Discussion on "Booms and Busts: Understanding Housing Market Dynamics" by Burnside, Eichenbaum and Rebelo

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What the paper is about

Question:

What drives boom and bust episodes in housing prices, which are both slow and unrelated to observable fundamentals?

3 key ingredients

- search model of the housing market
- heterogeneous priors about LR fundamentals
- epidemic model of social interactions that determines beliefs' evolution

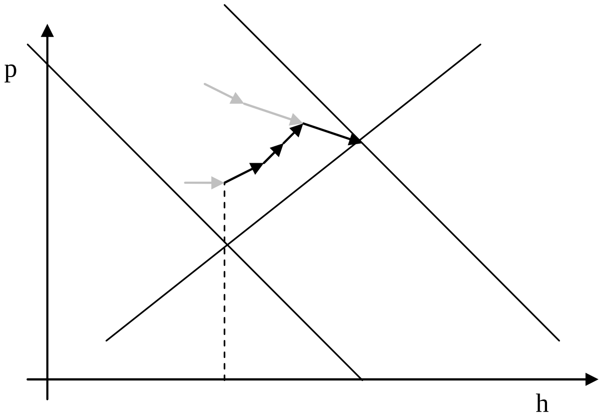
Alternative Models

1. sequence of good and bad shocks, BUT observable fundamentals often not enough

2. expectations about future changes in fundamentals: adjustment costs

   if people expect more demand at time T $\longrightarrow$ prices slowly increase and then slowly decrease

Adjustment Costs



Alternative Models (continued)

3. Piazzesi and Schneider (2009): few optimist may generate a big increase in price

   search model without epidemic dynamics,
   BUT no slow boom

Set up

- continuum of measure 1 of agents
- two states: renter (r) or homeowner (h)
- two types: natural homeowners (H) and natural renters (R)
- flow value from owning is ε for H and zero for R
- flow value from renting is zero for everybody
- total amount of owned houses fixed to k

$$\begin{aligned} h^H + h^R &= k \\ r^H + r^R &= 1 - k \end{aligned}$$

Type Switching

- agents can switch type according to transition matrix contingent on both type and state

$$
\begin{aligned}
\Pr(H|H,h) &= 1-\eta \text{ and } \Pr(H|H,r)=1 \\
\Pr(R|H,h) &= \eta \text{ and } \Pr(R|H,r)=0 \\
\Pr(H|R,h) &= 0 \text{ and } \Pr(H|R,r)=\alpha \\
\Pr(R|R,h) &= 1 \text{ and } \Pr(R|R,r)=1-\alpha
\end{aligned}
$$

- note: more standard if contingent only on type

- Focus on equilibrium where only h^R sell and r^H buy

Matching and Bargaining

- pairwise meeting according to CRS matching function
- define market tightness $\theta_t = h_t^R / r_t^H$
- $\mu(\theta_t)$ = prob. for a buyer to meet a seller
- $\mu(\theta_t) / \theta_t$ = prob. for a seller to meet a buyer
- price determined with Nash Bargaining
- all bargaining power to sellers

Bellman Equations

- renters get 0 surplus from matching and 0 from renting

$$R_t^H = R_t^R = 0$$

- value functions for owners:

$$H_t^H = \varepsilon + \beta \left[\eta H_{t+1}^R + (1 - \eta) H_{t+1}^H \right]$$

$$H_t^R = \frac{\mu(\theta_t)}{\theta_t} P_t + \left(1 - \frac{\mu(\theta_t)}{\theta_t} \right) \beta H_{t+1}^R$$

- equilibrium price:

$$P_t = \beta H_{t+1}^H = f(\varepsilon, \theta_{t+2}, \dots)$$

with f increasing in ε and decreasing in $\theta_{t+2}, \dots$

Uncertainty

- renters learn that with prob. $1 - a$ ε will change to $\tilde{\varepsilon}$
- few optimists (O) and the others pessimists (P)
- pessimists think $\tilde{\varepsilon} = \varepsilon$ and optimists think $\tilde{\varepsilon} = \varepsilon^* > \varepsilon$
- notice: if no optimists, same model as before
- after uncertainty is realized, everybody know true $\tilde{\varepsilon}$
- before uncertainty is realized, everybody knows ε
- no higher order expectations!

Value Functions

- call x_t the vector of buyers and sellers
- call $H^H(\tilde{\varepsilon}, x_t)$ and $H^R(\tilde{\varepsilon}, x_t)$ the values after $\tilde{\varepsilon}$ is realized
- Bellman value for $i = O, P$:

$$H_t^{H,i} = \varepsilon + \beta[\eta E_t[H_{t+1}^R | i] + (1-\eta) E_t[H_{t+1}^H | i]]$$

where

$$E_t[H_{t+1}^j | i] = aH_{t+1}^{j,i} + (1-a) E_t[H^j(\tilde{\varepsilon}, x_t) | i]$$

with $j = R, H$.

Effects on Prices

three possible effects on prices if there are some optimists:

1. **direct price effect**:
   average prices increase because optimists are willing to pay higher prices for higher expected fundamentals

2. **speculative effect**:
   all prices increase because people know optimists are around and willing to pay higher prices

3. **entry effect**: renters of type R may find it optimal to buy
   - for speculative reasons
   - if they are optimists because they may switch to type H

Price Effect

- imagine all optimists are renters of type H
- renters of type R are pessimists and still won't buy
- two equilibrium prices:

$$P_t^{H,O} = \beta H_{t+1}^{H,O} > \beta H_{t+1}^{H,P} = P_t^{H,P}$$

- expected price for sellers is higher

$$P_t = \frac{r^{H,O} P_t^{H,O} + r^{H,P} P_t^{H,P}}{r^{H,O} + r^{H,P}}$$

- BUT matching probabilities unchanged

$$\theta_t = \frac{h^R}{r^{H,O} + r^{H,P}} = \frac{h^R}{r^H}$$

Entry Effect

- imagine all optimists are renters of type R who also buy
- two equilibrium prices depending on buyer's priors

$$P_t^{R,O} = \beta H_{t+1}^{R,O} \text{ and } P_t^{H,P} = \beta H_{t+1}^{H,P}$$

- expected price for sellers

$$P_t = \frac{r^{R,O} P_t^{R,O} + r^{H,P} P_t^{H,P}}{r^{R,O} + r^{H,P}}$$

- now more buyers $\rightarrow$ matching prob. change

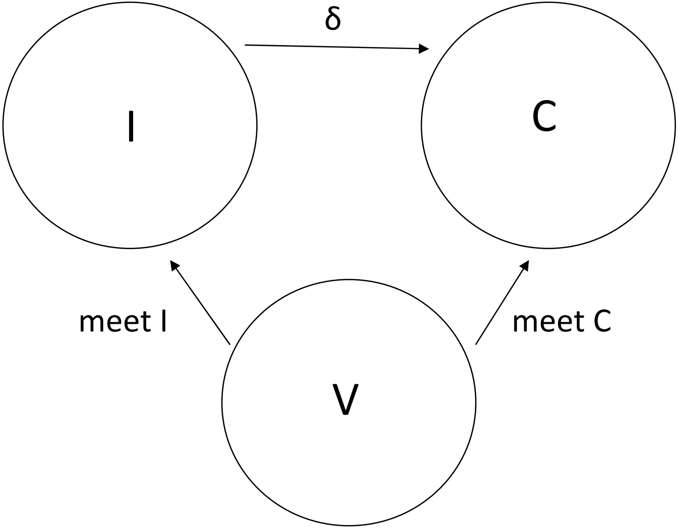
$$\theta_t = \frac{h^R}{r^{R,O} + r^{H,P}} > \frac{h^R}{r^H}$$

- positive feedback effect on prices that is long-lasting (buyers dynamics)!

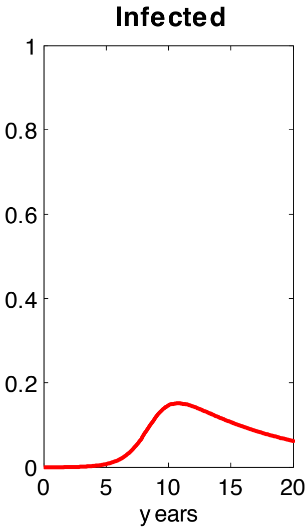
Switching Priors

- renters learn that with prob. $1 - a$, ε will change to $\tilde{\varepsilon}$
- there are three types of renters:
  1. **infected**: believe $E(\tilde{\varepsilon}) > \varepsilon$ and low entropy
  2. **vulnerable**: believe $E(\tilde{\varepsilon}) = \varepsilon$ and high entropy
  3. **cured**: believe $E(\tilde{\varepsilon}) = \varepsilon$ and low entropy
- renters now meet bilaterally and can switch type unexpectedly
- high entropy agents switch to low entropy type met

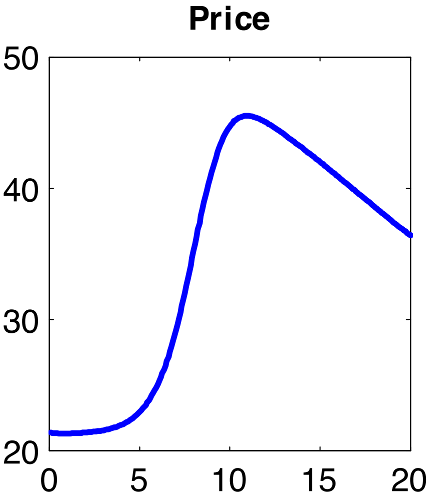
Social Dynamics



Beliefs Dynamics



Price Dynamics



What Behind Price Dynamics?

- The simulated paths of prices and infected guys are very similar
- Is it mainly driven by the direct price effect?
- Or the speculative effect and the entry effects may be quantitatively relevant?
- Both for levels and for propagation...

Asymmetric Belief Distribution and Humps

- try more Bayesian exercise
- population with beliefs about binary random variable X
- $E[X] = \pi$, but agents uncertain on π
- agent i has seen n_i signals, of which s_i good

$$E_i[X] = \frac{s_i}{n_i}$$

- when two agents meet both update to

$$\frac{s_i + s_j}{n_i + n_j}$$

- each period they receive exogenous signals (2^t)
- start with 5% have $9/10$ and 95% have $1/2$

Belief Dynamics