Introduction

- I study a simplified version of Kiyotaki-Moore.

- Entrepreneurs have good projects or bad projects.

- Housing serves as collateral.

- I discuss the properties of a particular equilibrium, with an exploding bubble in housing prices.
Equilibrium Dynamics With Stochastic Bubble

• Any positive bubble allows better allocation of capital among entrepreneurs.
  
  – people with good projects can borrow more b/c collateral is worth more.

• After the bubble bursts, huge redistribution of wealth.

• Output, consumption, wages collapse and then transit slowly to new (lower) SS.

• Capital grows \textit{after} bubble collapses, but is used inefficiently.
Good and Bad Interventions

• Undesirable: give government debt to financial intermediaries.
  – they won’t lend the debt to entrepreneurs
  – entrepreneurs have no collateral.

• Desirable: sell government debt at a low price.

• Allocate proceeds of sale to entrepreneurs ("fiscal stimulus").
Model

- Unit measures of entrepreneurs and workers
- Workers simply consume labor income.
- Entrepreneurs have log utility.
• They have technologies $A_t k_t^\alpha n_t^{1-\alpha}$.

• $A_t$ is either 0 or 1 and is iid over time and entrepreneurs.

• Entrepreneurs find out the realization of $A_t$ at date $t - 1$.

• Install capital $k_t$ then, and adjust labor demand at date $t$.
  
  – capital depreciates at rate $\delta$. 
Housing as Collateral

• Entrepreneurs each have a house.

• A house is an asset with zero consumption services.

• Entrepreneurs trade bonds, capital, and housing.

• Entrepreneurs can borrow up to the value of the house.
Simple, Simple, Simple!

- Entrepreneurs’ payoffs are linear in $k$.

- Face a standard consumption-savings decision at each date.

- With log utility, always consume fraction $(1 - \beta)$ of wealth.
Stochastic Bubble Equilibrium

• One equilibrium works like this ...

• At each date, a coin is flipped, with low probability $\varepsilon$ of getting heads.

• If tails, then house price is $p^* > 0$.

• There is a bubble in the house price.
• Investors \((A_t = 1)\) are always leveraged as much as possible.

• They are able to borrow up to \(p^*\) at each date.

• Savers \((A_t = 0)\) put almost all of their wealth in housing + bonds.
  
  − put \(\varepsilon/\delta\) into capital as a hedge.
Key Technical Point: Why do Bubbles Exist in this Model?

- Usually: bubbles can’t exist in eq’m b/c they provide an arb. opp.
  - sell house and rent instead
  - NOTE: arbitrage position is an infinitely long one.

- In model: entrepreneurs with good projects are always on their borrowing constraint.

- They hit their borrowing constraint infinitely often along every sample path.

- Can’t execute infinitely long arbitrage to exploit the bubble.
Bubble Collapse

• Heads: house price falls to zero and stays there forever.

• Immediate impact is a wealth redistribution.

• Investors’ wealths are unchanged, but savers lose almost all their wealth.

• Any intermediary is insolvent - owe savers $p^*$ and have 0 to give them.
• Next period and *forever* after: Output crashes.
  
  – See Figure 1 in paper.

• Huge need for re-allocation in economy because of iid productivity shocks.

• Without collateral: Capital can no longer be re-allocated efficiently.
Post-Bubble Interventions

• Interventions must cure two problems.
  – entrepreneurs have lost wealth
  – entrepreneurs have lost ability to borrow/lend

• Bad approach: just give government debt to intermediaries.
  – won’t work: they won’t lend to investors w/o collateral
A Good Plan

• Offer to sell government debt at a low price.
  – that is, raise interest rate (to 0 from $-\delta$).

• Distribute proceeds of sale to entrepreneurs.

• Then roll over debt in future periods.
• I show in paper: government sells exactly $p^*$ worth of debt.
  
  – savers buy debt and investors don’t
  – gov’t is an intermediary

• Aggregates immediately return to (and stay at) bubbly steady state.
Conclusion

• Simple model that allows bubbles to interact with productive activities.

• Provides a way to think about some aspects of current macroeconomic policies and events.

• Missing: Other forms of collateral?