# A Strategic Analysis of Portfolio Compression

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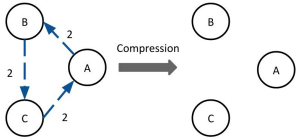
## Motivation

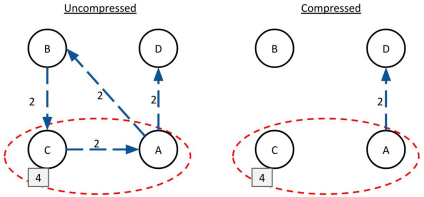
**Portfolio compression** simplifies a web of financial obligations by canceling a cycle of debt, leaving each financial institution's net position the same.




Financial institutions make a *compression decision*, deciding whether to accept or reject a potential compression.

With risk of default, compression may affect network stability by:

- Decreasing systemic risk by removing paths of default propagation
- Increasing systemic risk by limiting the ability for parts of the network to absorb losses from an insolvent institution

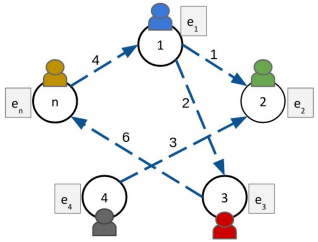



Questions: How should financial institutions make the compression decision? How does a strategic compression decision affect the network?

Approach: Define a *compression game* played by agents in a financial network. Use *empirical game-theoretic analysis* to identify Nash equilibria strategies.

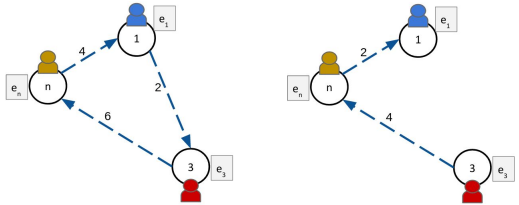
## Compression Game

### Financial Network




### Compression

$$\forall l_{ij} \in E^C \quad l_{ij}^C = l_{ij} - \mu \quad \text{where} \quad \mu = min_{ij \in N^C, i \neq j} l_{ij}$$




### Network Resolution

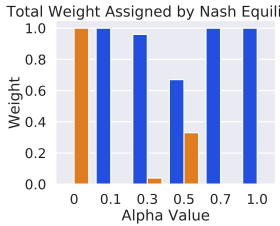
- Some nodes experience a negative external shock that reduces their remaining external assets to 0
- All nodes are forced to settle liabilities, calculated using the greatest clearing vector algorithm [1]
- Payoff to agents equals the remaining external assets of their assigned node

## Strategies

- 14 strategies that each emphasize a different piece of local information available to the node (assets, liabilities, $\mu$-value)
- Unconditional accept and reject strategies

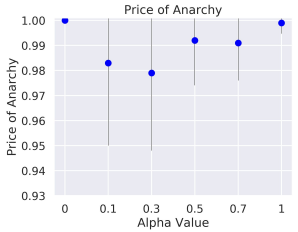
## Preliminary Analysis

### Empirical Game-Theoretic Analysis




The Nash equilibria assign a higher probability to playing strategies that use local information than to the unconditional strategies.

### Price of Anarchy




- Price of Anarchy is close to 1 for all tested $\alpha$-values
- Cost to the network of strategic compression is low

## References

[1] Luitgard A. M. Veraart. 2019. When does portfolio compression reduce systemic risk? (Jan. 2019). https://ssrn.com/abstract=3311176 Working Paper.