Tax cuts for the wealthy, mortgages for the poor, and the makings of a housing crisis for all

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Outline

Motivation

Motivation

- Novel explanation for the acceleration of US house prices in the mid-2000s

    - **The Bush Tax Cuts of 2001 and 2003**

- **Effects**, **timing**, and **size** of the tax cuts make for a compelling shock to explain the 2000s US mortgage credit and housing boom

The Bush Tax Cuts

- The Jobs and Growth Tax Relief Reconciliation Act (2003)
    1. Cut the top marginal income tax rate from 38% to 35%
    2. Cut the capital gains tax rate from 20% to 15%
    3. Created a new income category "Qualified Dividends" which were subject to capital gains rather than income. Top rate fell from 38% to 15%
- One of the largest ever changes to US capital income taxes (Yagan, 2015)

The Bush Tax Cuts

Table: Evolution of the top maringal tax rates

| Years	Ordinary Income	% Change	Dividend Income	% Change	Capital Gains	%Change
1988 - 1990	28.0	-	28.0	-	28.0	-
1991 - 1992	31.0	10%	31.0	10.7%	28.0	0.0%
1993 - 1997	39.6	27.7%	39.6	27.7%	28.0	0.0%
1997 - 2001	39.6	0.0%	39.6	0.0%	20.0	-28.6%
2001	39.1	-1.3%	39.1	-1.3%	20.0	0.0%
2002	38.6	-1.3%	38.6	-1.3%	20.0	0.0%
2003 - post	35	-10.3%	15.0	-61.1%	15.0	-25.0%

Timing of Tax Cuts: "The Savings Glut of the Rich"

- Mian et al. (2020) point to rising savings of top 1% of households
- Savings of the top 1% moved into borrowing of the bottom 90%
- Sudden acceleration in 2003 coincides with the Bush Tax Cuts
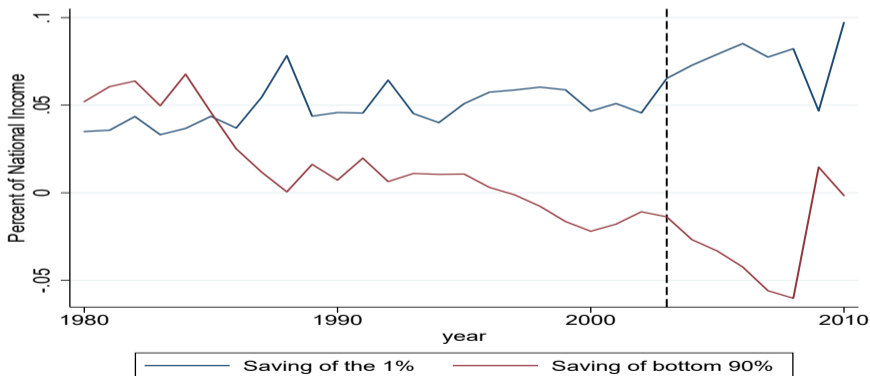
Timing of Tax Cuts: Increasing Equity Investment

- Lower "Qualified Dividends" taxes shifted savings of wealthy into equities

Equity share of household's portfolios
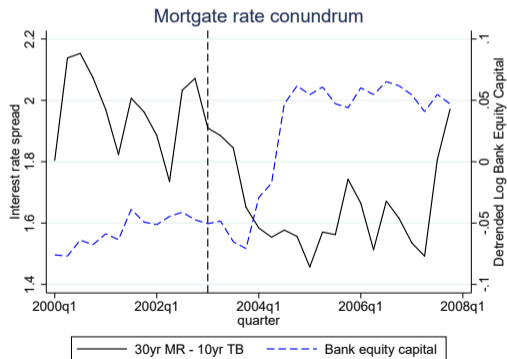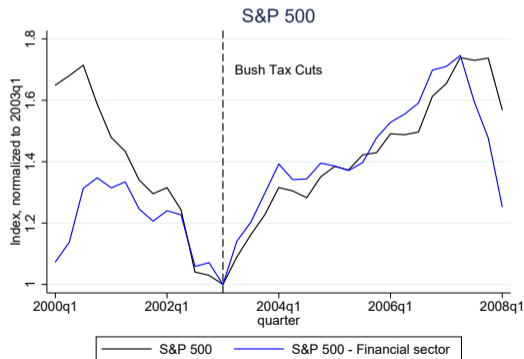
Ownership share of the 1%
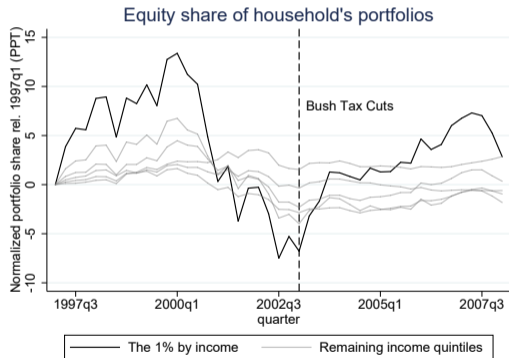
Liquid Assets   Real Estate

Timing of Tax Cuts: "The Mortgage Rate Conundrum"

- Justiniano et al. (2022): 2003 was turning point for the mortgage market
- Mortgage spread fell despite beginning of Fed tightening cycle
- Coincides with tax cuts and the rise in bank equity capital

Literature

Literature

Competing theories of the causes of the housing boom:

- **The Fed's fault** - Jordà et al. (2015) and Justiniano et al. (2022)
- **The Global Savings Glut** - Bernanke (2005), Justiniano et al. (2014), and Justiniano et al. (2019)
- **Loose lending standards** - Geanakoplos (2010); Favilukis et al. (2017)
- **Beliefs/Expectations** - Kaplan et al. (2020), Bordalo et al. (2021)

Effect of inequality on debt, interest rates, and credit supply:

- Mian, Straub, and Sufi (2021a) *"The Saving Glut of the Rich"*
- Mian, Straub, and Sufi (2021b) *"Indebted Demand"*

An Illustrative Two-Agent Model

An Illustrative Two-Agent Model

- Justiniano et al. (2019) explain housing boom with lender-borrower model:
  - Relaxation of a "mortgage lending constraint"
  - Increase in credit supply, lowers mortgage interest rate
  - Segmented housing market with rigid wealthy demand for housing
  - Borrowers are marginal house buyers, and push up the price of housing

- We swap "mortgage lending constraint" with a tax cut for the wealthy
  - Tax cuts raise after-tax rate of return on saving for wealthy
  - Greater savings by wealthy, accommodated by increase in borrowing
  - In equilibrium interest rates fall, thereby expanding mortgage supply
  - Higher housing demand from borrowers induces house price boom

An Illustrative Two-Agent Model

- The model:
    - Same setup as Justiniano et al. (2019)
    - Two agents: lenders (β_l) and borrowers (β_b)
    - Linear utility in consumption
    - Housing market segmentation (i.e. rich and poor consume different houses)
    - Borrowers face borrowing constraint with maximum LTV limit
    - Lenders taxed on interest income at rate τ

An Illustrative Two-Agent Model

- Simple first order conditions assuming borrowing constraint always binds:

$$
\begin{array}{rcll}
1 &=& \beta_l(1 + r_t(1 - \textcolor{red}{\tau})) & \text{Lender's Euler Eqn} \\[6pt]
1 - \lambda_t &=& \beta_b(1 + r_t) & \text{Borrower's Euler Eqn} \\[6pt]
p_t &=& \dfrac{\beta_b}{1 - \lambda_t\theta}\left(\overline{mrs} + (1-\delta)E_t p_{t+1}\right) & \text{Borrower Housing Euler/Pricing Eqn} \\[6pt]
D_{b,t} &=& \theta p_t \bar{h}_b & \text{Borrower's borrowing constraint} \\[6pt]
D_{b,t} &=& S_{l,t} & \text{Eqm: Poor Debt = Wealthy Saving}
\end{array}
$$

- Lower $\textcolor{red}{\tau} \Rightarrow$ lower $r_t \Rightarrow$ higher $\lambda_t \Rightarrow$ higher p_t, higher $D_{b,t}$, and higher $S_{l,t}$

An Illustrative Two-Agent Model: Experiment

- Borrow calibrated parameters from Justiniano et al. (2019)
- Observed changes in capital tax rates + proportion of income attracting lower capital gains tax rate

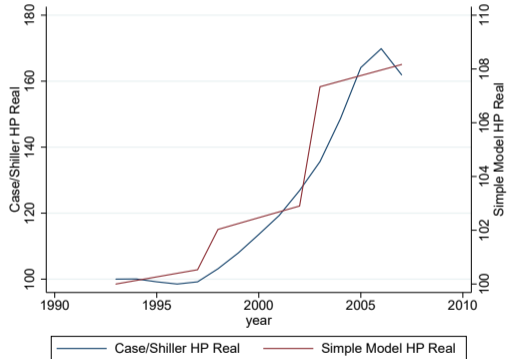Figure: Calibrated path of effective capital tax rate
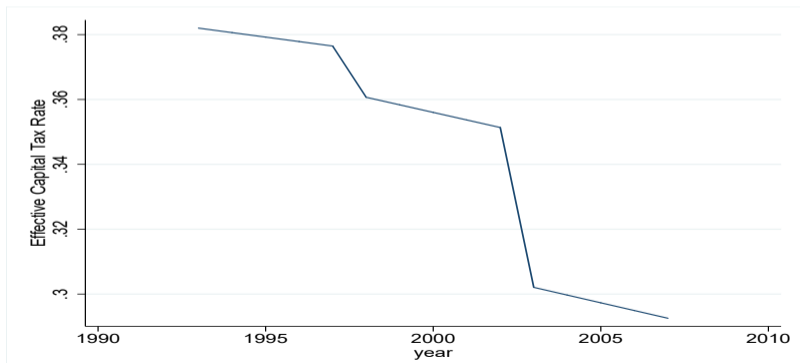
An Illustrative Two-Agent Model: Experiment

Figure: Borrowing Rates

Figure: House Prices

Quantitative Heterogeneous Agents Model

Quantitative Heterogeneous Agents Model

- Heterogenous agents life-cycle model
  - Life-cycle: working age 24–66, retirement 68–80
  - Stochastic income: AR(1) + "superstar income" states
  - Four assets: housing, mortgages, deposits, equity
    - Rent or own housing
    - Mortgages borrowed at rate r_m, subject to LTV and PTI constraints
    - Return on deposits $= r_d < r_e =$ return on equity
    - Equity subject to fixed participation cost f_e
    - Extensive margin only: deposits **or** equity
  - Separate progressive tax schedules for ordinary income and asset income

- Simple banking sector
  - Assets: mortgages
  - Liabilities: deposits and equity

Households: Income Process

- Superstar income yields realistic inequality (Kindermann and Krueger, 2022)
- AR(1) process for lowest income states, two top-income states
- Simple Markov chain:

$$z = \begin{bmatrix} 0.1375 & 0.3131 & 0.7129 & 1.6230 & 3.6950 & 6.6472 & 366.9099 \end{bmatrix}$$

$$\begin{bmatrix} (1-\pi_{.,6})\pi_{1,1} & & \cdots & & (1-\pi_{.,6})\pi_{1,5} & \pi_{.,6} & 0 \\ & & & & & \pi_{.,6} & 0 \\ \vdots & & \ddots & & \vdots & \pi_{.,6} & 0 \\ & & & & & \pi_{.,6} & 0 \\ (1-\pi_{.,6})\pi_{5,1} & & \cdots & & (1-\pi_{.,6})\pi_{5,5} & \pi_{.,6} & 0 \\ 0 & 0 & 1-\pi_{6,6}-\pi_{6,7} & 0 & 0 & \pi_{6,6} & \pi_{6,7} \\ 0 & 0 & 0 & 0 & 0 & 1-\pi_{7,7} & \pi_{7,7} \end{bmatrix}$$

Households: Tax System

- Define total taxable income as:

$$Taxable\ Income = y + r_d d + r_e e$$

- Separate progressive tax schedules (i.e. Heathcote et al., 2017):

$$Ordinary\ Income\ Tax = (y + r_d d)(1 - \lambda_o (Taxable\ Income)^{-\tau_o})$$
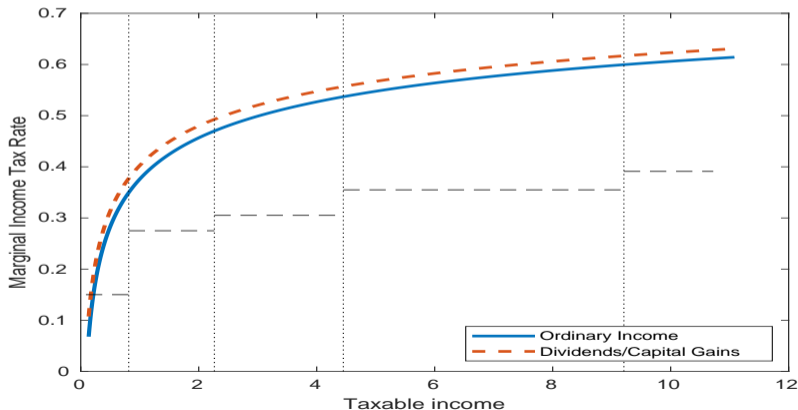$$Capital\ Income\ Tax = (r_e e)(1 - \lambda_g (Taxable\ Income)^{-\tau_g})$$

- λ_o, λ_e govern tax levels
- τ_o, τ_e govern tax progressivity

Households: Tax System

- Marginal tax rates with respect to each income source are:

$$Marginal\ Tax\ Rate_o = 1 - \lambda_o(Tax\ Inc)^{-\tau_o} + (y + r_d d)\tau_o\lambda_o(Tax\ Inc)^{-\tau_o-1}$$

$$Marginal\ Tax\ Rate_g = 1 - \lambda_g(Tax\ Inc)^{-\tau_g} + (r_e e)\tau_g\lambda_g(Tax\ Inc)^{-\tau_g-1}$$

Banking Sector

- Simple one-period bank:

$$\max_{M,D,E} (1 + r_m)M - (1 + r_d)D - (1 + r_e)E$$

$$\text{s.t.} \quad M = D + E \qquad \text{Balance Sheet Constraint}$$

$$M \leq \Omega E \qquad \text{Capital Constraint}$$

- First order conditions yield:

$$r_m = \left(\frac{1}{\Omega}\right) r_e + \left(1 - \frac{1}{\Omega}\right) r_d$$

- Link between equity and credit:
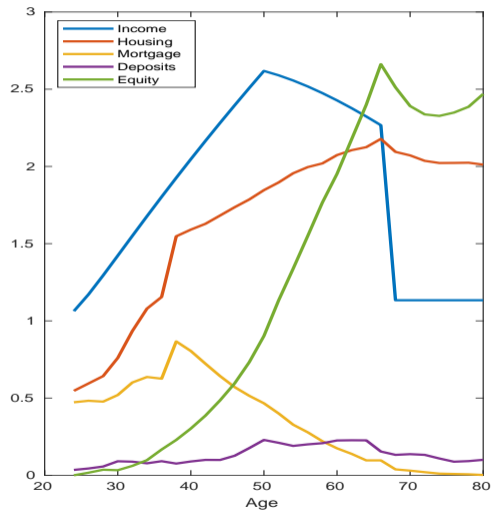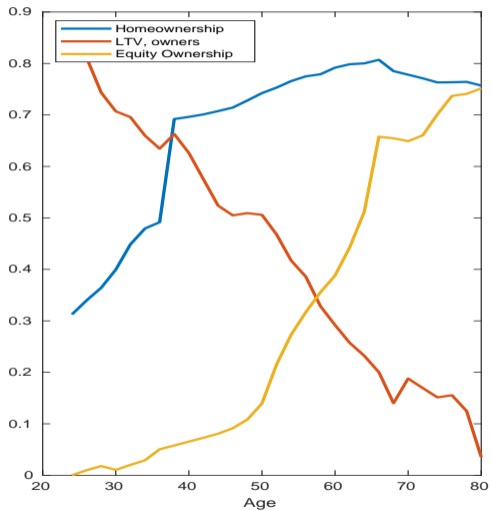   - Tax cuts $\Rightarrow$ inflow of equity $\Rightarrow$ loosen capital constraint $\Rightarrow$ fall in r_e, fall in r_m

General Equilibrium

- Rental market clears (P_r)
- Housing market clears (P_h)
- Mortgage market clears (r_m)
- Deposit market clears (r_d)
- Equity market clears (r_e)

Model Life-Cycle Profiles

Distribution of Income and Wealth

	Income		Networth	
	Model	Data	Model	Data
Bottom 50%	0.133	0.159	0.171	0.148
Top 20%	0.640	0.593	0.580	0.638
Top 10%	0.500	0.454	0.441	0.505
Top 5%	0.367	0.354	0.280	0.387
Top 1%	0.175	0.200	0.126	0.162

Homeownership and Equity Ownership Across Income Distribution

Figure: Bar chart showing Ownership rate (y-axis, 0 to 1) versus Total Income Percentile (x-axis: 0-50, 50-70, 70-90, 90-95, 95-99, 99-100). Legend: Equity (Model), Home (Model), Equity (Data), Home (Data).
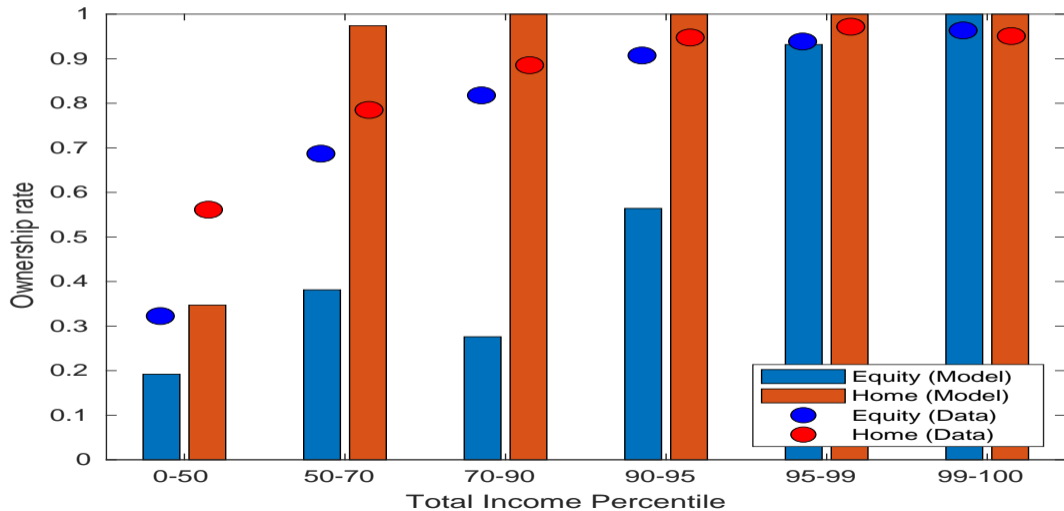
Wealth Portfolio Shares

| | Housing Networth | | Deposits | | Equity | |
	Model	Data	Model	Data	Model	Data
Bottom 50%	0.562	0.635	0.113	0.079	0.324	0.286
Top 20%	0.438	0.297	0.027	0.101	0.534	0.603
Top 10%	0.382	0.272	0.014	0.102	0.604	0.626
Top 5%	0.318	0.246	0.004	0.110	0.678	0.643
Top 1%	0.185	0.210	0.000	0.128	0.815	0.662

# Experiment: Cut in Capital Income Marginal Tax Rates

- Experiment:
  - Model in steady state, unexpectedly hit by the 2000s Bush **tax cuts**
  - Perfect foresight transition path to new steady state
- Effects:
  - Increase in after-tax rate of return on equity for wealthy households
  - Greater investment in bank equity
  - Relaxation of bank capital constraint
  - Fall in mortgage interest rates
  - Housing boom
- Compare to alternative experiments:
  - Exogenous loosening of credit conditions
  - "Global Savings Shock": external increase in bank funding

Experiment: Cut in Capital Income Marginal Tax Rates
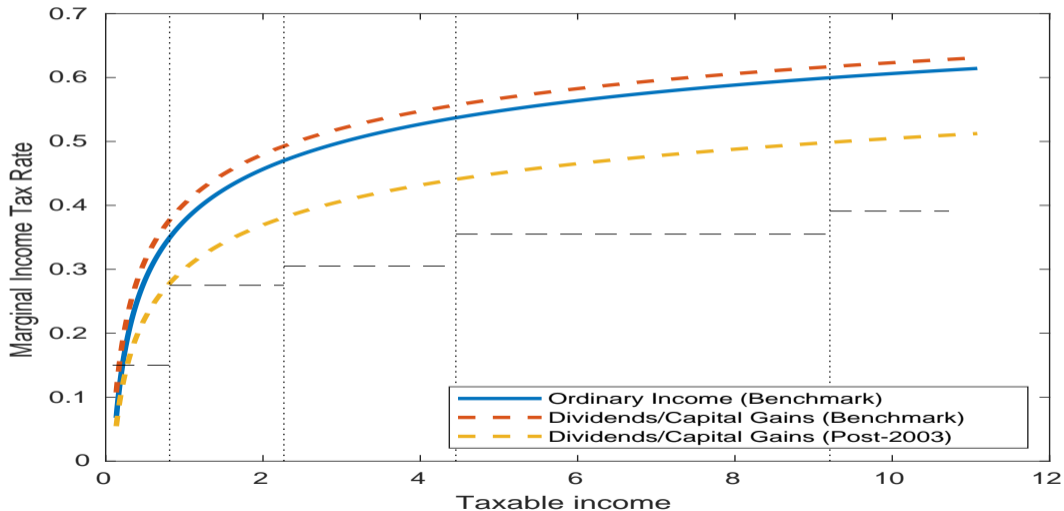
Experiment: Change in After-Tax Asset Returns
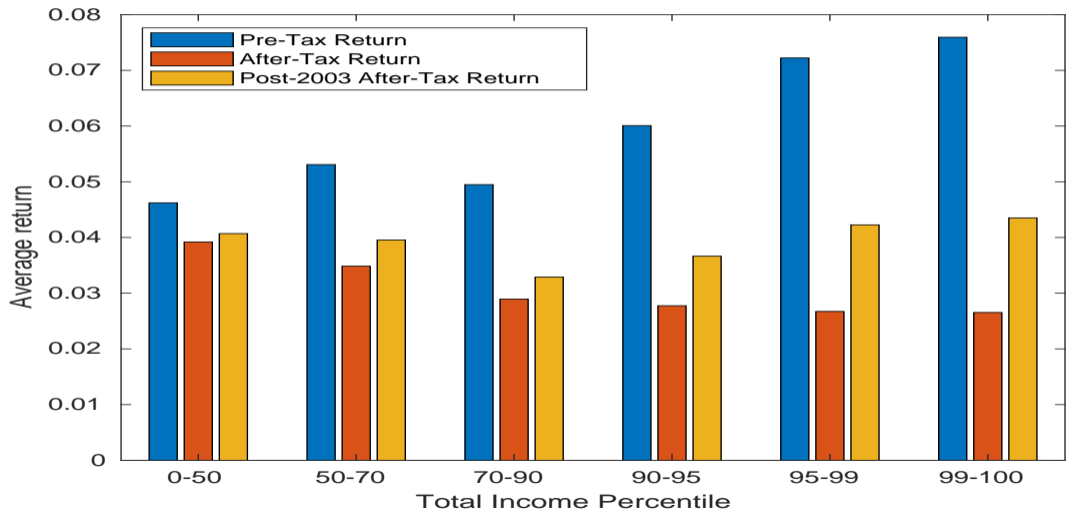
Experiment: Partial Equilibrium Changes in Equity

- Lower capital income tax leads to increase in equity investment
- However, currently concentrated among lower income households
- But changes in top income households' equity have large aggregate effects

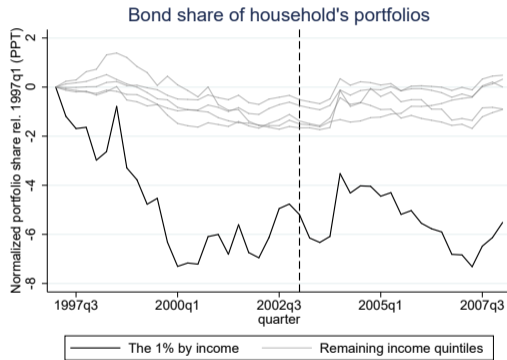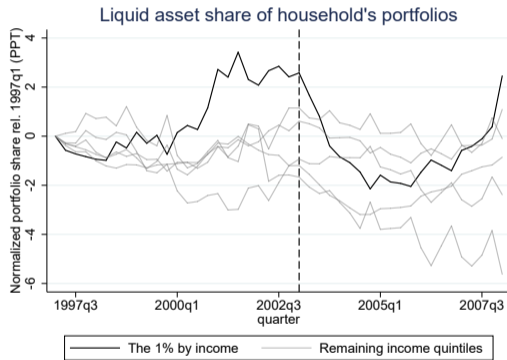| | Equiy Ownership | | | Equity Share of Networth | | | Change Total Equity |
	Baseline	Tax Cut	Δ (%)	Baseline	Tax Cut	Δ (%)	Frac. Baseline
Bottom 50%	0.192	0.323	0.131	0.324	0.437	0.112	0.042
Top 20%	0.592	0.742	0.150	0.534	0.562	0.028	0.048
Top 10%	0.755	0.877	0.122	0.604	0.622	0.018	0.025
Top 5%	0.946	1.000	0.054	0.678	0.688	0.011	0.010
Top 1%	1.000	1.000	-0.000	0.815	0.818	0.003	0.003

Next Steps

Next Steps

- Empirical work:
  - Use HMDA data on universe of mortgage originations
  - Do C-corp lenders issue more mortgages following exposure to Bush Tax Cuts?
  - Direct evidence on credit supply mechanism
  - Note contrast with Yagan (2015)

- Illustrative model:
  - Two-period life-cycle model?
  - Include simple banking sector?

- Quantitative model:
  - **Fix banking sector setup!**
  - Solve for new steady state following tax change
  - Solve for equilibrium transition paths following tax changes
  - Comparison to "Global Savings Shock" (e.g. Favilukis et al., 2017)

Appendix

Top 1 Percent Liquid Asset and Bond Shares

Liquid asset share of household's portfolios

Bond share of household's portfolios

Top 1 Percent Real Estate Shares

Ownership share of the 1%

Real estate share of household's portfolios

Bush Tax Cuts

The 1% by income   Remaining income quintiles

Calibration: Internal Parameters
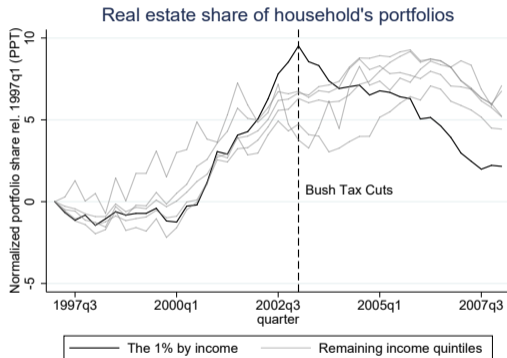
Parameter		Value	Moment	Model	Data	Source
Discount factor	β	0.926	Networth-to-income	2.753	2.992	SCF, 2001
Bequest preference	ψ	49.558	Homeownership rate, $j \geq 65$	0.774	0.820	SCF, 2001
Minimum house size	$\underline{h}$	1.750	Median owner LTV ratio	0.627	0.560	SCF, 2001
Equity participation cost	f_e	0.007	Deposits-to-Equity	0.106	0.180	SCF, 2001
Ordinary income tax, level	λ_o	0.780	Tax revenue-to-income	0.414	0.250	OECD
Capital income tax, level	λ_g	0.598	Dividend marg. tax rate, top 1%	0.651	0.618	Model
Trans. prob. to z_6	$\pi_{.,6}$	0.005	Income share, 95%–99%	0.190	0.153	SCF, 2001
Trans. prob. remain in z_6	$\pi_{6,6}$	0.955	Income share, 99%–100%	0.168	0.154	SCF, 2001
Trans. prob. z_6 to z_7	$\pi_{6,7}$	0.003	Income Gini	0.580	0.593	SCF, 2001
Trans. prob. remain in z_7	$\pi_{7,7}$	0.641	Wealth share, 95%–99%	0.203	0.234	SCF, 2001
Income z_6	z_6	6.647	Wealth share, 99%–100%	0.168	0.277	SCF, 2001
Income z_7	z_7	366.910	Wealth Gini	0.688	0.778	SCF, 2001
Firm rental cost	κ	0.140	Homeownership rate	0.671	0.710	SCF, 2001

Calibration: External Parameters

Description	Parameter	Value	Source
Maximum age	J	80	Standard
Retirement age	J_{ret}	66	Standard
Life-cycle income, peak age	J_y	50	Ma and Zubairy (2021)
Life-cycle income, growth	ξ	0.50	Ma and Zubairy (2021)
Productivity standard deviation	σ_z	0.20	Kaplan et al. (2020)
Productivity persistence	ρ_z	0.97	Kaplan et al. (2020)
Retirement replacement rate	ω	0.50	OECD (2019)
Fraction receiving bequest	π_{beq}	0.67	SCF, 2001
Bequest-to-income ratio	ω_{beq}	0.11	SCF, 2001
Housing depreciation rate	δ	0.03	Harding et al. (2007)
Maximum LTV ratio	θ_m	0.95	Greenwald (2018)
Maximum PTI ratio	θ_y	0.55	Greenwald (2018)
House sale cost	f_s	0.06	Standard
Mortgage origination cost	$\underline{f_m}$	0.01	FRED 1990-2000
Max-to-min house size	$\bar{h}/\underline{h}$	8.75	SCF, 2001
Risk aversion	σ	2	Standard
Non-durable consumption share	χ	0.80	Piazzesi and Schneider (2016)
Tax progressivity	τ	0.20	Heathcote et al. (2017)

Homeownership and Equity Ownership Across Networth Distribution
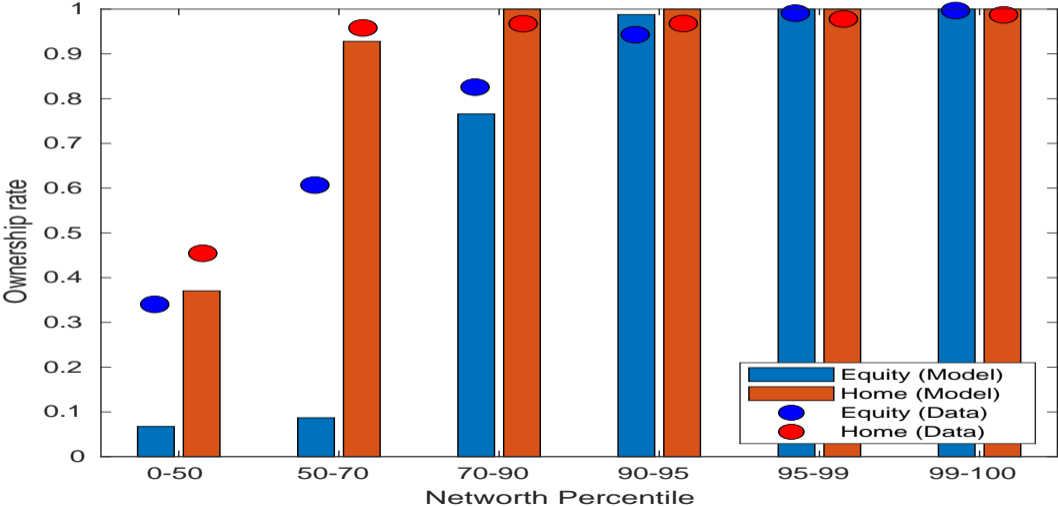
Average Asset Returns Across Income Distribution