Sources of U.S. Wealth Inequality: Past, Present, and Future

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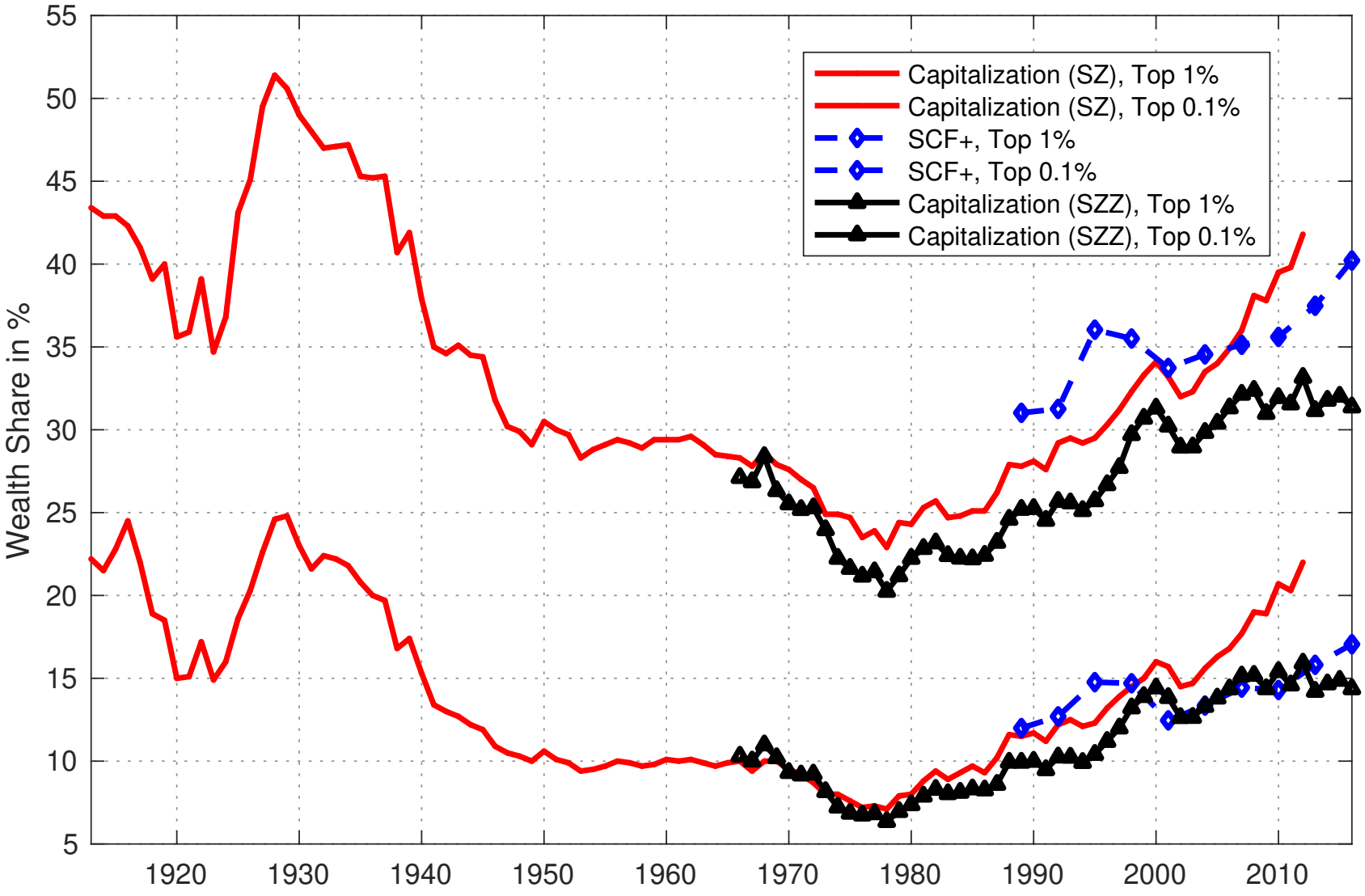
Evolution of top wealth inequality in the U.S.



Data sources: Saez & Zucman (2016), Smith, Zidar & Zwick (2019).

Overview

- examine a quantitative macro model with sharp implications for the distribution of wealth: can it match the data?
  - its average shape
  - its evolution over time
- in particular, study the role of a number of wealth inequality determinants: tax rates, labor income, and portfolio returns—all varying across households and over time
- we discipline the model by tying all parameters to micro data
  - does the benchmark framework do an adequate job?

Quantitative model

Extended Aiyagari 1994 framework:

- exogenous labor supply with idiosyncratic risk: persistent and transitory component, plus Pareto tail
- heterogeneous returns: increasing in wealth, i.i.d. idiosyncratic component
- progressive taxation

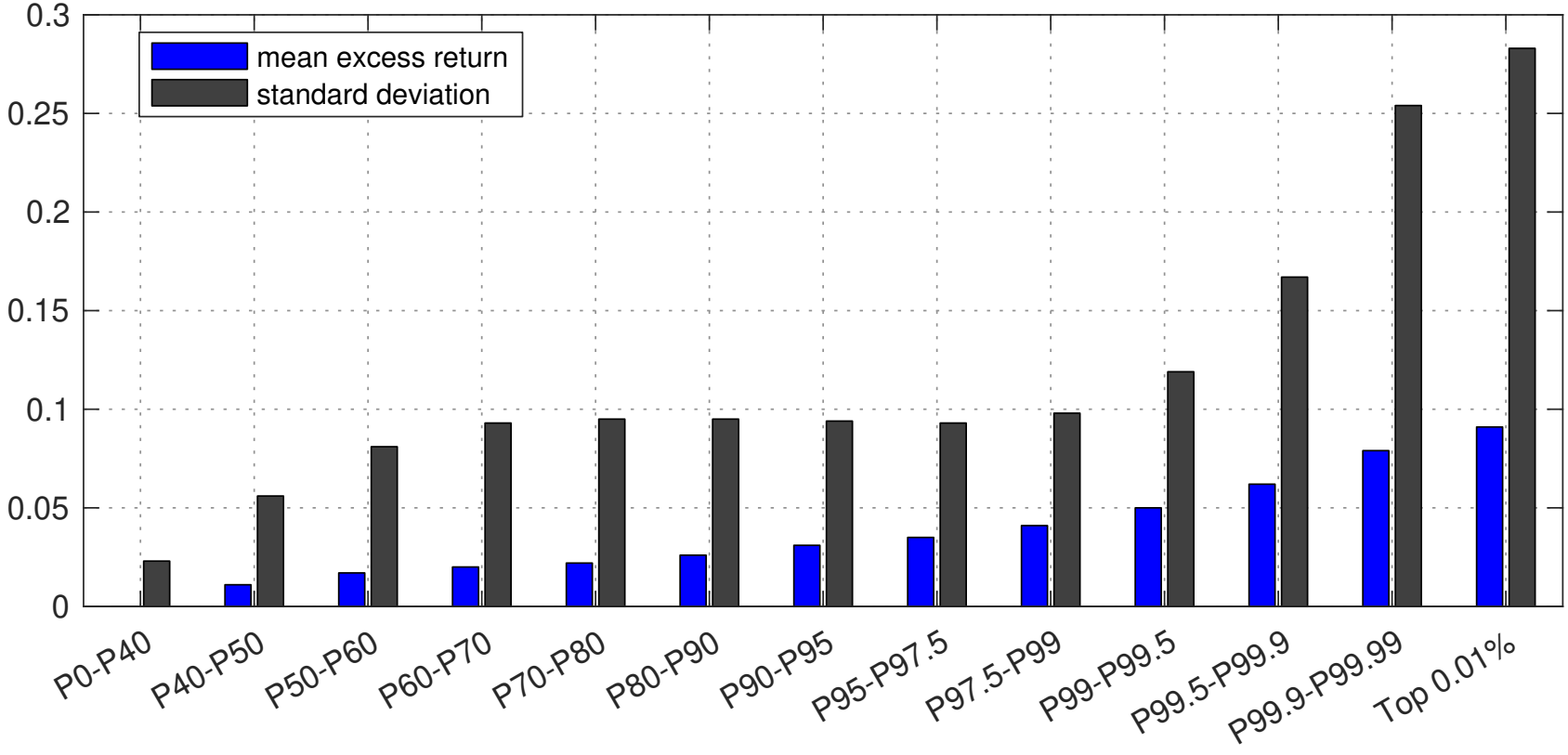
Return heterogeneity

- overall return given asset holdings a_t equals

$$\underline{r}_t + r_t^X(a_t) + \sigma^X(a_t)\eta_t$$

- $\underline{r}_t$ is endogenous
- $r_t^X(\cdot)$ and $\sigma^X(\cdot)$ are exogenous excess return schedules (mean and st.dev.), taken from the data
- η_t is an i.i.d. standard normal shock
- reduced form portfolio choice

Schedule of excess returns



Data sources: Bach, Calvet, Sodini (2019); Kartashova (2014); Jorda, Knoll, Kuvshinov, Schularick, Taylor (2019); Case-Shiller.

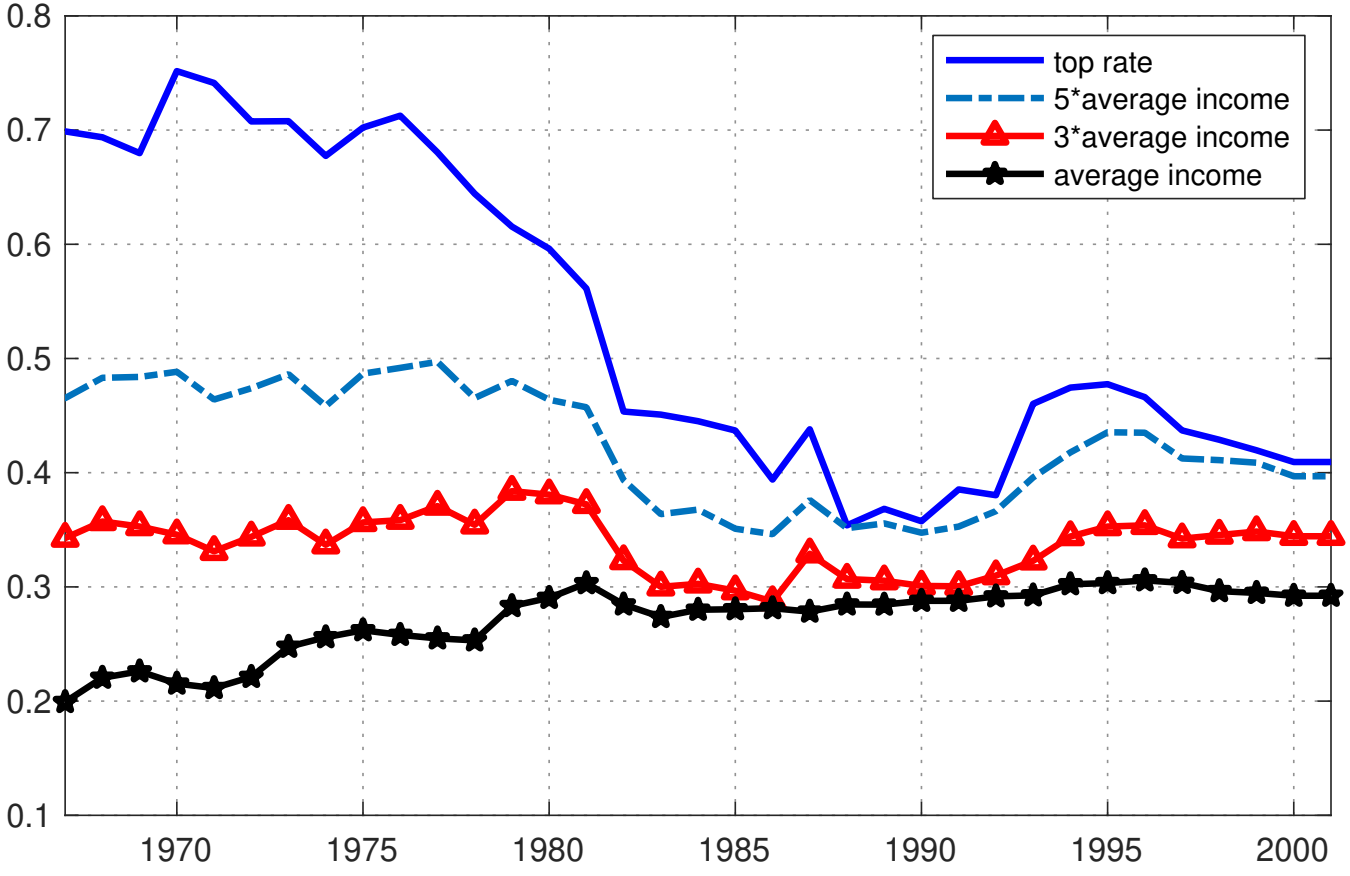
Results, I: steady state (1967)

	Top 10%	Top 1%	Top 0.1%	Top 0.01%
Data	70.8%	27.8%	9.4%	3.1%
Model	66.6%	23.7%	11.2%	7.2%
	Bottom 50%	Fraction $a < 0$		
Data	4.0%	8.0%		
Model	3.5%	7.3%		

- model matches wealth distribution well on its entire domain
  - return heterogeneity is key ingredient
  - wealth concentration is mitigated by progressive taxation and labor income risk

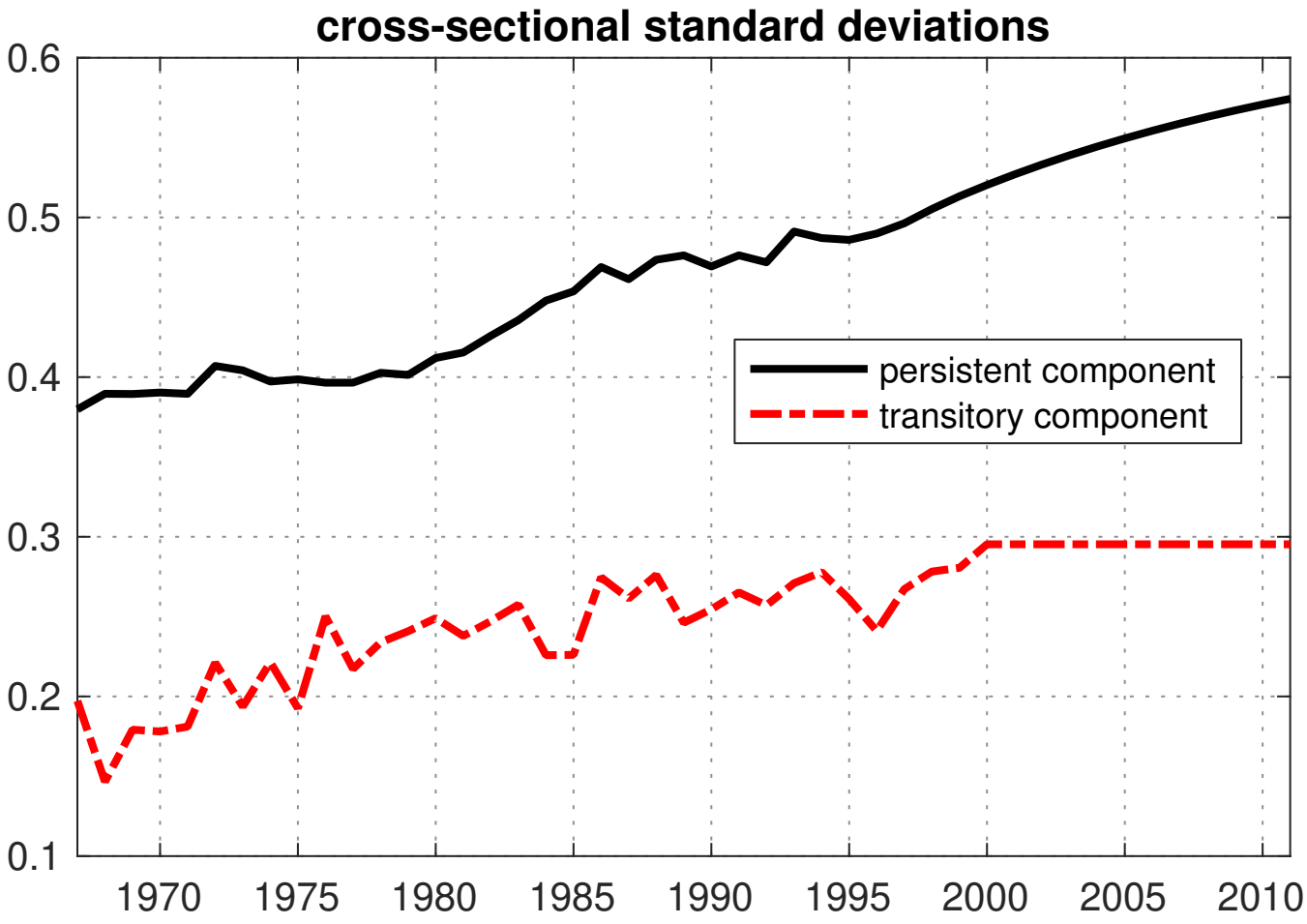
Observed change 1: decrease in tax progressivity

- federal effective tax rates (Piketty & Saez 2007): income, payroll, corporate and estate taxes



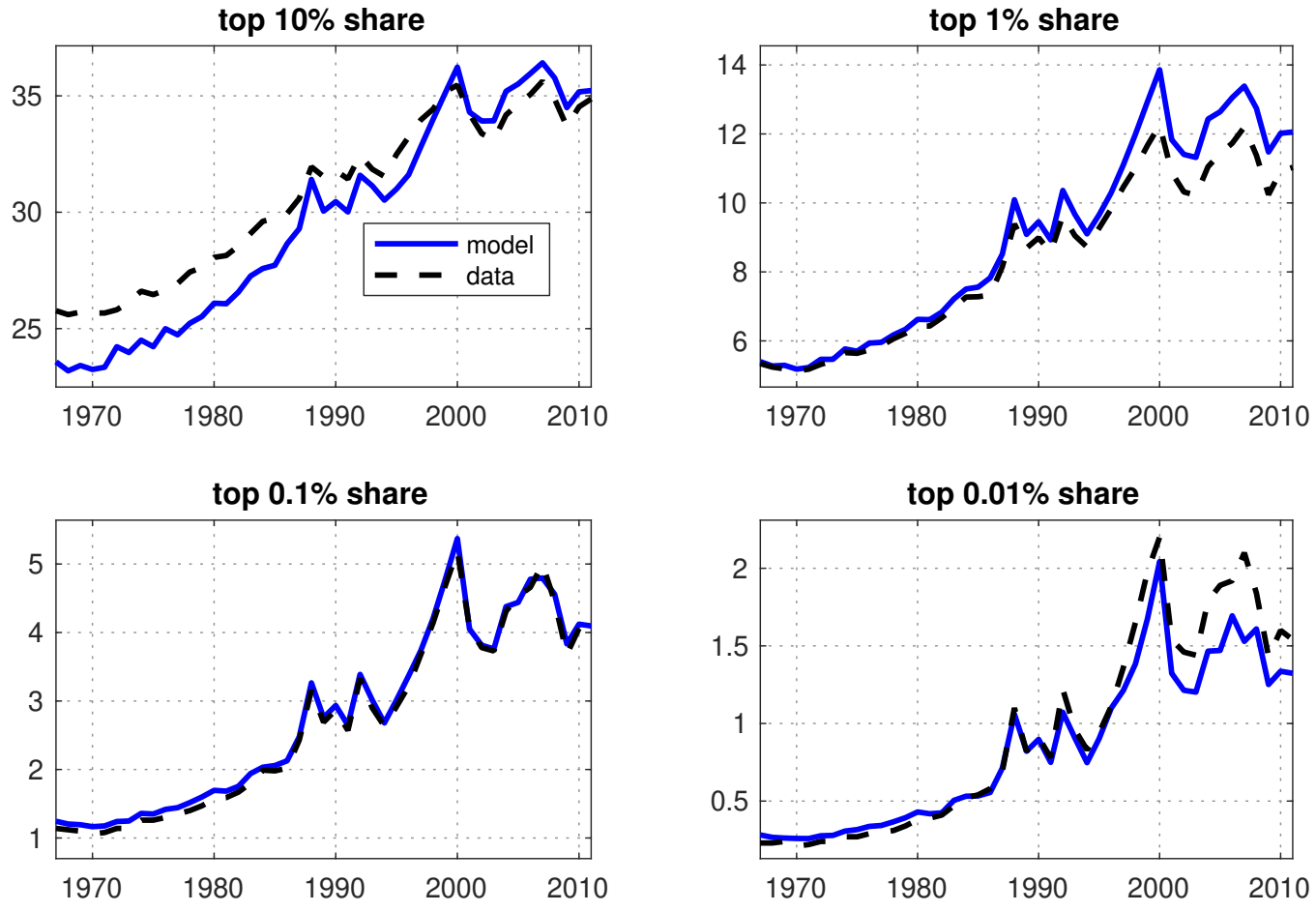
Observed change 2: increase in labor income risk

- estimates for variance of persistent and temporary components 1967-2000 (Heathcote, Storesletten & Violante 2010)



Observed change 3: increase in top labor income shares

- adjust standard AR(1) in idiosyncratic productivity by imposing a Pareto tail for the top 10% earners: calibrated tail coefficient decreases from 2.8 to 1.9 (updated Piketty & Saez 2003 series)



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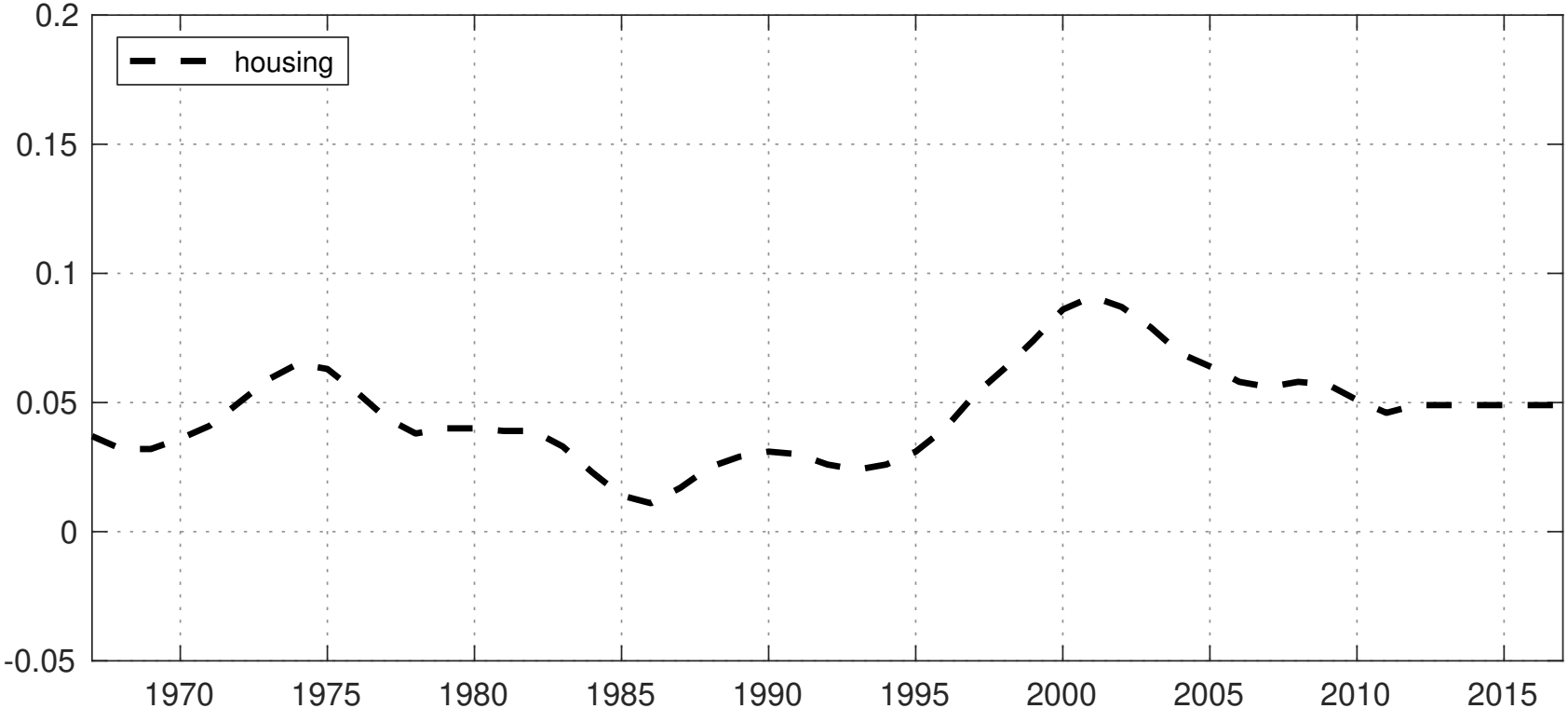

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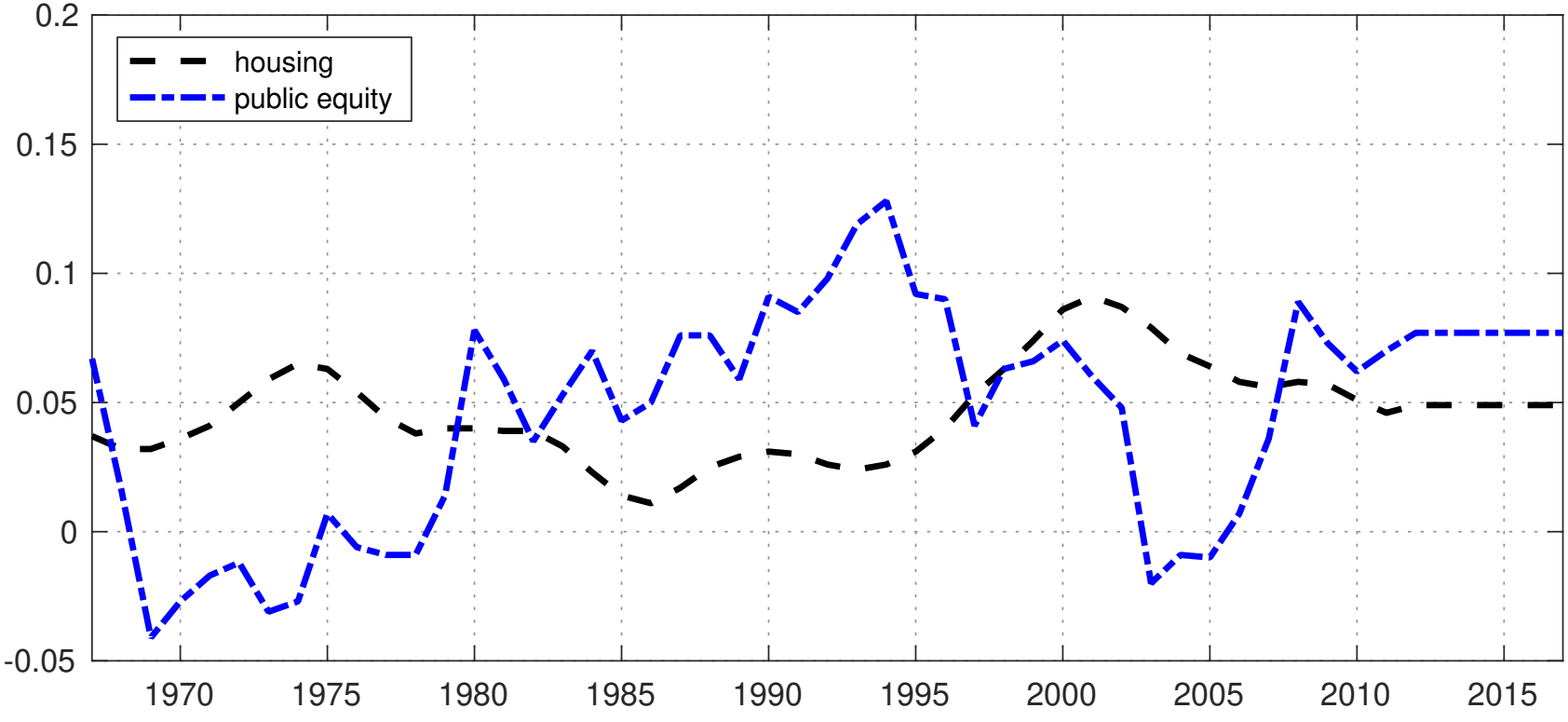

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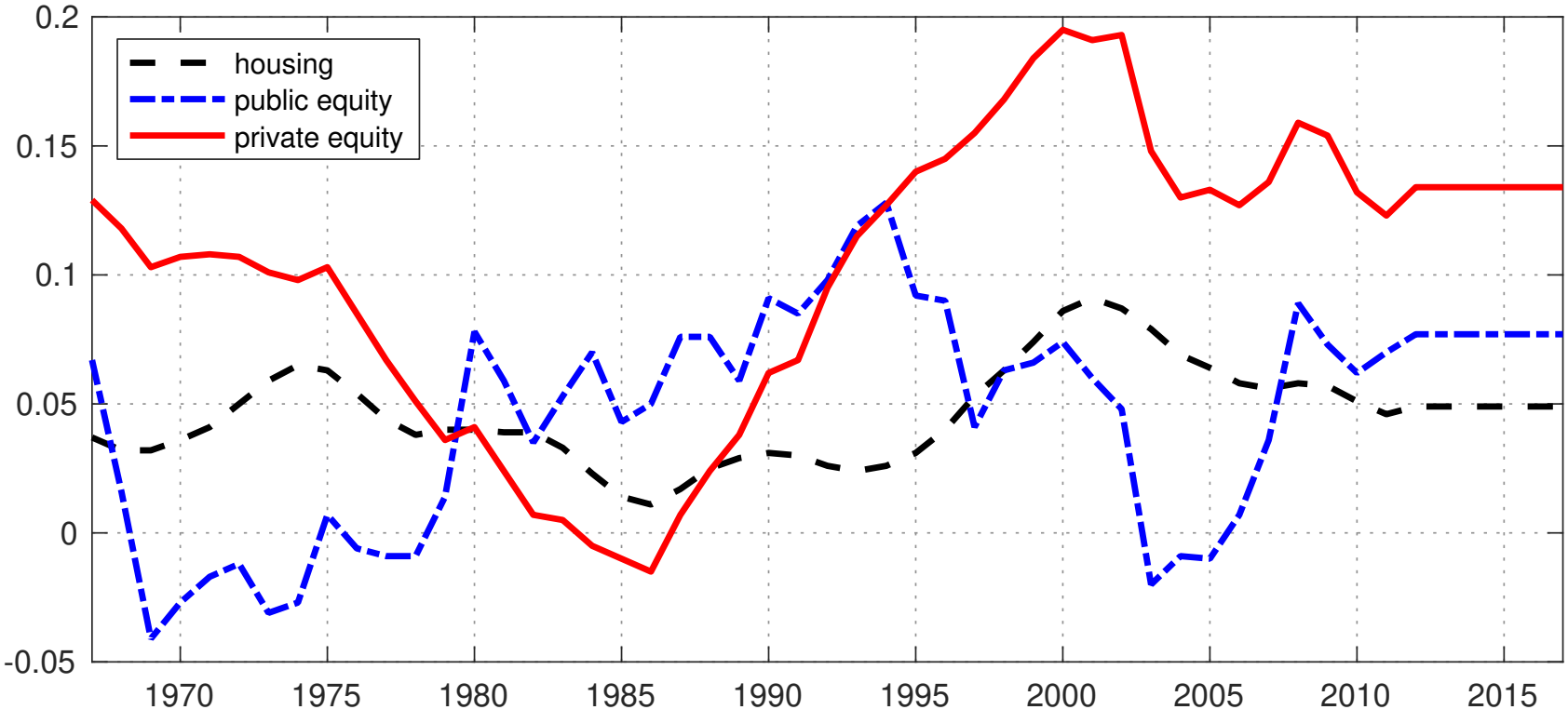
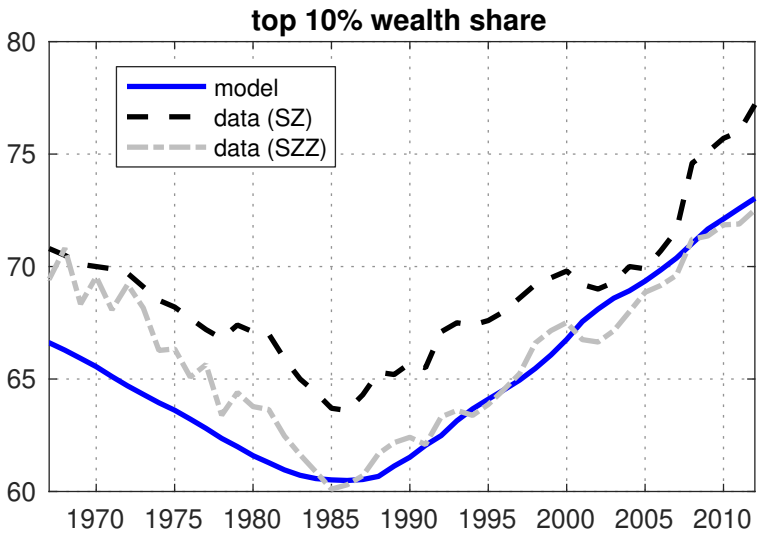
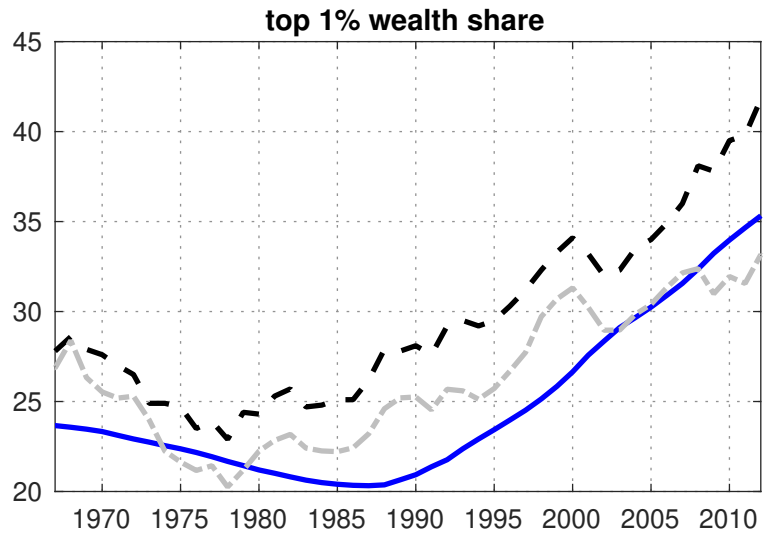
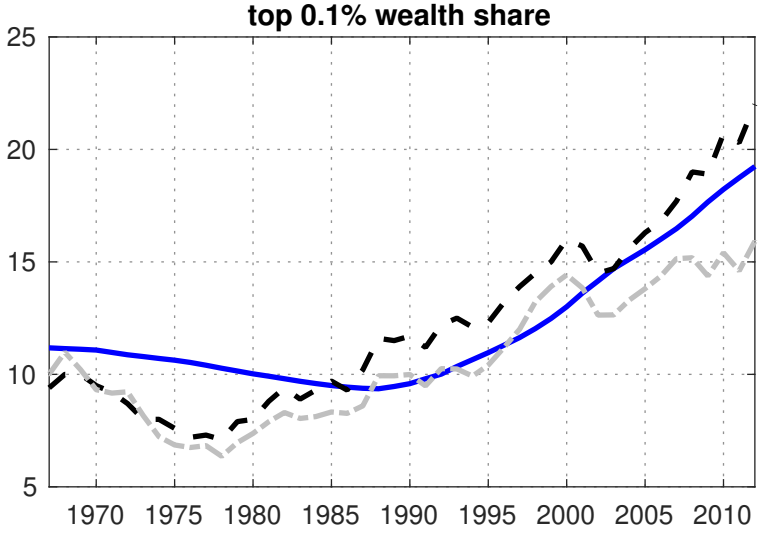
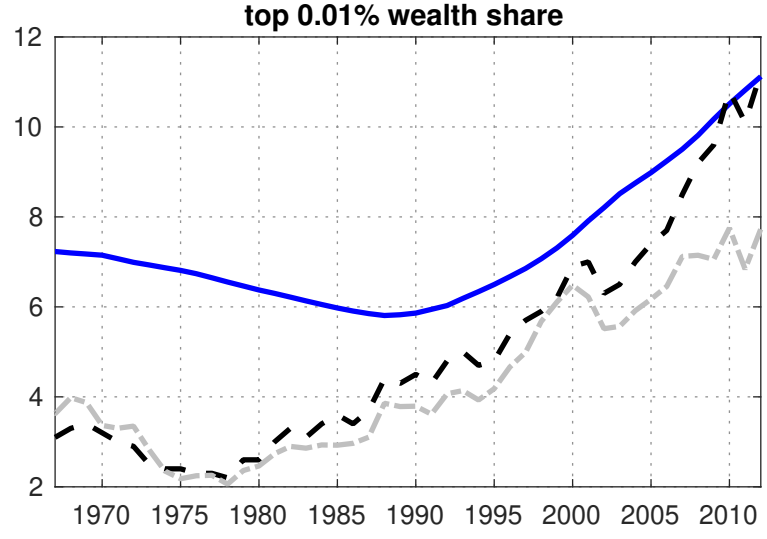


Results, II: historical evolution









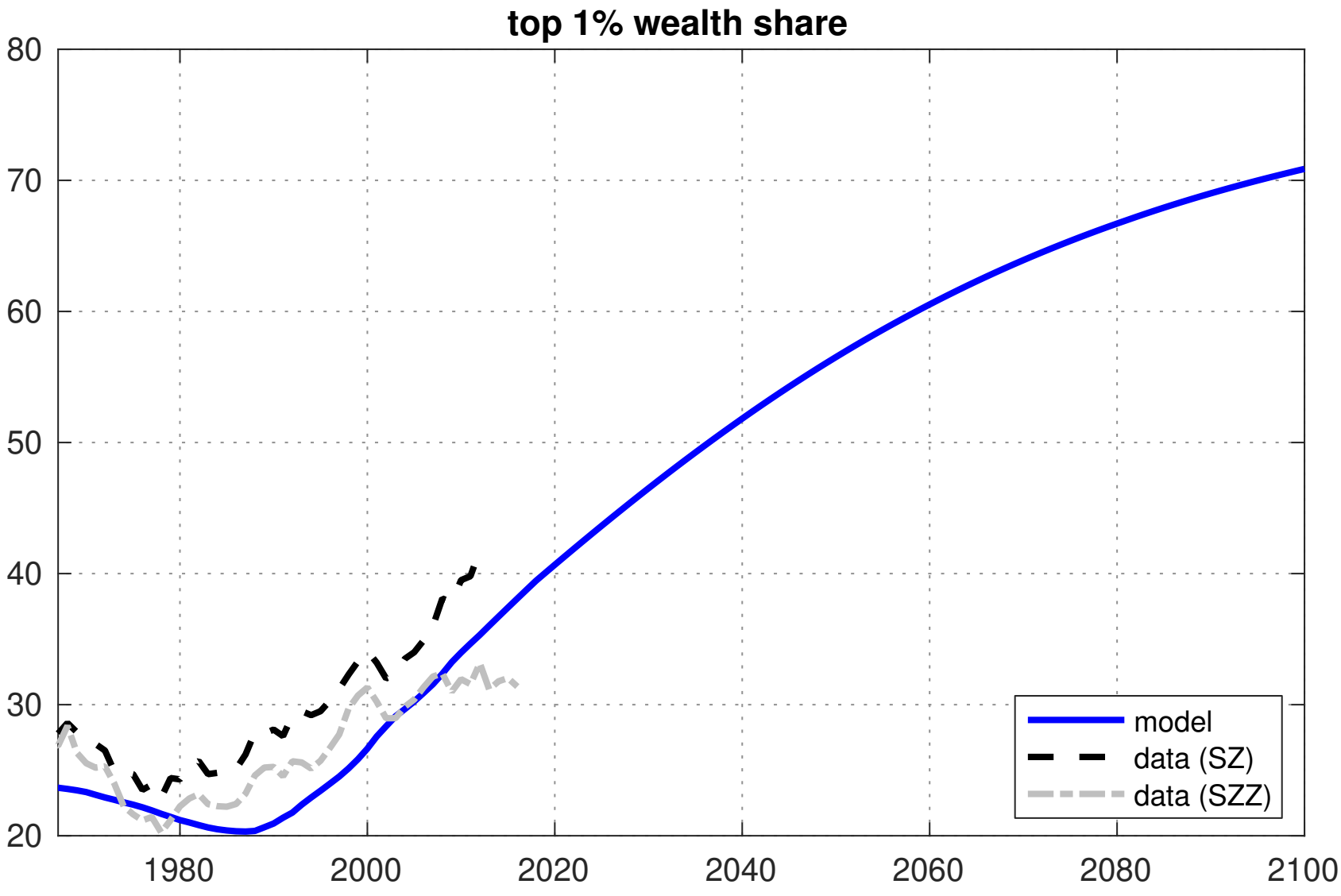
Summary of transitional dynamics

- model captures the salient features of the evolution of the U.S. wealth distribution
- these results are robust
  - perfect foresight not critical (▸ details)
  - robust to CES production function with elasticity > 1 and more generally falling labor share (▸ details)
- shortcomings:
  - explosion of wealth concentration at the extreme top (0.01%) not fully captured quantitatively

Decomposition of transitional dynamics

- overall increase in wealth inequality (more than) fully explained by declining tax progressivity
  - primarily due to direct effect on resource distribution and not due to changing savings behavior details
- time-varying return premia account for U-shape in wealth inequality
- subtle role of increasing earnings dispersion
  - thickening Pareto tail in labor income contributes slightly positively to wealth inequality
  - increase in overall earnings risk decreases wealth inequality

Capital in the 21st century?



Conclusion: (surprising) success, challenging new questions

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  - asset-price movements account well for medium-run dynamics

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- cautious prediction: unless stronger tax progressivity restored, wealth concentration will continue to rise
- remaining questions from perspective of this paper:
  - why are portfolios heterogeneous (both across and within wealth levels), what drives returns?

Appendix

Consumer problem

$$
\begin{aligned}
V_t(x_t, p_t) = & \max_{a_{t+1} \geq \underline{a}} \{u(x_t - a_{t+1}) + \beta \mathbb{E}\left[V_{t+1}(x_{t+1}, p_{t+1}) | p_t\right]\} \\
\text{subject to } x_{t+1} = & \, a_{t+1} + y_{t+1} - \tau_{t+1}(y_{t+1}) + (1 - \tilde{\tau}_{t+1})\tilde{y}_{t+1} + T_{t+1} \\
y_{t+1} = & \left(\underline{r}_{t+1} + r^X_{t+1}(a_{t+1})\right) a_{t+1} + w_{t+1} l_{t+1}(p_{t+1}, \nu_{t+1}) \\
\tilde{y}_{t+1} = & \, \sigma^X(a_{t+1}) \eta_{t+1} a_{t+1}
\end{aligned}
$$

- cash-on-hand x_t
- persistent component of labor income process p_t
- transitory shocks to labor income ν_t and capital income η_t
- progressive tax on ordinary income $\tau_t(\cdot)$; flat on cap. gains $\tilde{\tau}_t$
- Lumpsum transfer T_t

Equilibrium: capital market clearing

need to find two equilibrium objects $(K_t, \underline{r}_t)$ for capital market clearing:

1. aggregate capital (as usual)

$$K_t = \int a_t d\Gamma(a_t)$$

2. aggregate capital income (redundant if $r_t^X(\cdot) = 0$)

$$(MPK(K_t) - \delta)K_t = \int \left(\underline{r}_t + r_t^X(a_t)\right) a_t d\Gamma(a_t)$$

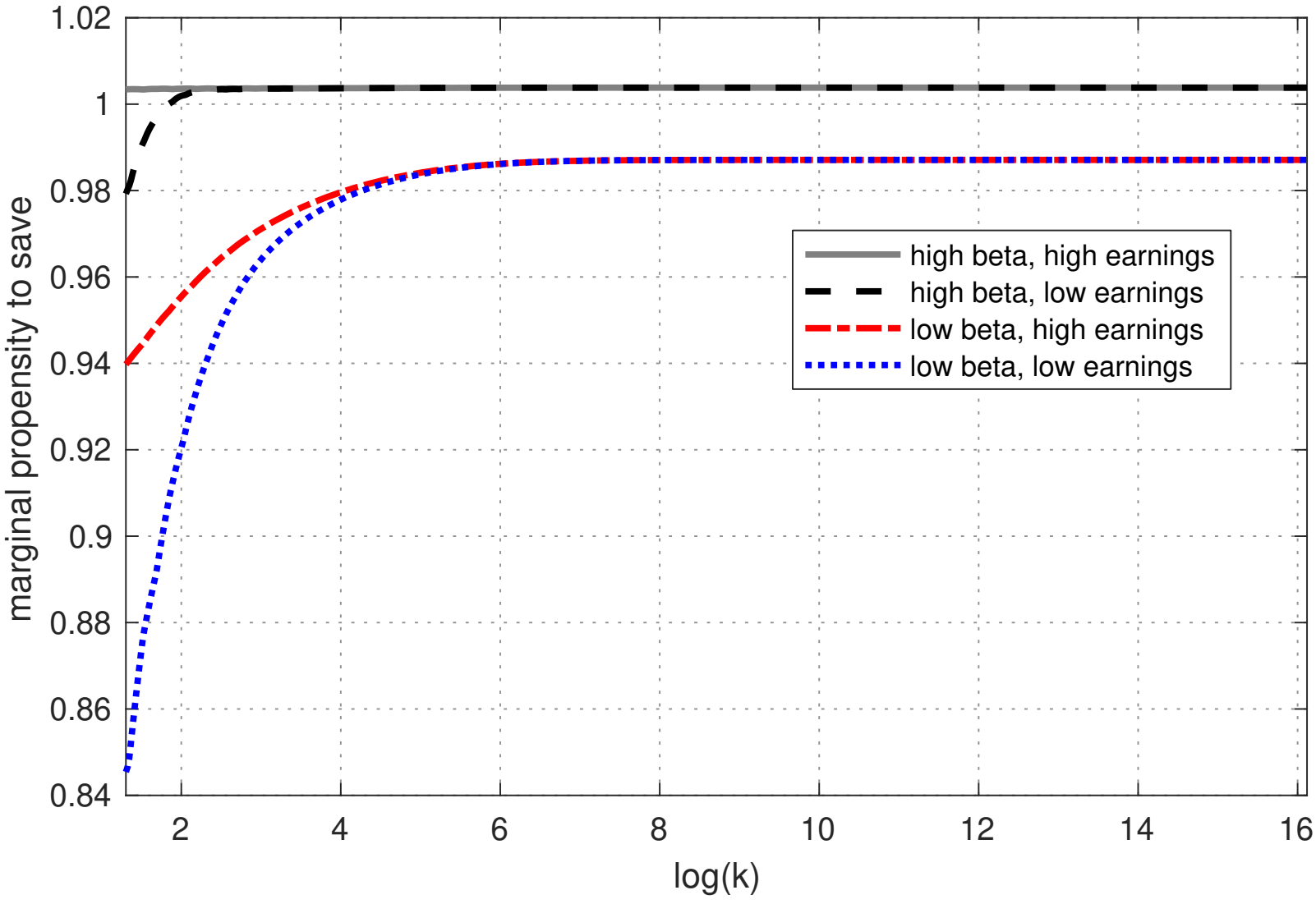
Multiplicative shocks and Pareto tails

- linear savings rules as wealth grows large (Bewley 1977; Carroll 2012; Benhabib et al. 2015): $\lim_{x\to\infty} s(x,\beta) = \bar{s}_\beta x$.
- asset accumulation for large x:

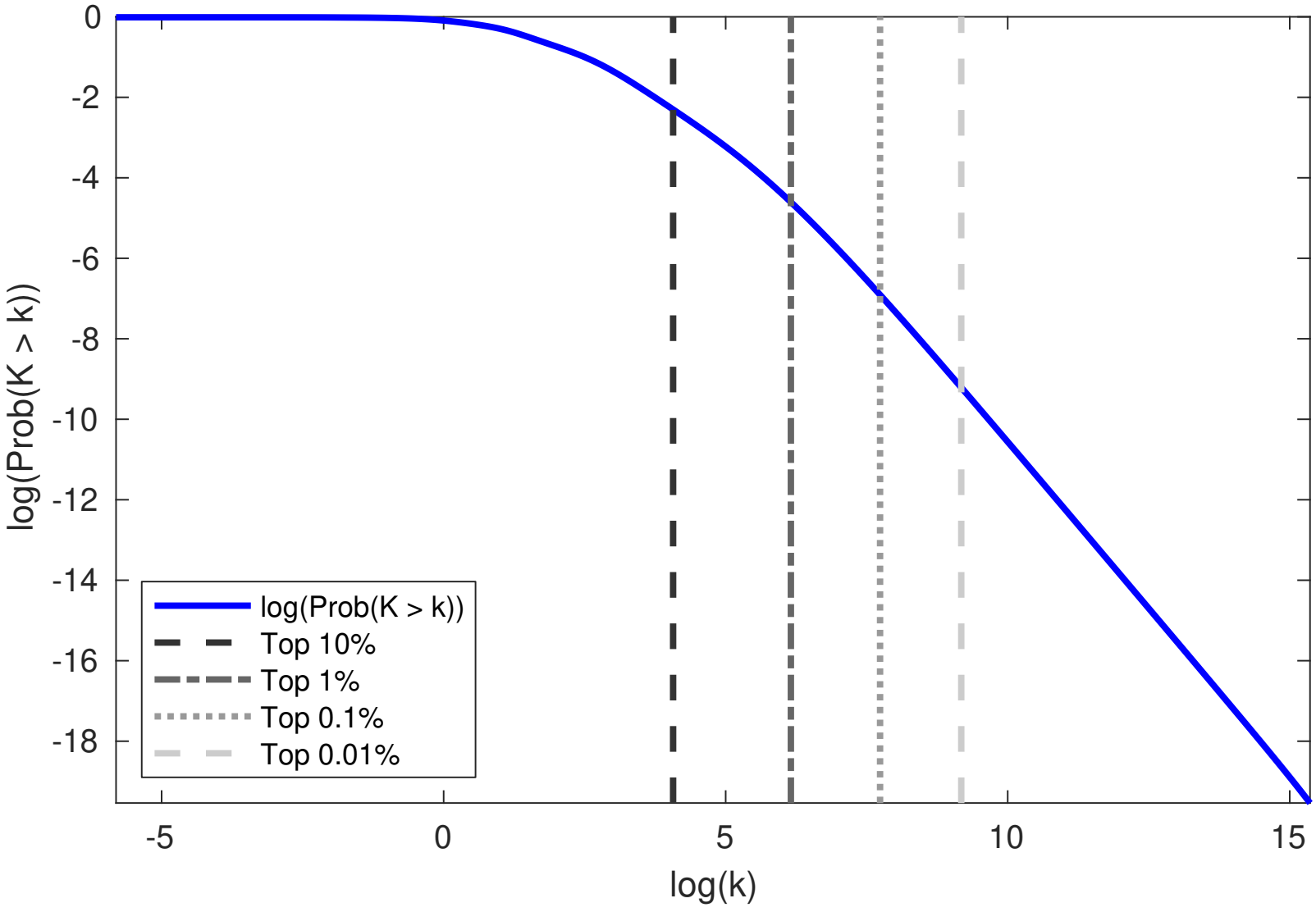
$$\begin{aligned} a_{t+1} &= s(x_t,\beta) \\ &= s(a_t + y_t - T(y_t),\beta) \\ &\approx \bar{s}_\beta a_t(1+(1-\tau_{\max})r) + \bar{s}_\beta(1-\tau_{\max})e_t \\ &\equiv \hat{s}a_t + z_t, \end{aligned}$$

  where e_t is earnings.
- β and/or r random $\to$ $\hat{s}$ is random.
- with reflecting barrier (borrowing constraint) and/or random earnings, the invariant distribution for wealth has a Pareto tail with coefficient ζ solving: $\mathbb{E}[\hat{s}^\zeta] = 1$.

Stochastic-β yields stochastic, linear savings decisions



Gives rise to a Pareto tail in the wealth distribution



Excess return schedule details

- Aggregate Excess Returns in 1967 steady state:
  - public equity 0.067 (U.S., Kartashova 2014)
  - private equity 0.129 (U.S., Kartashova 2014)
  - housing 0.037 (incl. imputed rent; Jorda, Knoll, Kuvshinov, Schularick, Tayler 2017)
- Cross-sectional data from Bach, Calvet, Sodini (2019)

	P0-P40	P40-P50	P50-P60	P60-P70	P70-P80	P80-P90	P90-P95	P95-P97.5	P97.5-P99	P99-P99.5	P99.5-P99.9	P99.9-P99.99	Top 0.01%
fixed portfolio weights													
risk-free	0.722	0.412	0.248	0.182	0.156	0.134	0.115	0.102	0.090	0.079	0.071	0.051	0.029
housing	0.162	0.394	0.580	0.662	0.678	0.674	0.658	0.626	0.572	0.482	0.363	0.253	0.155
public equity	0.113	0.189	0.165	0.147	0.153	0.170	0.189	0.207	0.219	0.232	0.230	0.185	0.179
private equity	0.002	0.005	0.007	0.009	0.013	0.021	0.038	0.065	0.118	0.207	0.336	0.511	0.637
difference from aggregate return on asset class													
risk-free	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
housing	0.000	0.000	0.002	0.004	0.005	0.007	0.009	0.010	0.010	0.011	0.010	0.010	0.011
public equity	0.000	0.000	0.001	0.002	0.003	0.005	0.008	0.012	0.014	0.015	0.016	0.016	0.016
private equity	0.000	0.000	-0.019	-0.030	-0.054	-0.055	-0.049	-0.066	-0.064	-0.063	-0.063	-0.059	-0.060
standard deviation of return on asset class													
risk-free	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
housing	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
public equity	0.035	0.035	0.031	0.031	0.031	0.031	0.032	0.033	0.035	0.038	0.042	0.046	0.053
private equity	0.664	0.664	0.621	0.595	0.544	0.525	0.518	0.480	0.474	0.470	0.474	0.492	0.443
private equity (re-scaled)	0.345	0.345	0.323	0.309	0.283	0.273	0.269	0.249	0.246	0.245	0.246	0.256	0.230
excess return schedule in 1967													
mean excess return	0.000	0.011	0.017	0.020	0.022	0.026	0.031	0.035	0.041	0.050	0.062	0.079	0.091
standard deviation	0.023	0.056	0.081	0.093	0.095	0.095	0.094	0.093	0.098	0.119	0.167	0.254	0.283
st. dev. (priv.equ. re-scaled)	0.023	0.056	0.081	0.093	0.095	0.095	0.093	0.089	0.086	0.085	0.098	0.136	0.149

Housing details

- financial return on housing as sum of capital gains term and rental income
- we set capital gains term to zero in steady states (in long run 0-0.5% real price growth)
- over transition, use growth in aggregate house price index (Case-Shiller)
- rental income set to 5.33% (average for U.S. from Jorda, Knoll, Kuvshinov, Schularick, Tayler "Rate of Return on Everything")

Public and private equity

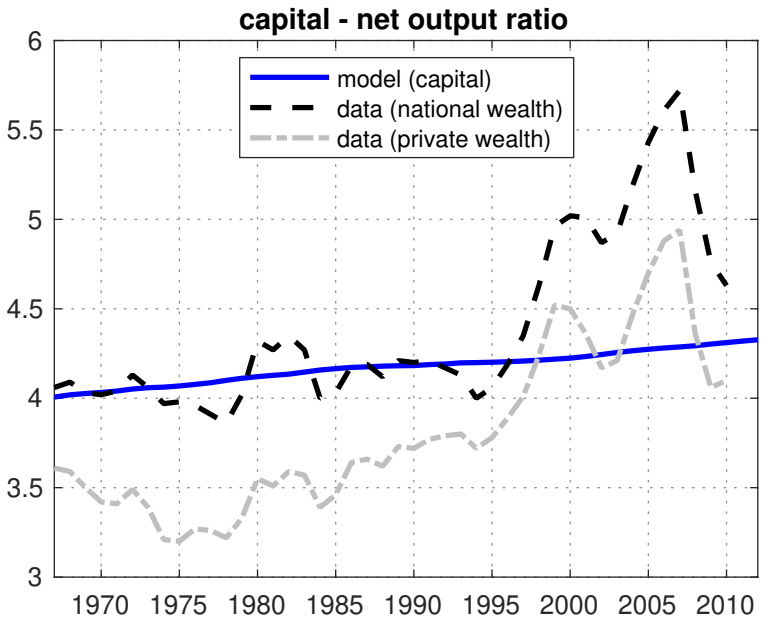
Public Equity

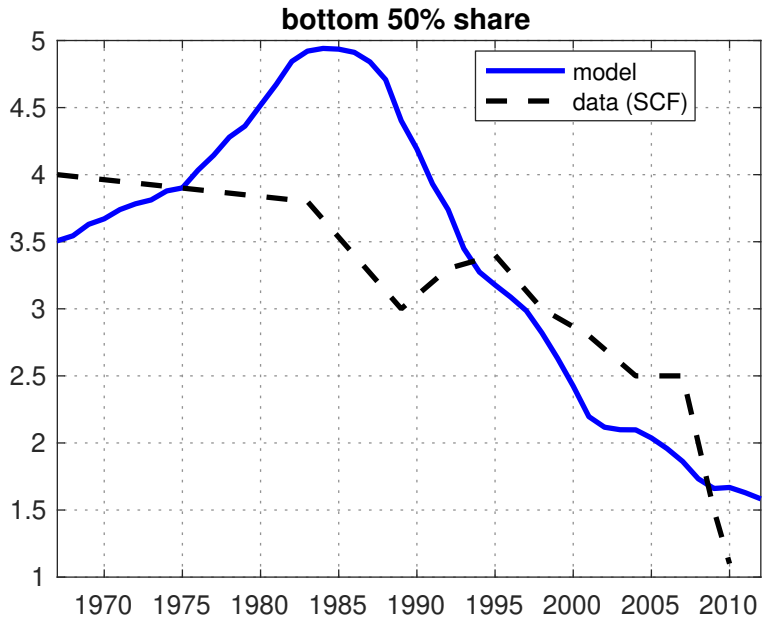
- U.S. stock market return

Private Equity

- Kartashova (AER, 2014) documents private equity premium over stock market
- aggregate time series for U.S. starting in 1960

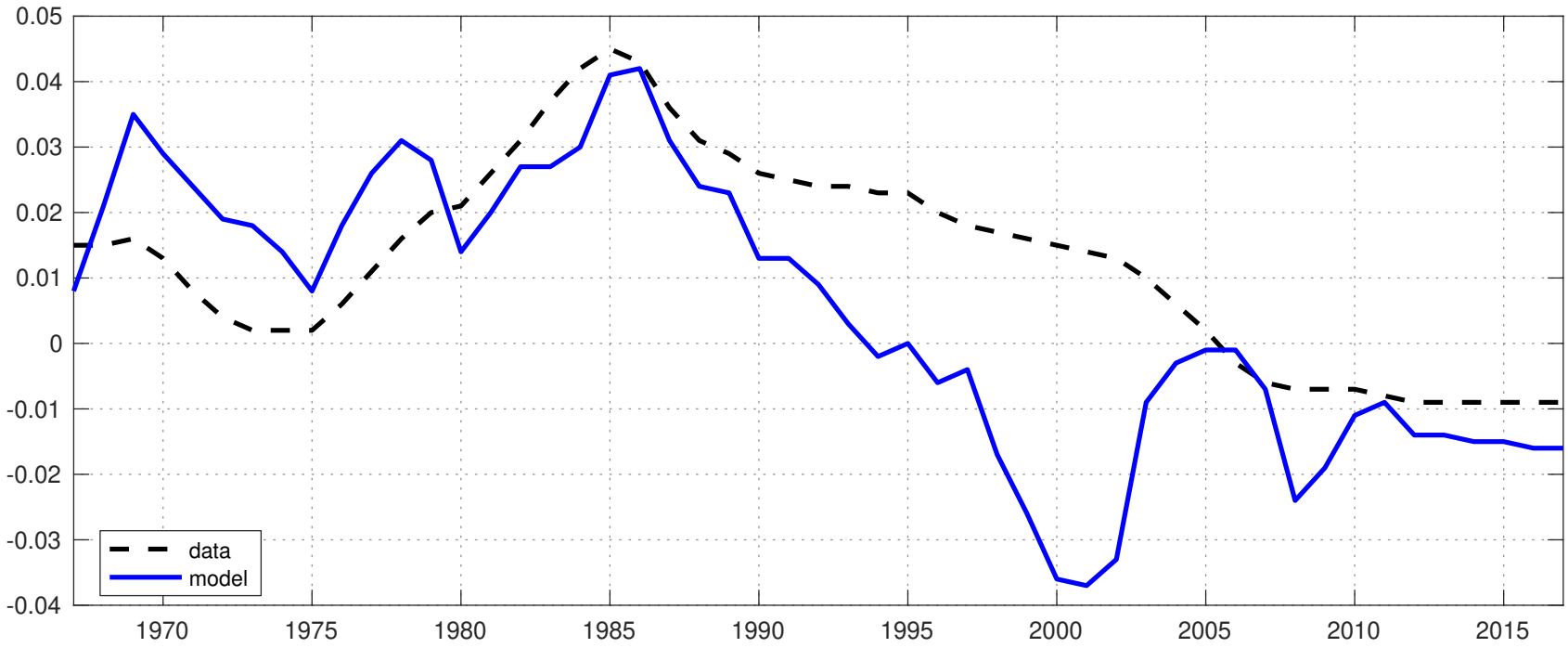
Results: Capital-output ratio and bottom 50 %



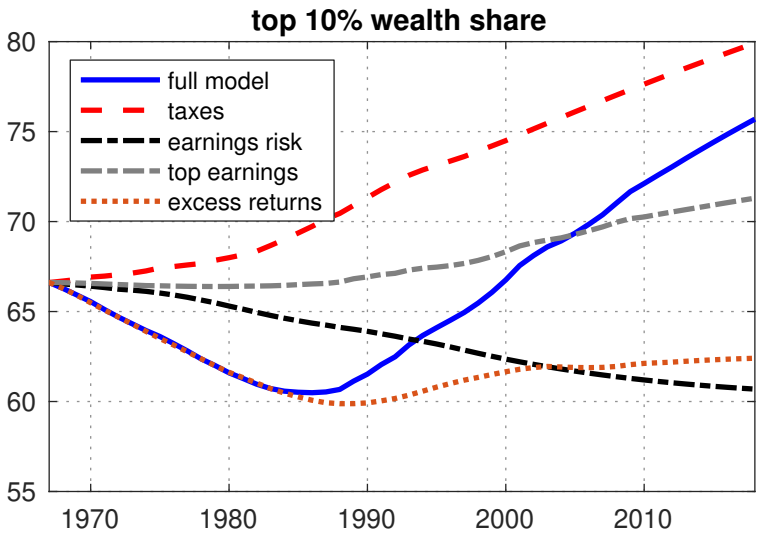


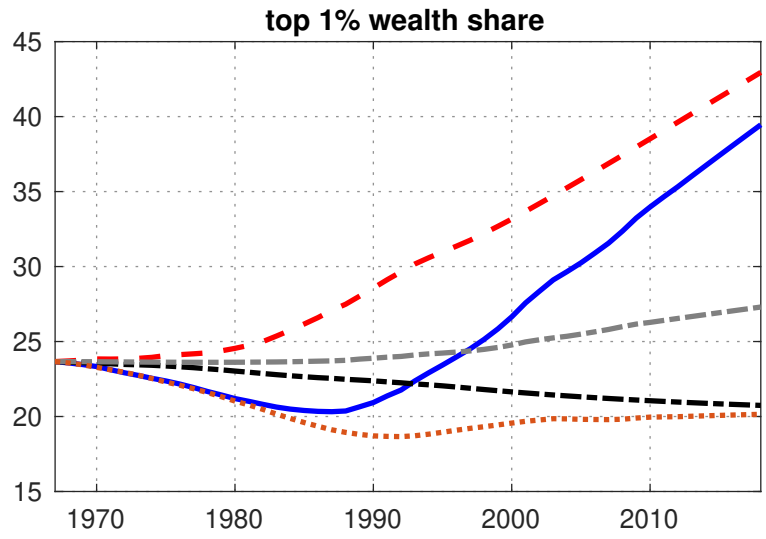
Results: Risk-free rate

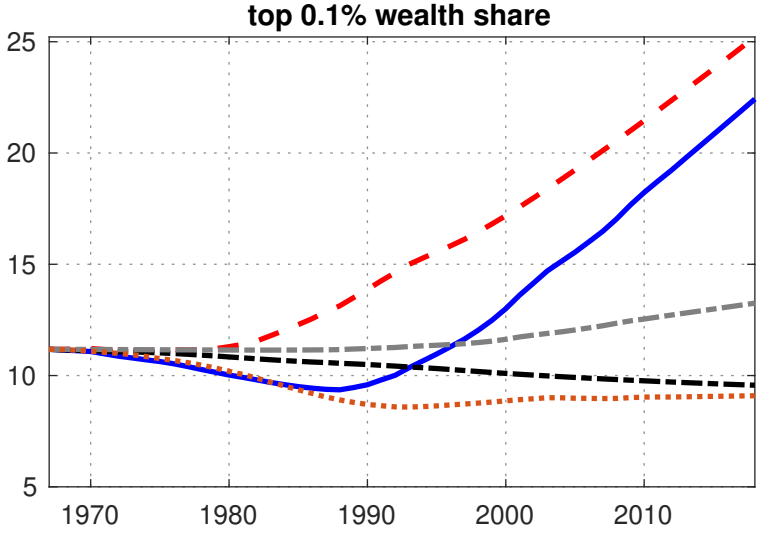
- return premia are matched in model by construction
- risk-free rate is endogenous: comparable level and decline

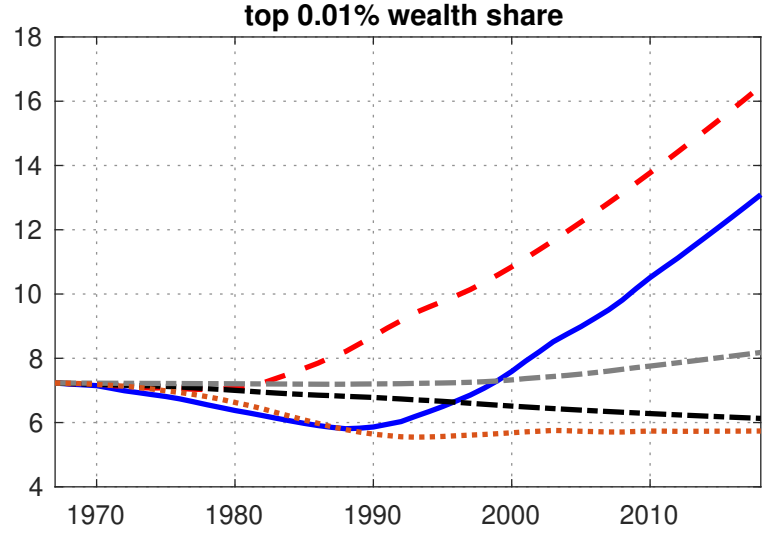


Decomposition of transitional dynamics



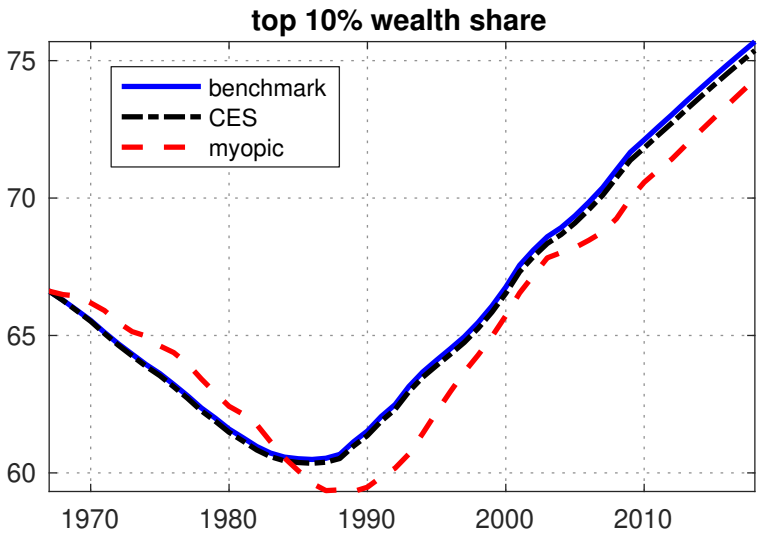


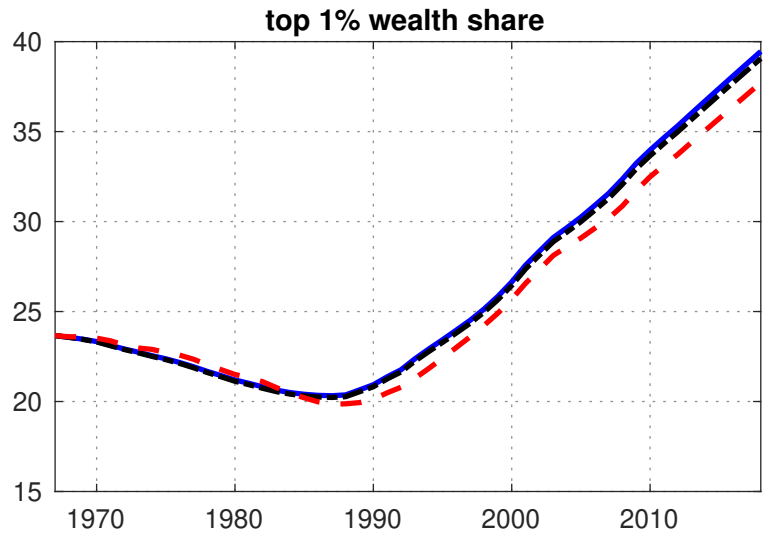


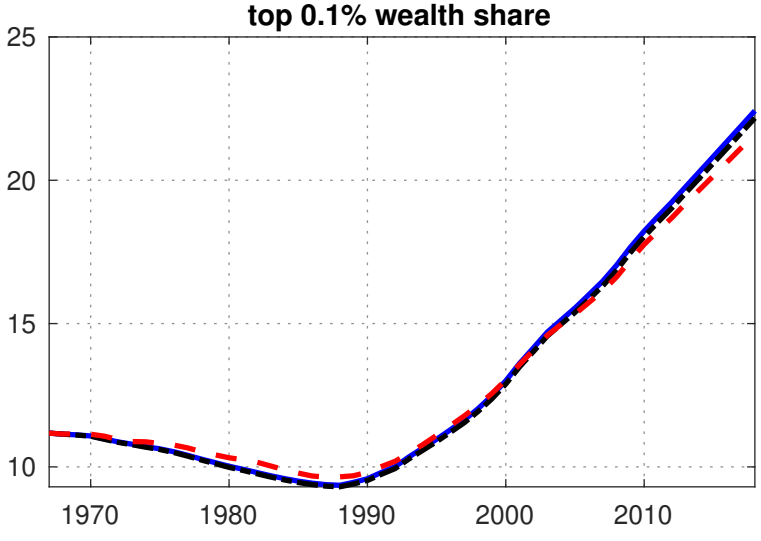


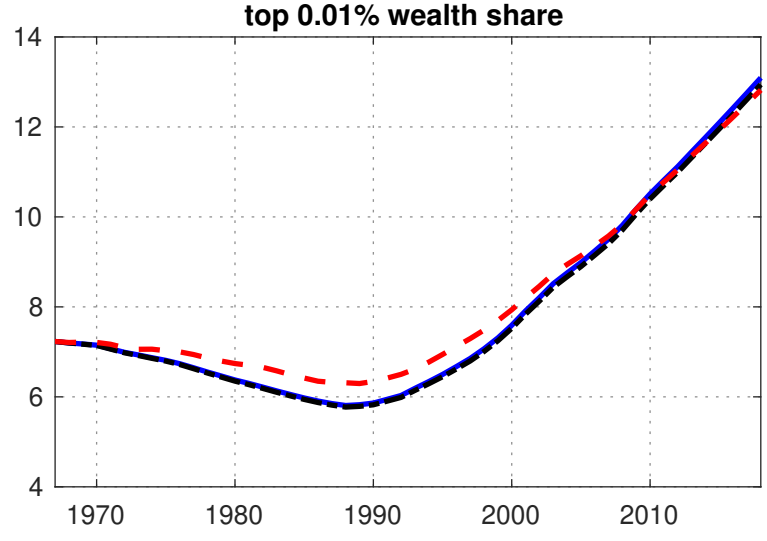
Perfect foresight vs. myopic transition; CES

return









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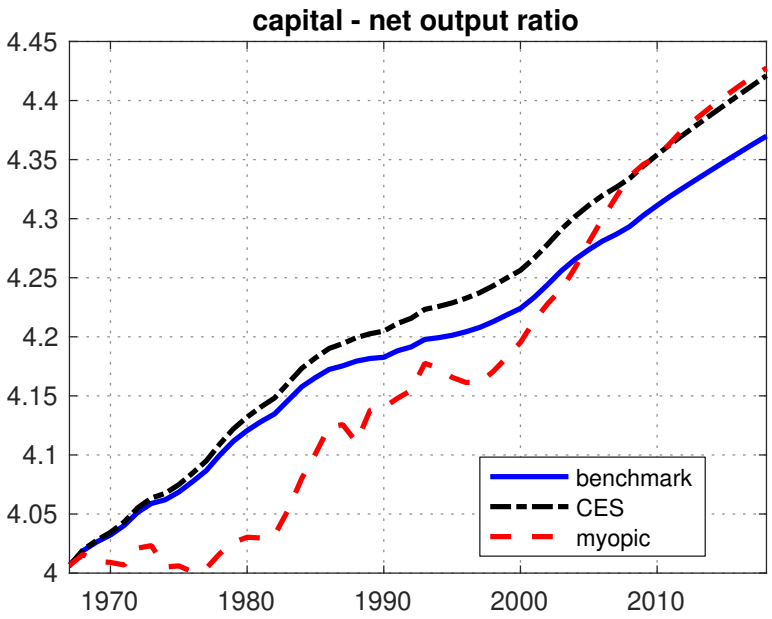
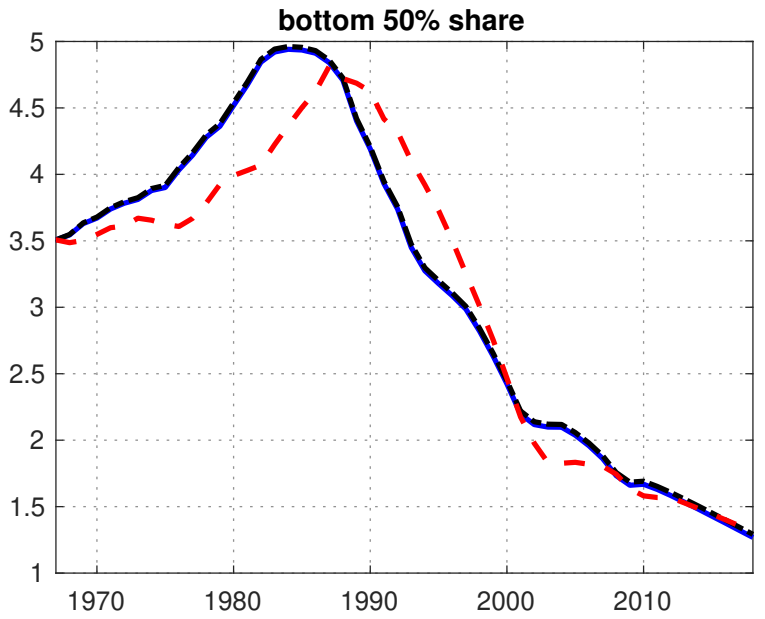
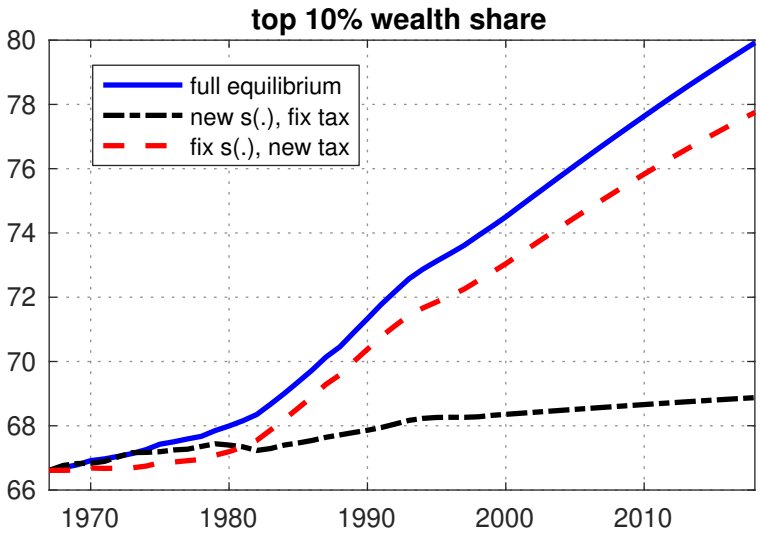
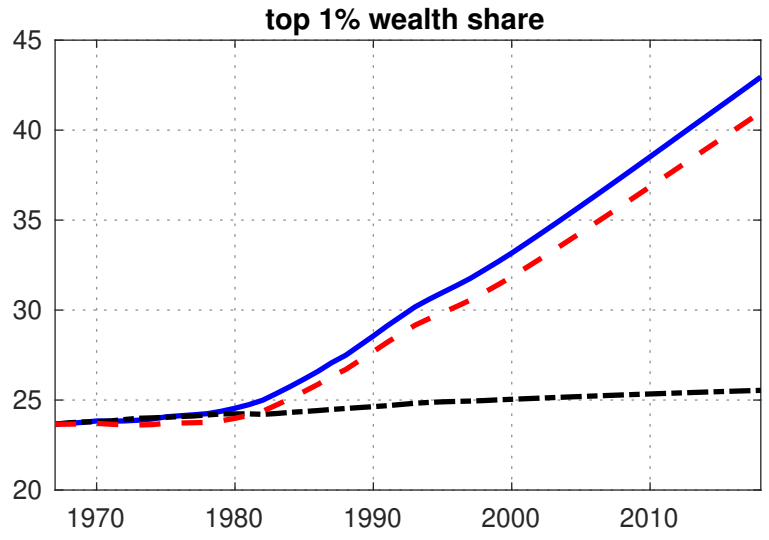


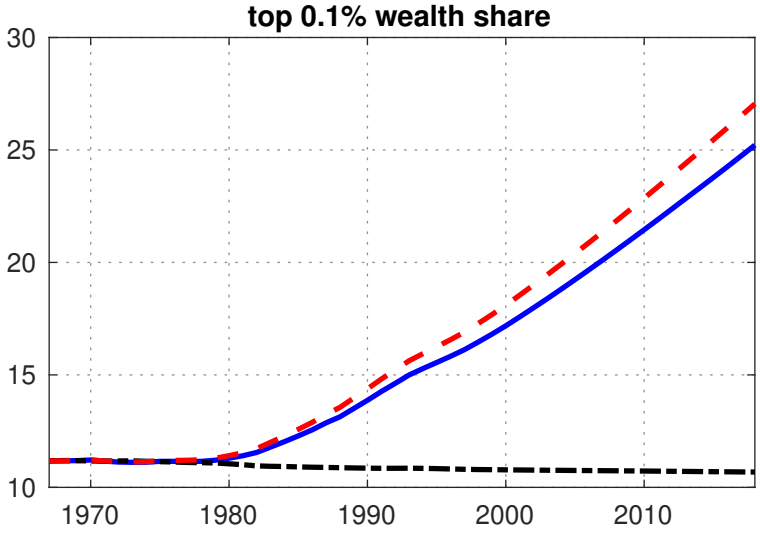


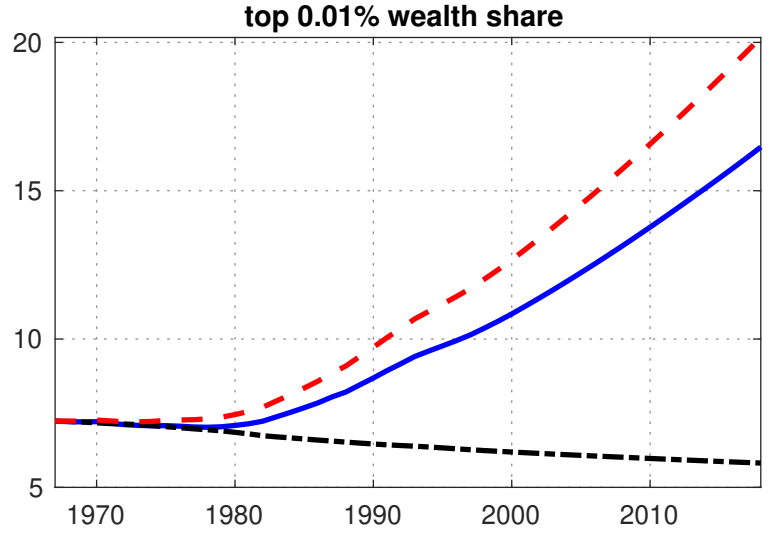
Tax changes: changes in savings behavior vs. resources

return

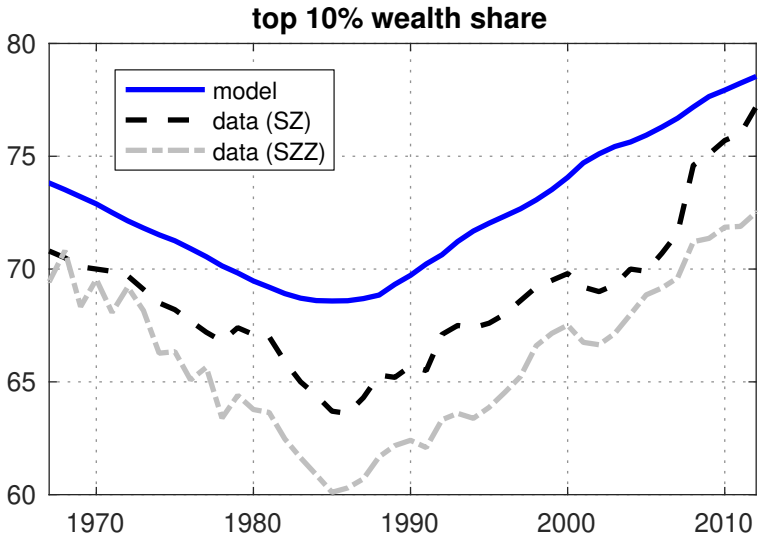


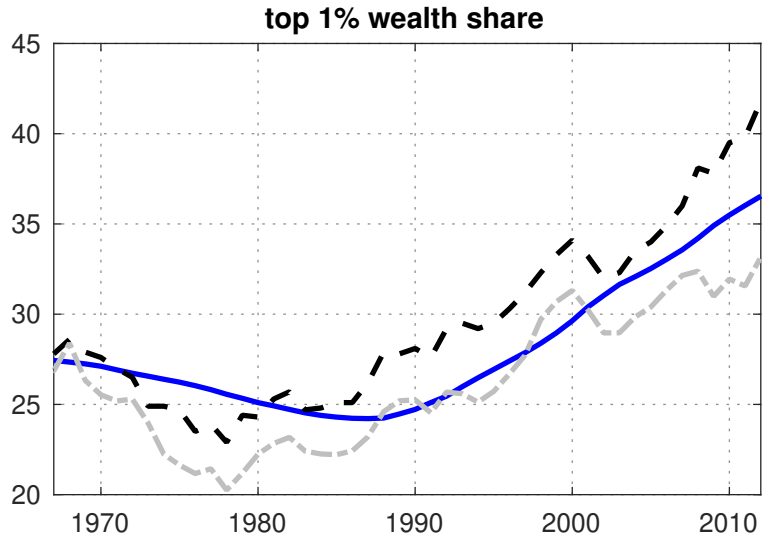


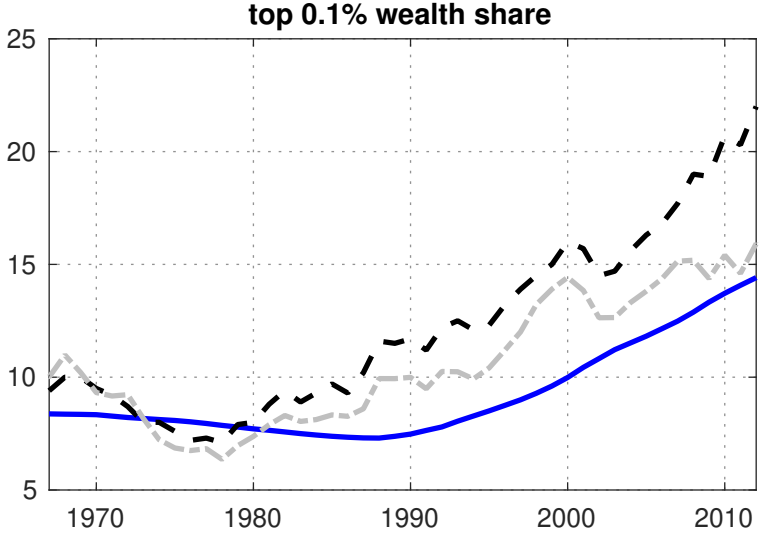


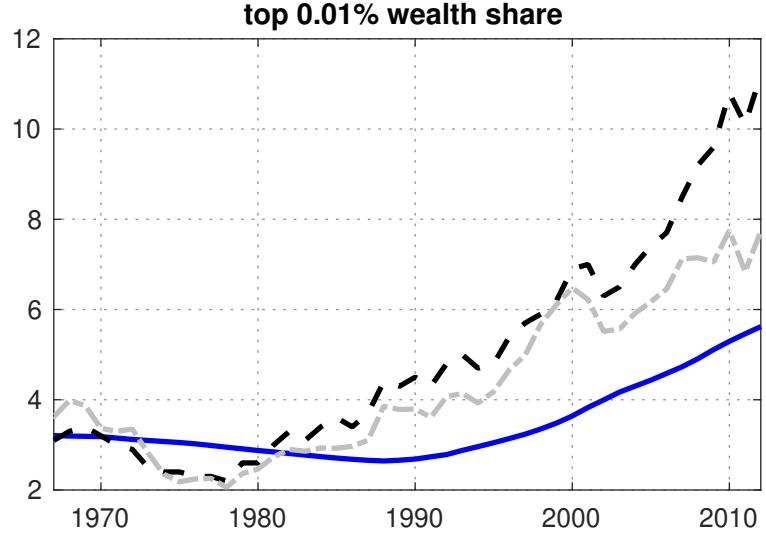


Dynamics in multiple-β model I









Dynamics in multiple-β model II