discussion of "Complex Methods in Economics: An Example of Behavioral Heterogeneity in House Prices" by Bolt, Demertzis, Diks and Van der Leij

Vincent Sterk

University College London

DNB annual research conference, November 3-4 2011

The paper

Goal:

- Theory of (nonlinear) booms and crashes in housing markets
- Early warning indicators

Tool:

- Estimated asset-pricing model with heterogeneous beliefs

Results:

- Empirical support for belief heterogeneity
- Possibility of multiple equilibria

My discussion

- Alternative motivation
- Model
- Implications
- Suggestions

What's wrong with standard models?

Off-the-shelf equilibrium model with rational expectations

- Households:

$$\max_{(c_t,h_t)_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{\ln c_t + \gamma \ln h_t\right\}$$
$$s.t.$$
$$c_t + p_{h,t}\left(h_t - h_{t-1}\right) = y_t$$

  where c_t is consumption, $p_{h,t}$ is the house price, h_t is housing, y_t is income and $\gamma, \beta \in (0,1)$ are preference parameters.

- Housing supply:

$$h_t = h$$

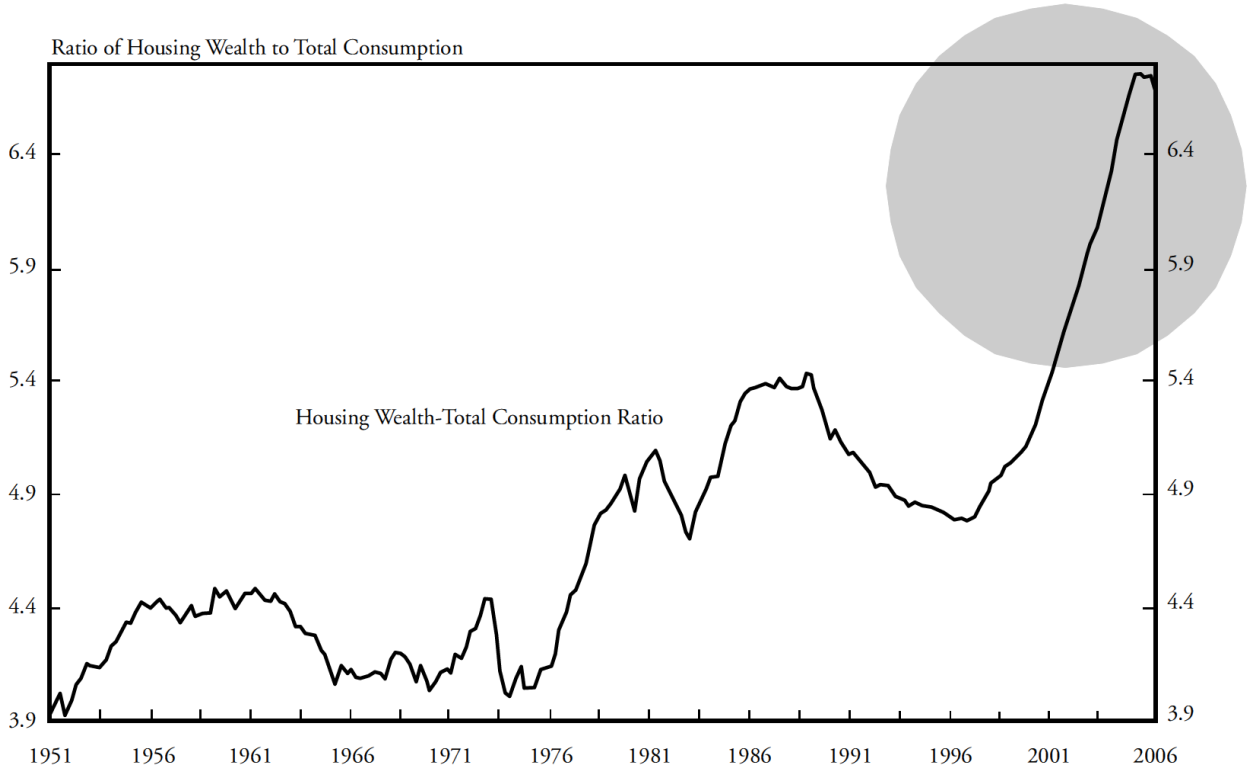
What's wrong with standard models?

House-price equation:

$$\begin{aligned} \frac{p_{h,t}}{c_t} &= \frac{\gamma}{h} + \beta \mathbb{E}_t \frac{p_{h,t+1}}{c_{t+1}} \\ &= \frac{\gamma}{h\,(1-\beta)} \end{aligned}$$

$\Rightarrow$ **constant** ratio of housing wealth to consumption $\frac{p_{h,t}h}{c_t}$.

What's wrong with standard models?



Source: Ludvigson (2007)

What's wrong with standard models?

$$\frac{p_{h,t}}{c_t} = \frac{\gamma}{h} + \beta \mathbb{E}_t \frac{p_{h,t+1}}{c_{t+1}}$$

- DSGE literature: introduce collateral constraints + shocks to preference parameter γ
- This paper: free up expectation $\mathbb{E}_t$

Beliefs and house prices

Exciting new literature

- Burnside, Eichenbaum and Rebelo (2011): "infectious" beliefs about house price fundamentals
- Adam, Kuang and Marcet (2011): learning about expectations
- Bolt, Demertzis, Diks and Van der Leij (2011): estimated model with belief heterogeneity and endogenous switching

The model

- equilibrium asset pricing model of the housing market
- all agents know the *fundamental* house price
- 2 types of agents with different expectations about *actual* house price developments
- exogenous process for rents, constant interest rate

Excess return on housing

$$\underbrace{R_{t+1}}_{\text{excess return}} = \underbrace{Q_t}_{\text{rent}} + \underbrace{(P_{t+1} - P_t)}_{\text{capital gain}} - \underbrace{P_t r}_{\text{foregone interest}}$$

- Excess return compensates homeowners for taking risk
- Alternative interpretation: return that is needed to make agents indifferent between owning and renting

Housing demand

- Being a mean-variance investor, the demand for housing of a type-h agent is given by:

$$z_{h,t} = \frac{\mathbb{E}_{h,t} R_{t+1}}{\alpha V}$$

$\Rightarrow$ housing demand proportional to expected excess return, according to subjective beliefs

$\Rightarrow$ pessimistic agents may go short in housing

Behavioral assumptions

1. Expectations formation of type-h agent:

$$\mathbb{E}_{h,t} X_{t+1} = \theta + \phi_h X_{t-1} \; h = 1, 2$$

   where $X_t = P_t / P_t^f - 1$, with P_t^f being the fundamental house price.

2. Fraction of agents switching between the two types is an exogenous function of past forecasting performance.

Estimation

	United States	Netherlands
ϕ_1	0.89	0.99
ϕ_2	1.13	1.04

Interpretation of the coefficients

Q How do type-1 and type-2 agents expect house prices to develop over the next two years?

How much belief heterogeneity?

Expected change in house prices over the next two years

Expectation of house price growth after k quarters:

$$\mathbb{E}_{1,t}\frac{P_{t+k}}{P_t} = \left(1+\phi_1^{k/2}\cdot\frac{P_t-P_t^f}{P_t^f}\right)(1+g)^k\frac{P_t^f}{P_t}$$

where g is the quarterly growth rate of the fundamental house price which I set equal to 0.5%.

How much belief heterogeneity?

Expected change in house prices over the next two years

- currently 5% overvaluation:

	United States	Netherlands
type-1 agent	$+2\%$	$+4\%$
type-2 agent	$+7\%$	$+5\%$

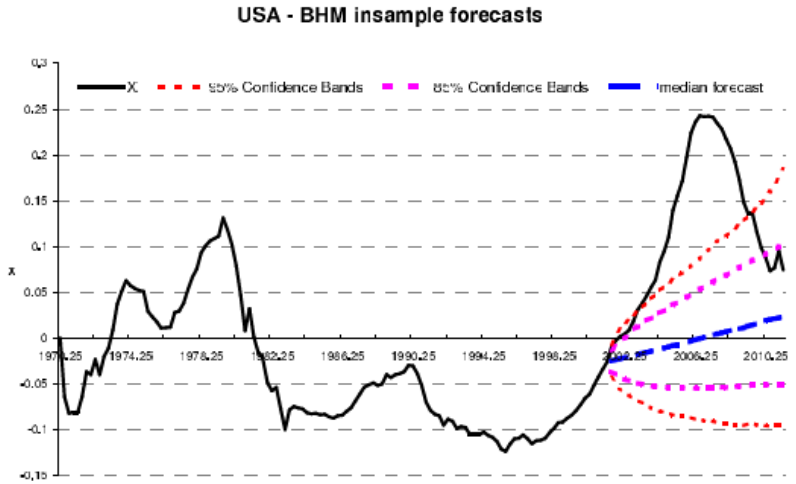
- currently 25% overvaluation:

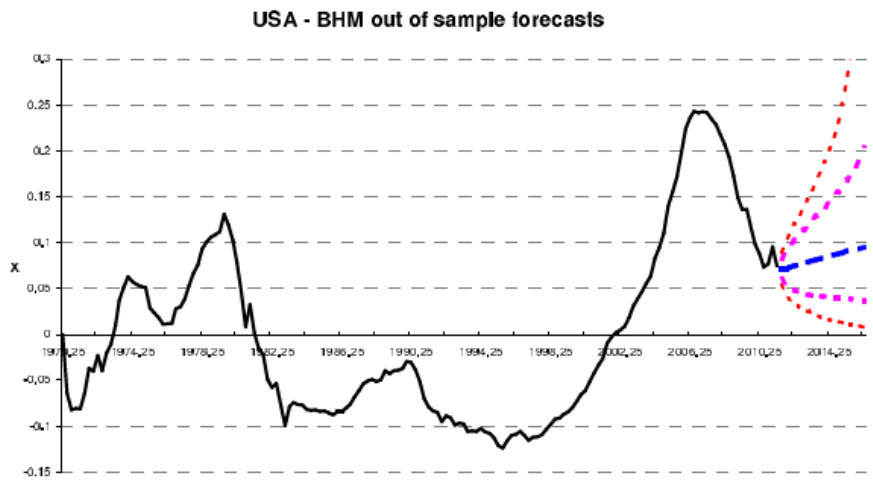
	United States	Netherlands
type-1 agent	-4%	$+3\%$
type-2 agent	$+17\%$	$+8\%$

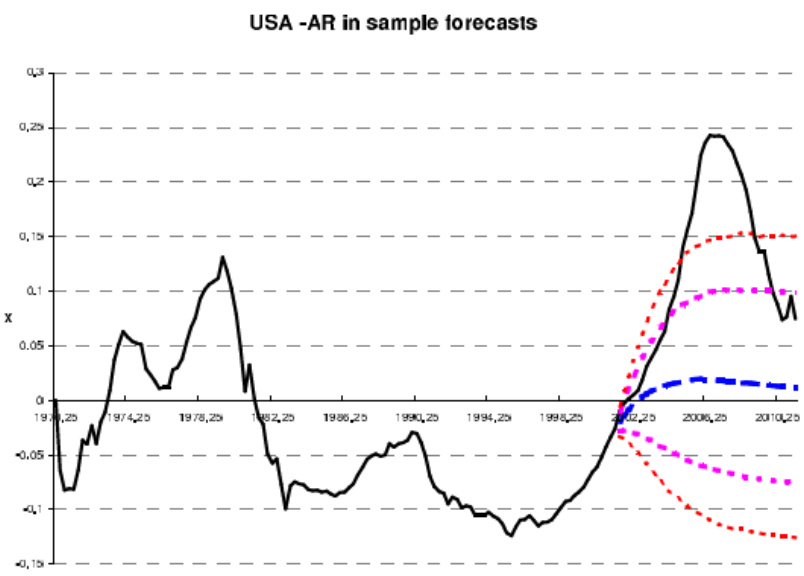
What about trade volumes?

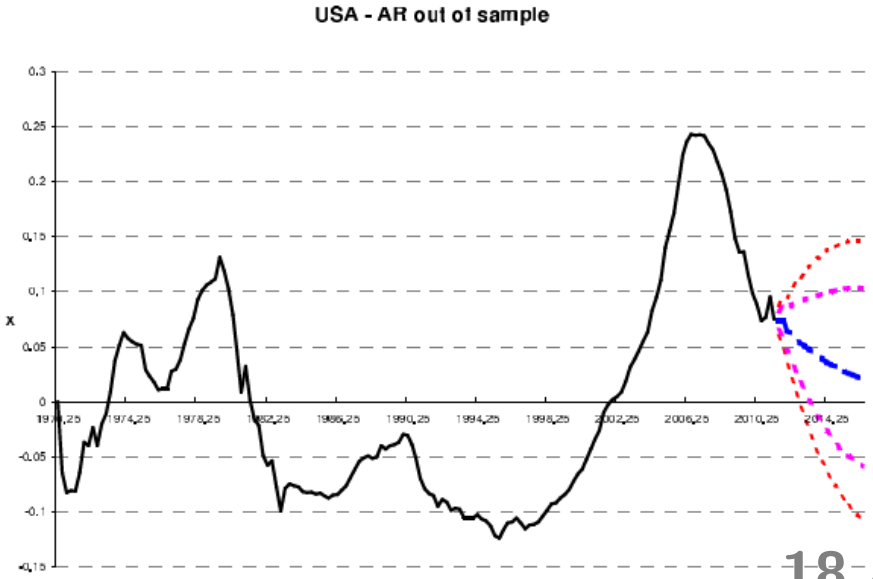
- strong belief heterogeneity $\Rightarrow$ many housing trades?
- how does the volume of housing trades fluctuate over the housing cycle?
- Idea: simulate individual agent

Forecasting power?









More modest objective

- Does the introduction of the belief heterogeneity improve the model's ability to explain observed cyclical patterns in house price data?

Conclusion

- Exciting new work on housing!
  - What do we learn about house prices from the model? When to declare empirical success?
  - Relax assumption of housing as pure asset? Short-selling restrictions?
  - Implications for housing trades?
  - Robustness over different forecasting and switching rules? Include rational agent in the model?