

# Consumption and House Prices in the Great Recession: Model Meets Evidence

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Greg Kaplan

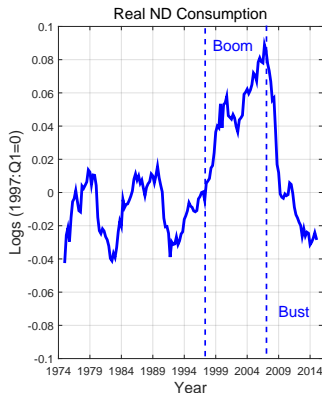
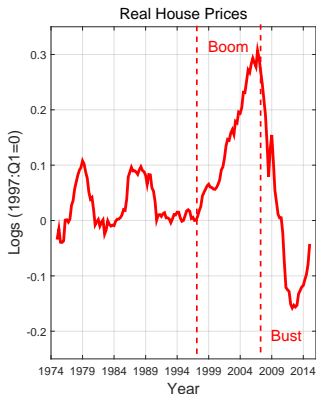
Kurt Mitman

Gianluca Violante

Recent Developments in Macroeconomics

Alghero – July 8, 2016

# $p_h$ and $C$ around the Great Recession



- Boom and bust in **house prices**
- Boom and bust in **non-durable consumption**

# Four questions

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- Financial deregulation vs beliefs about future growth in  $p_h$

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- Channels: Collateral vs wealth effects

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- Study large-scale Principal Reduction program

4. What do we learn about the macro elasticity of  $C$  to  $p_h$ ?

- Sufficient statistic approach

# Methodology

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- Simulate boom-bust
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  - Consumption
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  - Home ownership
  - Leverage
  - Foreclosures
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- **Counterfactuals** to address our questions

# Preview of main results

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- Main driver is beliefs, not change in credit conditions
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## 4. Two observations on the macro elasticity of $C$ to $p_h$

- Magnitude depends strongly on the underlying shock
- Caution about the sufficient statistic approach

Model

# Model

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## Demographics

- OLG lifecycle economy with work & retirement

## Endowments

- Workers face uninsurable risk in individual earnings  $y$

## Preferences

- Utility over nondurable  $c$  and housing services  $h$

## Housing

- Finite number of house sizes  $h \in \mathcal{H}$
- Households can **buy** a unit of  $h$  at price  $p_h$ , or **rent** it at rate  $\rho$
- Linear **transaction cost**  $\kappa_h \cdot (p_h h)$  for sellers



# Financial instruments

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- Price schedule  $q_j(h, m, b, y)$  set by competitive banking sector
- Amortized over remaining lifetime at rate  $r_b (1 + \iota_m)$
- Refinancing option available (cash-out)
- Max Loan-to-Value constraint binds at origination only  $m \leq \lambda^m p_h h$

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**HELOCs** ( $b < 0$ )

- One-period borrowing, non-defaultable at rate  $r_b (1 + \iota_b)$
- Collateralized by housing,  $b \geq -\lambda^b p_h h$

# Closing the model

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## Final good sector

- $Y = Z\bar{N} \rightarrow w = Z$

## Construction sector

- Determines aggregate housing investments  $I(p_h)$

## Rental sector

- Buys housing from sellers and rents them out, or vice-versa, sells rental units to home buyers
- Operating cost  $\psi$  per unit of housing owned
- Zero-profit condition yields equilibrium rental rate  $\rho$

## Government

- Taxes workers (with mortgage interest deduction) and properties, sells land permits, and pays SS benefits to retirees

# Aggregate shocks

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**Underlying shocks** that cause equilibrium house price to fluctuate:

1. **Aggregate labor income**:  $Z$
2. **Credit conditions**: collateral parameters  $\lambda^m, \lambda^b$
3. **Beliefs / News** about future housing demand:

Three regimes for  $\phi$  (share of housing services in  $u$ ):

- (a)  $\phi_L$ : low housing share and **unlikely** transition to  $\phi_H$
- (b)  $\phi_L^*$ : low housing share and **likely** transition to  $\phi_H$
- (c)  $\phi_H$ : high housing share

**Boom-Bust**: shift from (a) to (b), and back to (a)



# Solution and simulation

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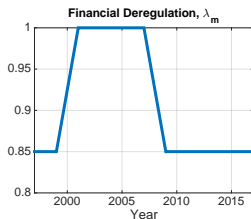
- Equilibrium computed with a version of [Krusell-Smith \(1998\)](#)

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## Simulation of boom-bust: realized path for shocks



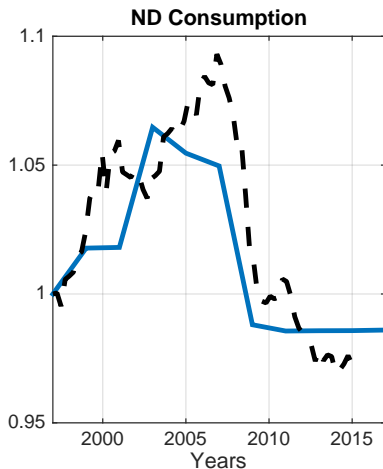
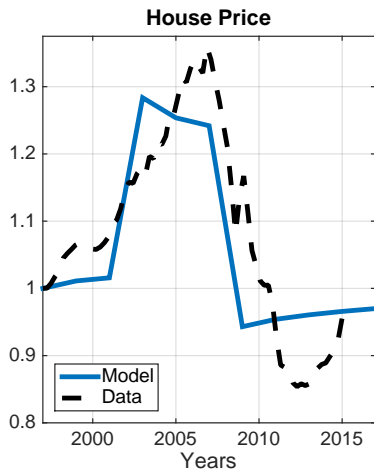
- Analyze **IRFs** of the model economy to these realized shocks

Q1

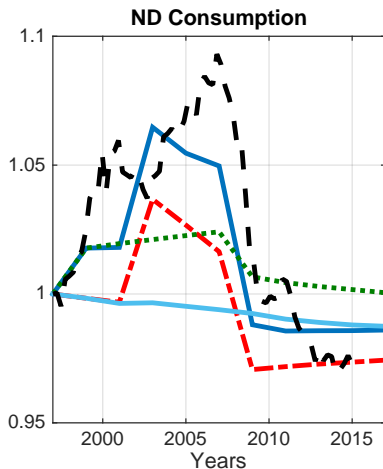
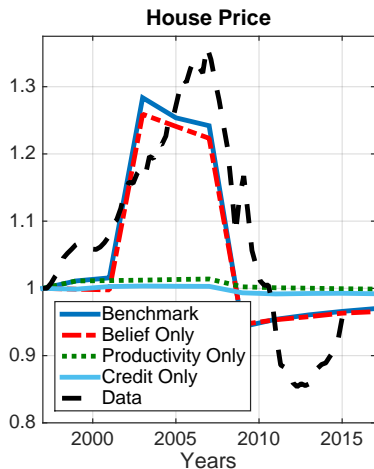
What caused the boom-bust in  $p_h$  and  $C$ ?

# Consumption and house price dynamics

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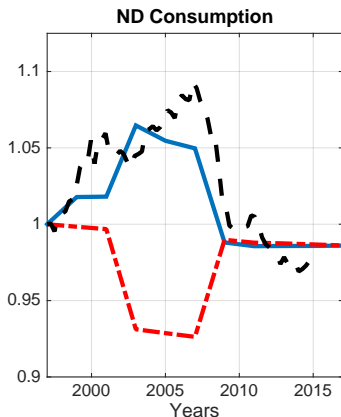
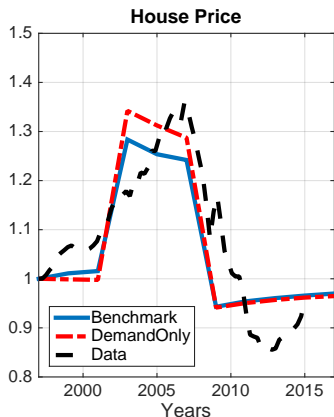
# Consumption and house price dynamics



## Beliefs vs actual change in preferences

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# Beliefs vs actual change in preferences



- Preference shock: similar dynamics of  $p_h$ , but  $C$  falls!

# Dynamics of rent-price ratio

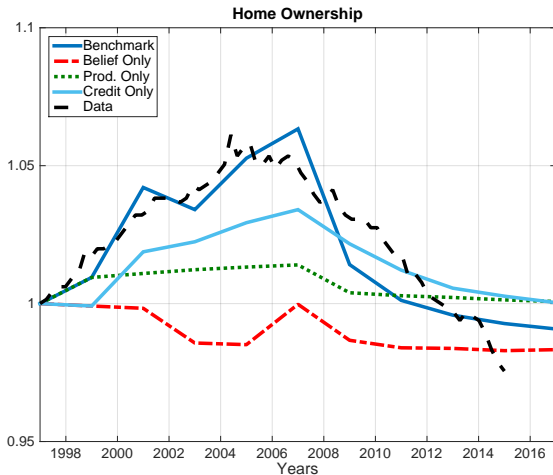


$$\rho = \psi + p_h - \left( \frac{1 - \delta_h - \tau_h}{1 + r^b} \right) \mathbb{E}_{p_h} [p'_h]$$

- Belief about future appreciation essential



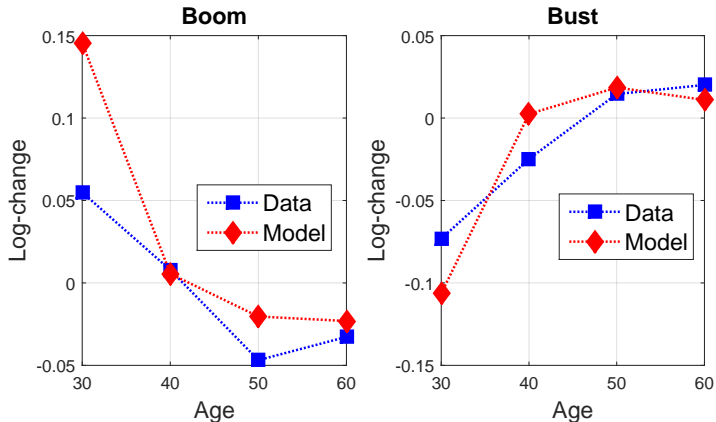
# Dynamics of home ownership



- Financial deregulation drives rise in home-ownership

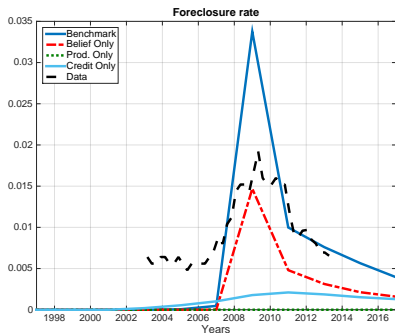
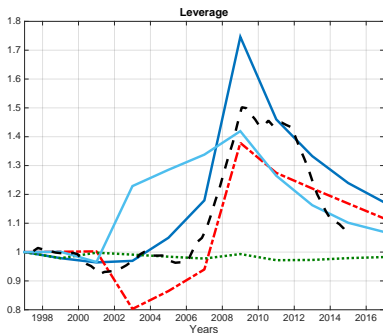
# Change in home ownership by age: data and model

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- It's the young who go in/out of housing market

# Dynamics of leverage and foreclosure

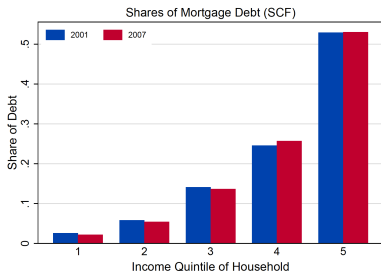


- Financial deregulation key for constant leverage pre-boom
- **Interaction** belief-deregulation important for foreclosure

# Revisited narrative of the crisis I

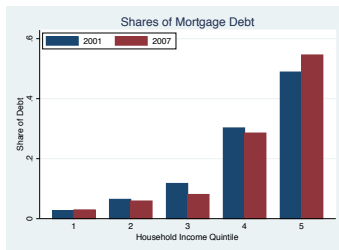
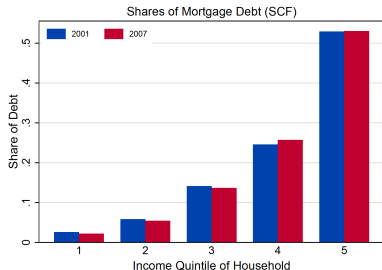
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- Foote et al. (better data): no, equally distributed across income



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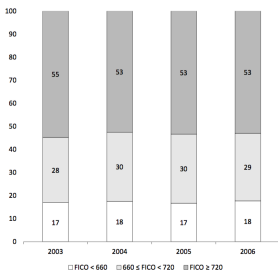


- Low-income hh switch from rent to buy, high-income hh upsize

# Revisited narrative of the crisis II

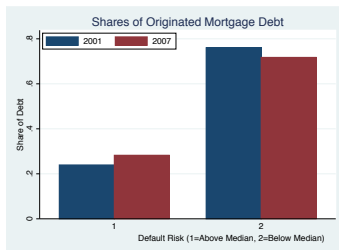
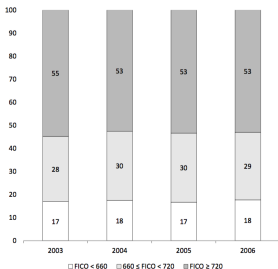
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- Mian-Sufi: mortgage origin. concentrated in subprime groups
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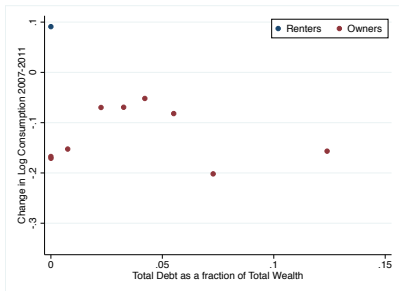
- Young hh switch from rent to buy, older hh upsize

Q2

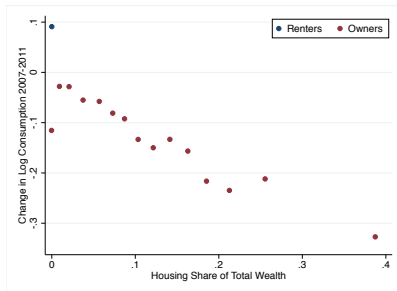
How does the fall in  $p_h$  transmit to  $C$ ?



# Deleveraging or wealth effect in the bust?



Deleveraging: NO



Wealth effect: YES

Q3

Could a massive debt forgiveness program  
have cushioned the bust?

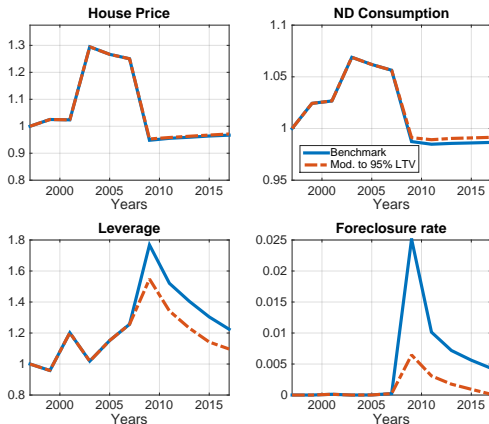
# Counterfactual principal reduction program

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All homeowners with LTV >95%: forgive excess debt

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- Beneficiaries account for small share of  $C$  + do not foreclose

Q4

What do we learn re: the elasticity of  $C$  to  $p_h$ ?

## Model-implied macro-elasticities of $C$ to $p_h$

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	Boom	Bust
Benchmark (all shocks)	0.24	0.25
Productivity	1.60	1.28
Credit Conditions	-0.61	0.32
Belief Shift	0.15	0.18
Taste for housing	-0.28	-0.23

- Elasticity depends on the underlying shock
- Elasticity differs between boom and bust

# Implications for sufficient statistic approach

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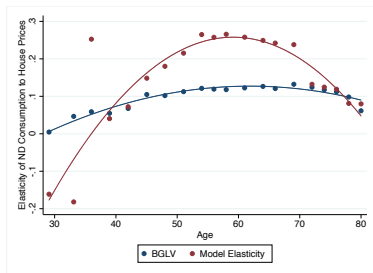
- Berger et al. (BGLV, 2015) propose the following sufficient statistic:

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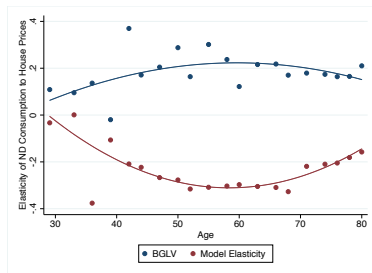
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Beliefs



Preferences

- Fairly accurate for belief shock, not for preference shock



## Summary: what did we learn from the model?

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1. Shift in **expected house appreciation** key to boom-bust in  $p_h$
2.  $\Delta p_h$  transmits to  $\Delta C$  through **wealth effects**
3. Principal reduction programs would **not** have led to faster recovery
4. Elasticity of  $C$  to  $p_h$  heavily dependent on the **nature of the shock**

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Thanks!