WEALTH AND VOLATILITY

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Source of Business Cycles

- Old idea recently revived : business cycles can be driven by self-fulfilling waves of optimism or pessimism
- But why now?
- Our idea: extent to which animal spirits can generate fluctuations depends on the level of household wealth
- Declines in US house prices left the economy fragile and susceptible to a confidence-driven recession

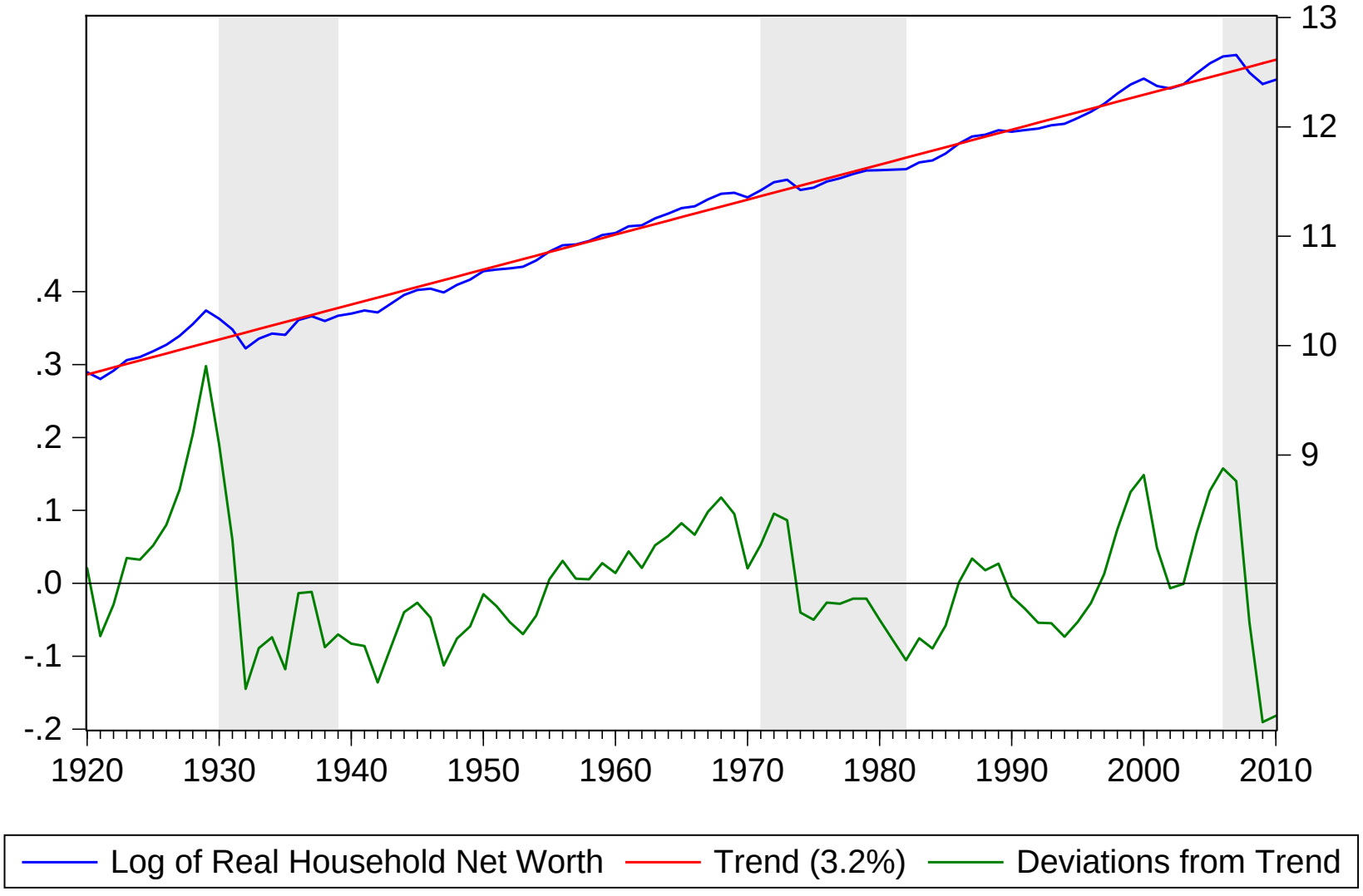
Sunspot-driven fluctuations

- Rise in expected unemployment $\rightarrow$ consumers reduce demand $\rightarrow$ firms reduce hiring $\rightarrow$ higher unemployment
- For pessimistic expectations to be self-fulfilling need high sensitivity of consumption to change in unemployment risk
- Sensitivity of consumption demand depends on level of household wealth:
  - High wealth or cheap credit $\rightarrow$ weak precautionary saving motive $\rightarrow$ demand less sensitive to risk $\rightarrow$ no sunspot-driven fluctuations
  - Low wealth and costly credit $\rightarrow$ strong precautionary motive $\rightarrow$ desired consumption / saving more sensitive to risk $\rightarrow$ confidence-driven recessions possible

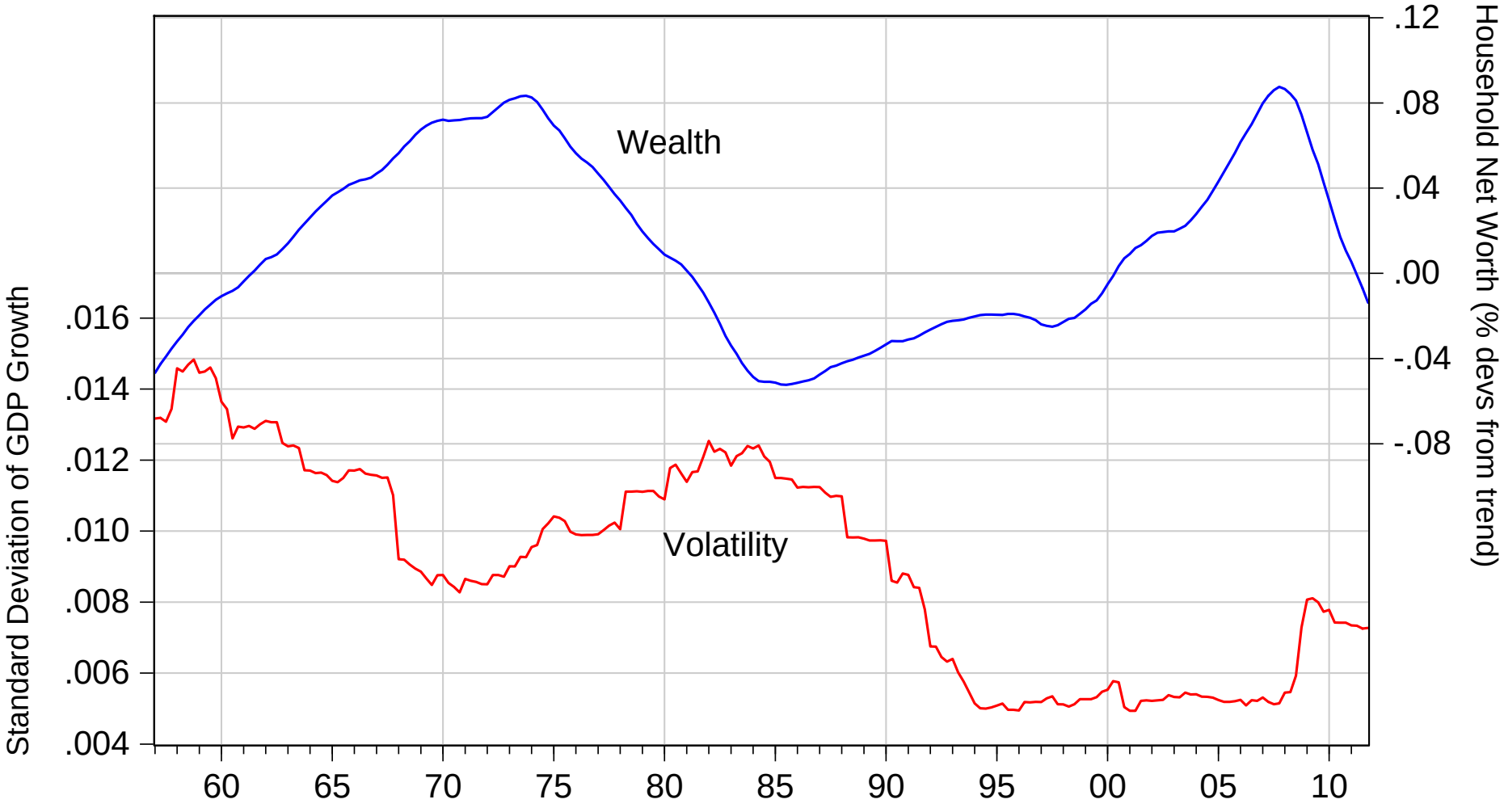
Outline

1. Wealth and volatility in the United States
2. A stylized model
3. Micro evidence on the mechanism
4. Policy implications

Household net worth in the long run



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

- Non-durable consumption c, produced by competitive firms using indivisible labor
- Durable housing h, in fixed supply with relative price p
- Each representative household contains continuum of potential workers
- Each representative firm produces with linear technology:

$$y = n$$

where n is mass of workers employed

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}.

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

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.

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

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

2. Credit friction: Unemployed with low wealth must use expensive credit $\Rightarrow$ precautionary motive

3. Consumption commitment friction: Consumption chosen before income known $\Rightarrow$ precautionary motive sensitive to expected unemployment

Equilibrium Conditions

1. $$w_t = w_t^* = 1$$

2. $$h_t = 1$$

3. $$T_t = \frac{\psi}{2} u_t \max\left\{\left(c_t - \left(p_t - d\right)\right), 0\right\}^2$$

4. $$c_t = n_t = 1 - u_t$$

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

Agenda for Theory

- Characterize solutions to inter-temporal FOC and the conditions $c_t = 1 - u_t$ and $h_t = 1$:

$$\frac{p_t}{(1-u_t)} \cdot \frac{1}{(1+\psi u_t \max\{((1-u_t)-(p_t-d)),0\})} = \beta E_t \left[\phi + \frac{p_{t+1}}{(1-u_{t+1})}\right]$$

- Note that probability distribution over $\{u_{t+j}\}_{j=0}^{\infty}$ pins down p_t

- Our focus: explore dynamics for u_t that are possible given fixed p

Floor for Asset Prices

- Introduce "marginal investor" with same preferences that faces no risk $(c = \bar{c} = 1)$ and is measure zero
- Marginal investor establishes a floor $\underline{p} = \frac{\beta\phi}{1-\beta}$ for house prices
- If

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

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

- Logic: high wealth $\Rightarrow$ credit constraint does not bind $\Rightarrow$ demand insensitive to expectations $\Rightarrow$ full employment

Low wealth $\Rightarrow$ unemployment possible

- If $\phi < \bar{\phi}$ credit constraint always binds in steady state
- If $\phi < \bar{\phi}$ and

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

then the economy is fragile:

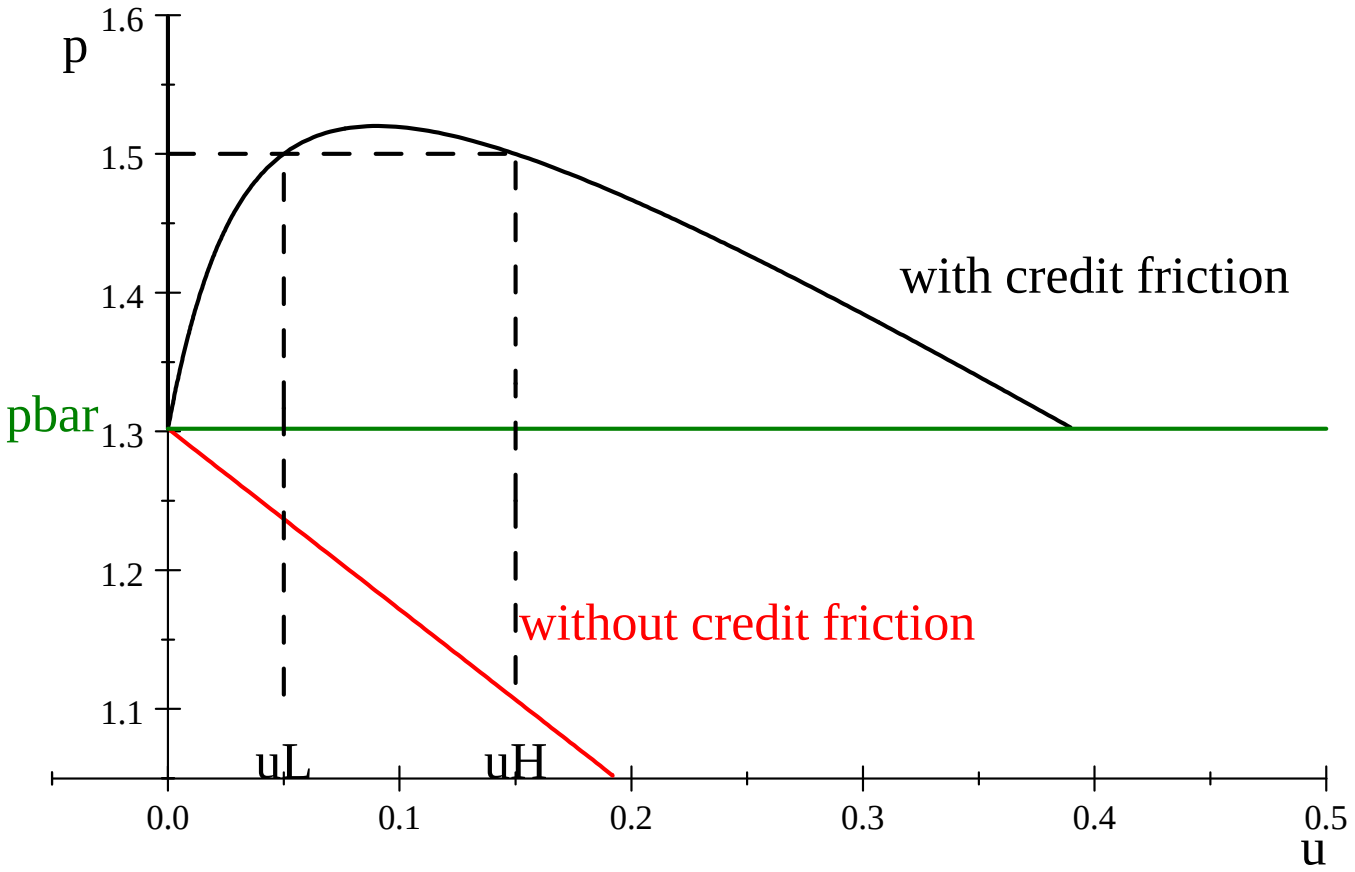
1. There is (still) a steady state with $p = \underline{p}$ and $u = 0$
2. There are additional steady states with $p \geq \underline{p}$ and $u > 0$.
   - Note $u > 0$ & $p \geq \underline{p} \Rightarrow$ asset has liquidity value

A numerical example

$\beta = 0.96$ $\psi = 0.7067$ $\phi = 0.0543$ $d = 0.75$

- $\phi < \bar{\phi} = 0.073$ (housing demand weak)
- $\psi > \bar{\psi} = 0.089$ (credit expensive)
- Values for (ϕ, ψ) imply $u = 5\%$ or $u = 15\%$ in steady state when $p = 1.5$ (US household real estate $\approx 1.5\times$ income)

Multiplicity 1: Multiple steady states p's



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

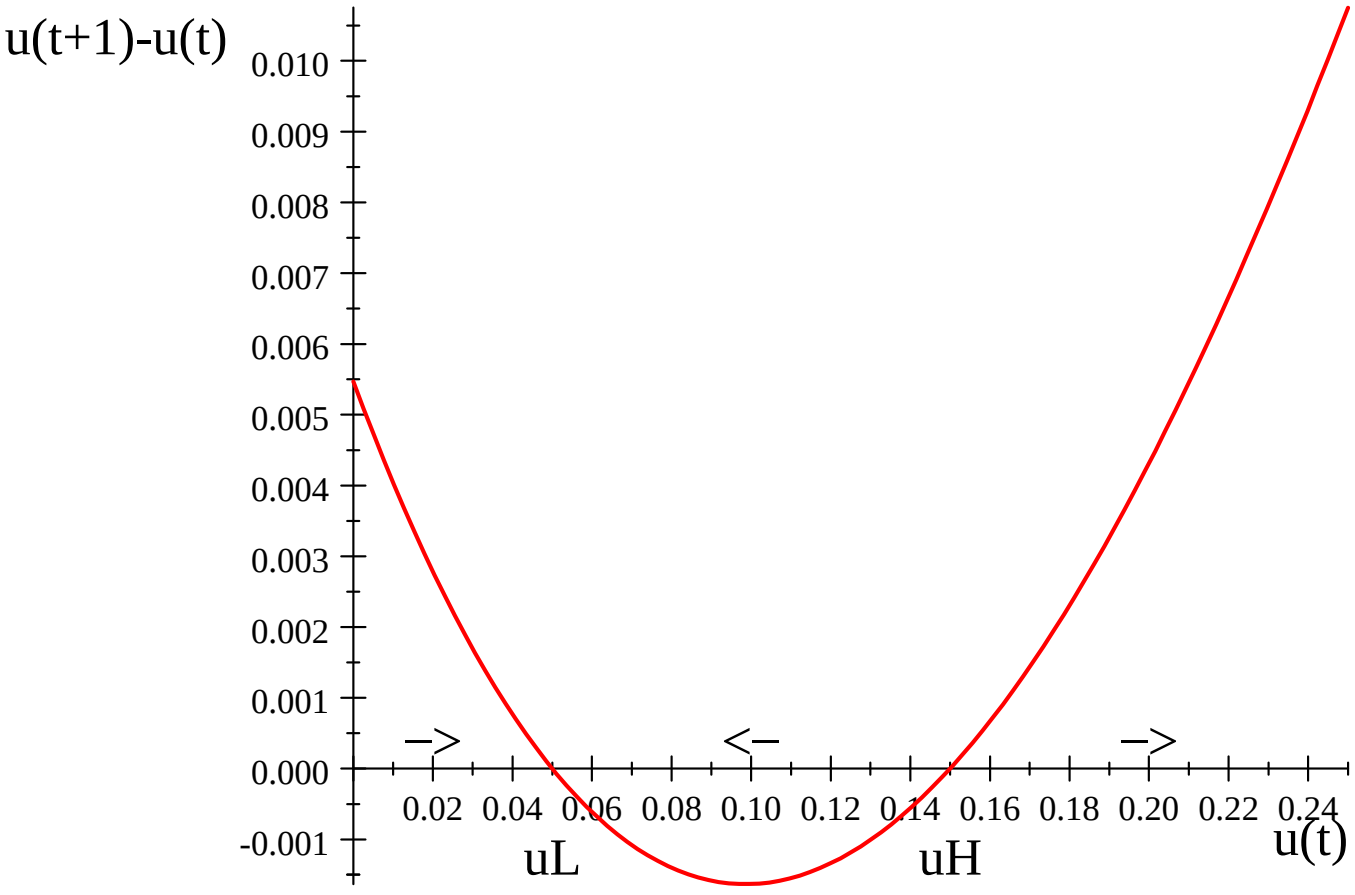
- Suppose $p_t = p > \underline{p}$
- Difference equation defining equilibrium is

$$\frac{1}{(1-u_t)} \cdot \frac{p}{(1+\psi u_t \max\{(1-u_t)-(p-d),0\})} = \beta\phi + \beta p E_t\left[\frac{1}{1-u_{t+1}}\right]$$

- Assume no uncertainty / sunspots / expectational errors:

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

Unemployment Dynamics, $p = 1.5$



Multiplicity 3: Sunspots generate fluctuations in u_t

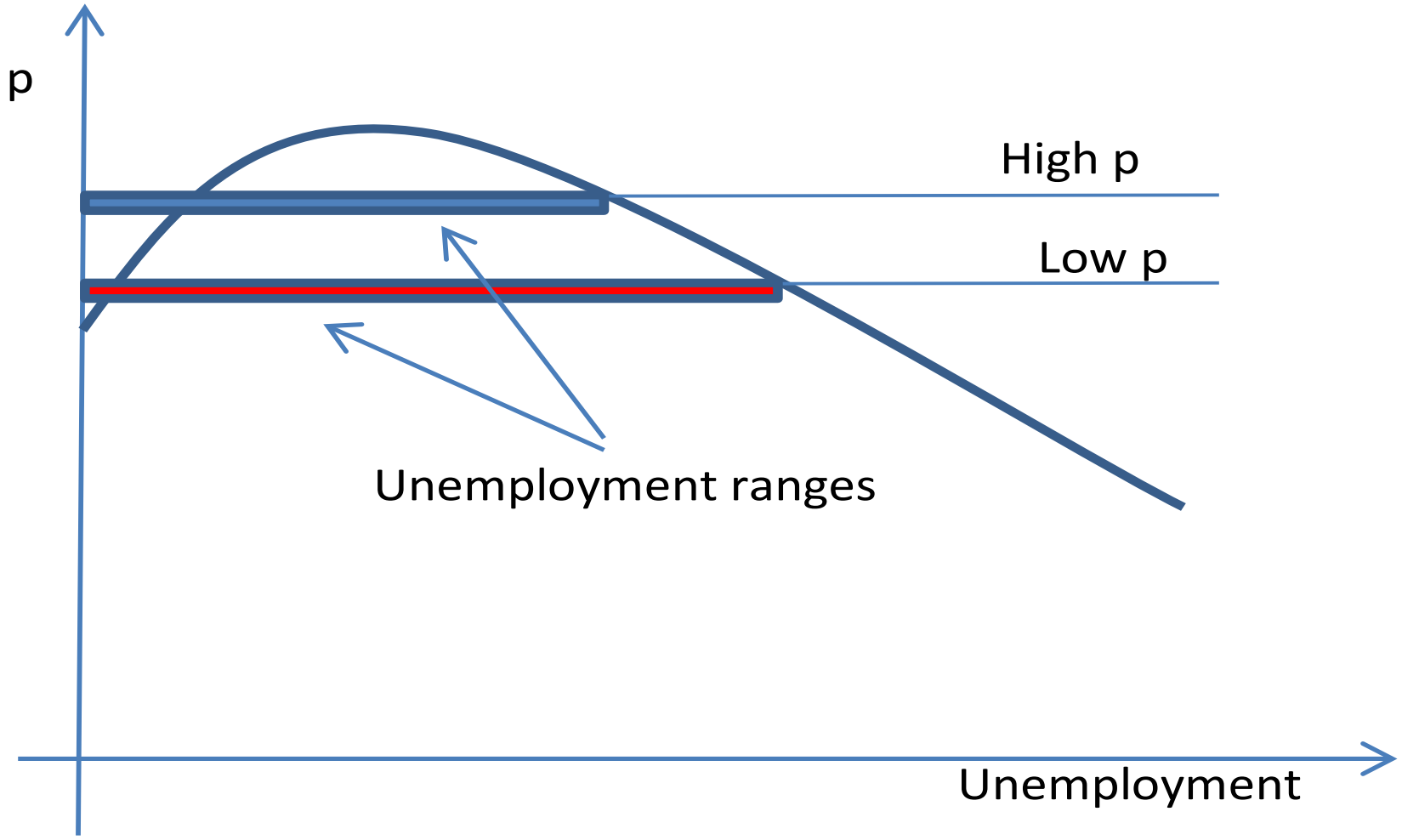
- Low unemployment steady state is dynamically stable $\Rightarrow$ possibility of "sunspots"

- 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



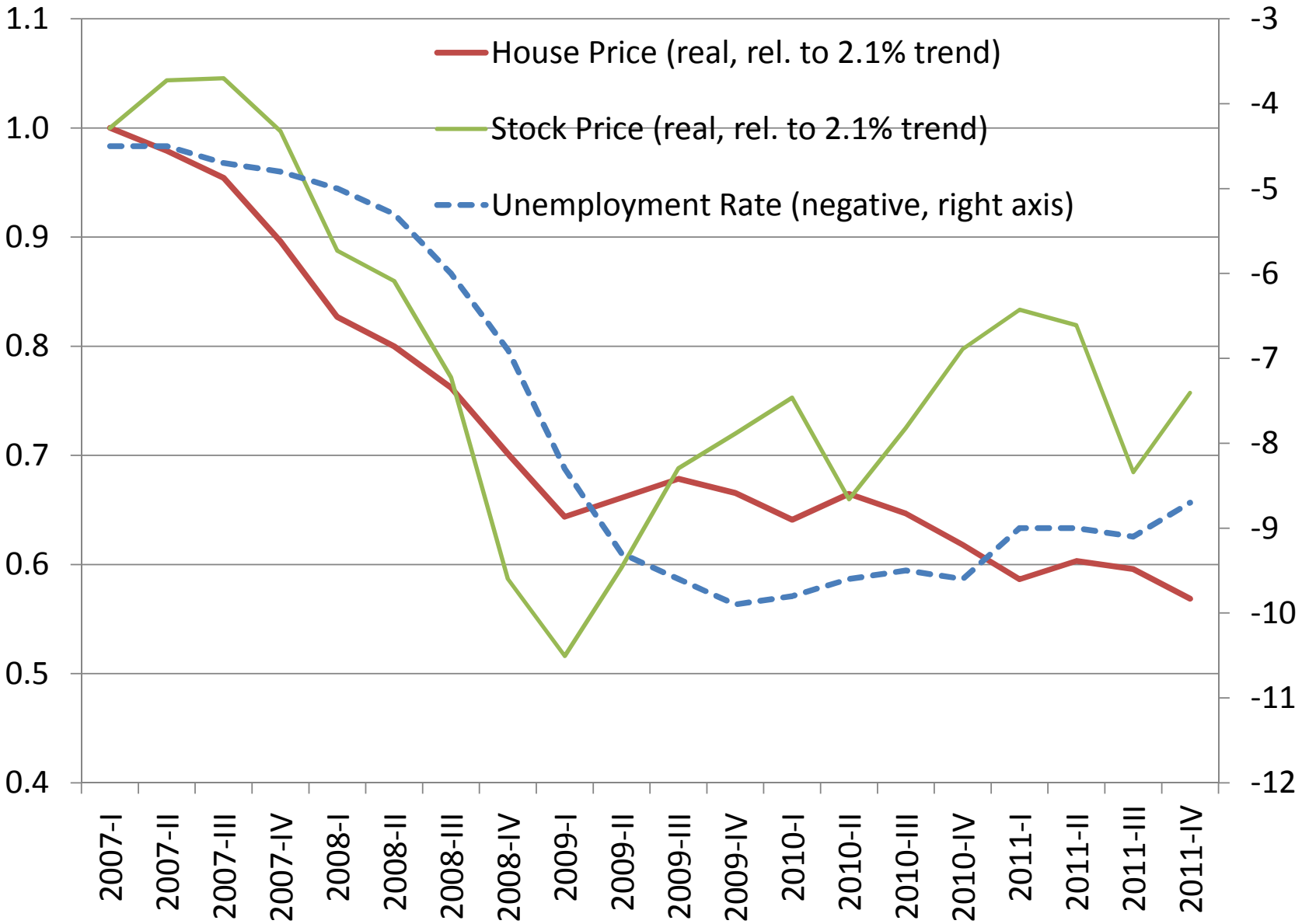
Review: Asset Prices and Macro Volatility

- 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

Features of the Great Recession

1. Large fall in asset values, led by housing
2. Sharp decline in consumer spending, especially durables
3. Sharp rise in unemployment, labor productivity strong
4. Very slow recovery

Great Recession



Question

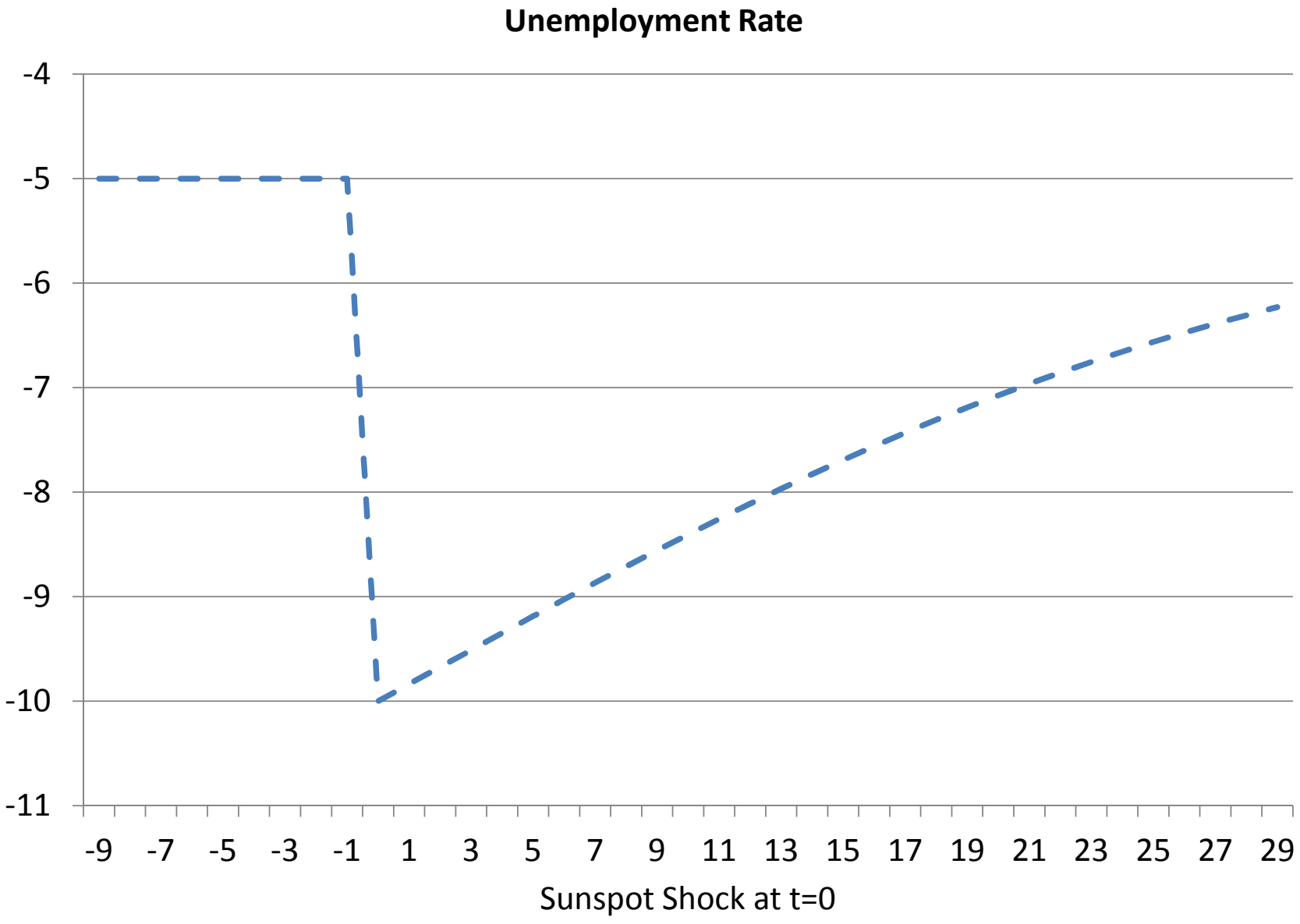
1. Assume we start at the parameterization described above (low ϕ and low $\underline{p}$) so the economy is fragile

2. Begin simulation at the low unemployment steady state: $u = 5\%$

3. Construct one-time sun-spot shock (Lehman Brothers?) that raises unemployment to $u = 10\%$

4. How quickly does the economy return to steady state, absent future surprises?

Model Great Recession



Why Is Recovery So Slow?

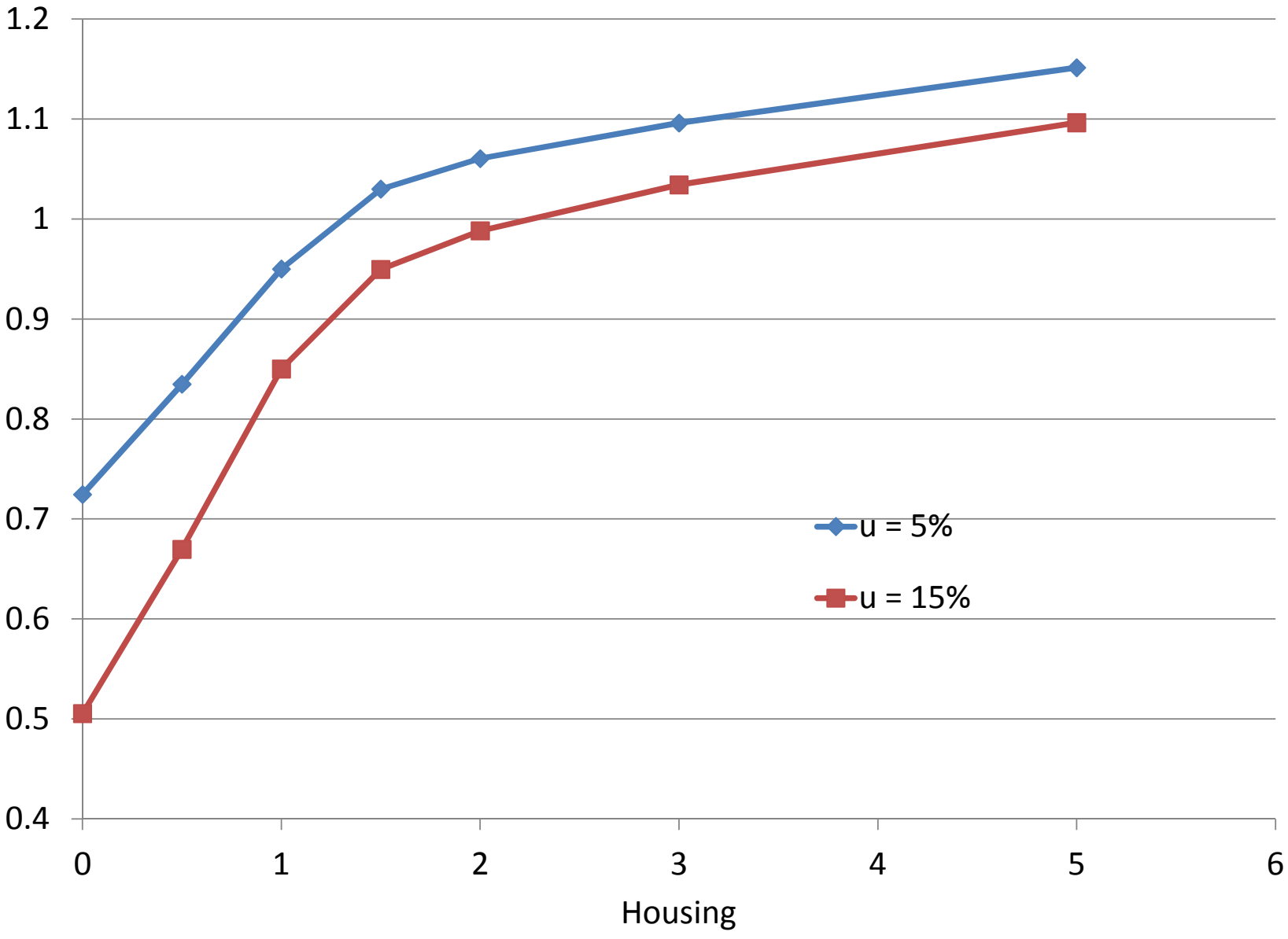
- Recession is driven by a large fall in consumption demand
- Large fall in consumption only optimal if fall in income expected to be persistent (PIH logic)
- Thus confidence-driven recessions are likely to be associated with slow recoveries (Great Depression, Great Recession)

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

Characteristics of Rich versus Poor

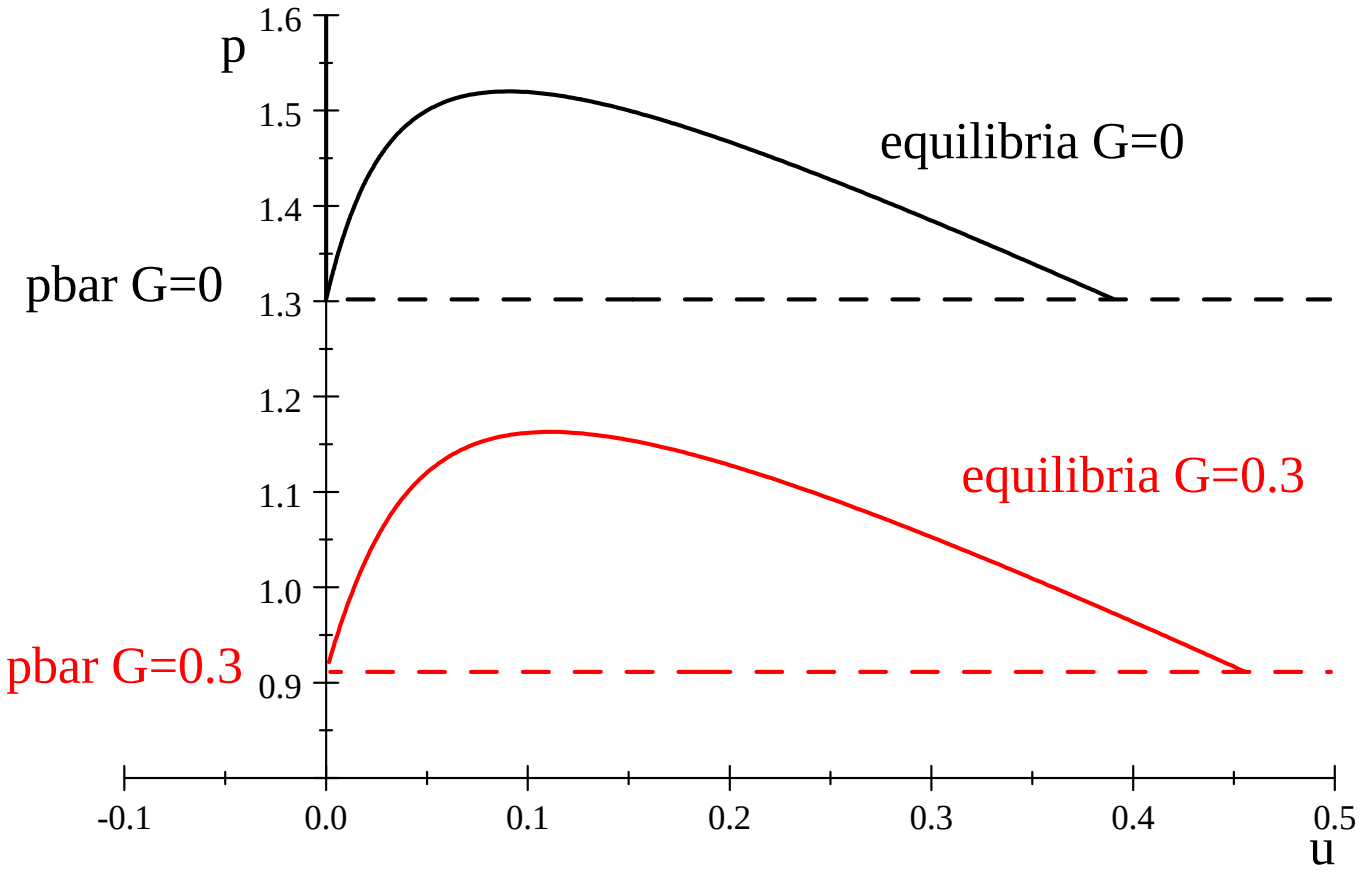
	Wealth Group	
	0-50	50-100
Sample size	8,864	8,873
Average age of head	41.4	46.9
Heads with college	25.7%	40.5%
Average household size	2.9	2.8
Net wealth p.c. (2005$)		
Mean	1,498	119,796
Median	238	63,162
Mean after-tax income p.c. (2005$)	22,117	32,811
Mean consumption p.c. (2005$)	9,353	11,252

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%

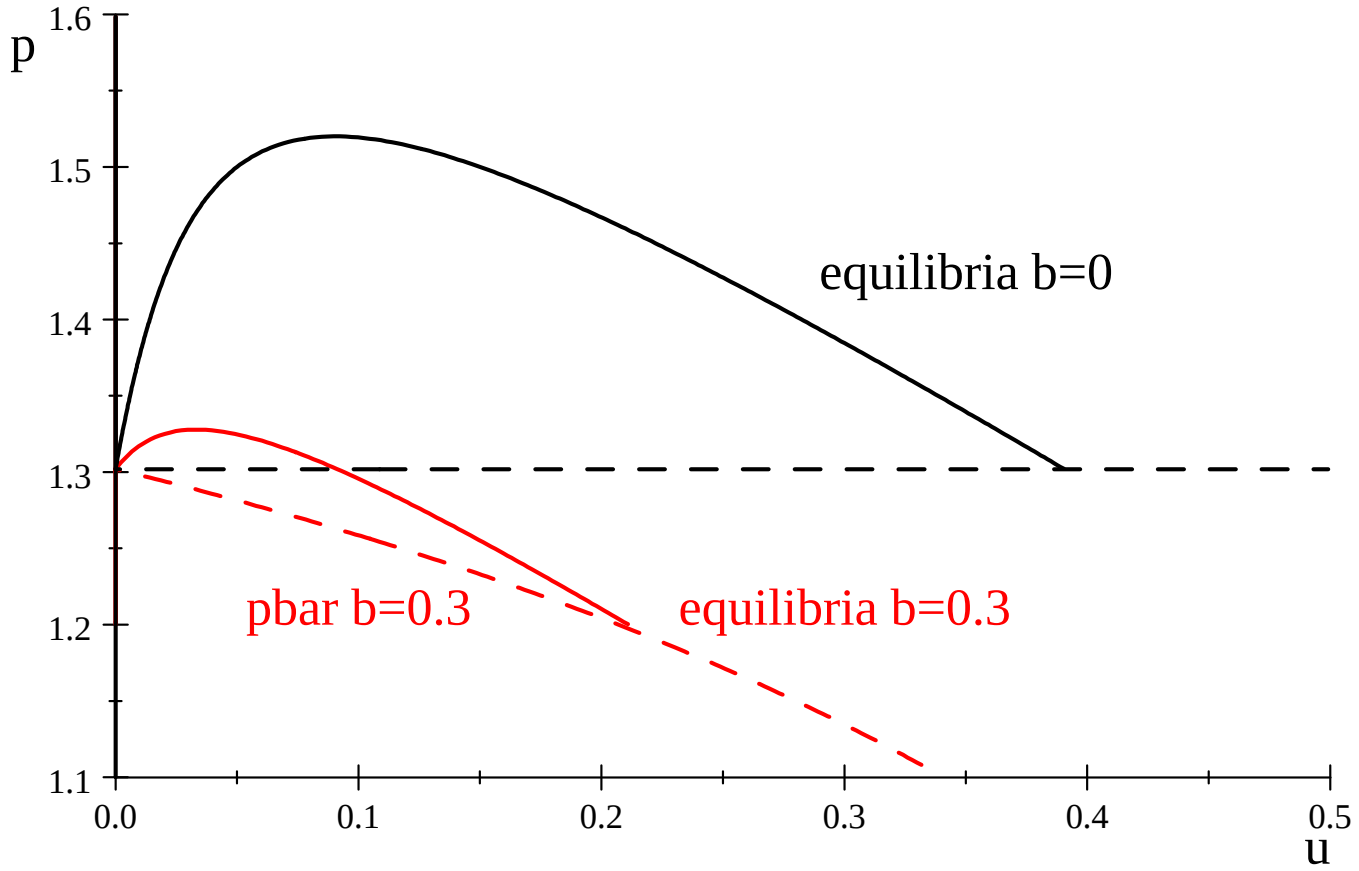
Policy 1: Tax and Spend



Policy 1: Review

- Reduces elasticity of aggregate demand to expectations
- Also reduces asset values
- Not necessarily effective: can expand range for equilibrium unemployment

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 $b \geq 0.41$ 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 of a link between level of wealth and consumption response to rising unemployment risk