Discussion of "What drives House Prices?" by James Kahn

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This paper

- Fact: house prices move around a lot
- Can these movements be explained by a two-sector RBC model?
- Davis & Heathcote (2003 IER)
  model works for quantities, not quite for prices

Discussion

- Baby version to illustrate mechanics
- rents and housing expenditure
- sources of house price movements
- historical boom/bust cycles
- implications for quantities

Mechanism

- 2 sector RBC model (shelter and "food")
- Two important properties:
  (i) Production of shelter is more land-intensive
  (ii) Shelter & food are complements in utility
- Productivity shock in food sector
  $\longrightarrow$ complements: need more shelter to enjoy the food
  $\longrightarrow$ land now scarce since needed to make shelter
  $\longrightarrow$ rental rate of land goes up
  $\longrightarrow$ land prices (and thus house prices) go up
- Productivity growth on average faster in food sector, no balanced growth path
- Regime switching with unknown regime creates slow adjustment of price

Baby Version

- shelter produced from land $H_t = L_t$
- food produced from labor $Y_t = g^t N_t$
- $g > 1$ (on average faster growth in food sector)
- labor supplied inelastically, $N = 1$
  fixed supply of land $L = 1$
- CES utility over food & shelter, intratemporal elasticity $\varepsilon < 1$

$$\sum_{t=0}^{\infty} \beta^t \log \left(\omega c_t^{\frac{\varepsilon-1}{\varepsilon}} + (1-\omega) h_t^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

- Competitive equilibrium
- here, no shocks. do comparative statics wrt g
- remark: paper also has unbalanced sectoral growth
  solution by log-linearization around "approx. balanced growth path"

Rents, quantities & housing expenditure

- In equilibrium, rents are

$$\begin{aligned} p_t^h &= \text{intratemporal MRS between shelter \& food} \\ &= \frac{(1-\omega)}{\omega}\left(\frac{c_t}{h_t}\right)^{1/\varepsilon} \\ &= \frac{(1-\omega)}{\omega} g^{(1/\varepsilon)t} p_0^h \end{aligned}$$

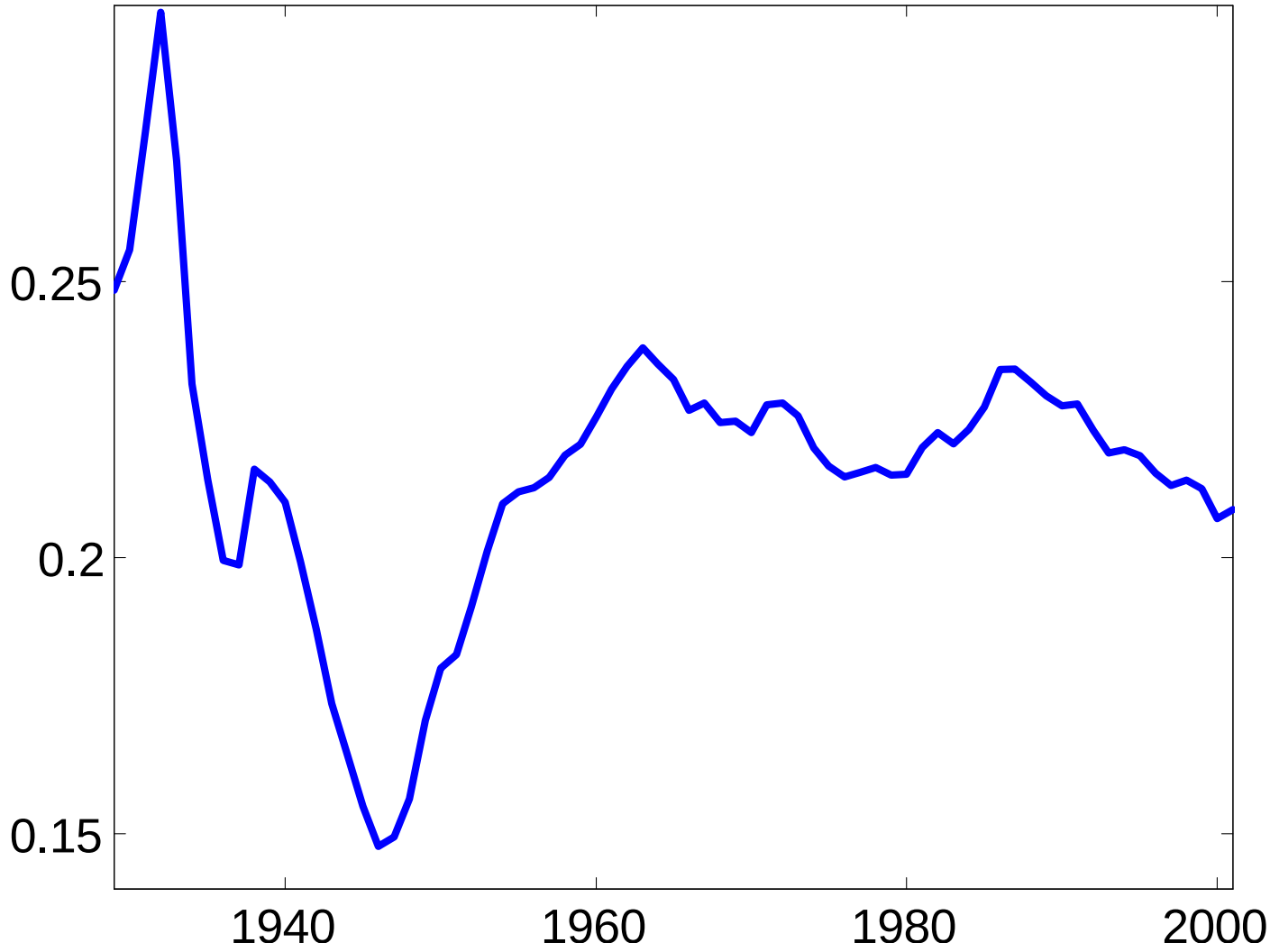
  grow because shelter produced from fixed factor land
  grow faster than productivity if complements $\varepsilon < 1$

- expenditure ratio

$$\begin{aligned} \frac{p_t^h h_t}{c_t} &= \frac{(1-\omega)}{\omega}\left(\frac{c_t}{h_t}\right)^{1/\varepsilon-1} \\ &= \frac{(1-\omega)}{\omega} g^{(1/\varepsilon-1)t} \end{aligned}$$

  if $\varepsilon < 1$ expenditure share on housing trends up and tends to one

Evidence on housing expenditure shares



p. 15 "... the ratio expenditures on housing services to non-housing consumption expenditures has no long run trend, ..."

Rents and quantities: evidence from volatilities

- Intratemporal FOC

$$p_t^h = \frac{(1-\omega)}{\omega}\left(\frac{c_t}{h_t}\right)^{1/\varepsilon}$$

  implies relationship between volatilities

$$\text{vol}\left(\Delta \log p_t^h\right) = \frac{1}{\varepsilon}\,\text{vol}\left(\Delta \log\left(c_t / h_t\right)\right)$$

- Ballpark numbers (from NIPA aggregates):

$$\begin{aligned}\text{vol}\left(\Delta \log p_t^h\right) &\approx 2 \text{ percent}\\ \text{vol}\left(\Delta \log\left(c_t / h_t\right)\right) &\approx 2 \text{ percent}\end{aligned}$$

- With $\varepsilon = 0.2$: prices five times more volatile than quantities

House prices

- In equilibrium,

  house price = present value of rents discounted at real rates

$$
\begin{aligned}
R_{t,t+s} &= \frac{1}{\text{intertemporal MRS}} \\
&= \beta^{-s} \; g^{s} \; \frac{\omega / c_t + (1-\omega)\, g^{\frac{1-\varepsilon}{e} s}}{\omega / c_t + (1-\omega)}
\end{aligned}
$$

- c_t high enough: $R_{t,t+s}$ close to constant at $\beta^{-s} g^{(1/\varepsilon)s}$
- So

$$
\begin{aligned}
\text{house price} &= \sum_{s=0}^{\infty} \frac{1}{R_{t,t+s}} p_s^h \\
&= p_t^h \sum_{s=0}^{\infty} \beta^s \; \frac{\omega / c_t + (1-\omega)}{g^{(1-1/\varepsilon)s} \omega / c_t + (1-\omega)}
\end{aligned}
$$

- c_t high enough: house price proportional to rent
- what about price-rent ratio? can initially increase with g

Sources of house price movements

- "price-dividend ratio" for housing

$$\text{price rent ratio} = \frac{\text{house price}}{\text{rent today}} = \frac{\text{present discounted value of rents}}{\text{rent today}}$$

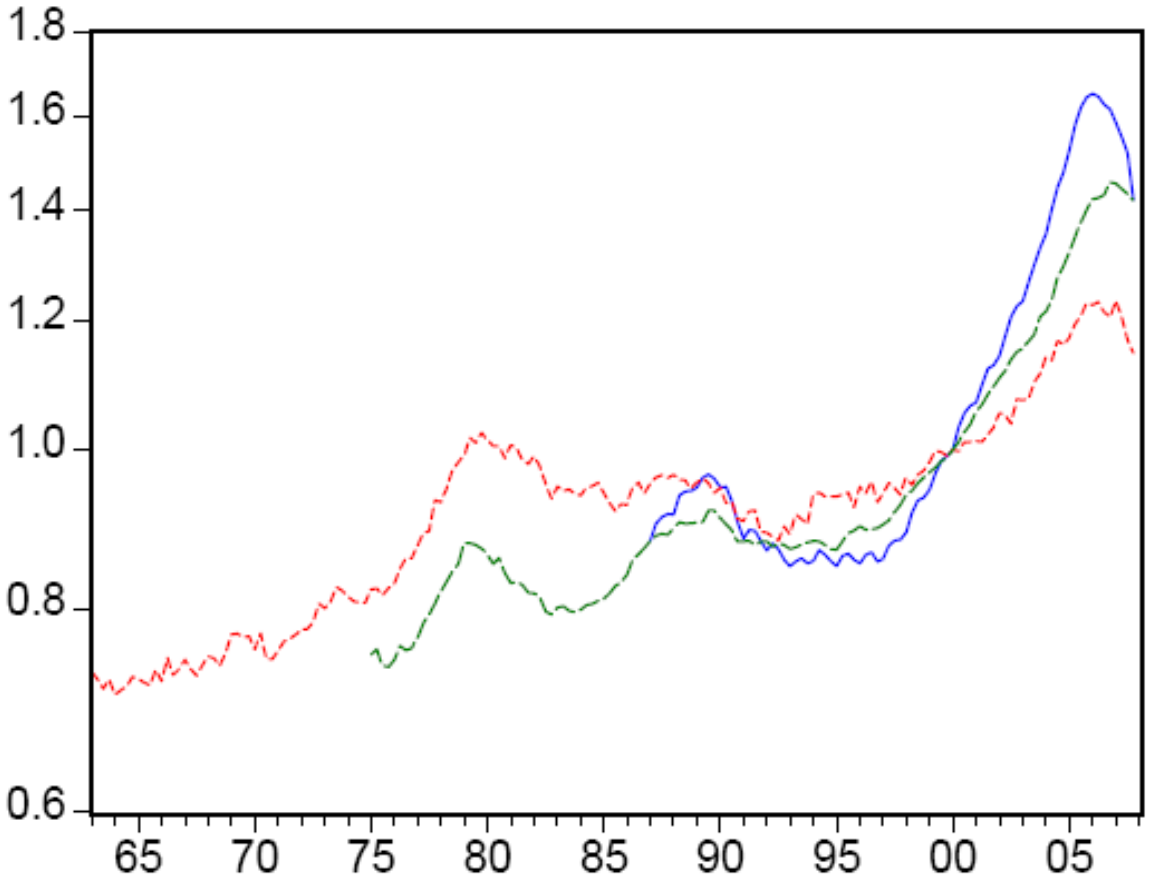
- decompositions of movements
  (e.g. Campbell-Davis-Gallin-Martin 2009)

$$\text{price rent ratio} = \text{expected rents} - \text{real rate} + \textit{rest}$$

- data: rest is most volatile
- model: (at most) expected rents and real rate move, rest is constant

Historical boom/bust episodes

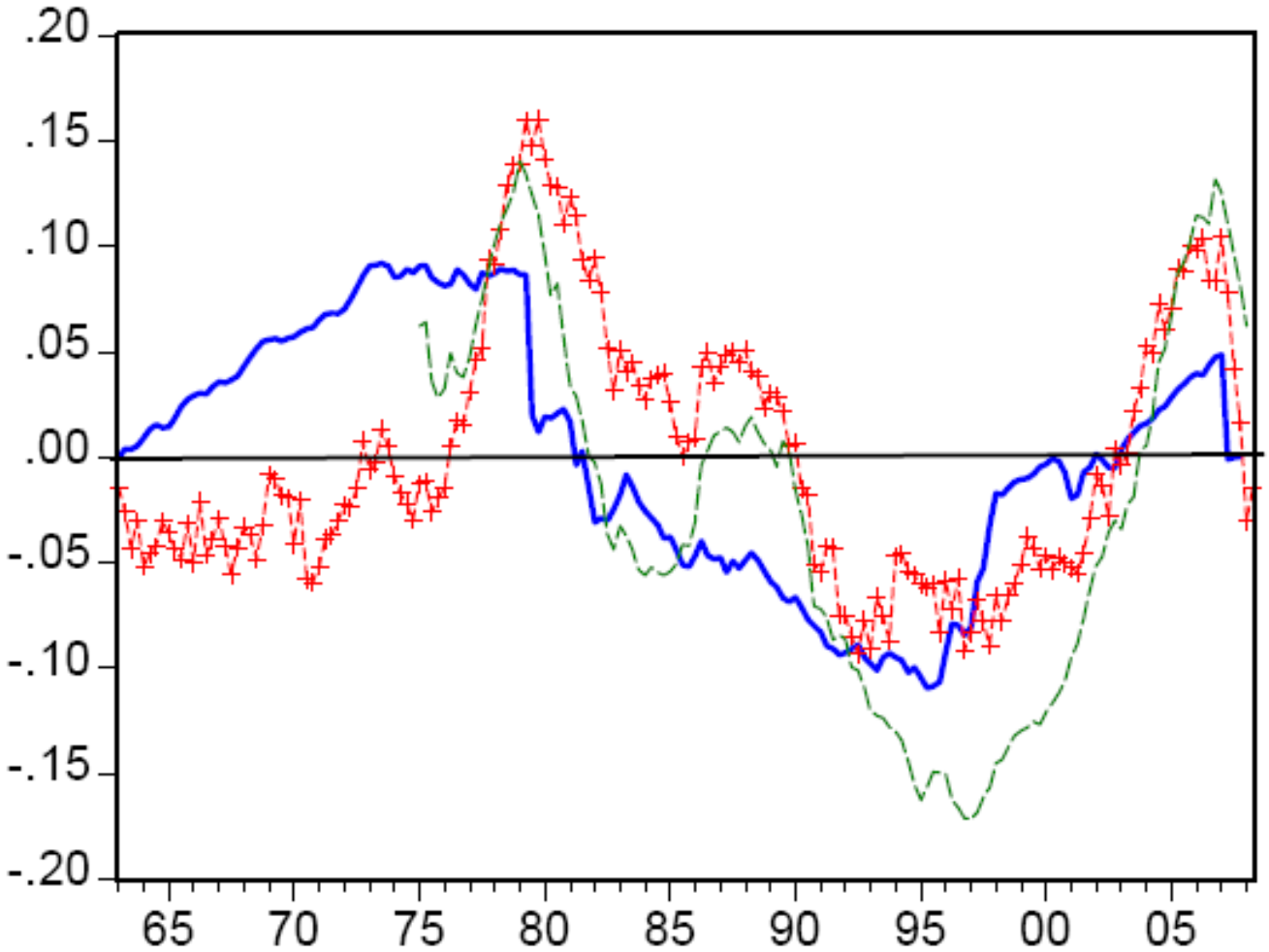
Figure 1: Alternative Home Price Indexes (Inflation-Adjusted)



Target boom? 80% Case-Shiller, 50% OFHEO, 30% Census New Homes

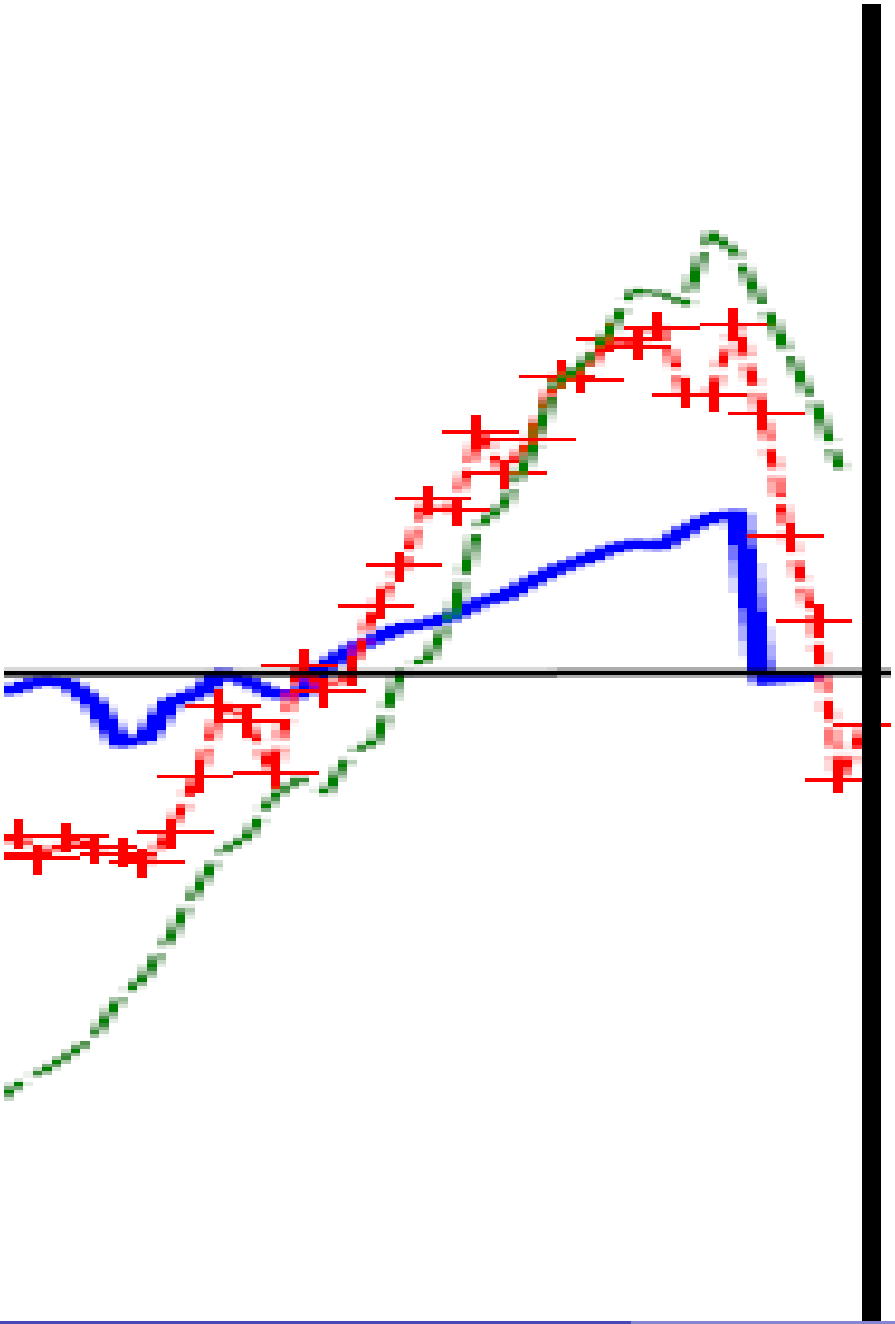
Historical boom/bust episodes

Figure 11: Model vs. Actual Housing Prices (detrended)



Qualitatively, yes —- except for 1960s & 70s, end 80s,

Recent episode



Early 2000s (2000-2006),
deviations from trend:

Model: 4%

OFHEO detrended: 25%

Implications for quantities

- real estate investment in the model highly volatile
  Figure 12 in the paper
- Davis & Heathcote 2003:
  matches real estate investment
  did not get enough house price volatilty
- This paper:
  generates more house price volatility
  does not match quantities

Conclusions

- Very useful exercise
- shelter and food are strong complements (small ε)
  $\longrightarrow$ implications for volatilities of rents and quantities
- unbalanced sectoral growth has a number of implications
  (e.g., trending expenditure shares)
  $\longrightarrow$ provide evidence from model simulations
- qualitatively, model gets boom/bust patterns
  except for 60s and 70s, end of the 80s
- quantatively, frictionless model
  - does not generate the large house price movements that we have seen, for example, in the recent episode
  - does not match sectoral investment