WEALTH AND VOLATILITY

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Sources of Business Cycles

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- Many feature of Great Recession (Little productivity change, international dimension) brought back old idea: business cycles can be driven by self-fulfilling waves of optimism or pessimism

- Problem: why now? why not 20 years ago?
- Our idea: extent to which these waves can generate fluctuations depends on the level of household wealth and/or financial frictions

- We will argue that decline in asset prices/increase in financial frictions left US economy fragile and susceptible to a confidence-driven recession

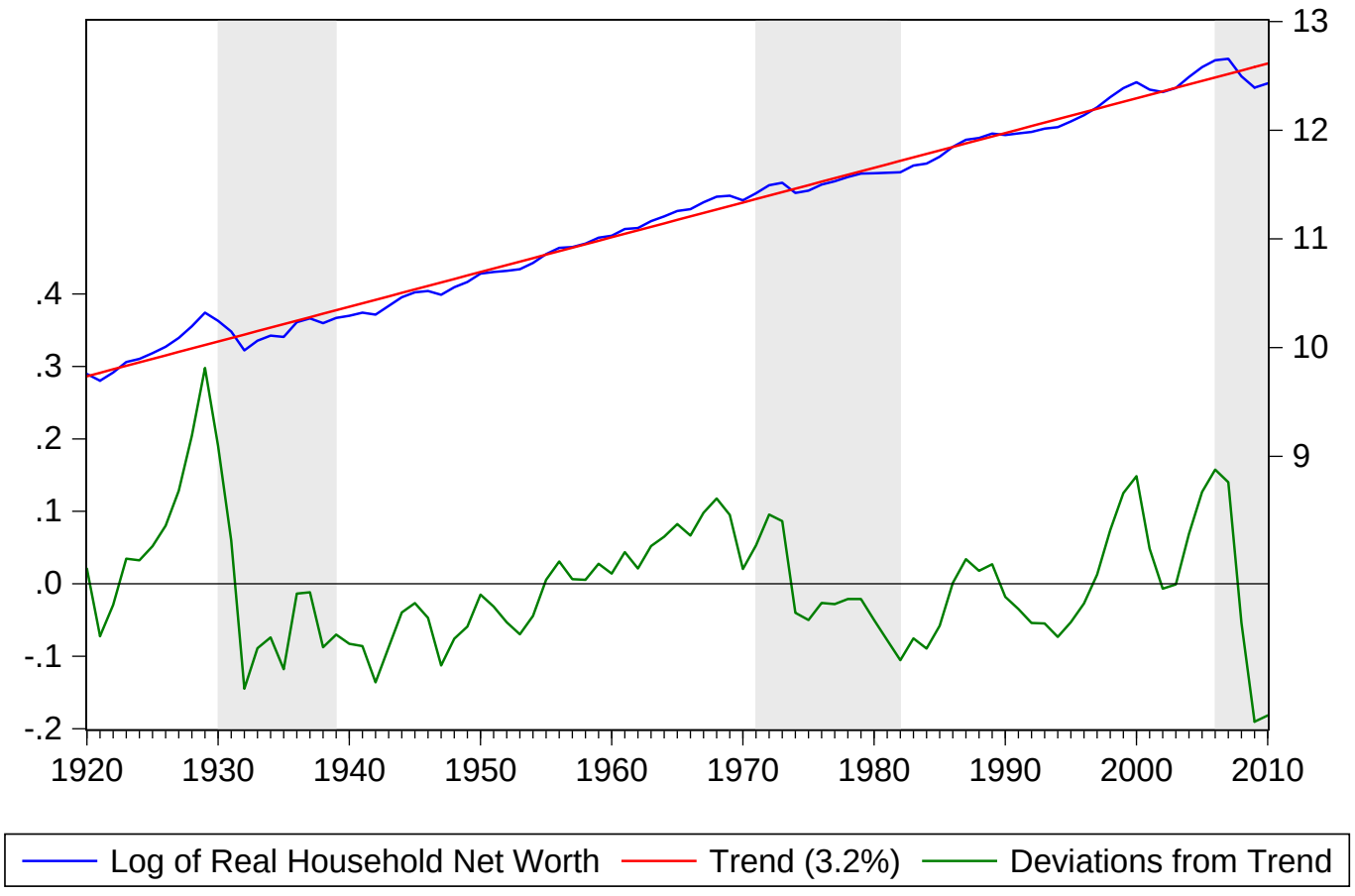
Sunspot-driven fluctuations

- Rise in expected unemployment
  $\rightarrow$ consumers reduce demand
  $\rightarrow$ firms reduce hiring
  $\rightarrow$ higher unemployment
- For a wave of pessimism to be self-fulfilling need high sensitivity of demand to expected unemployment
- Sensitivity of demand depends inversely on level of household wealth
- High wealth or cheap credit
  $\rightarrow$ demand less sensitive to expectations
  $\rightarrow$ no sunspot-driven fluctuations
- Low wealth and costly credit
  $\rightarrow$ demand more sensitive to expectations
  $\rightarrow$ confidence-driven recessions possible

Outline

1. Some suggestive evidence on the relation between wealth and fluctuations
2. A stylized model of confidence driven recessions
3. Micro evidence on the mechanism
4. Policy: Govt spending and unemployment insurance. The role of wealth is important in shaping policy.

Household net worth in the long run



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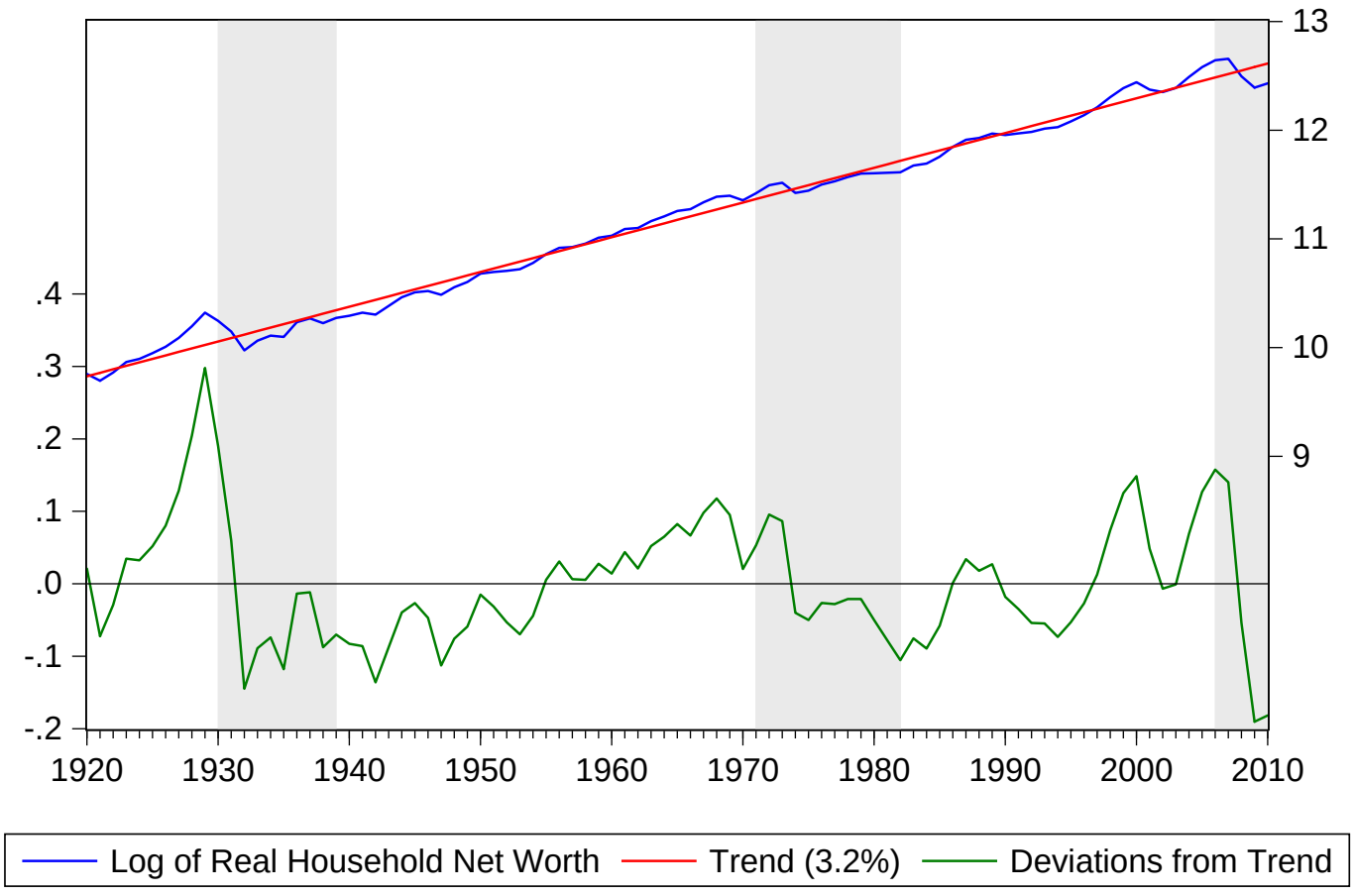
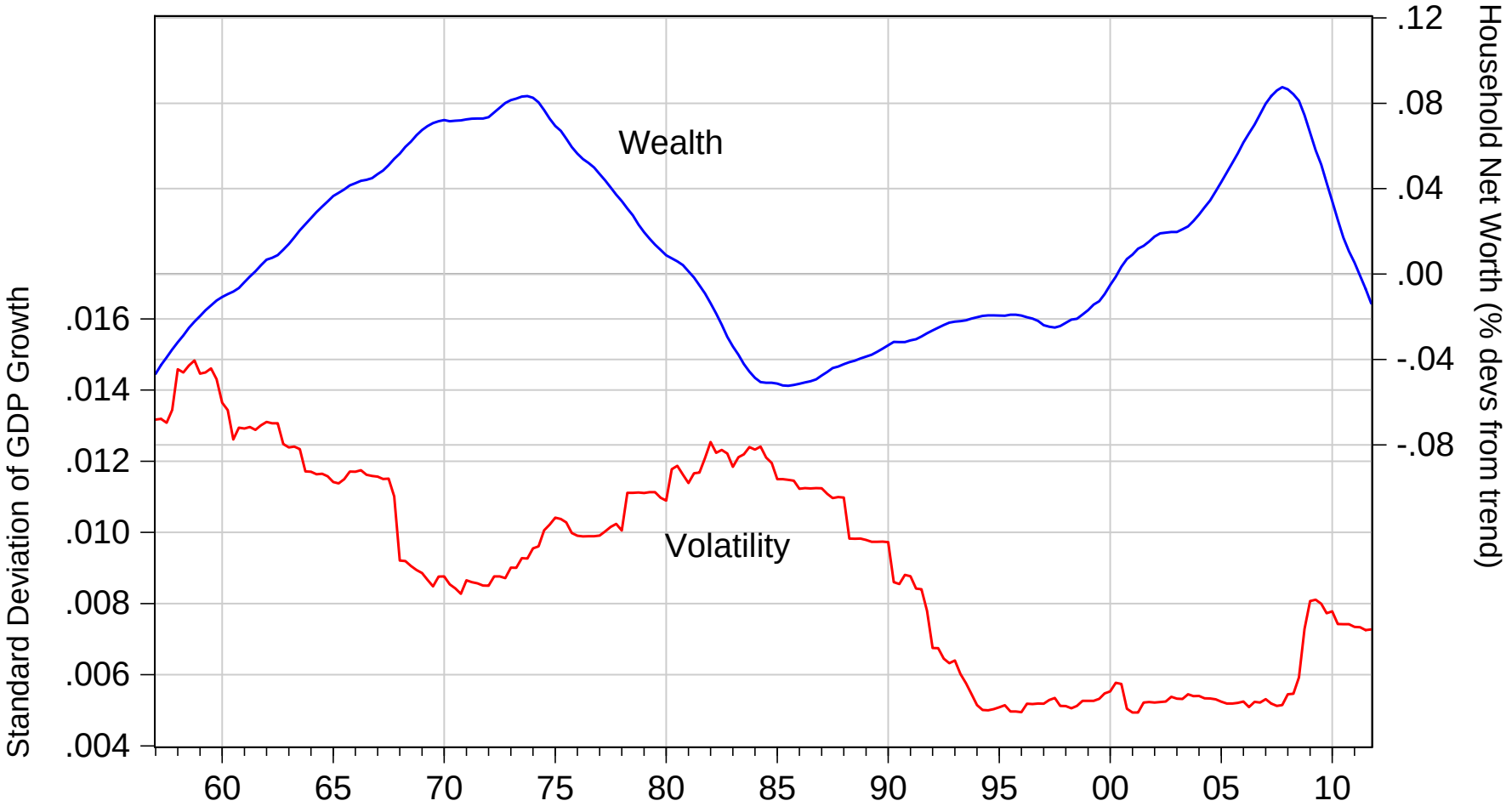


- Mian, Rao and Sufi (2012): similar evidence for county cross section

Wealth & GDP Volatility



Note: Standard deviation of GDP growth are computed over 40 quarters rolling windows.
Observations for net worth are average over the same windows

Stylized Model (related to *Farmer* 2010, *Chamley* 2011, *Guerrieri and Lorenzoni* 2009)

- Non-durable consumption good
- Used for consumption or government spending
- Produced by competitive firms using labor with a linear technology

$$c + g = y = n$$

  where n is mass of workers employed
- Durable housing h, in fixed supply with relative price p
- Each representative household contains continuum of potential workers

Timing

1. Households co-ordinate expectations on current unemployment, distributions of future unemployment rates
2. Representative household sends out workers with consumption order c_t, assets $p_t h_t$, reservation wage w_t^*
3. Representative firm randomly meets potential workers sequentially, decides whether to hire them
4. Firms pay wages $w_t = w_t^*$, workers pay for consumption - must borrow if unemployed and $c_t > p_t h_t - d$
5. Household regroups, net resources determine h_{t+1}.

Optimal firm strategy: hire worker iff aggregate order c_t not yet filled and $w_t^* \leq 1$

Optimal household strategy: set $w_t^* = 1$

Household Problem

$$\max_{\{c_t, h_{t+1}\}} E \sum_{t=0}^{\infty} \beta^t \left(\log c_t + \phi h_t \right)$$

s.t.

$$c_t + p_t(h_{t+1} - h_t) = (1 - u_t)w_t - \frac{\psi}{2} u_t \min\left\{ \left(p_t h_t - d - c_t \right), 0 \right\}^2 + T_t$$

ϕ : preference weight on housing
ψ : cost of credit
d : part of home value that cannot be used as collateral

u_t : fraction of household workers unemployed
T_t : lump-sum rebate of credit costs

Frictions

1. Labor market friction: No role for labor supply in determining allocations $\Rightarrow$ output demand-driven, equilibrium unemployment

    - Workers cannot affect the probability of meeting a firm by asking a lower wage, and when they meet they ask for the reservation wage.

Frictions

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    - Workers cannot affect the probability of meeting a firm by asking a lower wage, and when they meet they ask for the reservation wage.
2. Credit friction: Unemployed with low wealth must use expensive credit $\Rightarrow$ precautionary motive
3. Consumption commitment friction: Consumption chosen before unemployment status known $\Rightarrow$ precautionary motive sensitive to expected unemployment

Equilibrium Conditions

- $w_t = w_t^* = 1$
- $h_t = 1$
- $T_t = \psi u_t \min\left\{\left(p_t - d - c_t\right), 0\right\}^2$
- $c_t = n_t = 1 - u_t$

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-

$$p_t \frac{1}{c_t} \times \frac{1}{\left(1 - \psi u_t \min\left\{\left(p_t h_t - d - c_t\right), 0\right\}\right)} = \beta E_t \left[\phi + \frac{p_{t+1}}{c_{t+1}}\right]$$

Agenda for Theory

- Characterize paths for unemployment that satisfy the inter-temporal FOC and the condition $c_t = 1 - u_t$
- Especially interested in expectations-driven multiplicity
  - Multiple Steady States
  - Multiple Paths leading to Steady State
  - Sunspots

Role of Asset Prices

- Introduce "marginal investor" with same preferences that faces no risk $(c = \bar{c} = 1)$ and is measure zero
- In equilibrium no housing trade between the two types
- Marginal investor establishes a floor $\underline{p}$ for house prices:

$$p_t \geq \underline{p} = \frac{\beta}{1-\beta}\phi\bar{c}$$

- Will see that marginal investor rules out equilibria with very high unemployment

Strong Housing demand $\Rightarrow$ full employment

If

$$\phi \geq \bar{\phi} = (1+d)\frac{1-\beta}{\beta}$$

then the only steady state is $p = \underline{p}$ and $u = 0$

Logic: $\phi \geq \bar{\phi} \Rightarrow \underline{p} - d \geq c_{max} = 1$

... so even the unemployed never needs credit

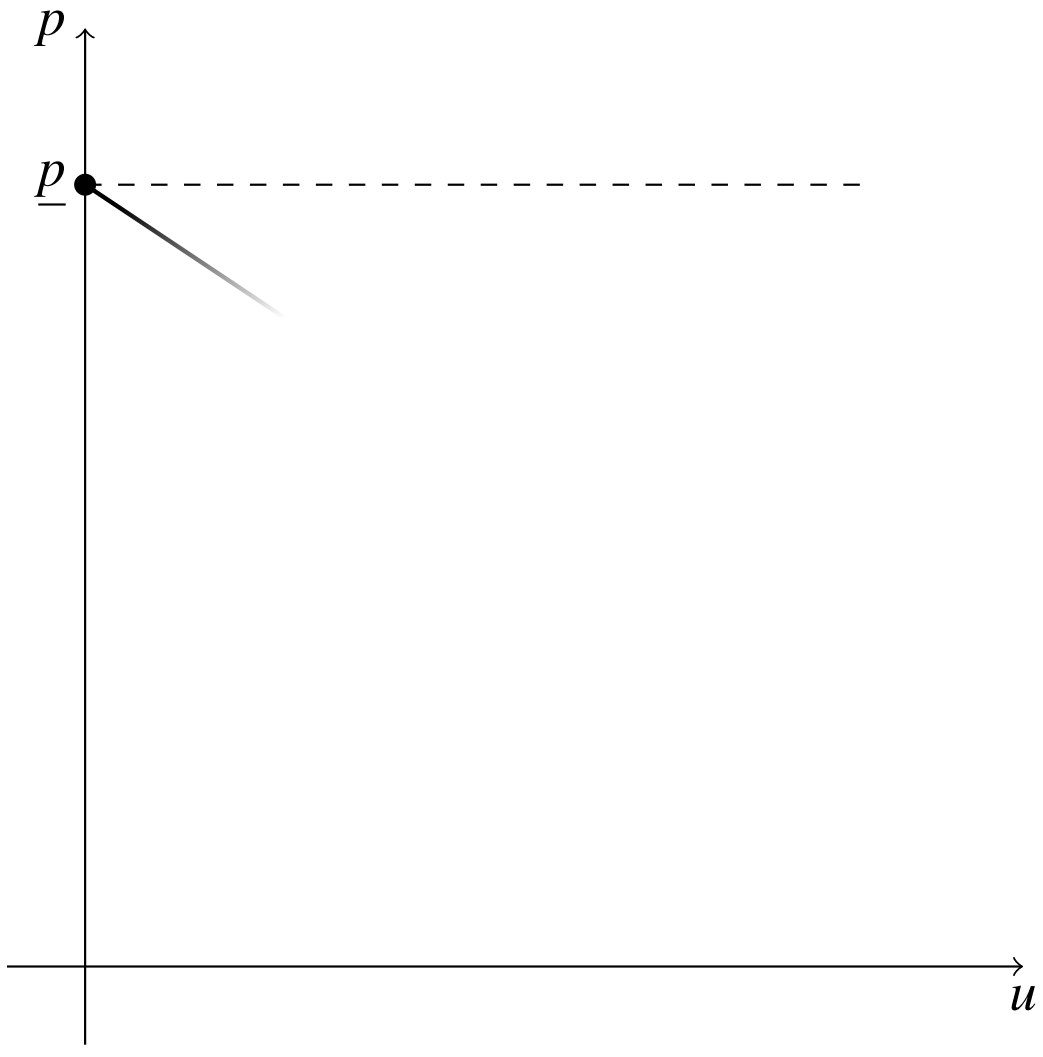
Absent credit constraints,

$$p = \frac{\beta(1-u)}{1-\beta}\phi \leq \underline{p} = \frac{\beta}{1-\beta}\phi$$

But marginal investor implies $p \geq \underline{p}$, so $p = \underline{p}$, $u = 0$

High wealth $\Rightarrow$ High consumption demand $\Rightarrow$ Full Employment

Steady state: high prices



Weak housing demand $\Rightarrow$ positive unemployment

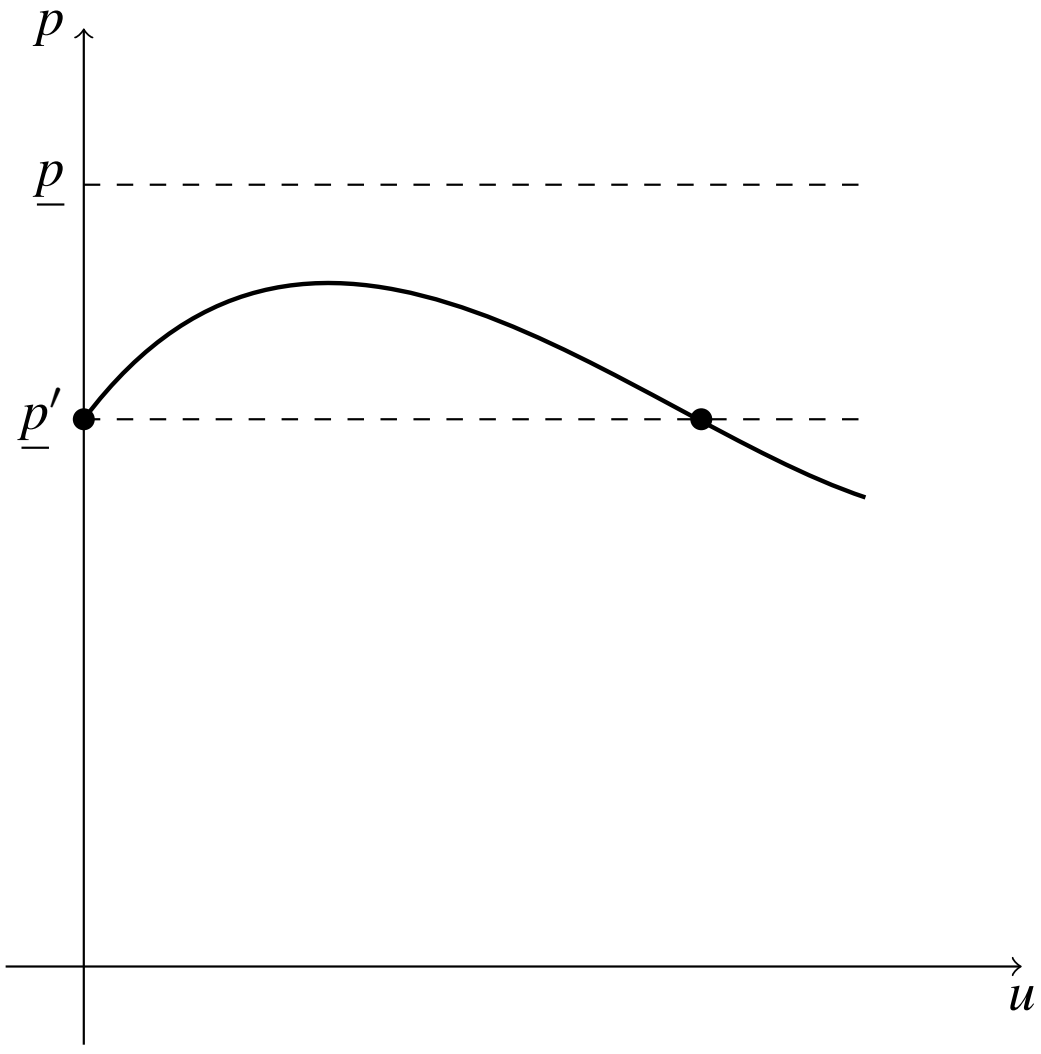
If $\phi < \bar{\phi}$ and

$$\psi \geq \bar{\psi} = \frac{(1-\beta)^2}{(1-\beta)(1+d) - \beta\phi}$$

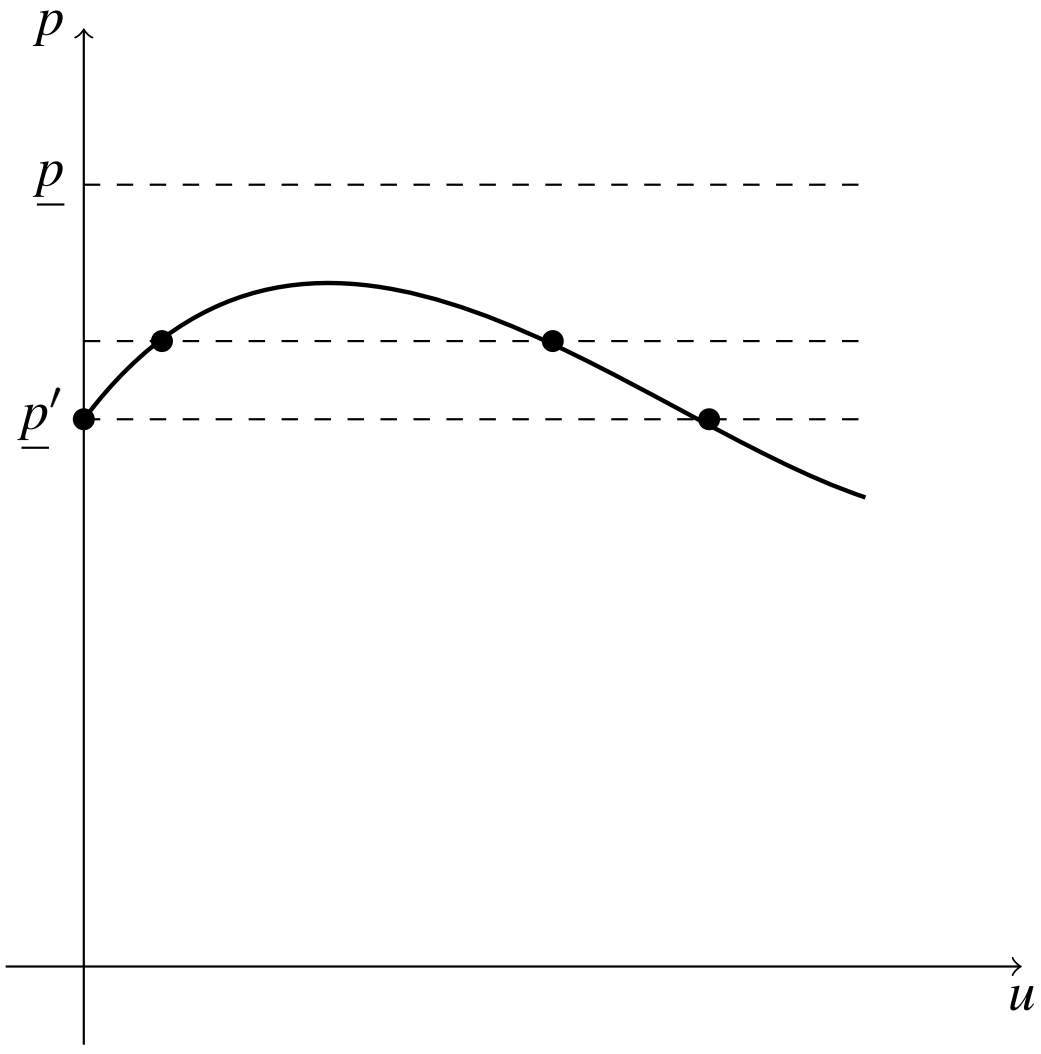
then

1. There is (still) a steady state with $p = \underline{p}$ and $u = 0$
2. There is another steady state with $p = \underline{p}$ and $u > 0$
   - Intuition: $p = \underline{p}$ & $u > 0 \Rightarrow$ asset has liquidity value $\Rightarrow$ $c > p - d$
3. There are additional steady states with $p > \underline{p}$ and $u > 0$.

Low housing prices: Multiple steady state u, given p



Low housing prices: Multiple steady state p



Constraints and multiplicity

- When credit constraint not binding:

$$
\begin{aligned}
p\frac{1}{c} &= \beta\left[\phi + \frac{p}{c}\right] \\
p &= \frac{\beta(1-u)}{1-\beta}\phi = p_f(u), \quad p_f'(u) < 0
\end{aligned}
$$

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- When credit constraint binding:

$$p\frac{1}{c}\underbrace{\frac{1}{[1+\psi u\,(c-(p-d))]}}_{\text{Liquidity discount}} = \beta\left[\phi+\frac{p}{c}\right]$$

$$p = p_f(u)\frac{1-\beta}{1/\left[1+\psi u\,(c-(p-d))\right]-\beta} = p_f(u)\Psi(u)$$

- $\Psi(u)$ is the liquidity premium
- Key to multiple u, given p, $p_f'(u)<0$, $\Psi'(u)>0$.

Multiplicity 2: many paths to a steady state pair (p, u)

- Suppose $p_t = p > \underline{p} \Rightarrow$ constraint always binding
- Difference equation defining equilibrium is

$$\frac{p}{(1-u_t)} \times \frac{1}{(1-\psi u_t [p-d-(1-u_t)])} = \beta\phi + \beta p E_t \left[\frac{1}{1-u_{t+1}}\right]$$

- Assume no uncertainty / sunspots / expectational errors:

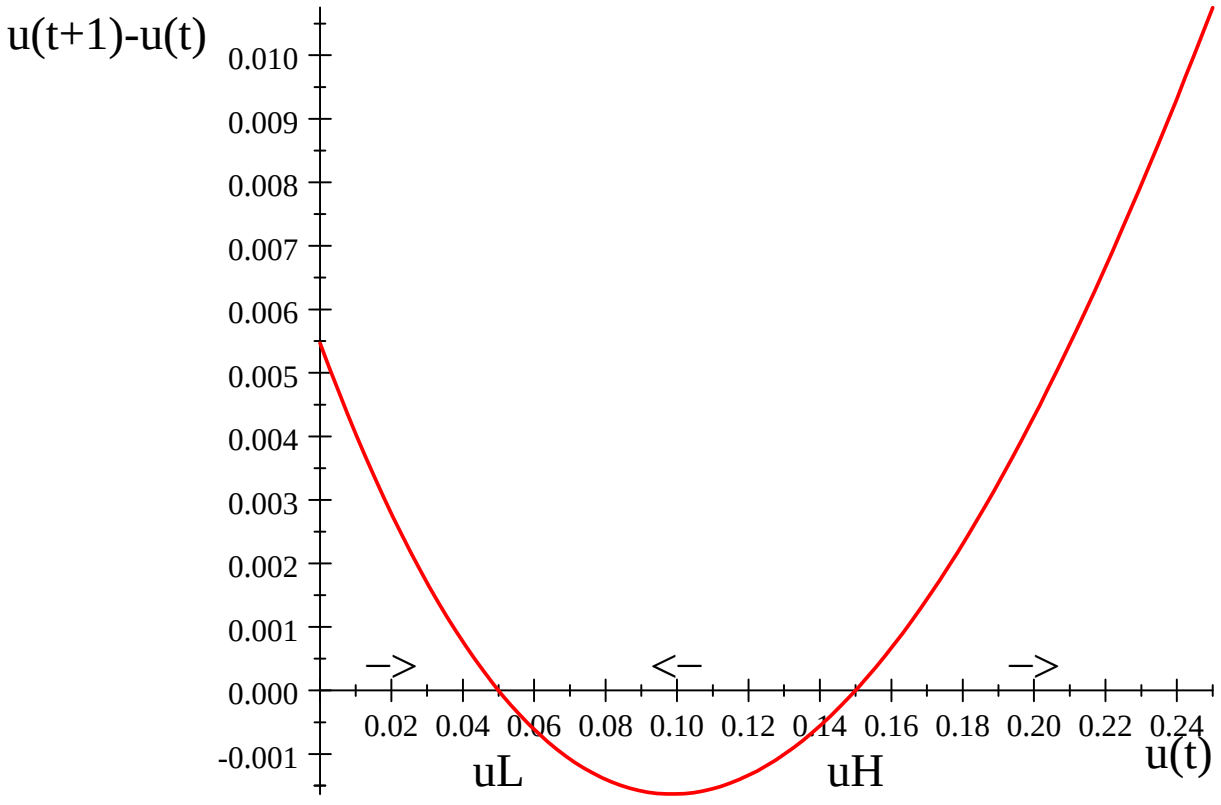
$$\frac{1}{1-u_{t+1}} = E_t \left[\frac{1}{1-u_{t+1}}\right]$$

A numerical example

$\psi = 1$ $\beta = 0.96$ $\phi = 0.05$ $d = 0.75$

1. $\psi > \bar{\psi} = 0.7$ (credit expensive)
2. $\phi < \bar{\phi} = 0.12$ (housing demand weak)
3. Chosen to match observed net worth to income ratio, unemployment ranges

Unemployment Dynamics



Intuition for Differential Local Dynamics

- Consider a hypothetical rise in unemployment starting from steady state
- Low unemployment stable steady state
  - Each unemployed worker borrows a lot $\Rightarrow$ high marginal credit cost $\Rightarrow$ optimal to cut consumption sharply even though recovery expected
  - Expected consumption growth during recovery offsets stronger precautionary motive $\Rightarrow$ stable demand for savings
- High unemployment unstable steady state
  - Each unemployed worker borrows little $\Rightarrow$ low marginal credit cost from rise in unemployment $\Rightarrow$ a sharp cut in consumption not consistent with expected recovery

Multiplicity 3: Sunspot

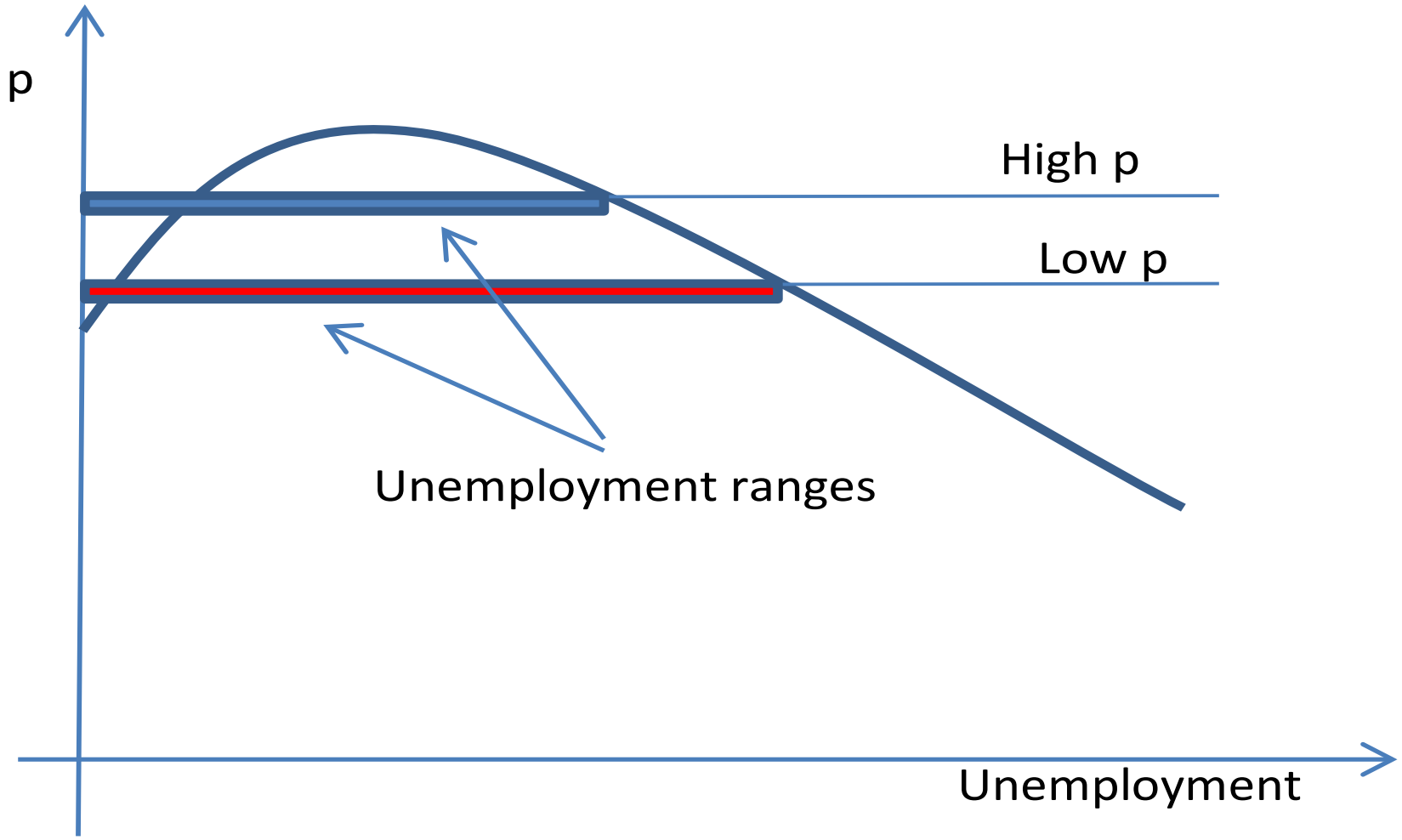
- Low unemployment steady state is dynamically stable $\Rightarrow$ possibility of "sunspots"

- Define sunspot shock v_{t+1}

$$v_{t+1} = \frac{1}{1-u_{t+1}} - E_t\left[\frac{1}{1-u_{t+1}}\right]$$

where v_{t+1} is iid over time with mean zero and a support that ensures we stay in the stable region

Range of equilibrium u decreasing in p



Review: Asset Prices and Macro Volatility

- High asset prices $\Rightarrow$ credit constraint does not bind $\Rightarrow$ unique full employment equilibrium
- Lower asset prices $\Rightarrow$ constraint binds $\Rightarrow$ range of equilibrium unemployment rates larger the lower is the asset price

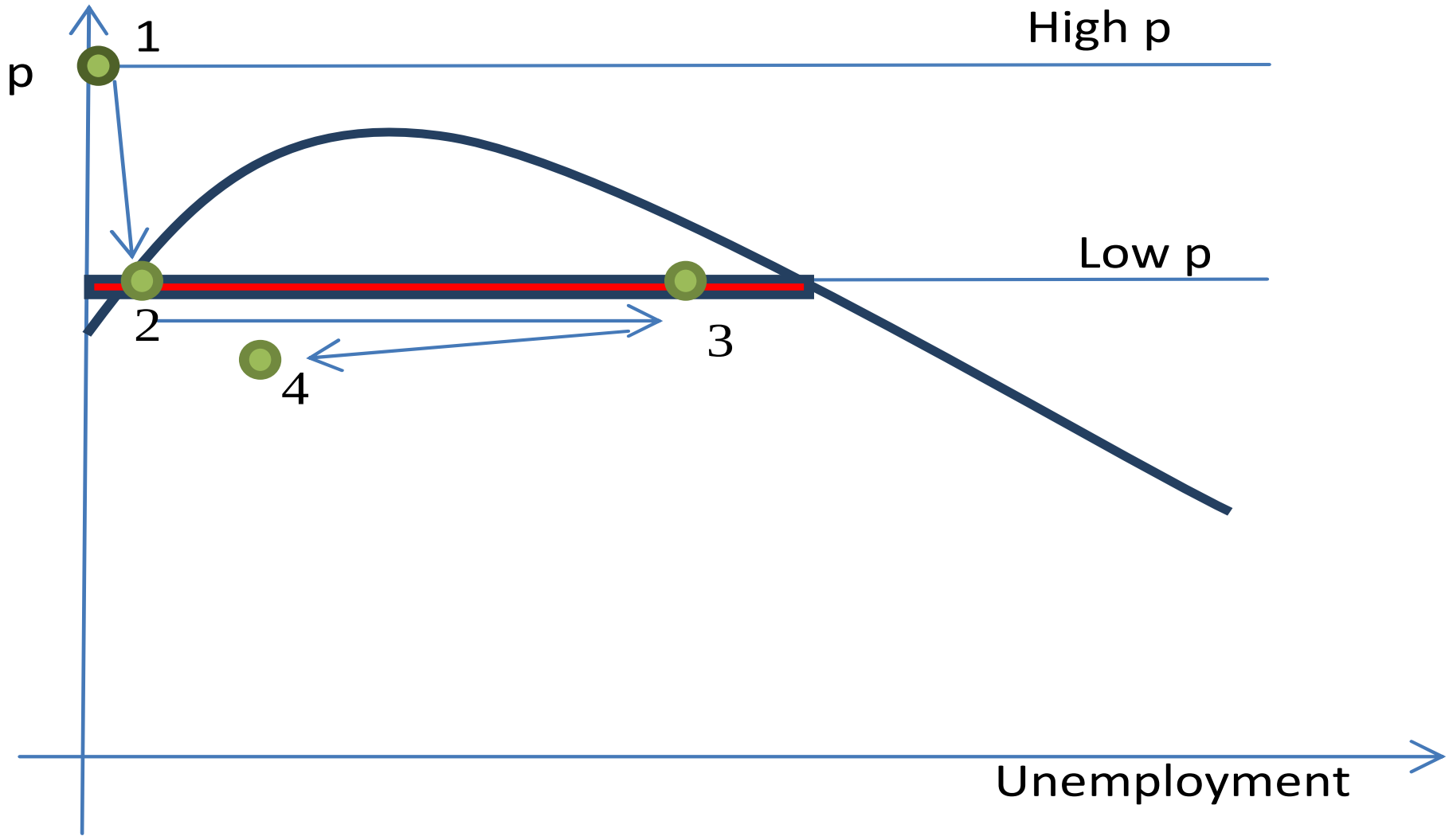
Using the model to capture The Great Recession

1. Fall in demand for housing (fall in ϕ) reduces $\underline{p}$ so that economy becomes fragile

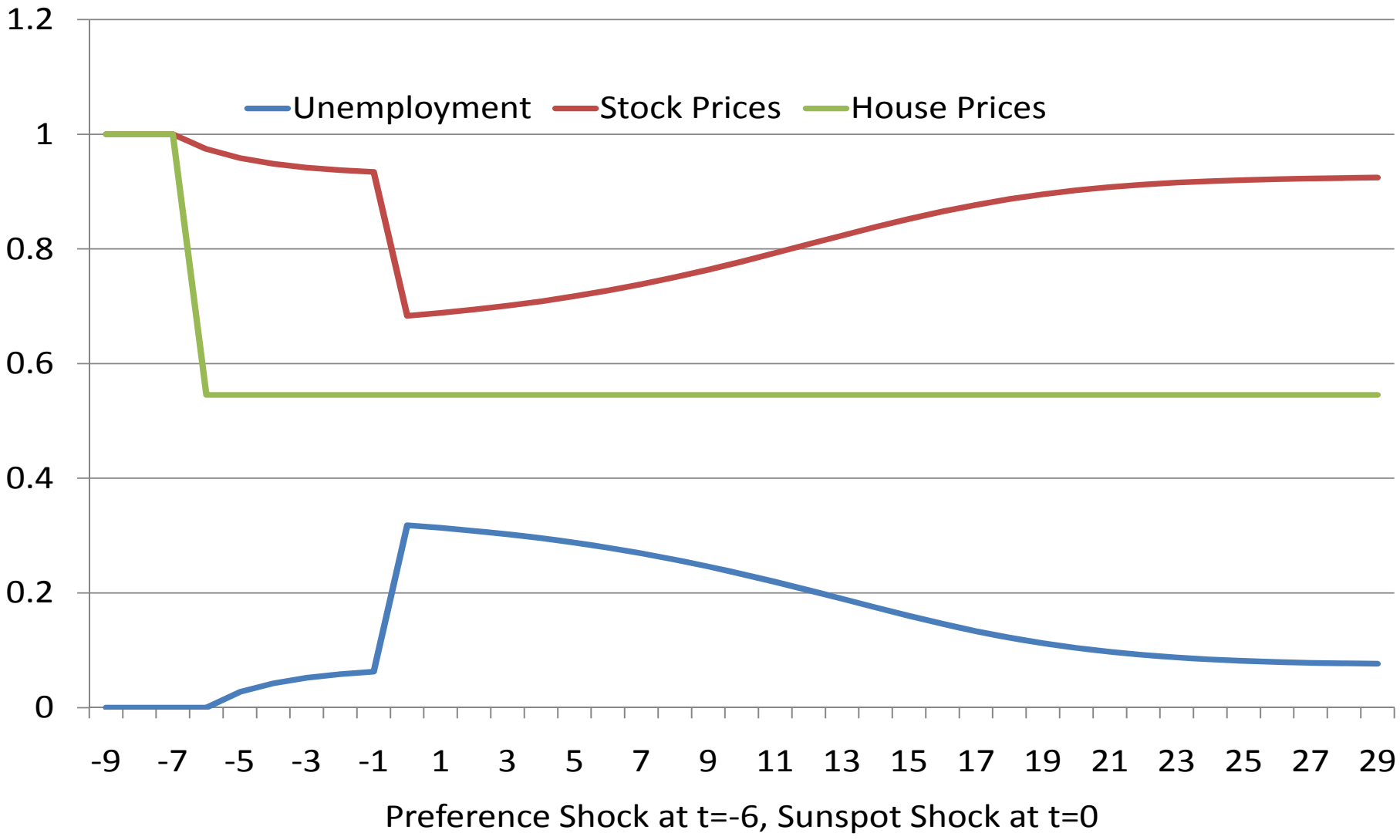
2. Sunspot (Lehman Brothers?) triggers jump in unemployment

3. Slow recovery to low unemployment steady state

Graphically



Great recession and slow recovery



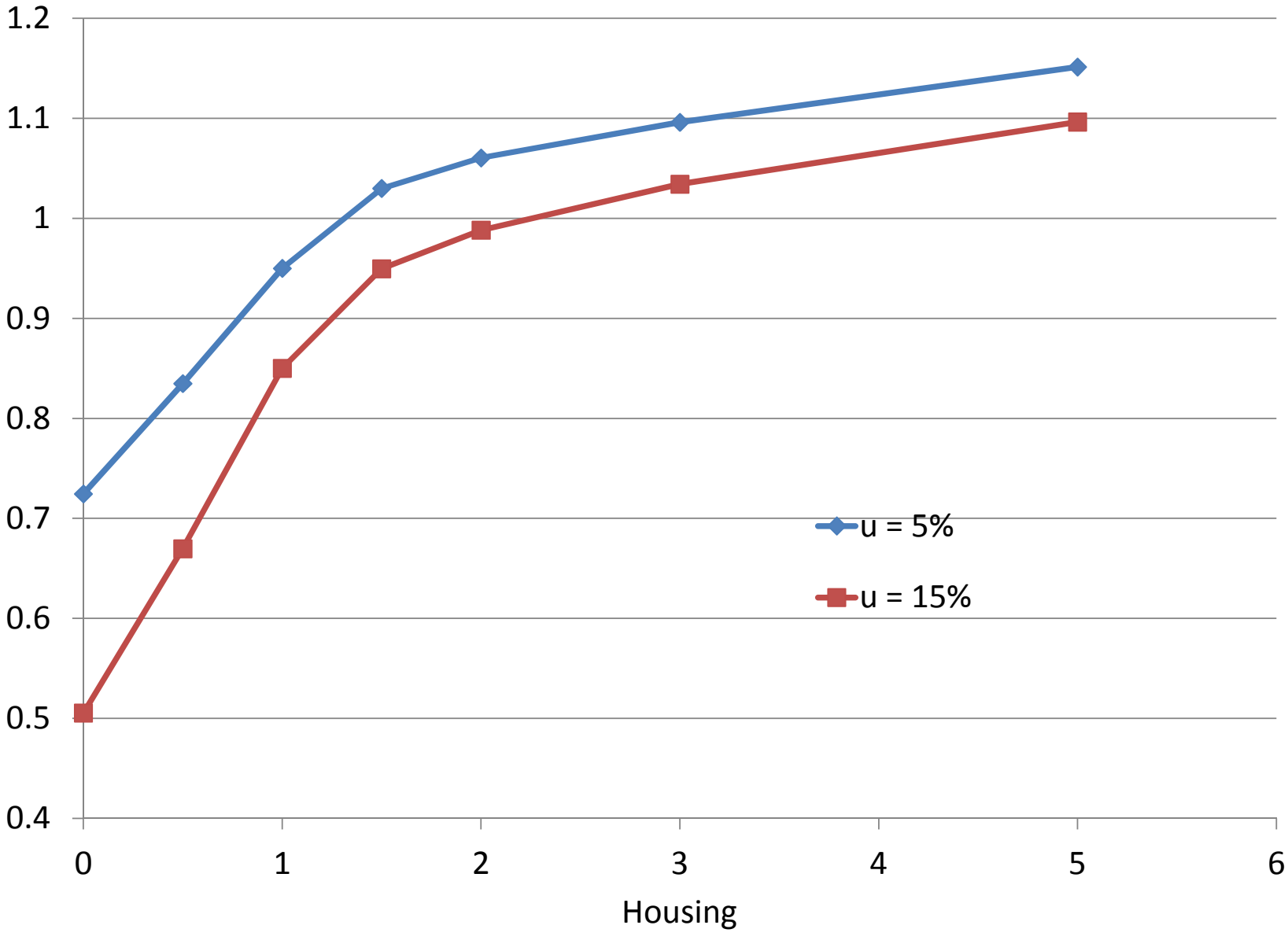
Why is the recovery slow?

- Large demand driven recession is driven by a large fall in consumption demand
- Large fall in consumption demand only happens if persistent fall in income is expected (PIH logic)
- Large fall <-> Slow recovery
- Consistent with data from Michigan Consumers Expectation

Micro Evidence for the Mechanism

- Key mechanism: Elasticity of demand wrt unemployment risk is larger when wealth is low
- Natural test: Did wealth-poor households reduce consumption more than rich households as unemployment rose during the Great Recession?

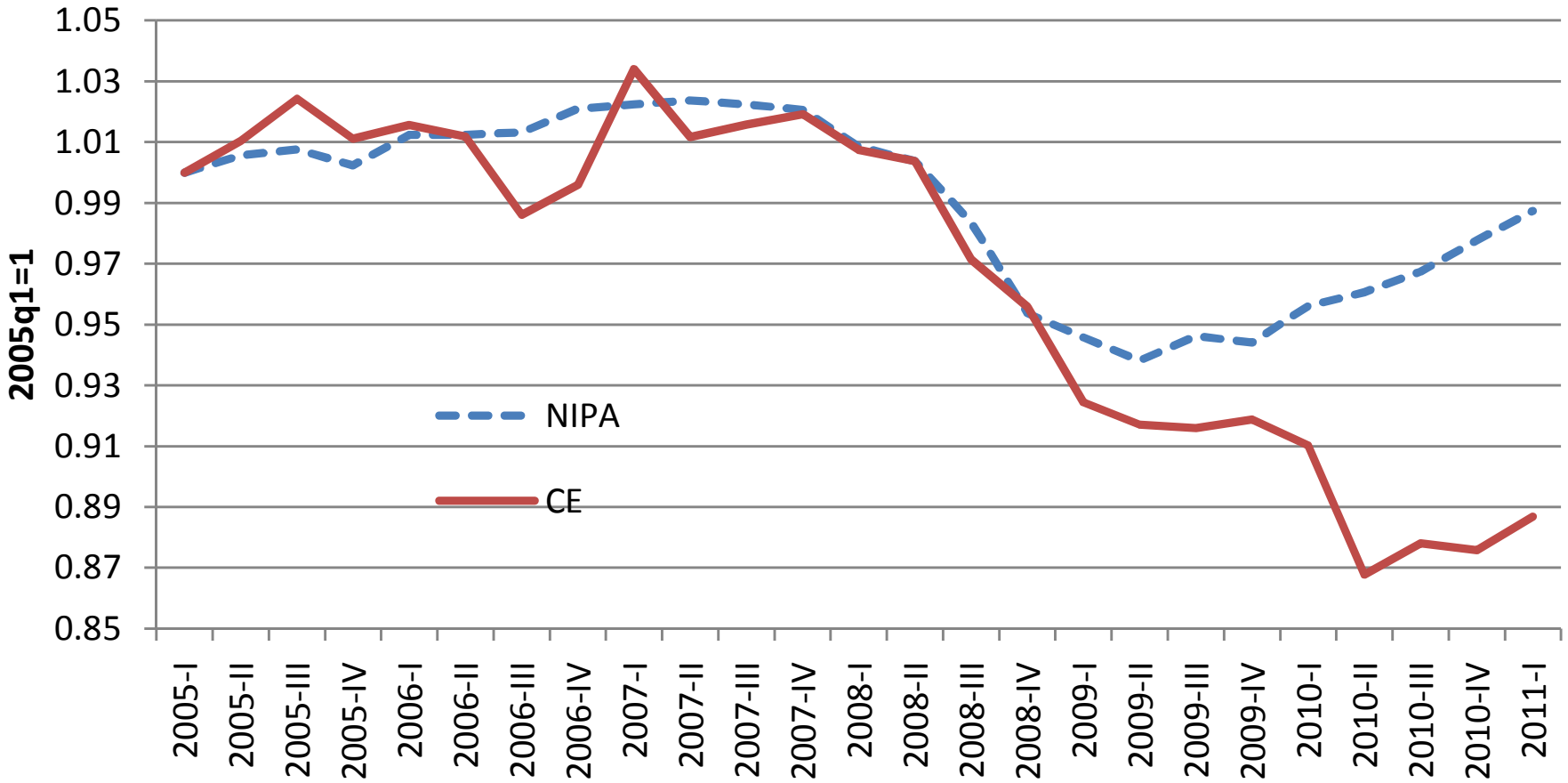
Differential Sensitivity in the Model



Consumer Expenditure Survey

- Households aged 25-60 with 4 quarters of consumption data
- Sort households by wealth (net financial wealth plus home equity) relative to consumption
- Compare consumption growth of top and bottom halves of wealth distribution

CE Survey versus NIPA



Characteristics of Rich versus Poor

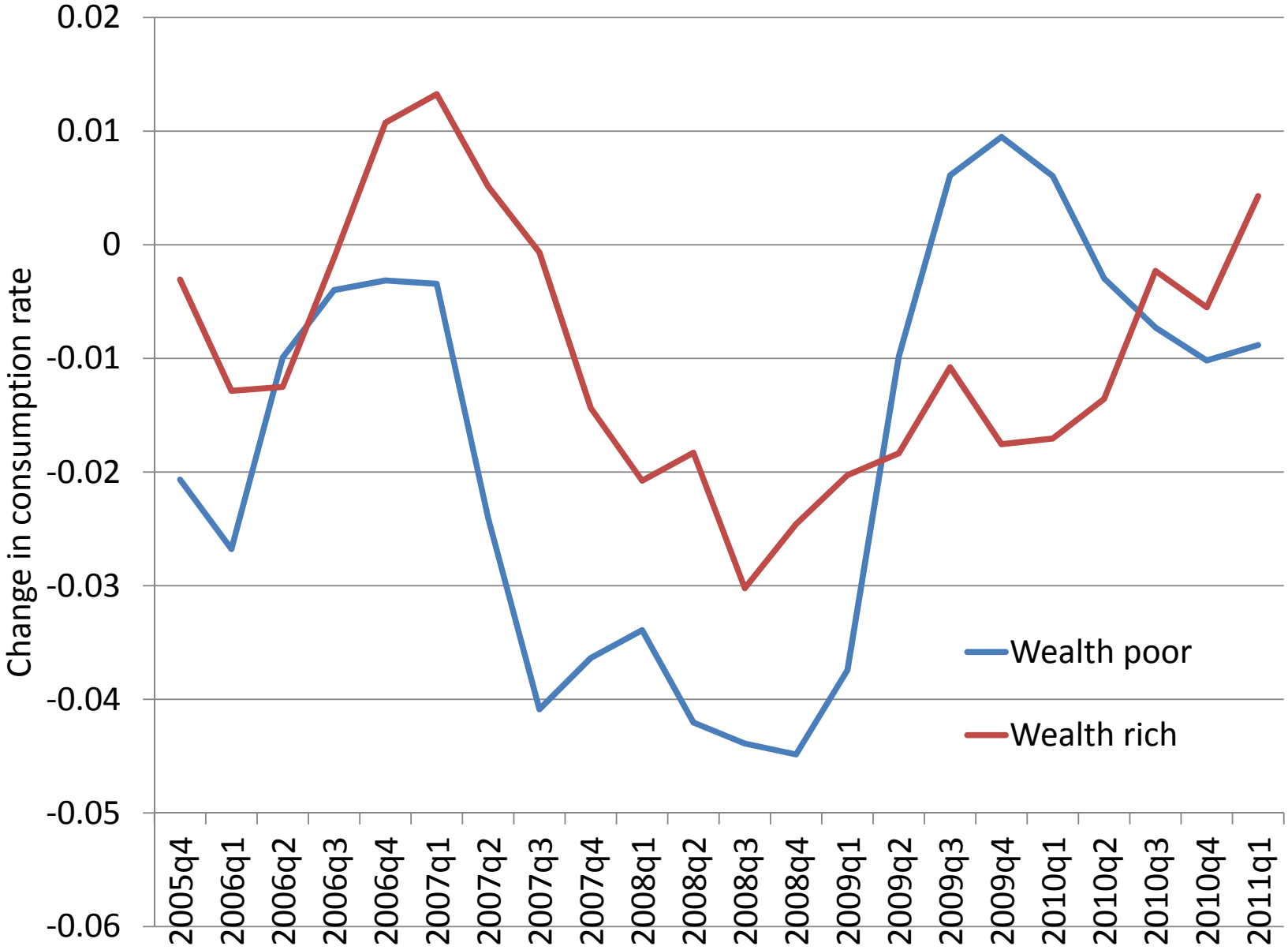
	Wealth Group	
	0-50	50-100
Sample size	8,864	8,873
Average age of head	41.4	46.9
Heads with college	25.7%	40.5%
Average household size	2.9	2.8
Net wealth p.c. (2005$)		
Mean	1,498	119,796
Median	238	63,162
Mean after-tax income p.c. (2005$)	22,117	32,811
Mean consumption p.c. (2005$)	9,353	11,252

Consumption Growth: Rich versus Poor

Consumption vs. Income Growth

	Wealth Group	
	0-50	50-100
Mean growth income p.c.	-0.3%	-1.0%
Mean growth cons. p.c.	-5.6%	-3.1%

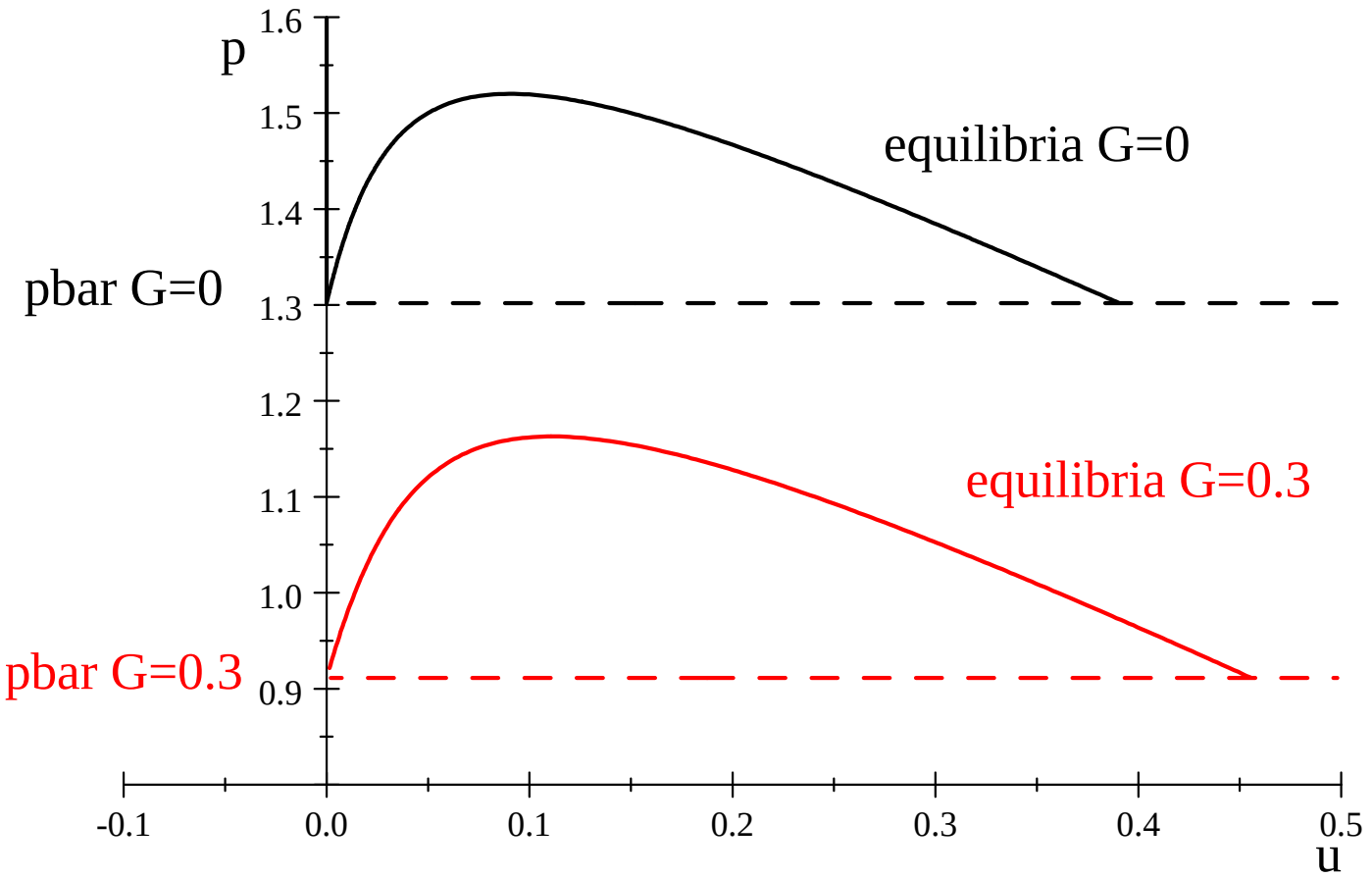
Consumption Rates: Rich versus Poor



Micro Evidence: summary

- Low wealth households reduce consumption much more during recession, despite facing similar increase in unemployment/income risk

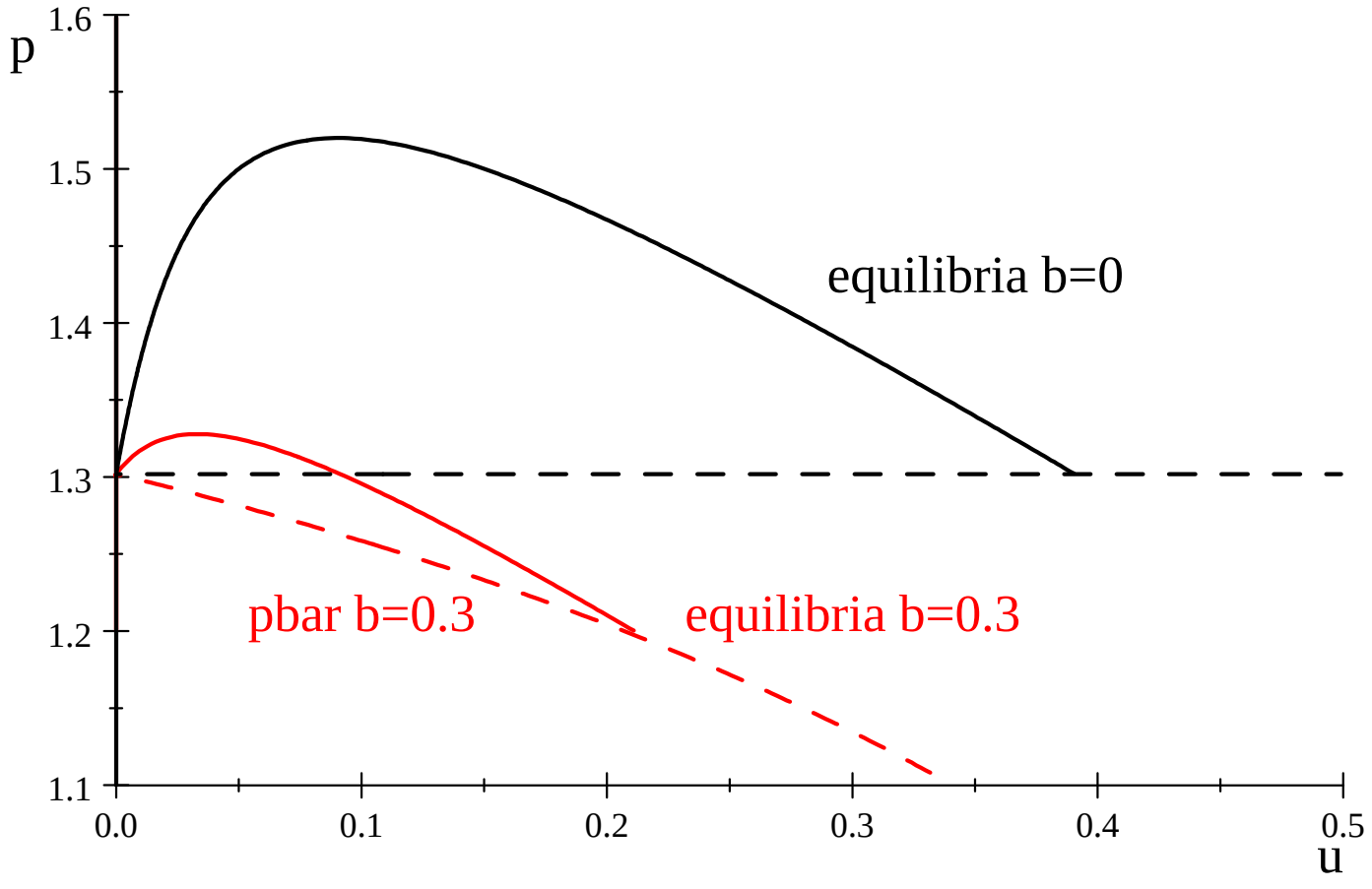
Policy 1: Tax and Spend



Policy 1: Review

- Reduces elasticity of aggregate demand to expectations
- Also reduces asset values (credit constraint more binding)
- Can narrow/expand range of equilibrium unemployment
- Welfare implications depend on utility from G
- Not necessarily effective!

Policy 2: Unemployment benefit b financed by proportional tax τ on earnings



Policy 2: Review

- Policy reduces need for costly credit $\Rightarrow$ shrinks range of possible unemployment rates
- Unique full employment equilibrium if

$$b \geq \frac{\psi\left((d+1)+\frac{\beta}{(\beta-1)}\phi\right)+(\beta-1)}{(\beta-1)+\psi}$$

- ... which implies $b \geq 0.61$ in our numerical example

Conclusions

- Model in which macroeconomic stability threatened by low asset values or tight credit markets
- Great Recession: Decline in home values + costly credit left economy vulnerable to wave of pessimism
- Macro evidence of a link between level of wealth and aggregate volatility
- Micro evidence that low wealth households reduced consumption most sharply
- Can evaluate effectiveness of policies geared toward stabilization of these fluctuations