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Comments on Leverage Cycles

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Comments on
Leverage
Cycles

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References

Instability from beliefs

I

- Crises due to non-rational beliefs amplified by traditional mechanisms. (Minsky, Kindleberger)
- Excess optimism, excess lending and investment
- Correction of expectations (bad news or waning optimism)
- Recession (impaired intermediation or excess pessimism)
- Program
  1. Measure and analyze expectations
     - Surveys
  2. Develop psychologically founded, portable models of beliefs
  3. Incorporate them in standard macro/finance settings
- Implementation
  - Overweighting of representative types
  - *Diagnostic expectations*

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Time series example

I

$$x_{t+1} = \rho x_t + \epsilon_{t+1}$$

$$f^\theta(x_{t+1}|x_t) = f(x_{t+1}|x_t) \left[\frac{f(x_{t+1}|x_t)}{f(x_{t+1}|\rho x_{t-1})} \right]^\theta Z_t$$

- Over-reaction to likelihood changes

-

$$x_{t+1} = \rho x_t + \theta \rho (x_t - \rho x_{t-1}) + \epsilon_{t+1}$$

- Surprises relative to RE cause deviations from RE.

- Next period agent forgets previous forecasts and looks for deviations from RE forecast.

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Time series example

II

- *"The eternal hourglass of existence is turned upside down and you with it"* Nietzsche (1882) *eternal recurrence*.

- Groundhog Day

- For if surprises are relative to agent's past forecast over-reaction implies reference expectations are higher the next period so on average agents get a bad surprise...

- Example where credit spreads and capital stock react to forecasts of productivity.
  - Productivity: $A_t = \rho A_{t-1} + \epsilon_t$ affected by diagnostic expectations with parameter θ.
  - Credit spreads over-react because productivity expectations over-react.

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Time series example

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- Same for capital stock.
- Overreaction to productivity shock today affects credit spread today but not future credit spreads.
- Half-life of credit-spreads shocks shorter than under RE.

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Some remarks

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- Simple model that has potential for quantification.
- Rationalizes regressions of the effect of surprises. Delivers over-reaction but there is also evidence for under-reaction in macro time-series.
  - Adjustment costs.
- Instability of beliefs is useful addition to the macro-dynamics toolkit.
- Representative agent model
  - Irrelevant in some cases (Krusel and Smith (1998))
  - May matter in other cases (Kaplan and Violante (2018))

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Some remarks

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- Introduce speculation. Evidence on trading volume and supply responses indicates episodes of large booms and busts involve more than repeated surprises on fundamentals.

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Collateral equilibrium and leverage cycle

I

- A GE theory of trading in assets and non-recourse loans using assets as collateral.

- Equilibrium determines asset prices and characteristics of traded loan contracts (collateral, interest rates.)

- Merton (1974) theory of debt valuation assumes that lenders have recourse to equity of firm.

- Macroeconomics literature
  - Kiyotaki and Moore (1997) and papers by Bernanke and Gertler or Bernanke, Gertler and Gilchrist.
  - Kehoe and Levine (1993) Agent's default punished by exclusion from future claim-markets and loss of part of their assets.

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Collateral equilibrium and leverage cycle

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- Default does not occur but possibility of default affects prices and amounts borrowed.
- Some previous work on sovereign debt.

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Structure

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- For simplicity assume two periods $\{0, 1\}$, one safe asset (cash) and one risky asset (asset) that pays s in state of the world $s \in S$. Assume also that contracts require 1 unit of asset as collateral and a promise to pay tomorrow ϕ units of cash.

- Lender receives in state s the payoff $\min\{\phi, s\}$. (no recourse, no reputation loss etc...)

- Equilibrium determines price of asset p, the traded contract ϕ^* and its price q.

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Structure

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- *Margin* and *Leverage*:

$$m := \frac{p - q}{p}; \ L = \frac{1}{m}$$

- q (and hence L) reflects ϕ and tail-risks.
- Theory can accommodate state dependent promises and collateral that includes cash.
  - Shorts: A promise to pay s in state s, collateralized by cash α and an interest rate paid on the collateral.
- Divergence of beliefs

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Implications

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- Leverage cycles are pro-cyclical
- Use as collateral may raise the price of an asset above the Arrow-Debreu price.
- A narrative for the MBS crash
  - Emphasizes the feedback effect from the fall of prices of MBSs on the tightening of housing-loan terms (lower LTV) and consequent fall on housing prices.
  - Role of changes in regulation allowing introduction of CDS on MBSs and CDO tranches.

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Measuring leverage

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- Market value leverage versus book value leverage (assets)
  - MV- Merton's model of bonds; used in some Macro-Finance models (He and Krishnamurthy (2013))
- Holding companies versus broker-dealer unit leverage.
- He et al. (2017) documents that market value *holding-company* leverage is counter-cyclical.
  - Opposite cyclical properties.

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Measuring leverage

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- How should we treat long term debt?
    - Banks' long-term debt often have weaker control rights than comparable non-financial firms.
    - TLAC
    - Special treatment of repo, swaps and other derivatives. See Bolton and Oehmke (2015) for impact.
- Bear Sterns had 3% equity and 17% long-term debt. Corresponds to leverage of 33 or 5.

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Leverage and overvaluation

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- When shorting costs are substantial asset prices reflect more optimists' valuation than pessimists' valuation.
    - Optimists hold assets
- Simsek (2013) argues that it is difficult to generate increase in leverage when disagreement concerns downstates (e.g. AAA tranches of CDOs)
- Overvaluation produces lower measured leverage.
- When prices are not publicly observable buyer may pay more than potential creditor would value asset.
    - Lower leverage and higher stated margin.

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Leverage and overvaluation

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- Huizinga and Laeven (2009) document that banks used accounting discretion to overstate the book-value of their assets in 2008.
- Stress tests vs. leverage. Bolton et al. (2018)
- Foote et al. (2012) argues that using "structural" model applied by Wall Street for the original ABS to the CDO tranches would have yielded more realistic prices.

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Narrative on crash

I

- JG's narrative on crash emphasizes the feedback of MBS prices on housing prices.

- Credit bubble origin shares characteristics of earlier bubbles - originating with innovations (financial or technological).(Scheinkman (2014))

- Credit bubble followed generalization of use of new financial instruments and hedging techniques and advances in risk measurement that promised better risk management and "justified" lower risk-premia.

- General acceptance of a "great moderation."

- In March 2006, Greek debt 5-year CDS traded in the teens.

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Narrative on crash

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- CDS on credit from Argentina, a country that had defaulted in 2002, traded for less than 3%/year.

- Evidence that higher leverage was used as a hedge by US home buyers (Hansman (2017), Bailey et al. (2017))

- Literature on bubbles emphasizes the role of supply in deflating bubbles (Hong et al. (2006))
  - Shorting (Nutz and Scheinkman (2018))

- CDO Machine: Transform mezzanine bonds into (mostly) AAA bonds.

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Narrative on crash

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- Supply limited by issuance of subprime mortgages. Cordell et al. (2011) estimates that 90% of all HE BBB bonds were placed in CDOs.

- Optimist investors supported supply of loans to subprime and Alt A borrowers, helping sustain housing bubble.

- Regulations allowed for synthetic CDOs after 2005H2. In less than 2 years, synthetics more than doubled the amount of BBB tranches of Home Equity Bonds placed in CDOs during 1998-2007, without creating a single new mortgage. (Cordell et al. (2011), Table 3.)

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Narrative on crash

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- Abacus 2007-AC1, the synthetic CDO made infamous by
  the SEC enforcement action against Goldman Sachs,
  composed of CDS totaling $2b. Original cash value of the
  underlying BBB bonds was $1.2b.

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