



Nobel Symposium 2018: Money and Banking

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Types of Distortions

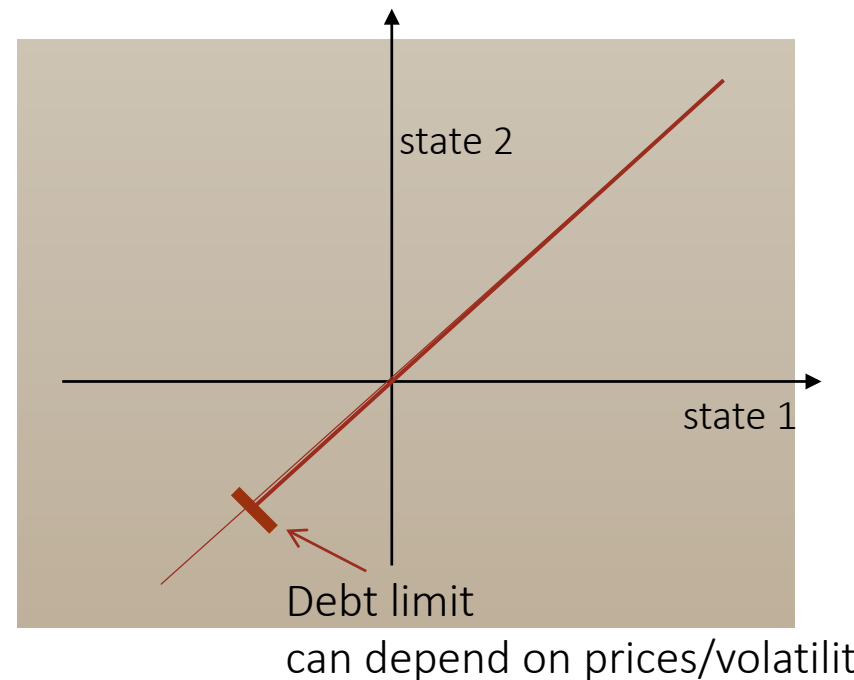
- Belief distortions
 - Match “belief surveys” (BGS)

- Incomplete markets
 - “natural” leverage constraint (BruSan)
 - Costly state verification (BGG)

- + Leverage constraints (no “liquidity creation”)
 - Exogenous limit (Bewley/Ayagari)

 - Collateral constraints
 - Next period’s price (KM)
 - $Rb_t \leq q_{t+1}k_t$
 - Next periods volatility (VaR, JG)
 - Current price

- Search Friction (DGP)



can depend on prices/volatilit

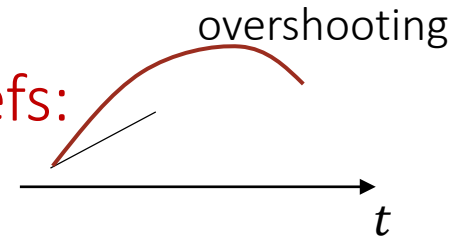
Overview

- Types of distortions/frictions
- Run-up phase
 - Distorted beliefs
 - Concentration of risk
- Crash phase
 - Fire-sales
 - Paradox of Prudence
 - Spillovers
- Recovery phase
- Endogenous volatility dynamics – volatility paradox
- Welfare/Regulation

Run-up 1: Beliefs “Distortions”

■ Representativeness heuristic/Diagnostic beliefs:

- As if error terms followed AR(1)
- Overestimate of productivity after good shock
- Bubbles/overinvestment driven by *level of beliefs* a la Miller (1977)
 - AS: Surveys consistent with each other, mutual fund flows



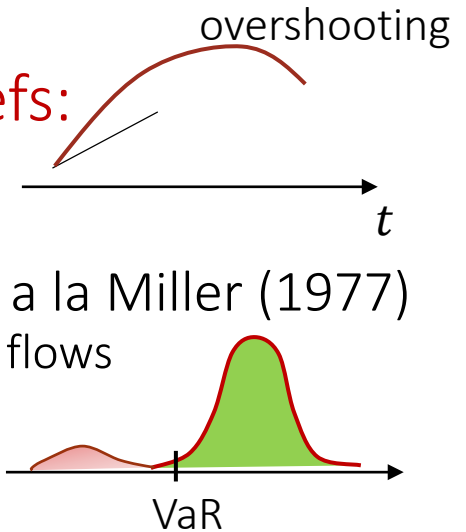
■ Heterogeneous beliefs: optimists and pessimists

“consensus beliefs” \neq marginal buyer’s beliefs

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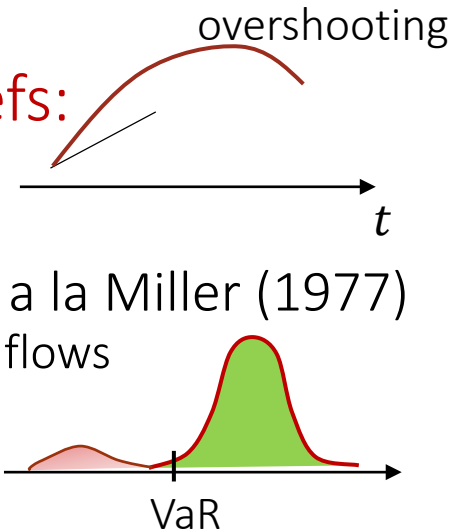
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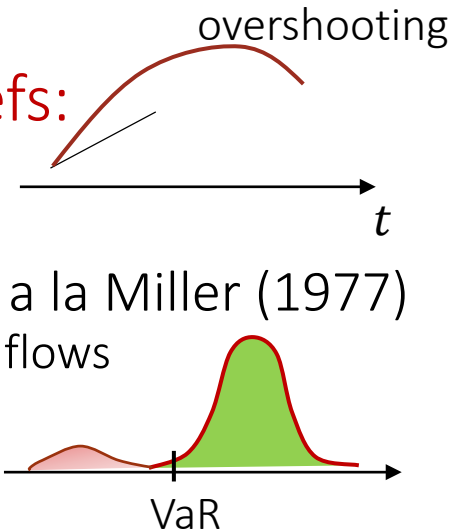
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- + limited commitment \Rightarrow Leverage cycle
- “Marginal buyer” vary with shocks
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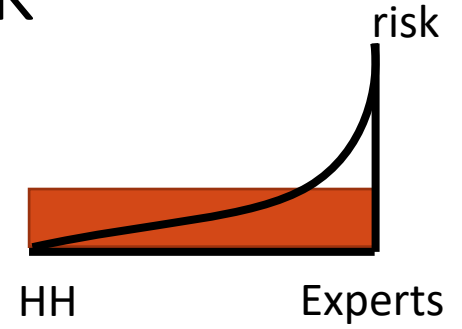
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Switching heterogeneous beliefs \Rightarrow Speculation

(Resale option a la Harrison-Kreps/Scheinkman-Xiong):

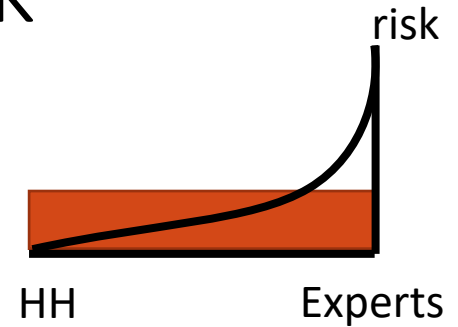
- optimist/pessimist “switching” + short-sale constraint
- \Rightarrow Bubbles, volatility, and transaction volume

Run-up 2: Concentration of Risk



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- Belief extrapolation:
 - No risk concentration necessary

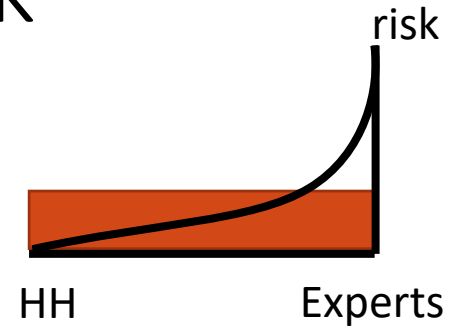


- Financial frictions models:
 - “Experts” hold most of aggregate risk in good times
 - Low volatility, but risk builds up in background
 - Credit cycle: (BGG/KM/BruSan)
 - Leverage cycle: (JG/BruPed)

extreme leverage in cts. time limit

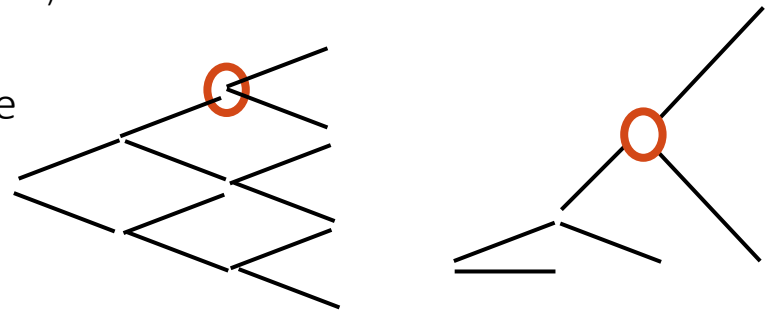
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- Financial frictions models:
 - “Experts” hold most of aggregate risk in good times
 - Low volatility, but risk builds up in background
 - Credit cycle: (BGG/KM/BruSan)
 - Experts save their way out of constraint *after string of good shocks*
 - Buffer against crisis
 - Leverage cycle: (JG/BruPed)
 - Most concentrated risk *after string of good shocks*
 - 2 key differences (besides hetero. beliefs):
 - More than two groups
 - Bubble don't burst, but deflate
 - Worst case moves up
 - Higher debt capacity

extreme leverage in cts. time limit



Crash 1: Fire Sales

- Definition: Assets transferred to second-best users
- BGG: No second-best user
- KM: Negative shock \Rightarrow Experts sell to HH (gatherers), “Market illiquidity”
- Shleifer-Vishny (1992):
 - Fire sales \Rightarrow GE debt capacity matters
 - Restructuring $>$ Fire sales
- Are fire-sales good or bad?
 - BruSan: Two competing effects
 - Ex-post: Fire sales stabilize economy in crisis, but misallocation
 - Ex-ante: Lead to excessive leverage (fire-sale/pecuniary externality) (Stein et al.,...)

Crash 2: Paradox of Prudence

- “Micro-prudence” of bank is “macro-imprudent”

*Like Keynes' Paradox of Thrift,
but in risk-space*

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- “Micro-prudence” of bank is “macro-imprudent”
- Two “spirals” amplify
 - Liquidity spiral (price of capital)
 - Disinflationary spiral (price of money)

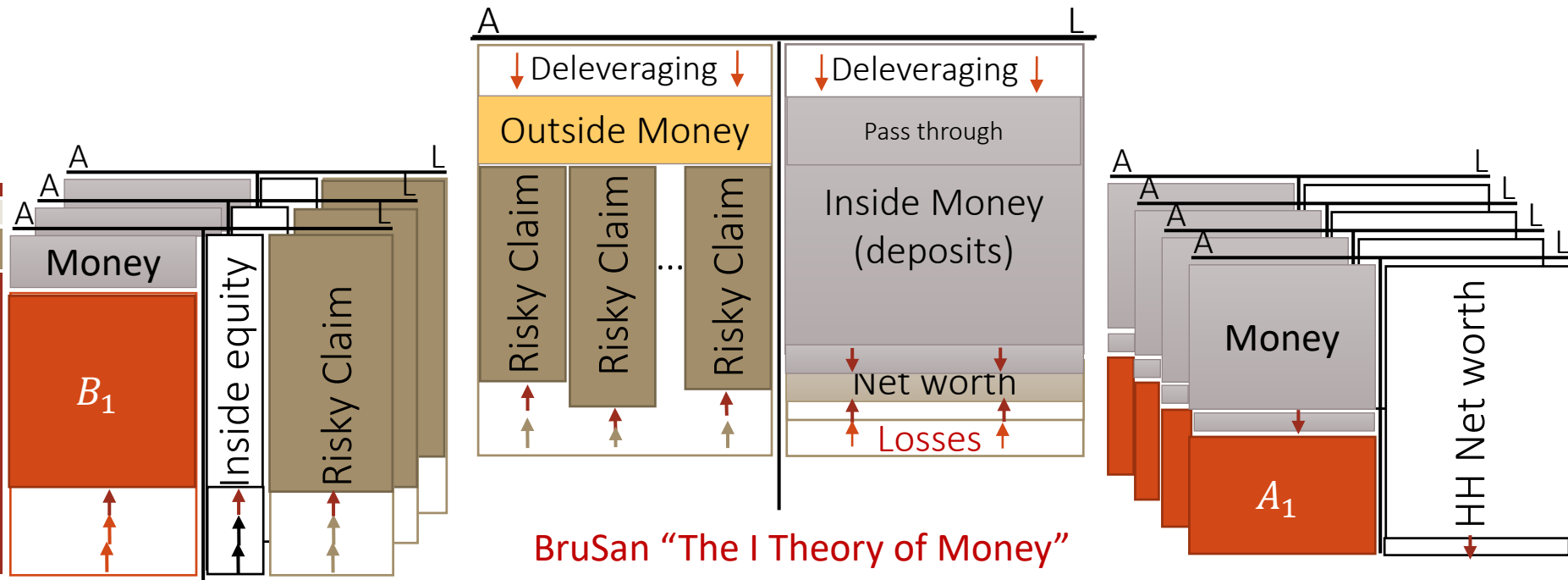
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Crash 2: Paradox of Prudence

- “Micro-prudence” of bank is “macro-imprudent”
- Two “spirals” amplify
 - Liquidity spiral (price of capital)
 - Disinflationary spiral (price of money)
 - Banks issue less inside money (& diversify less risk risk)
 - HH demand more money

Like Keynes' Paradox of Thrift,
but in risk-space

} ⇒ Lower inflation



Crash 3: Spillovers Across Assets

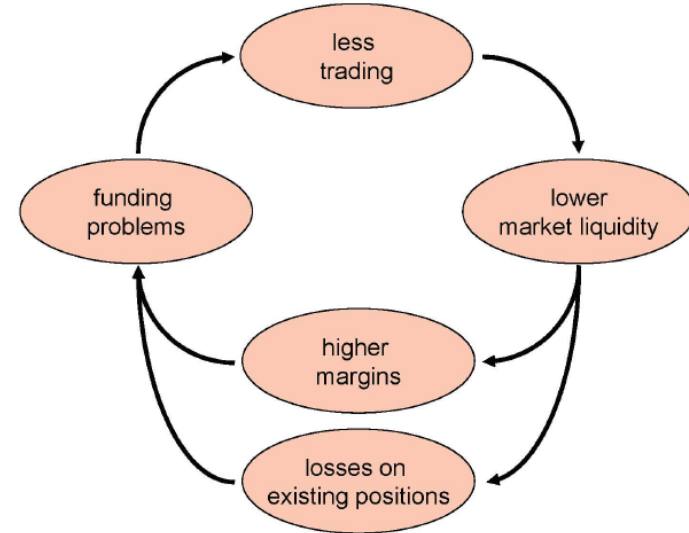
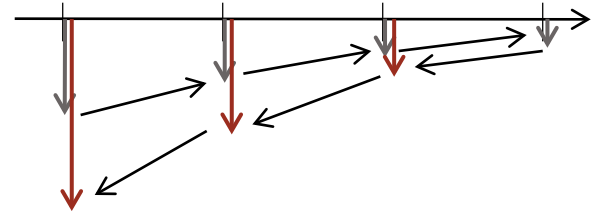
- Belief extrapolation: No spillovers
 - Unless “baked-in” in beliefs
- Net worth channel:
 - BGG/KM/BruSan: Expert net worth affects all assets
 - Diamond-Rajan (2005)
 - JG-Leverage cycle: Spillovers from “crossover” investors
 - Margins spike in one market
 - ⇒ Crossover investors transfer capital from other markets
 - BruPed: Multiple equilibria:
Joint jump in price across assets
 - Even assets with uncorrelated payoffs jump together
 - Could also be integrated in a DD-model
- Measurement: *CoVaR*

Speed of Recovery

- Speed of Recovery
 - KM: deterministic
 - BruSan: Length of recession is stochastic
⇒ precautionary savings

Mean & Leverage Dynamics

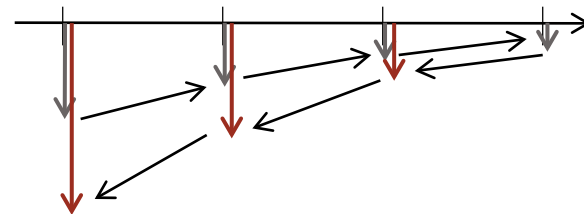
- Impulse Response curves:
 - Amplification



Mean & Leverage Dynamics

■ Impulse Response curves:

- Amplification

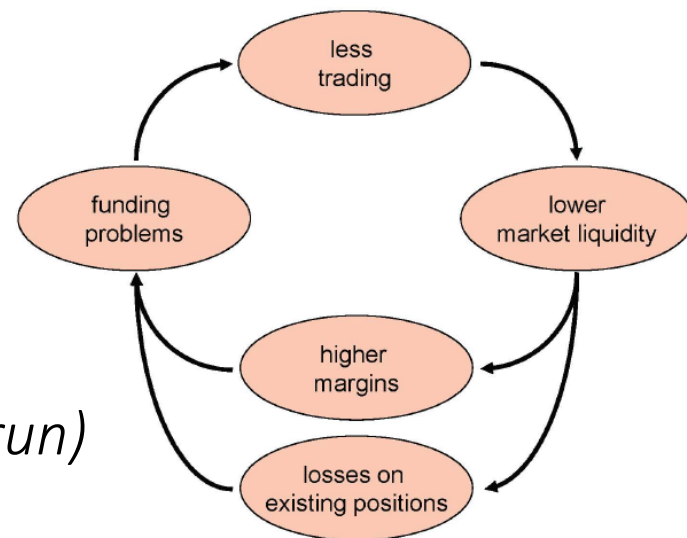


■ Credit cycle: *(Loss spiral)*

- Constant volatility exog. shocks
⇒ Countercyclical leverage
- Underinvestment (second best user problem)

■ Leverage cycle: *(Margin spiral/Repo run)*

- Exogenously time-varying volatility
ARCH/Scary bad news ⇒ Destabilizing Margins
⇒ Pro-cyclical leverage



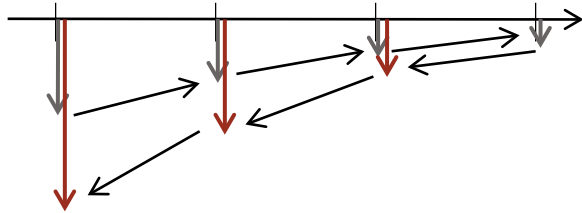
■ Evidence: Pro- vs. countercyclical leverage depends on

- investor type, book vs. market, new issuance vs. overall

Endogenous Volatility & Volatility Paradox

Endogenous Risk/Volatility Dynamics in BruSan

- Beyond Impulse responses



- Input: constant volatility
- Output: endogenous risk
time-varying volatility

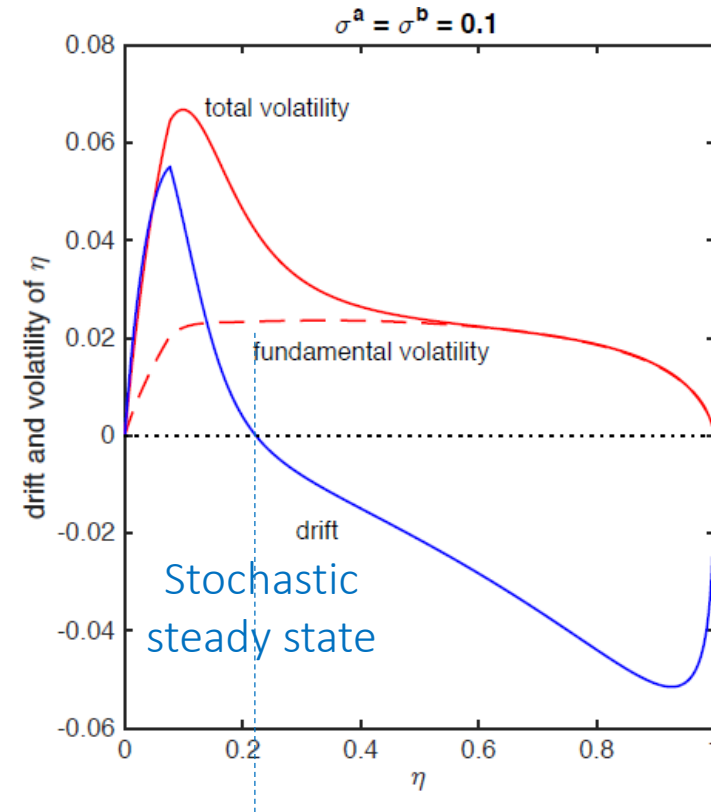
⇒ Precautionary savings

- Role for money/safe asset

⇒ Nonlinearities in crisis ⇒ endogenous fat tails, skewness

Volatility Paradox

- Low exogenous (measured) volatility leads to high build-up of (hidden) endogenous volatility (Minsky)



Financial Regulation/Welfare Criterion

- Important macro-prudential tools:
 - Countercyclical buffer, liquidity regulation, LTV, DTI, spillover metric,
- Belief extrapolation (mean dynamics):
 - Paternalistic: lean against price movements (all the time)
- Heterogeneous beliefs
 - JG: Financial innovation causes boom & bust (no welfare loss risk-neutral)
 - Speculation: Tobin tax insufficient?
 - Welfare criterion (BSX)
- Fire-sale externality/spillovers (CoVaR measure)
- Loosen borrowing constraints *in bad times* (BGG/KM)
- Also control concentration of risk *in good times* (JG/BruSan)

Conclusion

- “Run-up”, “Crisis”, and “Recovery”-mechanisms
 - Belief-focused (representative + heterogeneous)
 - Friction-focused, where risk is central
- Risk concentration, fire-sales, spillovers, ...
- Paradox of Prudence
- Volatility Paradox
 - Mean-Amplification, Exog. ARCH, Endog. Volatility Dynamics
- Macro/Monetary models with financial sector should include
 - physical investment
 - inside money creation



Extra Slides



Recovery from Crisis/Resilience

- Belief extrapolation: Recovery speed determined by belief persistence
 - Perceived AR(1) coefficient on errors
- BGG/KM: Recovery in tandem with experts' balance sheets
- JG: Recovery with experts' balance sheets & disagreement/volatility
 - Less disagreement \Rightarrow Lower margins \Rightarrow Higher marginal buyer
- BruSan: Length of recovery is stochastic
 - \Rightarrow additional precautionary savings

Extra Slide: Pro- vs. Counter-cyclical Leverage

- Adrian-Shin (2014): Book vs. market leverage
 - Intermediaries finance new assets with debt \Rightarrow Procyclical
- Geanakoplos-Pedersen (2014): New vs. old leverage
 - Margins spike in crisis \Rightarrow Procyclical
- He, Kelly, Manela (2017): Different constraints
 - “Equity constraint”: BGG/BruSan, countercyclical leverage
 - “Debt constraint”: Leverage cycle, procyclical leverage
 - Book/market leverage positively correlated for dealers
 - Evidence from HFs in Ang et al. (2011)
 - HFs procyclical, investment banks countercyclical