

Dissecting Saving Dynamics

Measuring Credit, Wealth, and Precautionary Effects

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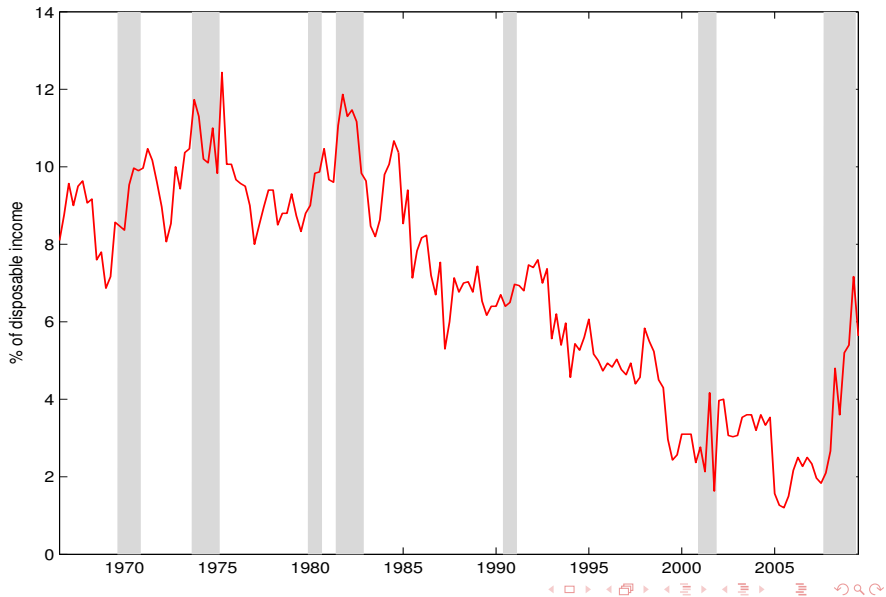
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NBER SI, July 2011

US personal saving rate (s), 1966–2009



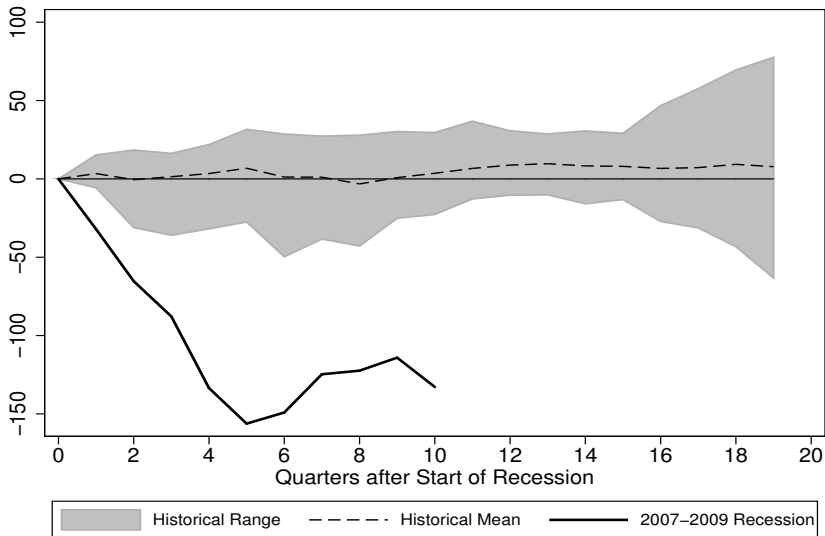
Literature

- ▶ “Wealth Effects”
 - ▶ Modigliani, Klein, MPS model, ...
 - ▶ $s_t = -0.05m_t + \text{other stuff}$
- ▶ “Precautionary”
 - ▶ Carroll (1992)
 - ▶ Saving rate rises in recessions
 - ▶ $\Delta \log C_{t+1}$ strongly related to $\mathbb{E}_t[u_{t+1} - u_t]$
- ▶ “Credit Availability”
 - ▶ Secular Trend:
 - ▶ Parker (2000), Dynan and Kohn (2007), Muellbauer (many papers)
 - ▶ Cyclical Dynamics:
 - ▶ Guerrieri and Lorenzoni (2011), Eggertsson and Krugman (2011), Hall (2011)

Great Recession:

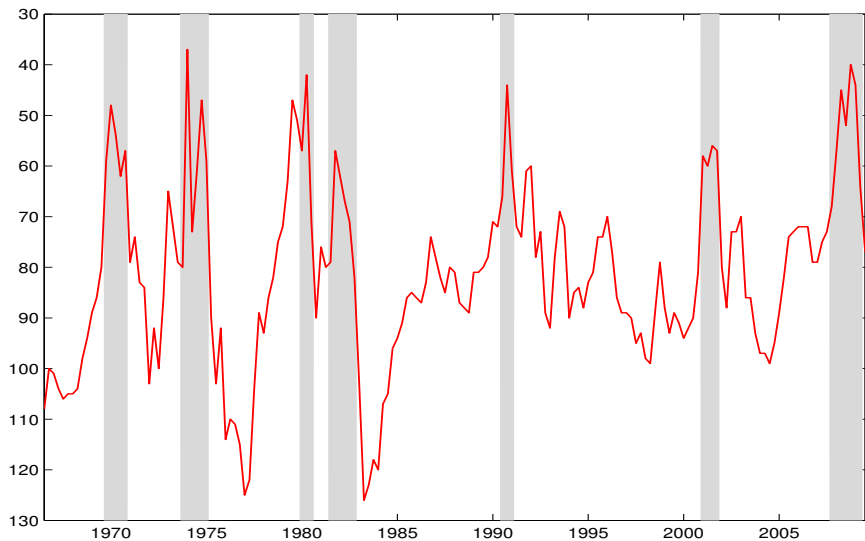
- ▶ s rises by 4 ~ 5 pp
- ▶ More than any previous postwar recession
- ▶ But all three indicators also move a lot:
 - ▶ Credit conditions tighten
 - ▶ Unemployment Expectations rise
 - ▶ Wealth falls

Household wealth 2007–2009 ↓ by 150% of income

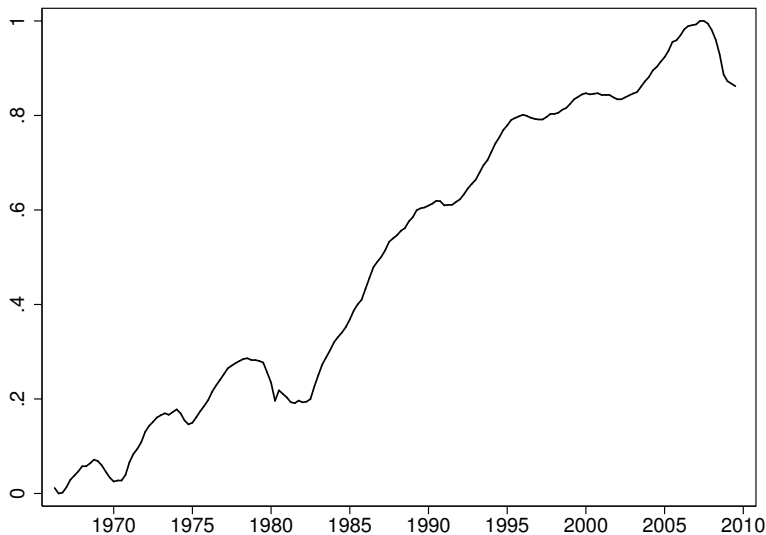


Higher unemployment risk

University of Michigan $\mathbb{E}_t[u_{t+4} - u_t]$



Tighter (Muellbauer-CCI) HH Credit Supply



Our Contributions

- ▶ Theory
 - ▶ Simple model that provides transparent role for all 3 channels
 - ▶ Qualitative implications of the model
 - ▶ “Overshooting” \Rightarrow possible role for fiscal policy
- ▶ Evidence
 - ▶ Quantify importance of the 3 channels
 - ▶ Two estimated models of s
 - ▶ **Reduced-form**—OLS
 - ▶ **Structural**—Minimum distance estimation

Theory à la Carroll and Toche (2009)

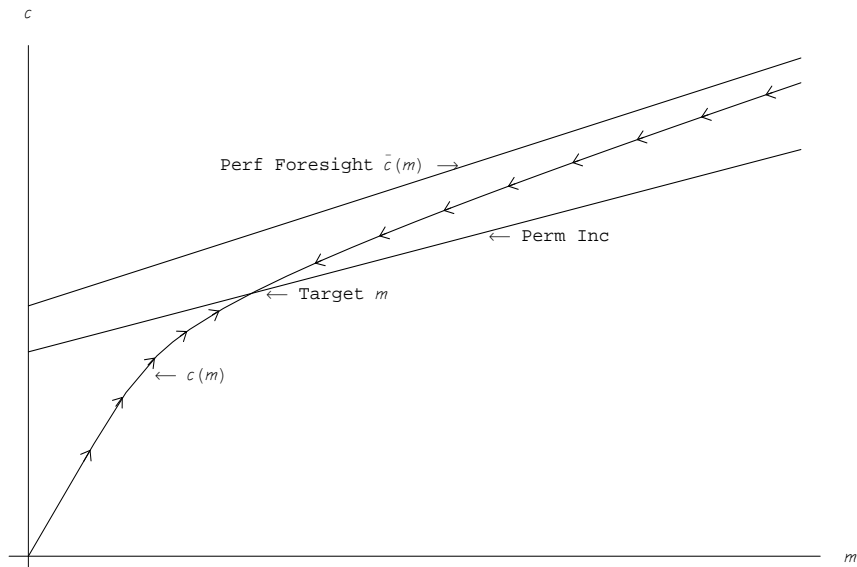
- ▶ CRRA utility, labor supply ℓ , agg wage W , emp status ξ :

$$\begin{aligned} v(\mathbf{m}_t) &= \max_{\mathbf{c}_t} u(\mathbf{c}_t) + \beta \mathbb{E}_t[v(\mathbf{m}_{t+1})] \\ \text{s.t.} \end{aligned}$$

$$\mathbf{m}_{t+1} = (\mathbf{m}_t - \mathbf{c}_t)R + \ell_{t+1}W_{t+1}\xi_{t+1}$$

- ▶ $\xi_{t+1} \in \{\xi^u, \xi^e\}$ where $\xi^u < \xi^e$
 - ▶ CT model: $\{\xi^u, \xi^e\} = \{0, 1\}$
 - ▶ Our model: wage-tax-financed unemp ins system so $\xi^u > 0$
- ▶ Tractability: unemployment shocks are **permanent**
 - ▶ If $\xi_t = \xi^u$ then $\xi_{t+1} = \xi^u$
- ▶ **Target wealth \check{m}** exists and is stable:
 - ▶ Consumption chosen so that $m_t \rightarrow \check{m}$

Consumption function



Target wealth \check{m}

Closed-form solution for target wealth depends on unemployment risk \bar{U} and generosity of unemployment insurance ξ^u :

$$\check{m} = f(\underbrace{\bar{U}}_{(+)}, \underbrace{\xi^u}_{(-)}, \text{preferences}, \dots)$$

Why does target wealth decline in ξ^u ?

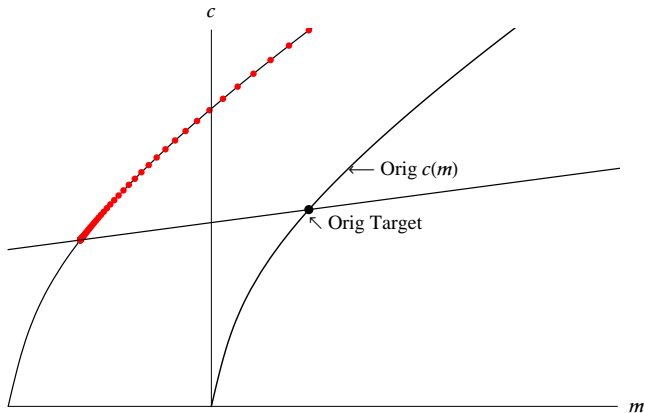
- ▶ $\xi^u \uparrow$ relaxes 'Natural Borrowing Constraint' (NBC)
- ▶ NBC: 'never end with a_t so low that $c_{t+1} = 0$ is possible'
- ▶ PDV of unemployment benefits is $\xi^u/(\mathcal{R} - 1)$
- ▶ So NBC says $a_t > -\xi^u/(\mathcal{R} - 1)$

We *could* add a tighter, 'artificial' borrowing constraint

- ▶ But tightening natural borrowing constraint is just like tightening artificial one
- ▶ Adds complexity to the model without adding insight

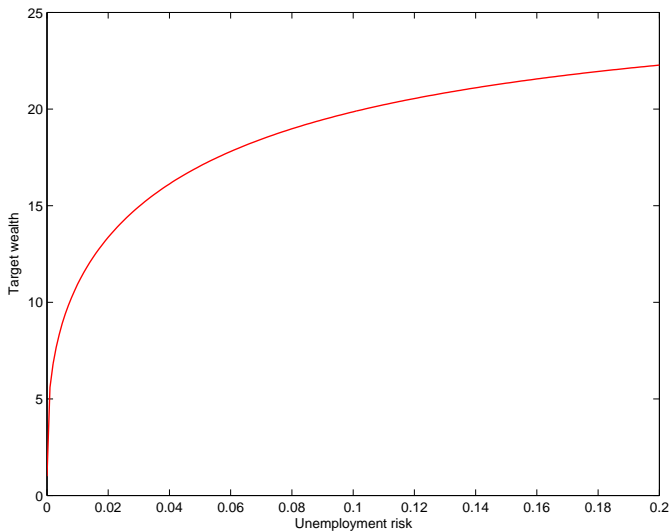
⇒ we assume our measure of credit conditions identifies NBC

Credit easing/Financial innovation & deregulation

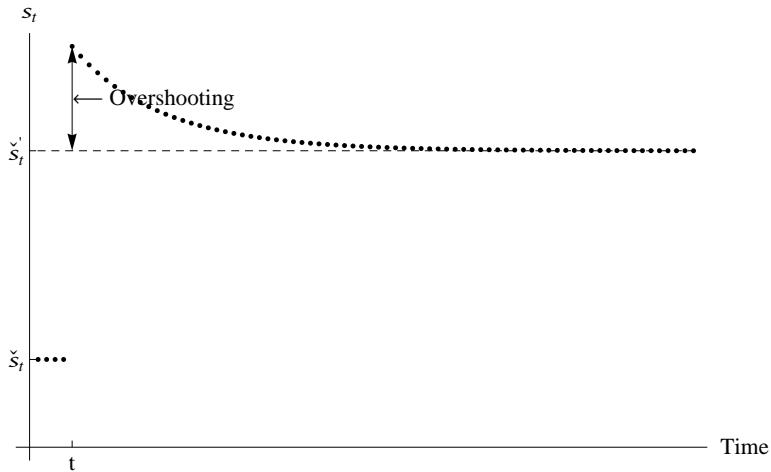


\check{m} is close to linear in CCI

Target wealth \check{m} as function of U risk \mathcal{U}



Saving Rate After a Permanent Rise in \bar{v}

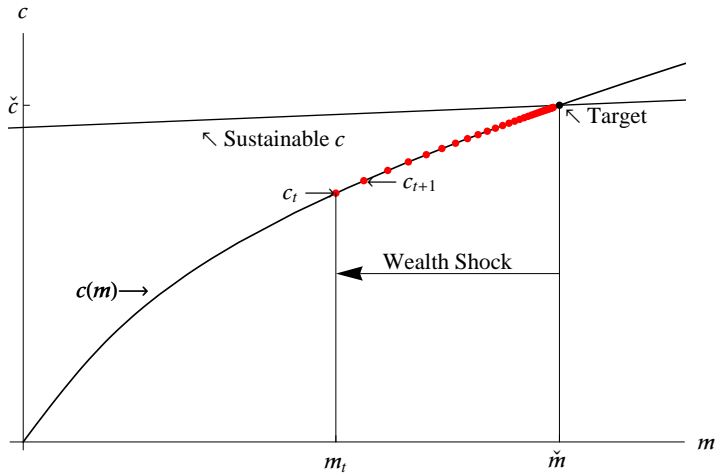


Overshooting and Fiscal Policy

DSGE models:

- ▶ Frictions, frictions everywhere; but missing here
- ▶ If c imposes 'external' costs of adjustment
 - ▶ Sticky prices/wages
 - ▶ Capital adjustment costs
 - ▶ Other reasons for 'pecuniary externalities'
- ▶ \Rightarrow 'stimulus' payments may reduce cost of cycle
- ▶ Justification for 'automatic stabilizers'?

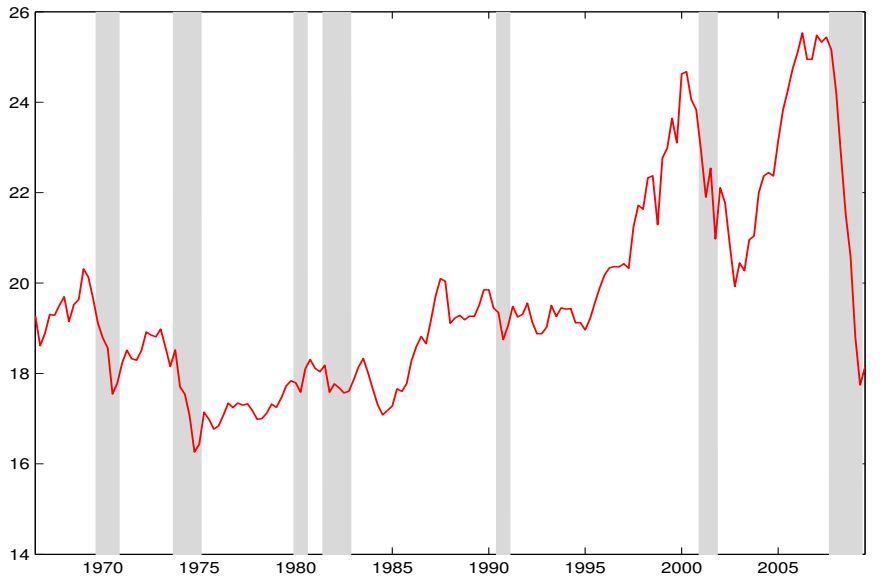
Consumption After a Wealth Shock



Data & sources

- ▶ Quarterly 1966Q2–2009Q3
- ▶ PSR: BEA NIPA
- ▶ Net worth: Flow of Funds, Fed
- ▶ m : Net worth–disposable income ratio
- ▶ CCI : Senior Loan Officer Survey (SLOOS), Fed
Question on banks' willingness to provide consumer installment loans
- ▶ Uncertainty: using Michigan unemployment expectations

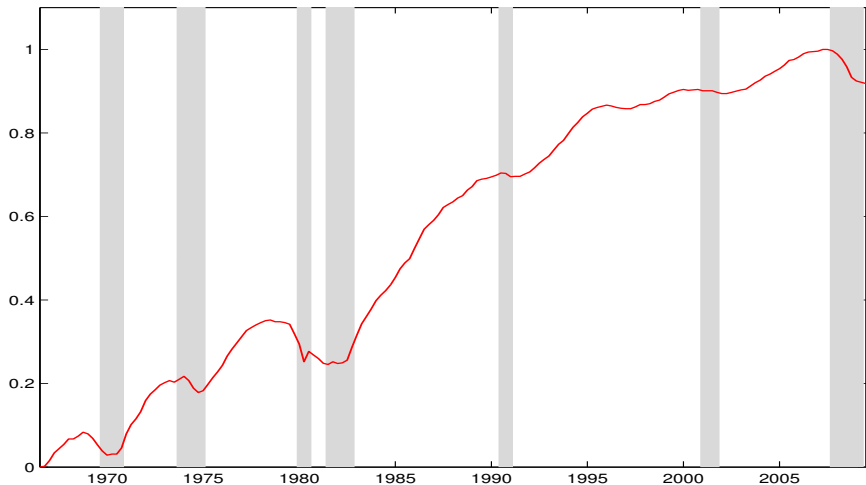
Net worth (fraction of quart disp income)



Credit Conditions Index (CCI) à la Muellbauer

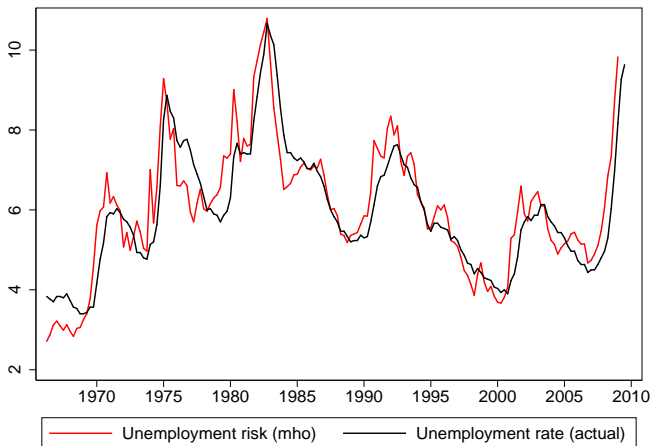
Normalized accumulated responses to:

"Please indicate your **bank's willingness to make consumer installment loans** now as opposed to three months ago."



\mathcal{U}_t implied by Michigan U expectations

- ▶ Regress: $\Delta_4 u_{t+4} = \alpha_0 + \alpha_1 UExp_t$
- ▶ U risk: $\mathcal{U}_t = u_t + \Delta_4 \hat{u}_{t+4}$
- ▶ $\Delta_4 u_{t+4} \equiv u_{t+4} - u_t$, $\Delta_4 \hat{u}_{t+4} \equiv$ fitted values
- ▶ \mathcal{U}_t tracks **but precedes** actual U

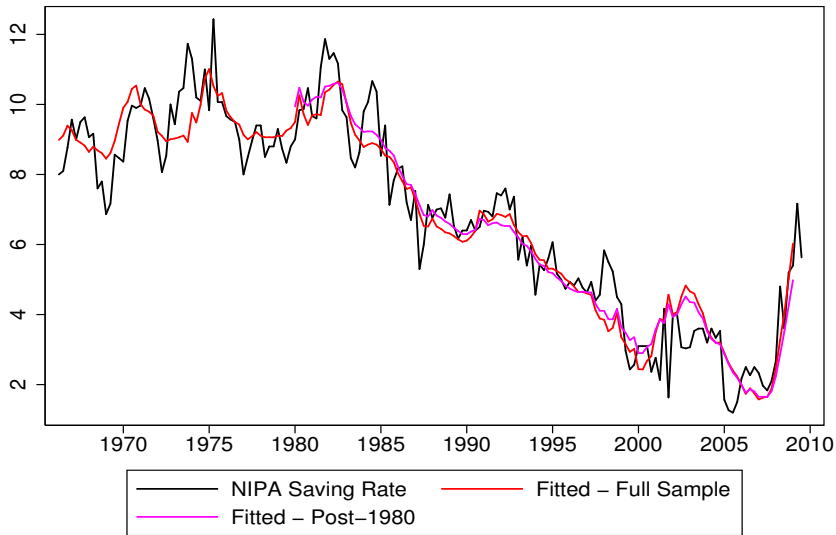


Reduced-form regressions

$$\text{OLS/IV: } s_t = \gamma_0 + \gamma_m m_t + \gamma_{CCI} CCI_t + \gamma_U U_t + \gamma' X_t + \varepsilon_t^s$$

Param	Baseline	Uncert	Lag s_{t-1}	Full	Post-80	IV
γ_0	16.72*** (1.52)	16.74*** (1.54)	6.73*** (1.43)	17.74*** (1.74)	18.57*** (1.59)	17.28*** (1.53)
γ_m	-1.74*** (0.29)	-1.76*** (0.32)	-0.63*** (0.20)	-1.79*** (0.29)	-1.48*** (0.26)	-1.82*** (0.29)
γ_{CCI}	-5.35*** (0.55)	-5.28*** (0.63)	-2.58*** (0.51)	-5.47*** (0.60)	-7.68*** (0.80)	-5.32*** (0.51)
γ_U	0.27*** (0.07)	0.26*** (0.10)	0.14** (0.05)	0.16* (0.09)	0.05 (0.11)	0.25*** (0.08)
γ_σ		0.15 (0.48)				
γ_s			0.56*** (0.08)			
γ_r				0.17*** (0.05)		
γ_{GS}				-0.00 (0.08)		
γ_{CS}				-0.22* (0.13)		
\bar{R}^2	0.91	0.91	0.93	0.91	0.91	
DW stat	1.00	0.99	2.22	1.04	1.16	

PSR fit in full sample & post-1980



Reduced-form regressions—Summary

- ▶ Three significant s drivers: m , CCI , \bar{U}
- ▶ Explain > 90 percent of variation in s
- ▶ Good fit (full sample and post-1980)
- ▶ Other vars don't increase expl power
demographics, corp&gov saving, int rate (to some extent)
- ▶ Great Recession 07–09

$$\gamma_m \times \Delta m = -1.7 \times -1.8 = 3.1$$

$$\gamma_{CCI} \times \Delta CCI = -5.4 \times -0.077 = 0.4$$

$$\gamma_{\bar{U}} \times \Delta \bar{U} = 0.3 \times 4.8 = 1.4$$

$$\text{Explained } \Delta s = 4.9$$

$$\text{Actual } \Delta s = 4.0$$

Structural estimation

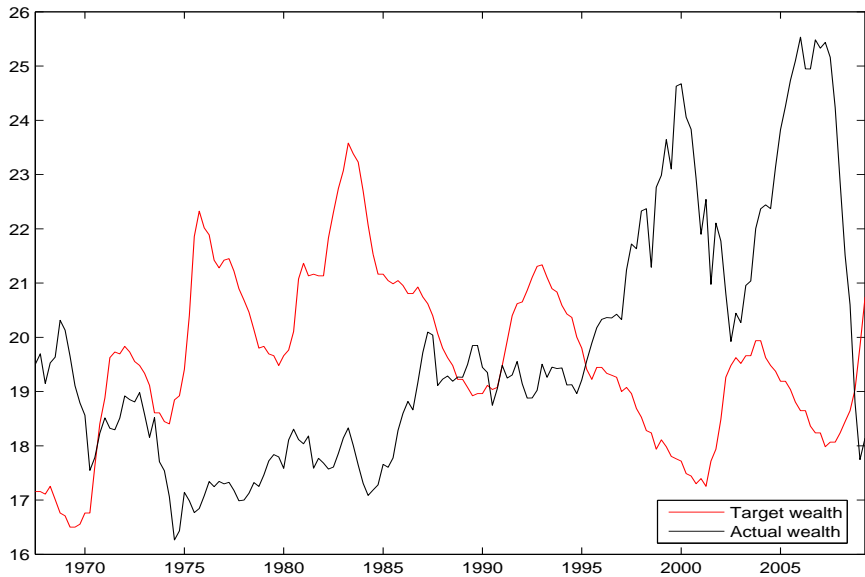
- ▶ Assume $\bar{m}_t = \gamma_0 + \gamma_1 CCI_t$
ie rescale CCI to get wealth units right
- ▶ Calculate $\check{m}_t = f(\mathcal{U}_t, \bar{m}_t, R, G, \dots)$
- ▶ Calculate PSR \hat{s}_t implied by model
- ▶ Estimate $(\beta, \gamma_0, \gamma_1)$ by

$$\min \sum (s_t - \hat{s}_t)^2$$

Calibration (for model with $\bar{m}_t \equiv 0$)

Description	Parameter	Value
CRRA	ρ	3
Interest rate factor	R	1.003
Income growth factor	G	1.005
Discount factor	β	0.98
	implied by matching mean $m = 19.7$	

Target Wealth \check{m}_t



Conclusion

- ▶ All three effects seem to be present
- ▶ Easier borrowing largely explains secular declines
- ▶ Order of importance in Great Recession:
 1. Wealth shock
 2. Labor income risk
 3. Credit tightening
 4. Deleveraging/elevated saving rate likely to continue for a while

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