## Beliefs, Aggregate Risk, and the U.S. Housing Boom

## Margaret M. Jacobson

Federal Reserve Board

What drove optimistic beliefs about house prices in the 2000s?
Incomplete information about the evolution of house prices in an unprecedented aggregate economic state.
Nationwide loosening of credit conditions in an economic expansion lacked historical precedent.

**Beliefs can be a driver housing booms** 

• Shown by Kaplan et al. (2020) in a general equilibrium

Impulse responses—aggregate shocks to income and credit



- model with incomplete markets and aggregate risk.
- This paper enriches their state-of-the-art framework with endogenous beliefs via adaptive learning.
- •Under endogenous beliefs, the model's house prices match the time path and volatility observed in the data.
- •Calibrate endogenous beliefs to a novel proxy of house price expectations.
- Persistently positive forecast errors consistent with data, mainly negative in exogenous beliefs specification.

**Expected house price growth from a novel proxy constructed from the Michigan Survey of Consumers** 



Calibrate annual learning gain g to mean squared forecast error

Aggregate House Prices, 1997=100



1.4

1.2

1.1





• Beliefs highest when house prices peak, at odds with fullinformation rational expectations.

## **Endogenous beliefs**

- •Krusell and Smith (1998) method relies on evolution of house prices  $p_{Z_t}$
- $\mathcal{Z} = Z, Z'$ —current and future aggregate states

$$\log p_{\mathcal{Z}_{t+1}} = \underbrace{a_{\mathcal{Z}}^0 + a_{\mathcal{Z}}^1 \log p_{\mathcal{Z}_t}}_{\mathbf{x}'_{\mathcal{Z}_t} \mathbf{a}_{\mathcal{Z}}} + e_{\mathcal{Z}_{t+1}}$$

• Exogenous beliefs are fixed and known,  $a_{\mathcal{Z}}$ .



Model's forecast error positive under endogenous beliefs, mostly negative under exogenous



Under adaptive learning, endogenous beliefs are time-varying and unknown, a<sub>Zt</sub>.
Learning gain g and forecast error e<sub>t-1</sub> are key parameters, and calibrated to novel survey proxy.



The views presented herein are those of the authors and do not necessarily reflect those of the Federal

Reserve Board, the Federal Reserve System or their staff.

## References

**Kaplan, Greg, Kurt Mitman, and Gianluca Violante**, "The Housing Boom and Bust: Model Meets Evidence," *Journal of Political Economy*, 2020, *128* (9).

Krusell, Per and Anthony A. Smith, "Income and Wealth Heterogeneity in the Macroeconomy," *Journal of Political Economy*, 1998, *106* (5).