

Leverage-driven cycles and complex dynamics in a model with endogenous network formation

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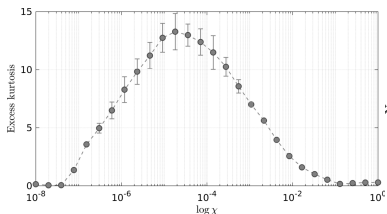
Leverage and fluctuations in financial markets

- Leverage is positively correlated with debt over equity.
- Higher leverage \rightarrow higher profits **but** also higher probability of bankruptcy! Banks typically set a leverage constraint arbitrating between the two objectives.
- If leverage constraints are not binding banks create links and invest in a common asset. This investment pushes the asset price up.
- If leverage constraints are binding banks destroy links, and disinvest in the the common asset. This pushes the asset price down.
- Leverage constraints are adjusted following changes in leverage

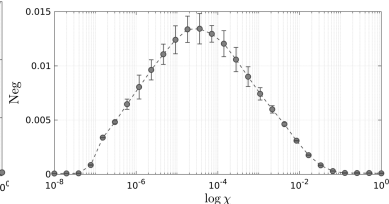
$$\Gamma_{k,t+1} = \Gamma_{k,t} - a \Delta \eta_{k,t} + \xi \quad \text{where } \xi \sim \mathcal{N}(0, \chi)$$

\rightarrow a is intensity of adjustment and χ is the **intensity of uncertainty** with respect to a change in leverage.

Extreme aggregate price fluctuations from micro uncertainty



(a) kurtosis vs noise χ



(b) negentropy vs noise χ

Phase transitions

- Small uncertainty \rightarrow price returns distribution is Gaussian.
- Intermediate uncertainty \rightarrow fat-tailed price returns distribution.
- Large uncertainty \rightarrow price returns distribution is back to Gaussian.