# "Housing Finance, Boom-Bust Episodes, and Macroeconomic Fragility" by Carlos Garriga and Aaron Hedlund

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## Overview

- Question
- Model
- Answer

## Question

- Awesome Abstract:
  - boom-bust cycles
  - fragility
  - incomplete markets
  - types of mortgages
  - Goal:
    - understand dynamics of housing
    - response to credit shocks

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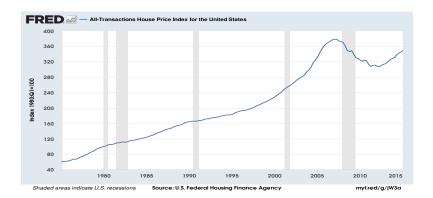
#### **Evaluation**

- boom-bust- boom feelings about paper
- great topic,
- GE model with Heterogeneous Agents!!, But
  - methodological concerns over experiments
  - not enough data on the table

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## 1998 Calibration, 2001-2006 is "Boom"







# Model: Key Elements

- Household
  - choice of housing type: rent vs own
  - idiosyncratic income shocks
  - infinitely lived
- pricing of mortgages with refinance (big deal in crisis)
- endogenous trading frictions in housing markets: market makers (Yavas)
- cdf over income and wealth can matter in equilibrium

## Mortgage Prices: WOW!

- Household Choice problem is complex
- Mortgage Pricing reflects these options
- Indicative of complexity of analysis

$$\begin{aligned} q_m^0((\overline{r}_m,m'),b',h,s)m' &= \frac{1-\delta_h}{(1+\zeta)(1+\phi)(1+r)} \mathbb{E} \left\{ \overbrace{\eta_s(\theta_s(p_s',h))m'}^{\text{sell + repay}} + \overbrace{[1-\eta_s(\theta_s(p_s',h))]}^{\text{no sale (do not try/fail)}} \right. \\ &\times \left[ \underbrace{d'\varphi \min\left\{J_{REO}(h),m'\right\}}_{\text{default + repossession}} + \underbrace{d'(1-\varphi)}_{\text{no repossession}} \left( -\phi m' + \underbrace{(1+\zeta)(1+\phi)q_m^0((\overline{r}_m,m'),b'',h,s')m'}_{\text{continuation value of current }m'} \right) \right. \\ &+ (1-d') \left\{ m' \mathbf{1}_{[\text{Refi}]} + \mathbf{1}_{[\text{No Refi}]} \left( \underbrace{l - \frac{\phi}{1+\overline{r}_m}m''}_{\text{payment - servicing costs}} + \underbrace{(1+\zeta)(1+\phi)q_m^0((\overline{r}_m,m''),b'',h,s')m''}_{\text{continuation value of new }m''} \right) \right\} \right] \right\} \end{aligned}$$

#### Model: Concerns

- lifecycle patterns missed: important for matching dynamics in housing?
- technology for apartments vs houses
- market makers seem constrained in arbitrage
- HH borrowing only against equity: IC?
- no bubbles or fragility in stationary equilibrium
- analysis of shocks comes after

#### Parameterization

- mixture of calibration and estimation (matching moments)
- which parameters matter for the dynamics: not clear
- fit seems very impressive
- moments from cdf over assets, wealth and debt are where???
- moments from 2003-2005 or 1998 ??
- turnover of housing?

#### Intuition on Boom-Bust

Relax downpayment and lower rates as "shock"

- demand shift outs for housing
- ownership rate increases, price increases
- equity rises so easier to smooth through these loans: neat
- equity interacts with mortgage type
- roll over risk and multiplicity?
- Richness of response is impressive.
- Ponder: relative to data, what happens to
  - the distribution of housing prices?
  - distribution of time on market?
  - cdf
  - effects on  $q(\cdot)$

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# Methodology: Boom-Bust

- paper could be clearer on how this was done
- is this it?
  - parameterize by matching a stationary equilibrium
  - decision rules determined for fixed productivity and credit conditions
  - economy "shocked" by productivity and credit booms, then turned off
  - mortgage rates are surprisingly decreased
- is this more than a simple shift in a demand curve? Yes AND No!

# Methodology: Concerns

- non-linearities ought to be key: where are they?
  - individual choice
  - evolution of the cdf
  - interaction of cdf with, say, equity drawdowns, refinancing, etc.
- prices of new or all homes? supply of new?
- agents are surprised multiple times: but market makers are SMART
- risk free rate is exogenous
- preferred alternative is to estimate a RCE and then study response to shocks

# Methodology: Alternative I

$$V(s|\Theta) = \max_{c} u(c, s|\Theta) + \beta E_{s'|s,c} V(s'|\Theta), \forall s.$$
 (1)

- ⊖ is a parameter vector
- estimate  $\Theta^*$  to match moments, for a given environment
- decision rule:  $c = \phi(s|\Theta^*)$
- introduce a new environment: use  $\Theta^*$  to obtain new decision rules
- $c=\phi(s|\Theta^*)$  is not robust across environments: do not use it but ponder "Counterfactural Equivalence in Macroeconomics" by Martin Beraja
- easier for individual optimization than RCE!

# Methodology: Alternative II

- HH optimzation
- Stationary Equilibrium
- Transition Dynamics: highlight role of CDF
- Shocks: Either
  - Analyze SREE for experiments
    - Solve model with stochastic processes from data
    - estimate parms in that environment
    - experiments on domain of model
    - hard: talk is cheap! python ???
  - Convincing argument that "MIT shocks" suffice

#### **Evidence**

- consumption response: type of expenditure?
- VAR evidence:
  - IRF wrt credit shock
  - estimate by matching these moments as well
  - thus match both "periods"
- micro data: on mortgage type, equity, etc.
- credit conditions are not exogenous, what drives them?
- what about regional markets? driven by local credit conditions? bursting bubbles?
- what is the period for the experiment? 2001-2006? or the crash too?

# Suggested Improvements

- Sharpen Focus
- Data, data, data: in Motivation, Estimation, Experiments
- Only essential elements in the model
- Do analysis in a Stationary Rational Expectations Equilibrium
- Study response to changes in exogenous variables
- write "Sunspots and Cycle: Durable Goods and Credit Conditions"