A Theory of Leaning Against the Wind

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Introduction

- Long debate as to what to do in face of rapid run-up in asset prices
  - Bernanke and Gertler (1999) – wait and clean up (stimulate) if price falls
  - Borio and Lowe (2002) – asset price booms + debt usually end badly

    Argue policymakers should lean against the wind (raise rates in asset booms)
  - Many have taken last crisis as further evidence that waiting is bad
  - Svennson (2014, 2017) argues raising rates can be counterproductive
- We explore these issues through lens of a GE risk-shifting model

Overview

- Key feature of risk-shifting – creditors unsure about their risk exposure
  - Common to new technologies or assets valued idiosyncratically (housing)
- We show risk-shifting can give rise to Borio-Lowe episodes
  - Asset bubbles financed with debt, eventually collapse and lead to default
- Model suggests scope for intervention (misallocation + excess leverage)
- Raising rates exacerbates first distortion but mitigates second
- Promise to raise rates if bubble lasts mitigates both (targets speculators)

Setup

- OLG setup with two-period lived agents and single consumption good
- Agents only care about consumption when old: $u(c_t, c_{t+1}) = c_{t+1}$
  1. At $t = 0$, old endowed with 1 unit of asset that pays d each period
     - We will eventually allow dividend to be stochastic
  2. At each $t \geq 0$, cohort consists of two types:
     - Savers – unproductive but endowed w/e goods when young $\Rightarrow$ need to save
     - Entrepreneurs – productive but born with no endowment
       - Each can convert up to 1 unit at t into $1 + y$ units in $t + 1$
       - $N(y) \equiv$ mass of entrepreneurs w/productivity $\leq y$, range of y is $[0, \infty)$
- Young savers use e to buy assets from old and fund young entrepreneurs

Frictions

Trade between savers and entrepreneurs subject to following frictions:

- Trade via debt contracts, pay $1 + R_t$ for each unit borrowed
- Savers can't observe y or whether borrowers buy assets or produce
- If borrower defaults, lenders incur cost Φ per unit lent

Warmup: Equilibrium with Riskless Asset

- Eqbm is path for asset price + loan rate $\{p_t, R_t\}_{t=0}^{\infty}$ that clears markets
  - Young savers allocate e between assets and lending
  - Young entrepreneurs choose to borrow to produce and/or to buy assets
  - Old sell any assets they own and collect on or repay loans
- With dividend constant, no default
  - Savers indifferent between lending and buying asset, i.e. $1 + R_t = \frac{d+p_{t+1}}{p_t}$
  - Only sufficiently productive entrepreneurs (with $y \geq R_t$) produce
  - Market clearing each period: $p_t + \int_{R_t}^{\infty} dN(y) = e$
  - Combining equations reveals unique eqbm has $(p_t, R_t) = (p, R)\ \forall t$
- Equilibrium price p uniquely solves $p + \int_{d/p}^{\infty} dN(y) = e$, no bubble

Monetary Policy

- How can we think about monetary policy in this setup?
  - Follow Galí (2014): income e emerges from production with sticky prices
  - Prices sticky for one period, so policy only affects current real variables
  - Assets trade after production, so prices as in analog endowment economy
- $1 + R_0 = \frac{d+p_1}{p_0}$; Since i_0 can't affect d or p_1, must lower p_0 to raise real rate
- Works by discouraging labor (via lower real wage) $\Rightarrow$ lower e_0
- Raising real rates $\approx$ reducing endowment (same effect as a tax)

Risky Asset

- Now suppose dividend follows regime switching process:

  $d_t = D$ w/prob π dividend d_t permanently switches to d where $0 < d < D$

- Denote equilibrium by (p_t^D, R_t^D) if $d_t = D$ and (p_t^d, R_t^d) if $d_t = d$
  - Need $1 + R_t^D \geq \frac{D+p_{t+1}^D}{p_t^D}$ or infinite borrowing from low y agents
  - Need $1 + R_t^D \leq \frac{D+p_{t+1}^D}{p_t^D}$ or else no demand for asset $\Rightarrow 1 + R_t^D = \frac{D+p_{t+1}^D}{p_t^D}$
- Market clearing same as before: $p_t^D + \int_{R_t^D}^{\infty} dN(y) = e$
- **Key Result:** Equilibrium (p_t^D, R_t^D) same as if $d_{t+1} = D$ forever

Credit Booms and Bubbles

- **Bubble:** asset price can exceed fundamentals while $d_{t+1} = D$
  - $1 + R^D = \frac{D+p_t^D}{p_t^D} > E\left[\frac{d_{t+1}+p_{t+1}}{p_t^D}\right]$; for small Φ, also true for expected return
  - $p^D >$ PDV of dividends evaluated at expected return on lending
  - Intuitively, speculators who don't care about downside bid up asset price
- **Credit boom:** for small Φ, all assets bought w/debt while $d_{t+1} = D$
- **High realized returns** on both lending and assets while $d_{t+1} = D$
  - Expected returns, however, can be lower; R^D too low given risk
- **Eventual crash:** asset price falls from p^D to p^d when dividends fall
- **Ends badly:** fall in dividends leads to default and output losses (Φp^D)

Leaning Against the Wind

- Two reasons there may be scope for intervention during boom:
  1. Bubble crowds out production (entrepreneurs misallocate resources)
     - Productivity of marginal entrepreneur is $y = R^D > E\left[\frac{d_{t+1}+p_{t+1}}{p_t}\right] - 1$
  2. Excessive borrowing against risky assets
     - Borrowers don't care about costs Φp^D they impose on lenders
- Can raising rates via monetary policy (LATW) improve welfare?
  - Reducing e_0 lowers p_0^D and increases R_0^D
  - Higher R_0^D further crowds out production $\Rightarrow$ exacerbates distortion
  - Lower p_0^D dampens borrowing, lowers forgone output Φp_0^D if bubble bursts

Welfare effect ambiguous, but leaning can raise welfare if Φ large

Threats of Future Action

Threat to raise rates if bubble persists (reduce e_1 if $d_1 = D$) raises welfare

- Lowers p_1^D at date 1, which reduces $1 + R_0^D = \frac{D+p_1^D}{p_0^D}$ at date 0
- Policy still lowers p_0^D and reduces forgone output Φp_0^D if bubble bursts
- Intuition: Serves to target speculation even without observing it

Take away: Risk-shifting useful framework for thinking about bubbles

- Reveals scope for intervention and connection to proposed remedies
- Evaluate when raising rates beneficial as well as other policies