# Housing and Heterogeneity:

# A Narrative and An Agenda

**Christopher Carroll**

**Johns Hopkins University**

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# Alternate History? ('History 2.0')

From 1998 We Had 2030 Tools:

## *Panel* data at the household level:

- Integrated HH balance sheets
  - Registry, or Mint.com (https://mint.com)-type
- *With*
  - Expectations ('What will stock/housing prices do?')
  - Explanations ('*Why*'?)
  - Uncertainty, Perceived Constraints ... whatever models say matters

## Models that can handle:

Heterogeneity in expectations *and explanations*

- Many competing theories right now
  - Fading Memory
  - Diagnostic Expectations
  - k-Level Thinking

## Winner Will Have Two Features

1. Expectations are extrapolative
    - *Perception* of
      $\Delta p_t \Rightarrow \mathbb{E}_t[\Delta p_{t+1}]$

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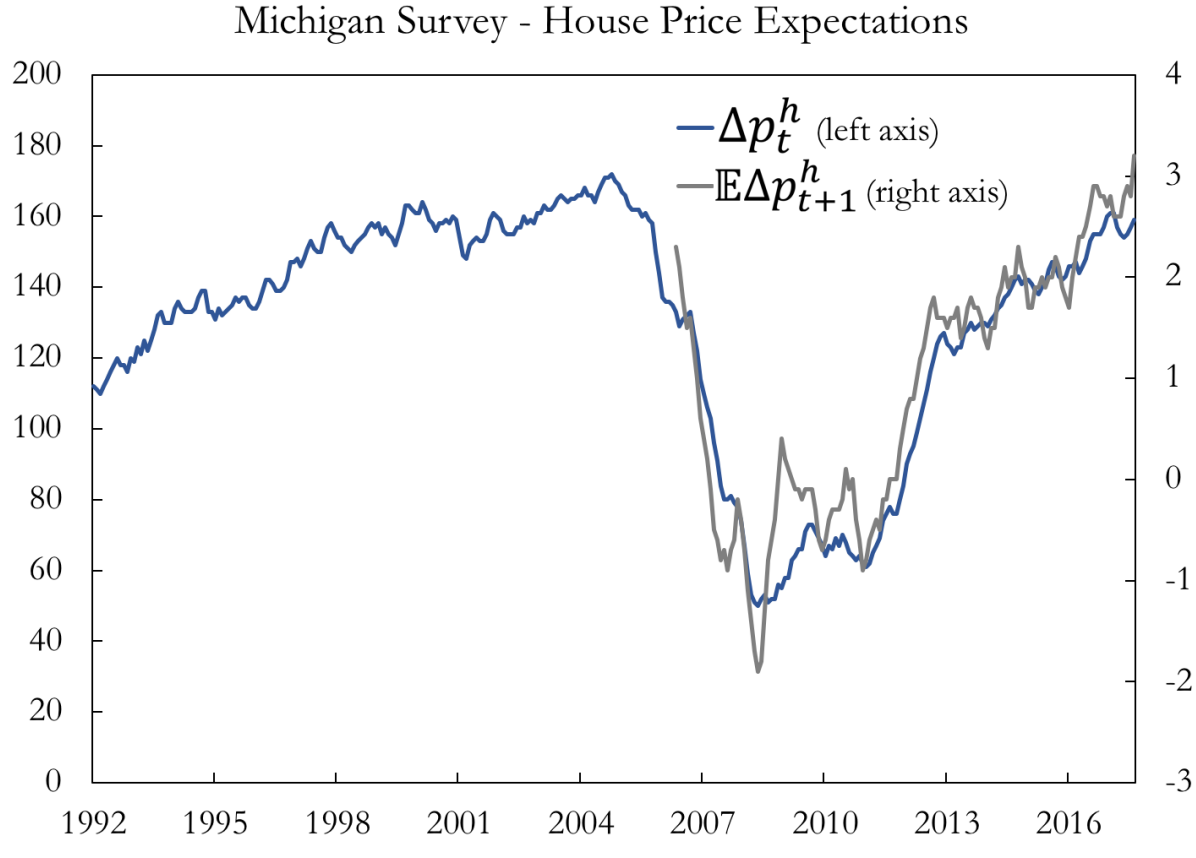

## Winner Will Have Two Features

1. Heterogeneity in the interval used for extrapolation
    - Shiller looks back 150 years
    - A lot of people right now don't remember events from 10 years ago

Combination of "Diagnostic Expectations" and heterogeneous "Fading Memory"?

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        - ... and short 'memory'
        - ... who are optimists
            - "Infection": *marginal* people buy

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1. Collapse of bubble is like "recovery" from infection
    - Recovered: Behavior of "marginal" people back to normal

# Prehistory

Mid-90's Productivity Acceleration

- Greenspan's "New Economy" (~1996)
- Becomes Consensus:
  - Economic Report of the President (2001) (http://www.presidency.ucsb.edu/economic_reports/2001.pdf)

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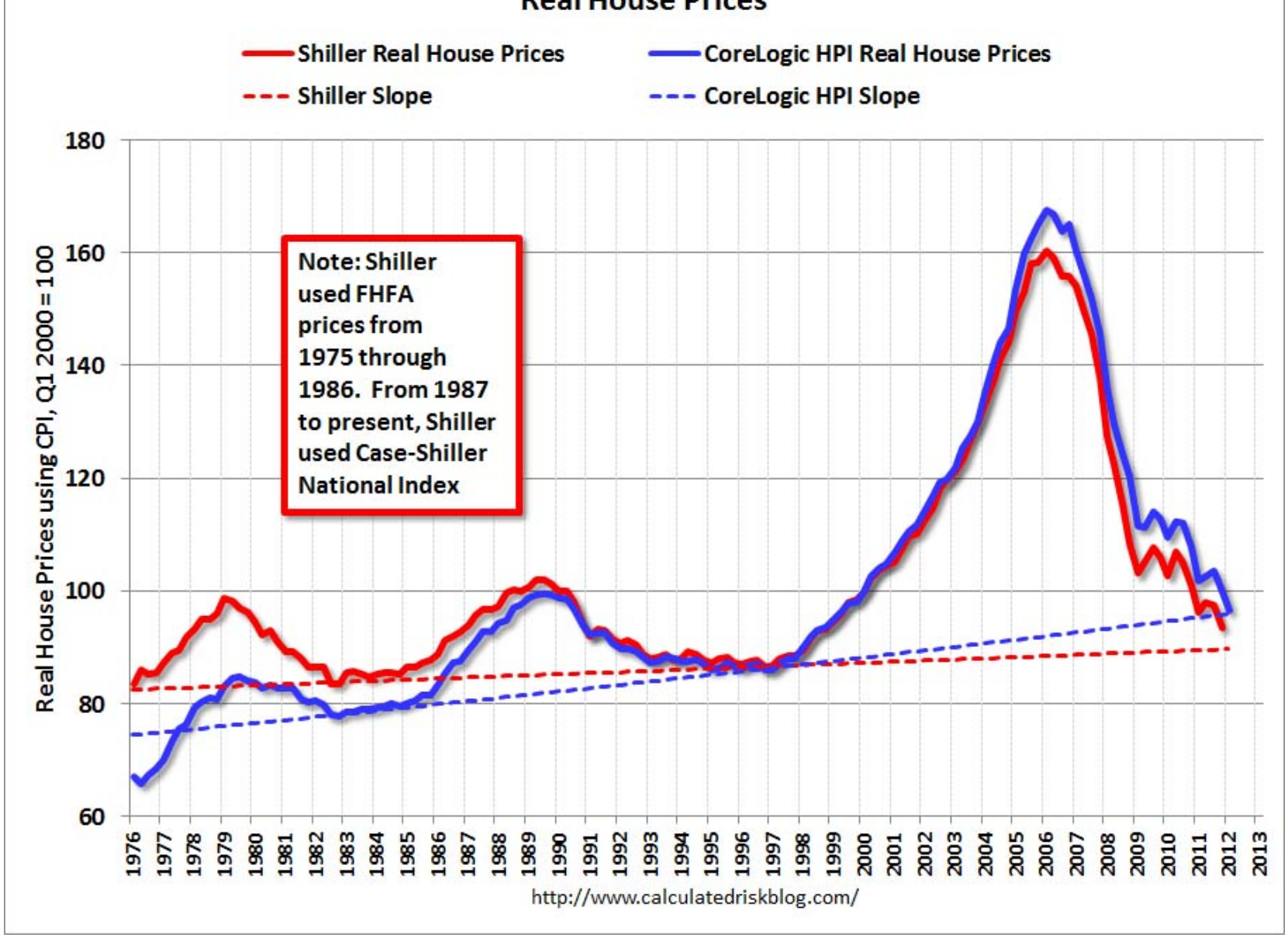
⇒ Boom in asset prices

- Stock Market (1994-2000)
- **Also big ↑ in house prices (~1997-2002)**

# Housing Prices Started Rising: ~1997


Real House Prices
Shiller Real House Prices
CoreLogic HPI Real House Prices
Shiller Slope
CoreLogic HPI Slope
Note: Shiller used FHFA prices from 1975 through 1986. From 1987 to present, Shiller used Case-Shiller National Index
Real House Prices using CPI, Q1 2000 = 100
180
160
140
120
100
80
60
1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
http://www.calculatedriskblog.com/

# The Boom: History 1.0 - Facts

2000-01: Contra , housing was *not* the cycle

- Barely a blip in house prices or construction

2001-05: Chinese external saving unleashed

- "global savings glut ('GSG')"
- ⇒ Interest rates lowest since Great Depression

2002-06: Continuing ↑ in availability of credit across the board

- Subprime *and* prime
- For primary residences *and* nonprimary

# The Boom: History 1.0 - Contemporaneous Views

- First prominent claims housing bubble is inflating?
  - 
  - 
- "That Hissing Sound"
- 'Financial innovation'
  - 'Something funny going on around here'
- Popular culture
  - "Flip That House" first episode: July 2005

# The Boom: History 1.0 - Contemporaneous Views

"It is *Not* A Bubble"

- 2005 JEP
  Paper

Instead, It's Improved Fundamentals

- "New Economy", Low $\mathbb{R}$, 'financial innovation'

# The Boom: History 2.0 (2002-2006)

- **2030 Theory**: Improved fundamentals are *prereq* for a bubble
  - *Not* an argument against a bubble
  - Bubble: $p^h \uparrow$ from fundamental sets off spiral:

    1. Marginal buying by extrapolative optimists $\mathbb{E}_{i,t}[\Delta p^h_{t+\bullet}]$
       - Not buying, e.g., because of $R$
    2. ... and consequent $\Delta p^h_t \uparrow$ "infects" more: $\mathbb{E}_{j,t+1}[\Delta p^h_{t+1+\bullet}]$
    3. Bursts when these *marginal* people depart

# The Boom: History 2.0 (2002-2006)

- **2030 Data**: Lots of people in "susceptible" (=marginal) pool in 2002-03

    1. Beneficiaries of 'financial innovation' (Mian and Sufi)
    2. "New Economy" beliefs + Bush tax cuts ...
        - Some people with money to invest ...
        - ... are pessimistic about stock market (after dot-com bubble)
        - ... but optimistic about house prices (extrapolating)

# History 2.0 (2003-2006): Infection Spreading

- **2030 Data**: Let us see expectations and options changing *heterogenously*
  - Among *marginal* buyers, we see ↑ in $\mathbb{E}_{i,t}[\Delta p_{t+1}]$
    - *We ask them why* ↑ in $\mathbb{E}_{i,t}[\Delta p_{t+1}]$
      - They *say*, basically, "momentum"
    - and the marginal buyers *say they are buying*:
      - *because* $\mathbb{E}_{i,t}[\Delta p^{h}_{t+\bullet}]$

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- "You know it's a bubble" when
  - 1920s: Shoeshine boys give stock tips (Joe Kennedy)
  - 2000s: 'Flip That House': Hairdressers, bartenders become flippers

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**2030 Data** *are* the plural of anecdotes.

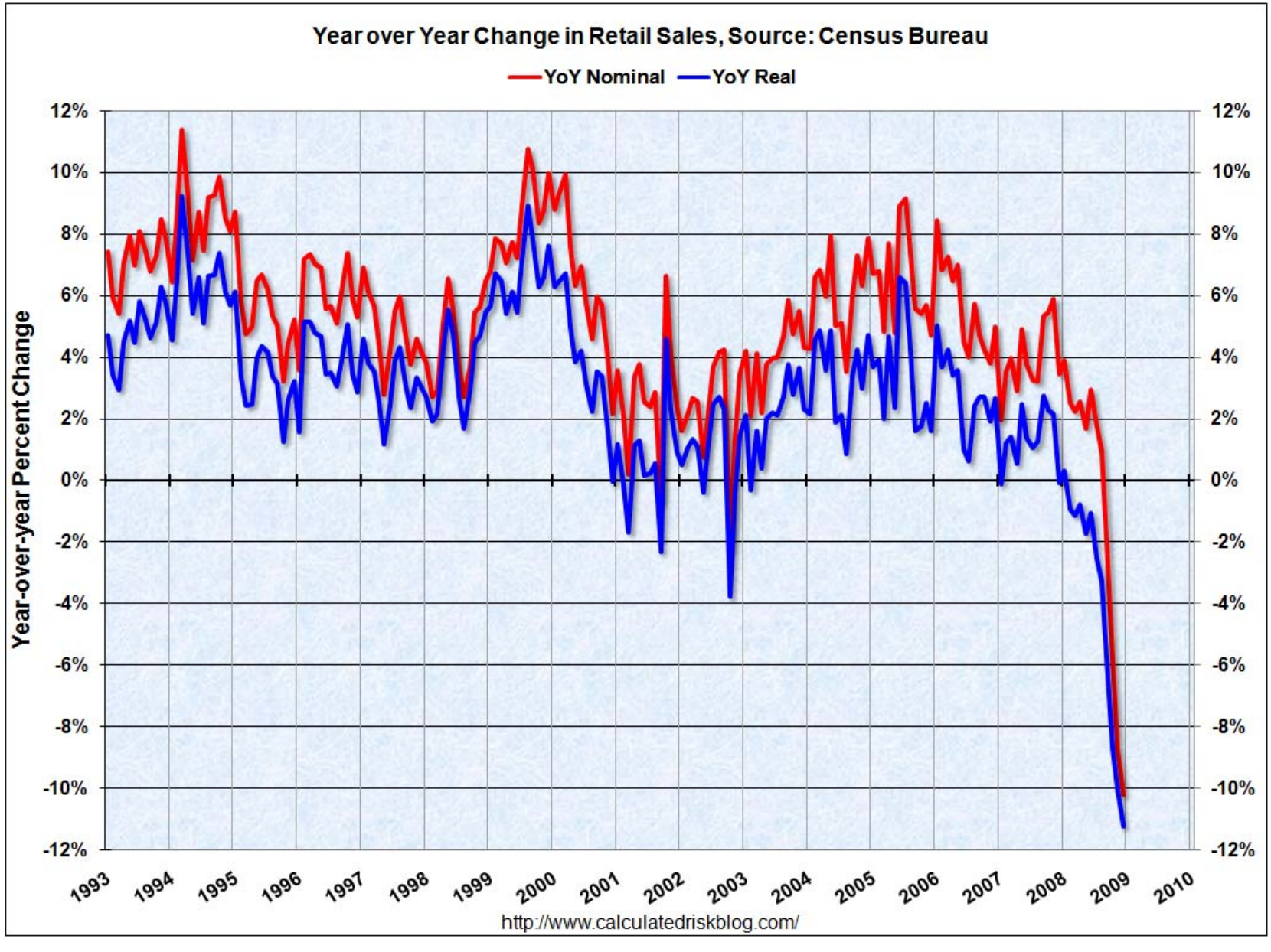
# Boom to Bust (2007-2008): History 1.0

Competing Interpretations of Great Recession

1. Huge negative shock to credit supply
    - Eggertson and Krugman, Guerrieri and Lorenzoni, Aruoba et al
2. Huge increase in uncertainty
    - Bloom, many others

# Boom to Bust: History 2.0 (2007-08)

- In 2006-07, *expansion* of credit stops
  - *Low memory marginal types* extrapolate quickly:
    - Low memory optimists become pessimists
    - $\Delta p^h_{2007} < \mathbb{E}_{2006}[\Delta p^h_{2007}]$
      - $\Rightarrow \mathbb{E}_{2007}[\Delta p^h_{2008}] < \mathbb{E}_{2006}[\Delta p^h_{2008}]$
  - Hissing sound gets loud
  - Explains slowdown 2006-2008q2
    - My Guess: Does *not* explain collapse between 2008q2-2008q4


Year over Year Change in Retail Sales, Source: Census Bureau
YoY Nominal
YoY Real
Year-over-year Percent Change
12%
10%
8%
6%
4%
2%
0%
-2%
-4%
-6%
-8%
-10%
-12%
1993
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http://www.calculatedriskblog.com/

# Boom to Bust: History 2.0 (2008q2-2008q4)

**2030 Data**

- Consumption collapsed even:
  - For people who are never going to want to borrow
  - More for people whose expectations deteriorated more
  - In regions where there had not been a boom

**2030 Theory**

- Degree of uncertainty is a "fundamental"
  - We see huge increase in uncertainty
  - Those whose uncertainty increased more, cut C more

# The Boom: History 2.0 (2002-2006, Macropru edition)

- Macropru regulators know how to do *micro* 'stress tests' <!-- * Prudence: $\mathbb{E}[u']$
  - At date $t$, see dist'n of balance sheets *and* $\mathbb{E}_t[\Delta p^h_{t+\bullet}]$
    - Can see unusual participation by *marginal* types -->
  - **2030 Theory**: We know what circs cause defaults
  - Can simulate defaults under alternate *future* histories:
    - Productivity growth, interest rates, uncertainty
      - ,
- By 2006, micro stress tests reveal major fragility to minor shocks

# The Boom: History 2.0 (2002-2006, Macropru edition)

Which Macropru policies do what?

- **2030 Theory+Data**: People default when
  - Underwater + Negative income shock ('double trigger')

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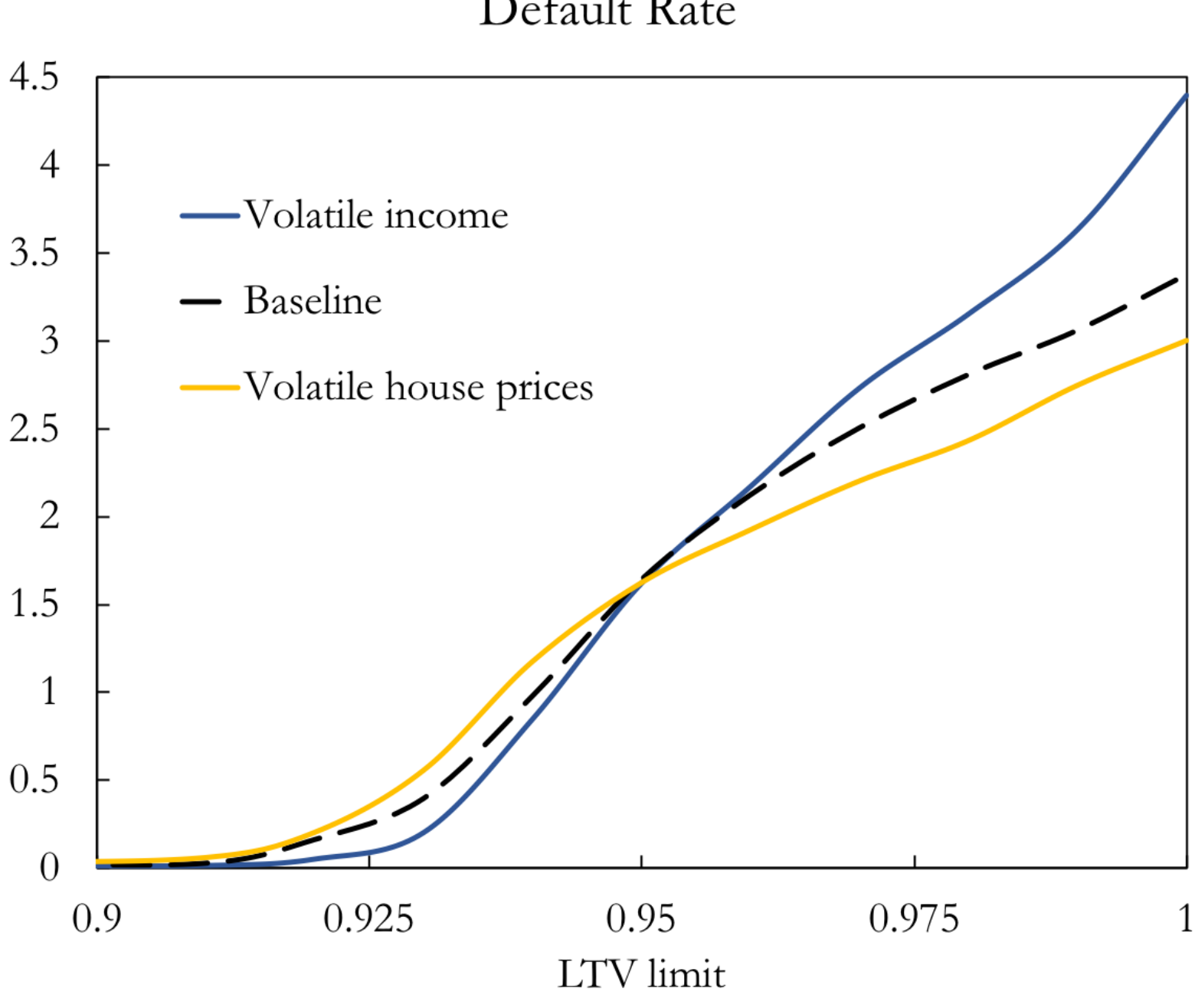
- **2030 Theory+Data**: People default when
  - Underwater + Negative income shock ('double trigger')

- **2030 Theory**
  - : Theory that matches 'double trigger' facts implies
    - Debt-To-Value rules insulate against income shocks
    - Payment-To-Income rules insulate against $p^h$ shocks
  - Calibrated stress tests tell you which to adjust

# Khan (2018): Macropru Effectiveness Vs Shock Kinds


Default Rate
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Volatile income
Baseline
Volatile house prices
0.9
0.925
0.95
0.975
1
LTV limit

# The Boom: History 2.0 (2002-2006, Macropru edition)

New kinds of macropru rules

- Countercylical rules that target "speculative" demand. Examples:
  - Risk-weighted capital rules where "riskiness" rises with
    - Proportion of aggregate lending for non-primary-residence
    - Proportion of buyers who *say* they are buying because $\mathbb{E}[p^h]$ high

# The Boom: History 2.0 (2002-2006, Macropru edition)

Consequence? History 2.0 differs from 1.0

- Size of bubble is smaller
- For a given bubble size, consequences are milder

# Part 2: Agenda

# Modeling (near term priorities)

## Incorporate real estate investing in HH problem

- Integrated with "primary housing" choices
- Governed by same expectations, explanations
- In *model* eqbm, consumers face choice between:
  - Stock market
  - Real estate

## New focus of models (and analysis thereof):

- *Tell us what to do on surveys*
- e.g., Kaplan, Mitman, Violante would imply:
  - Ask expectations, explanations
  - Are explanations about fundamentals or extrapolative?
    - 'I think $\mathrm{R}$ is permanently lower'? or
    - 'Prices have been going up'
      - *Whose* expectations to focus on
  - Target surveys to people making marginal decisions

## Dynamics (not just steady states)

- *Especially* for the marginal players
- Sluggishness in $p^h$ *and behavior* comes from:
  - Search frictions
  - Information frictions
    - Everybody knows everything instantly: won't work
- Very hard

# Modeling Expectations and Explanations (Desiderata)

- Ideally, same deep model for *Everybody*
  - Difference in deep parameter like "memory"
  - Most diffs in behavior explained by circs
- Behavioral foundations strongly disciplined by evidence
  - "Other people are like me"
  - "Representativeness Heuristic"
  - Fading Memory
  - ...

# Deep Improvements in Modeling Practice

Need a DYNARE for HA modeling

- ECB can run Riksbank model calibrated to Italy
- Riksbank can run Fed model calibrated to Sweden

Feasible with modern collaborative software development tools:

- Modular
- Open-source
- Robust reproducibility

# Getting There?

- Institutional support of infrastructure development
  - Like DYNARE has had
  - As is done in other scientific/technical fields
    - Astronomy, Artificial Intelligence, Bayesian Statistics, Biology, ... (https://www.scipy.org/topical-software.html)
- Changes in professional equilibria
  - "Publication"
    - Referees need to be able to run your code
    - Readers need to be able to reproduce your results
- Beginning: Econ-ARK (http://econ-ark.org) project

# Abolish Consumer Expenditure Surveys

Replace them with Consumer *Expectations* Surveys

- Get expenditures from admin data (Mint.com, registries)
- Use precious survey time asking:
  - expectations
  - explanations: 'Did you buy that second house because ↑ in $\mathbb{E}_i[\Delta p^h]$?'
  - *whatever else models say is important*
- Oversample potential *marginal* decisionmakers
  - e.g. intensive focus on new homebuyers
  - 'Are you a flipper?' (and a hairdresser?)

# Conclusion

- Might take more than 12 years
- We'll get there!

# References