# A Multi-Asset Agent-Based Model

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# Outline

# General Applications of Agent-based Models

- Vulnerabilities and test for severity and path of shocks
- Efficacy of various risk metrics and suggest new ones
- Evaluation of importance of types of data
- Effects of policy actions

# Objective

- Interaction of hedge funds and banks in a multi-asset framework
- Paths for market (and bank) contagion
  - e.g., for a given {leverage, concentration, liquidity}

# Development

- Starting point: Thurner, et. al (2010).
- Refinements:
  - multi-asset
  - agent behavior
  - institutions and timing
  - short selling

# Agents

- Noise traders
- Hedge fund managers
- Portfolio managers within each hedge fund
- Banks
- Investors

# Basic Model Dynamics

1. Markets clear with noise traders and hedge funds fulfilling demands
2. Hedge funds borrow from banks, e.g., prime brokers
3. Hedge fund managers adjust leverage to manage margin constraints
4. Investors inject or extract capital based on individual hedge fund performance

# Issues to Consider

- Number of Markets
- Measure of Concentration
- Measure of contagion
- Paths of stress:
  1. Price shocks
  2. Change in margin level
  3. Investor withdrawals
- Demand function specification
  1. Effect of immediacy
  2. Effect of high volatility

# References


Thurner, S., Farmer, J. D.&Geanakoplos, J. (2010)
*Leverage Causes Fat Tails and Clustered Volatility*.
Cowles Foundation Discussion Paper No. 1745