sapienza"

Ambitions of CASoS Engineering

- Design and *implement* good solutions in evolving systems with open boundaries

- Perfect designs are pointless if they cannot be realized

- Implementation entails considering:
  - Varied and usually conflicting interests of participants
  - Historical contingencies and inertia
  - Adaptive processes that might work against change or shift the design assumptions

- Dominant players have learned to thrive in the current system: they are inherently reluctant to change the rules

Why Share Information?

- ## System perspective
  - Banks face common threats and shouldn't have to face them separately
  - The banking system is an essential economic asset, and weak links compromise the whole

- ## Bank perspective
  - Information about other banks is useful to me
  - Information I share might help my competition
  - New systems entail some cost, unfamiliarity, and loss of control

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Congestion and Cascades in Payment Systems

- Network defined by Fedwire transaction data:
  - Payments among more than 6500 large commercial banks
  - Typical daily traffic: more than 350,000 payments totaling more than $1 trillion
  - Node degree and numbers of payments follow power-law distributions
- Bank behavior controlled by system liquidity:
  - Payment activity is funded by initial account balances, incoming payments, and market transactions
  - Payments are queued pending funding
 - Queued payments are submitted promptly when funding becomes available
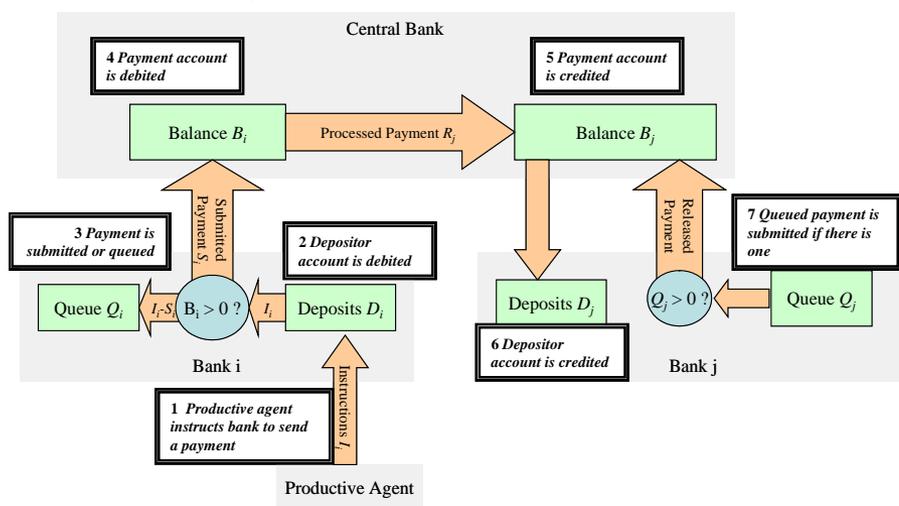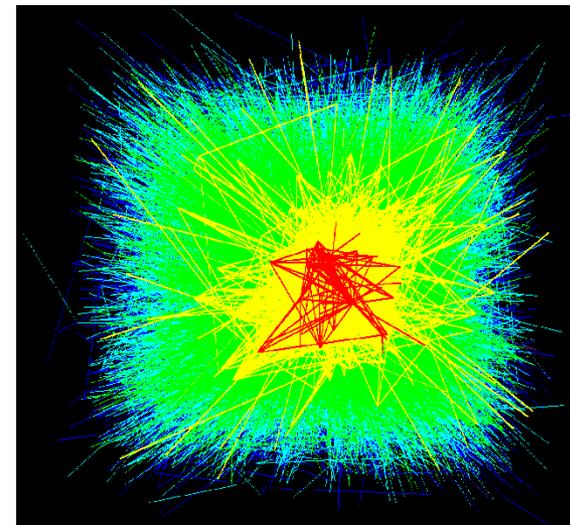
Findings

- Payment flows follow a scale-free distribution
- Performance is a function of both topology and behavior – neither alone can explain robustness
- Liquidity limits can lead to congestion and limit throughput, but performance can be greatly improved by moving small amounts of liquidity to the places where it's needed, e.g. through markets

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Entities and Processes Involved

Hostile agents:
- Explore system security
- Attempt fraudulent transactions
- Attempt to disrupt service
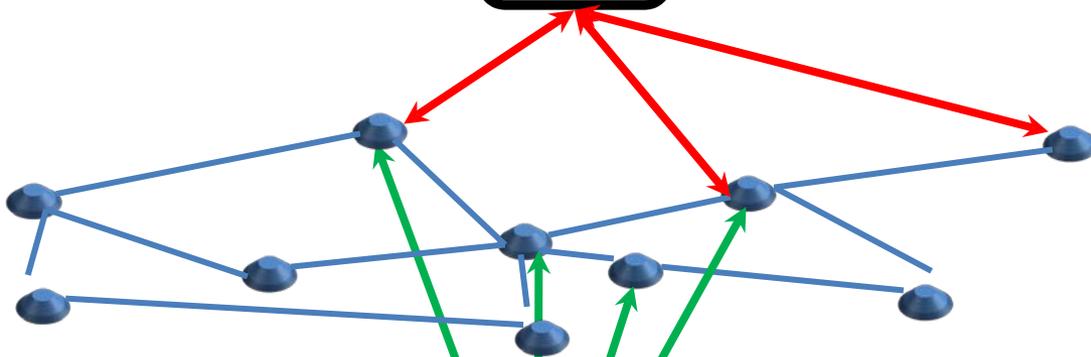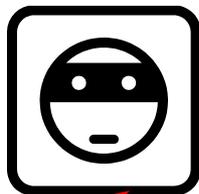
Banks connected by:
- Existing IT systems
- Financial obligations
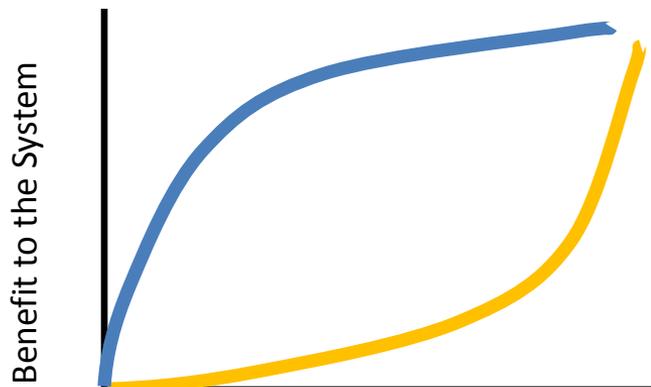- Service providers
- Social networks

Information sharing system:
- Detects anomalous traffic
- Propagates protective information
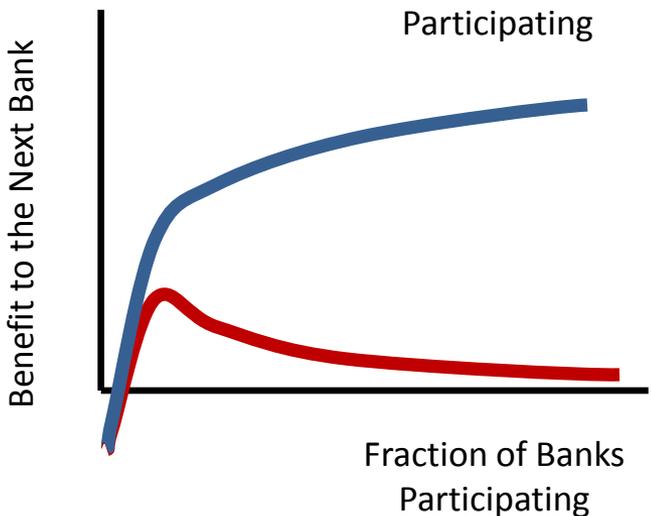- Speeds detection and reaction

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Some Questions to Answer

How many banks must participate to realize large benefits?

With a given participation, how much does a bank gain if it joins?

How might we make banks' incentives support a good outcome for the system?

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