Motivating Information Sharing in Interdependent Networks

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