

Falling Behind: Has Rising Inequality Fueled the American Debt Boom?

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Outline

Introduction

Model

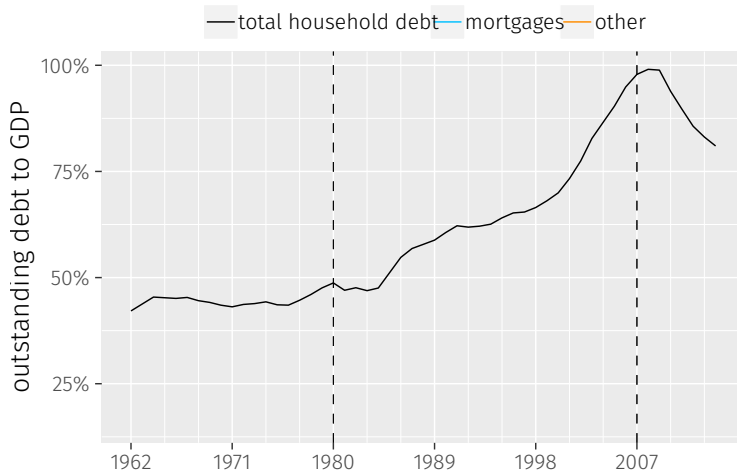
Analytical Results

Empirical Evidence

Quantitative Results

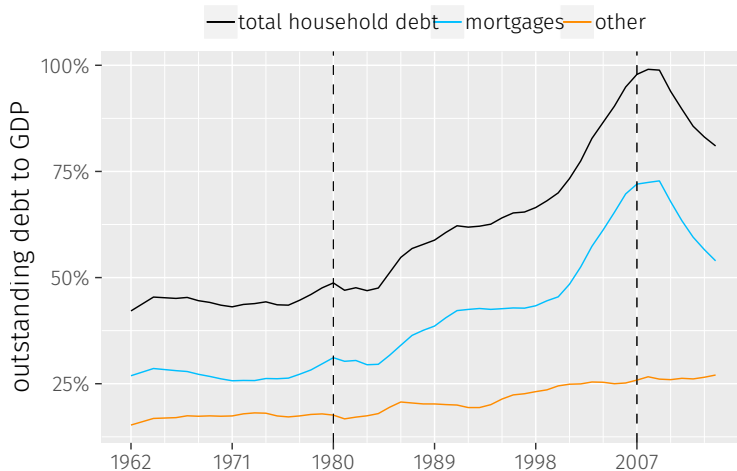
Conclusion

Fact I: US Household Debt Boom



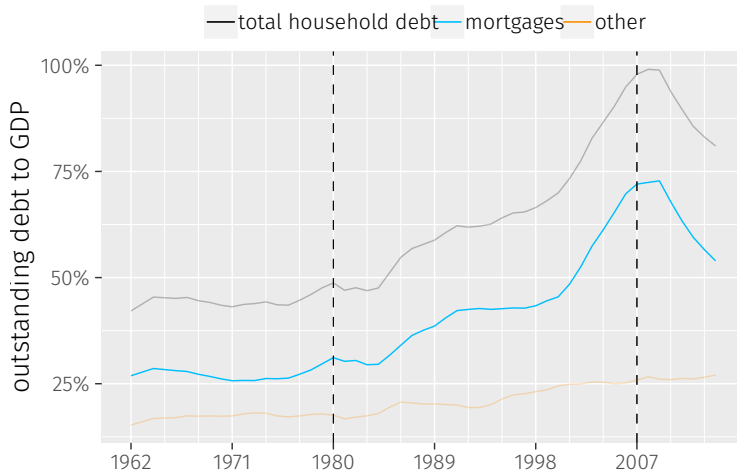
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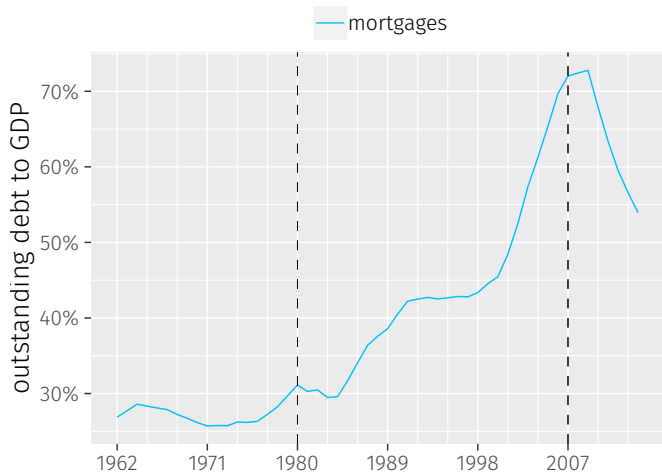
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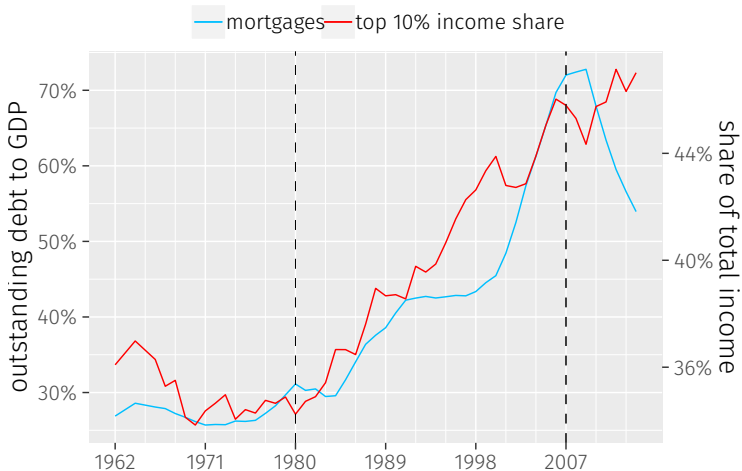
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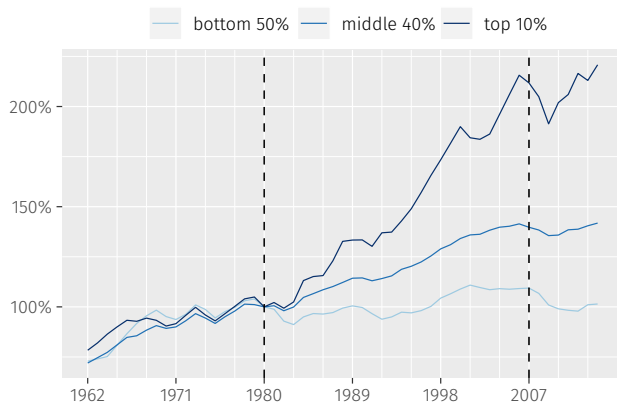
Fact I: US Household Debt Boom and Income Inequality



Source: US Flow of funds and World Inequality Database (Piketty et al.)

► alternative inequality measure

Fact II: Top Incomes Drive Inequality



Pre-tax incomes in the US. Base year: 1980. Based on Piketty et al. (2018).

Fact III: Mortgages of Non-Rich and Top Incomes Across US States

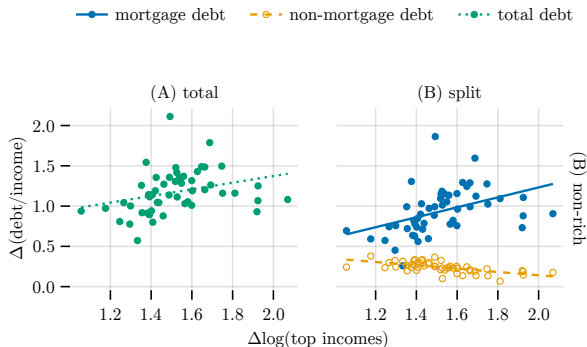


Figure shows changes between 1980 and 2007 for mortgages of the bottom 90% and incomes of the top 10%. Data: Distributional National Accounts.

In the paper: various specifications that confirm this result.

Research Question and Method

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Can **rising income inequality** account for (part of) the **mortgage debt boom**?

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Macroeconomic Model

- heterogeneous agents (income and wealth)
- durable housing and non-durable consumption, mortgages
- **social preferences** (Keeping up with the Joneses)

Data

- US State-Level Distributional National Accounts (Piketty et al., 2018; Mian et al., 2020)

Findings

Analytical Results

1. individual debt is increasing in the incomes of the reference group
2. aggregate debt-to-income is increasing in top incomes when somebody cares about the rich

Empirical Results

1. top incomes drive mortgages of the non-rich
2. top housing wealth drives housing wealth of the non-rich

Quantitative Result

1. Rising inequality and social comparisons **generate about 50%** of observed mortgage and house price booms

How Rising Income Inequality Leads to a Mortgage Boom

rising top inequality $\xRightarrow{\text{Keeping up with the Joneses}}$ mortgage boom

1. rich become richer (exogenously)
2. rich improve their houses, raise reference point
3. non-rich want to keep up with the richer Joneses
4. non-rich improve their houses using a mortgage
5. higher debt-to-income ratios across the distribution

Note: non-rich \approx bottom 90 % (almost everyone!)

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- risky post-tax earnings \tilde{y}
- non-durable consumption c , durable housing h
- asset a (savings device and mortgage)
- social comparisons
 - housing status $s(h, \bar{h})$
 - reference measure \bar{h}
- house price p , interest rate r

Preferences

$$\mathbb{E}_0 \int_0^\infty e^{-\rho t} u(c_t, s(h_t, \bar{h}_t))$$

Endogenous States

$$\dot{a}_t = \tilde{y}_t + r_t a_t - c_t - p_t x_t$$

$$\dot{h}_t = -\delta h_t + x_t$$

Collateral constraint

$$-a_t \leq \omega p_t h_t$$

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Stylized Version of the Model: No Income Risk

- finite number of types j
- constant incomes y^j
- flexible reference groups $\bar{h} = Gh$

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e.g.

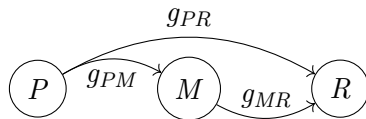
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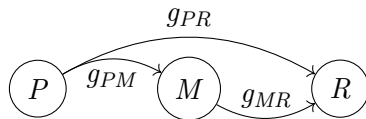


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- flow utility is
$$\frac{((1 - \xi)c^{1-\varepsilon} + \xi s(h, \bar{h})^{1-\varepsilon})^{\frac{1-\gamma}{1-\varepsilon}}}{1 - \gamma}$$
- $s(h, \bar{h}) = h - \phi \bar{h}$
- interest rate $r = \rho$
- life-time budget constraint
- for convenience: $a_0 = \delta = 0$

General Result

Lemma

Equilibrium debt (given p, r) is

$$-\begin{pmatrix} a_1 \\ \vdots \\ a_N \end{pmatrix} = \kappa_1 \begin{pmatrix} y_1 \\ \vdots \\ y_N \end{pmatrix} + \kappa_2 \phi \underbrace{\left(\sum_{i=1}^{\infty} \kappa_3^i G^i \right)}_{\approx \text{Leontief inverse of } G} \begin{pmatrix} y_1 \\ \vdots \\ y_N \end{pmatrix},$$

where $\kappa_1, \kappa_2 > 0, \kappa_3 \in (0, 1)$.

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Proposition

Type j 's debt is increasing in type k 's income as long as j cares about k (directly or indirectly).

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Proposition

Total debt-to-income is increasing in type k 's income as long as some other type *cares* about k . The total effect depends on the *in-centrality of k* .

Result: Example with three income types

$$\text{Let } \begin{pmatrix} \bar{h}_P \\ \bar{h}_M \\ \bar{h}_R \end{pmatrix} = \underbrace{\begin{pmatrix} 0 & g_{PM} & g_{PR} \\ 0 & 0 & g_{MR} \\ 0 & 0 & 0 \end{pmatrix}}_G \begin{pmatrix} h_P \\ h_M \\ h_R \end{pmatrix}$$

then equilibrium debt (given p, r) is

$$- \begin{pmatrix} a_P \\ a_M \\ a_R \end{pmatrix} = \kappa_1 \begin{pmatrix} y_P \\ y_M \\ y_R \end{pmatrix} + \kappa_2 \phi \begin{pmatrix} 0 & \tilde{\phi} \cdot g_{PM} & \tilde{\phi} \cdot g_{PR} + \tilde{\phi}^2 \cdot g_{PM} \cdot g_{MR} \\ 0 & 0 & \tilde{\phi} \cdot g_{MR} \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} y_P \\ y_M \\ y_R \end{pmatrix}$$

where $\tilde{\phi} = \kappa_3 \phi$, $\kappa_1, \kappa_2 > 0$, $\kappa_3 \in (0, 1)$.

↪ Households need not be directly linked! (effects trickle-down)

General Equilibrium I: Top incomes and house prices

Special case: Cobb-Douglas ($\varepsilon \rightarrow 1$)

- optimal **debt** is independent of p
- the equilibrium **house price** is

$$p = \alpha^{-\alpha} \left(\frac{\delta \theta \xi}{\bar{L}(r + \delta)} \right)^{1-\alpha}$$

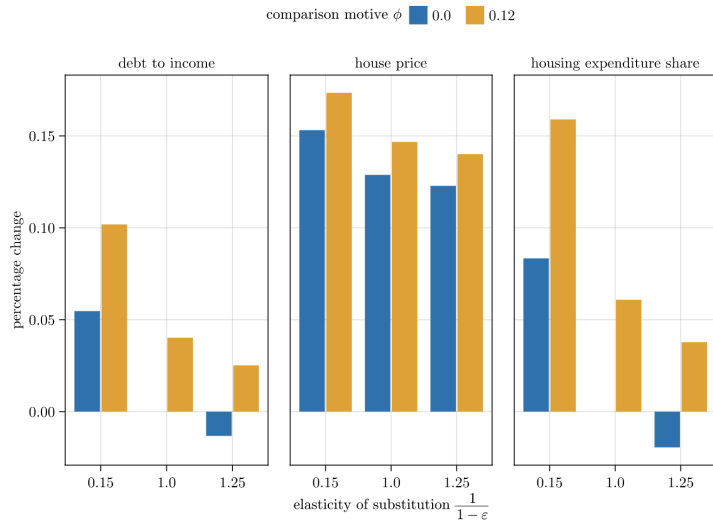
where

$$\theta = \omega^T \left(I + \sum_{i=1}^{\infty} ((1 - \xi)\phi G)^i \right) \mathcal{Y}.$$

- That is, house prices rise even if there are no social comparisons. But house prices rise *more strongly with social comparisons*.

General equilibrium II: Beyond Cobb-Douglas

Rising top incomes for three-type example



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- US State-Level Distributional National Accounts (Piketty et al., 2018)
- state-level identifiers imputed from IRS data for top incomes (Mian et al., 2020)
- aggregate to state-year panel 1980–2007

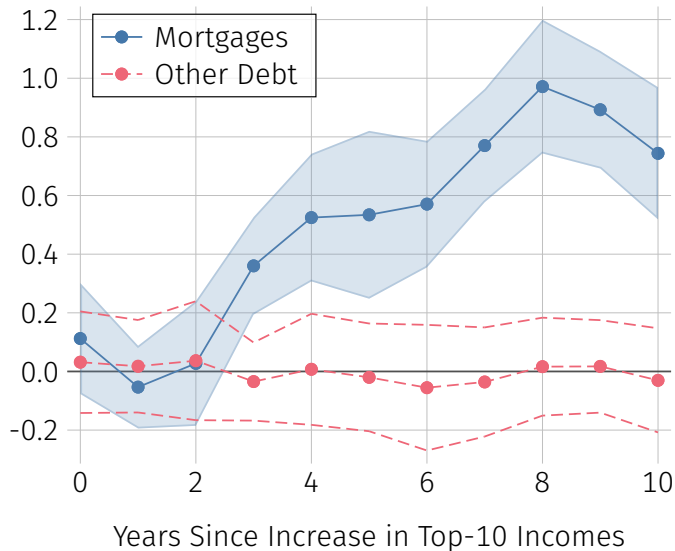
Regressions I: Top Incomes and Mortgages of Non-Rich

	$\log(\text{NonRichMortgages}_t)$		HousePrice_t
	(1)	(2)	(3)
$\log(\text{TopIncomes}_{t-2})$	0.3218*** (0.0923)	0.2922*** (0.0862)	2.0311*** (0.4456)
HousePrice_t		0.0002 (0.0003)	
Non-Rich Income FE	Yes	Yes	–
Total Income FE	–	–	Yes
Demographic Controls	Yes	Yes	Yes
State & Year FE	Yes	Yes	Yes
Method	OLS	IV	OLS
F-test (first stage)	–	13.54	–

Regressions II: Evidence for Social Comparisons

	$\log(\text{NonRichMortgages}_t)$		$\log(\text{NonRichHousing}_t)$	
	(1)	(2)	(3)	(4)
$\log(\text{TopHousing}_{t-2})$	0.9934*** (0.3417)	0.7651** (0.2410)	0.4713*** (0.1720)	0.3498* (0.2025)
HousePrice_t		0.0005 (0.0004)		0.0003 (0.0004)
Non-Rich Income FE	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
State & Year FE	Yes	Yes	Yes	Yes
Method	IV	IV	IV	IV
F-test (first stage)	26.31	20.63	25.79	17.47

Dynamic Effects on Debt of Bottom 90% — Local Projections



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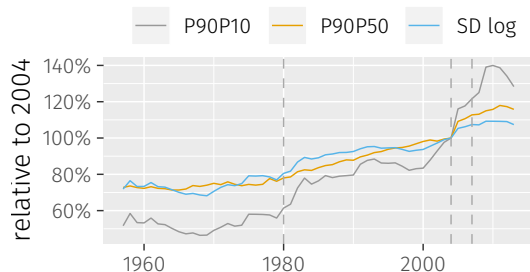
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Rising inequality, mortgages and house prices 1980–2007 (1)

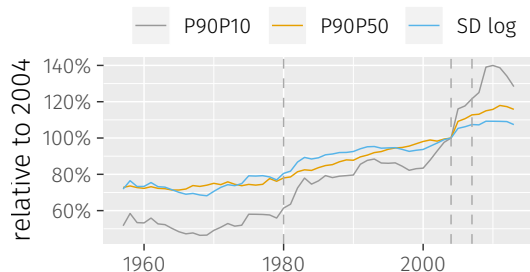
- inequality rises



Source: Guvenen et al. (2018)

Rising inequality, mortgages and house prices 1980–2007 (1)

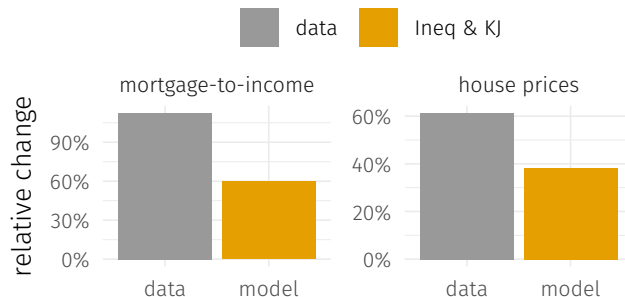
- inequality rises



- adjust permanent component of incomes (σ_α^2) to match difference in P90/P50 ratio between 1980 and 2007
- all other parameters are kept constant

Source: Guvenen et al. (2018)

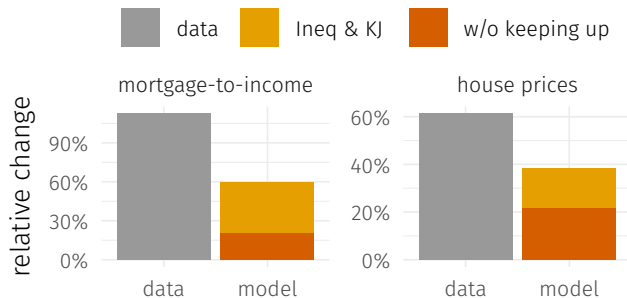
Rising inequality, mortgages and house prices 1980–2007 (2)



Take-away: Inequality & keeping up with the Joneses generate

- 40% of the observed mortgage boom
- 55% of the observed house price boom

Social Comparisons are an Important Amplifier — Rising Inequality is not Enough



Note: Keeping reference measure \bar{h} constant at \bar{h}_{1980} .

Take-away: Keeping up with the Joneses contributes 61% of the mortgage debt increase and 30% of the house price increase

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- We **formalize a causal link** between rising top incomes and the debt boom based on “keeping up with the richer Joneses”
- We show **analytically** that aggregate debt-to-income ratio is increasing in top incomes when somebody cares about the rich
- We show **empirically** that top incomes drive mortgage debt across states and time
- We show that rising income inequality “keeping up with the Joneses” are a **quantitatively important driver** of mortgage debt

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