

Inequality, Leverage and Crises

Michael Kumhof, International Monetary Fund

Romain Ranciere, International Monetary Fund and Paris School of Economics

Pablo Winant, Paris School of Economics

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1 Introduction

- **Empirical Motivation: Similarities of pre-1929 and pre-2008 decades:**

Focus is on United States.

- Sharply increasing income inequality.
- Sharply increasing debt leverage among low-/middle-income households.
- High debt leverage eventually triggered a large financial and real crash.

- **Plan of the Presentation:**

1. *Literature*
2. *Stylized Facts*
3. *Discussion of the Model*
4. *Simulation of the Model: Crises or Reversal of Inequality*
5. *Inequality and Current Accounts*

2 Literature Review (U.S.)

2.1 Literature on Income and Wealth Distribution

- **Objective:** Description of long-run changes in income/wealth distribution.
- **Findings:**
 - Changes in top income shares have been very large.
 - Changes in Gini coefficients have been less pronounced.
- **Consequences for Models:**
 - Two-agent models (top earners, bottom earners) are very useful.
 - Continuum-of-agents models (complicated) are unnecessary.

2.2 Literature on Financial Fragility and Financial Crises

- **Literature 1:** Inequality explanations for high debt and crises.
 - Rajan (2010), Reich (2010).
 - Stylized facts that offer a similar explanation to our paper.
 - But no general equilibrium model.
 - Model advantages:
 1. Quantifying the relative importance of the inequality channel.
 2. Quantifying the relative importance of credit demand and supply.
- **Literature 2:** Alternative explanations for high debt and crises.

We look at these in the paper.

 1. Global saving glut.
 2. Financial innovation.

2.3 Literature on Preferences for Wealth

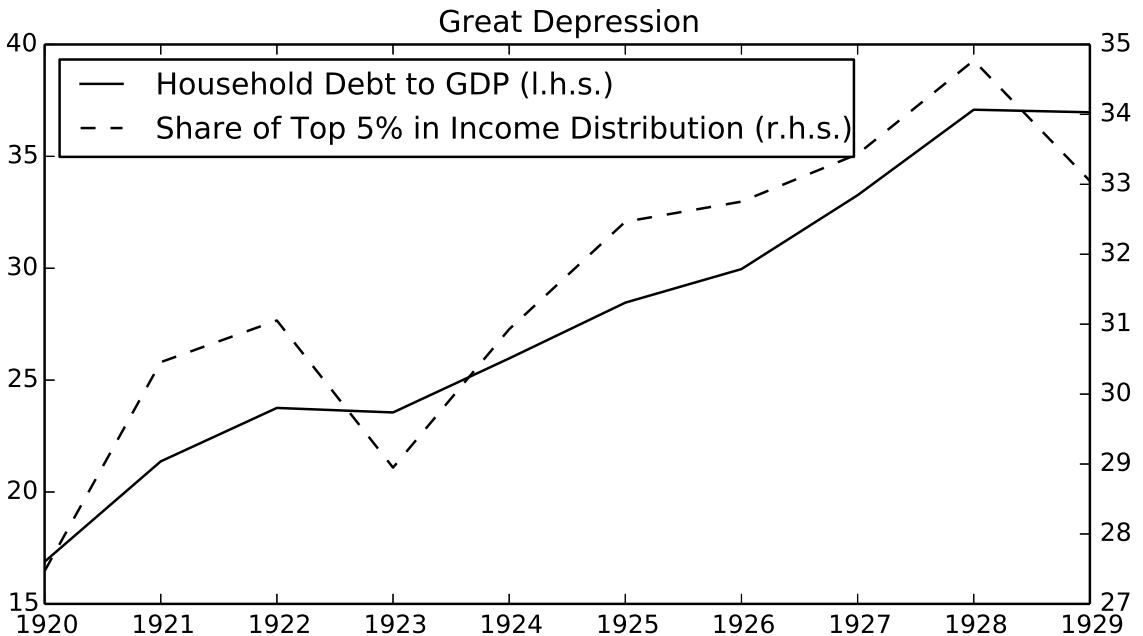
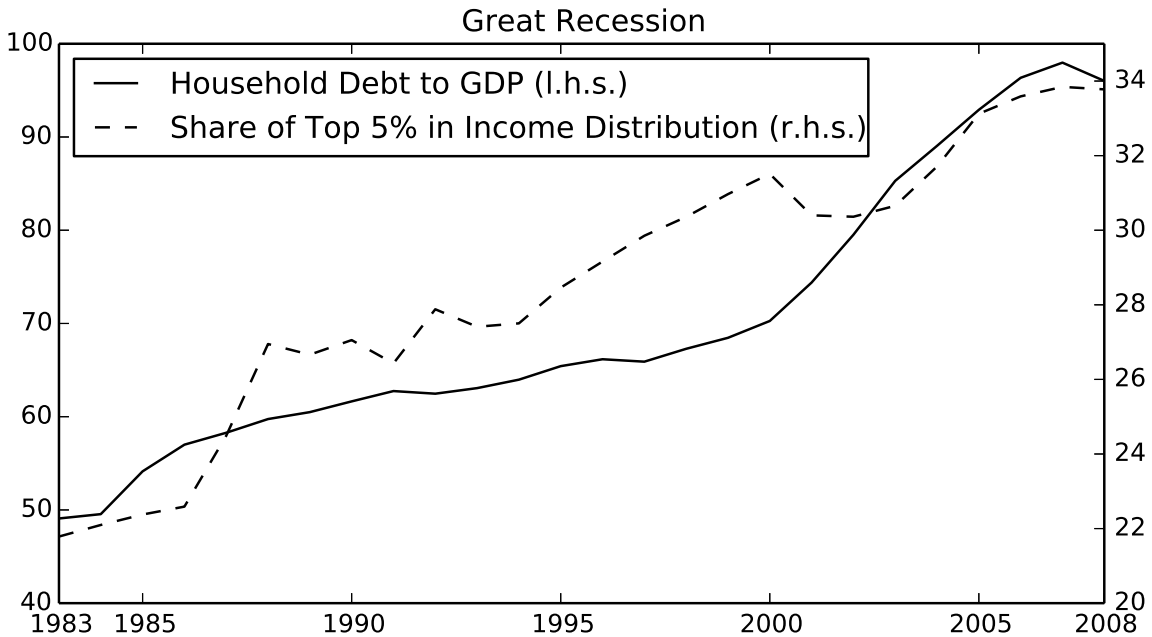
- **Objective:** Accounting for the saving behavior of the richest households.
- **Consequence:** Two additional parameters.
 - Utility weight on wealth: φ .
 - Utility curvature with respect to wealth: η .
 - Together these determine the marginal propensity to save (MPS).
- **Calibration:** Dynan et al. (2004) on MPS of different income groups:
 - MPS steeply increasing in permanent income.
 - MPS near zero for bottom income groups.
 - MPS reach 0.5 - 0.6 for the top income groups.
 - This can be mapped into a calibration of the two new parameters.

2.4 Literature on Endogenous, Rational Default

- **Objective of Sovereign Default Literature:** Default = optimal decision.
- **Our Model:** Related to sovereign default literature.
- **Differences of our Model:**
 1. Our lenders are risk-averse, not risk-neutral.
 2. Default is only on a fixed fraction of debt, not all debt.
 3. Two types of costs of default:
 - Non-stochastic output costs \implies crisis accompanied by deep recession.
 - Stochastic utility costs \implies single-digit default probabilities.
 4. High level of debt can be sustained in equilibrium.

3 Stylized Facts (U.S.)

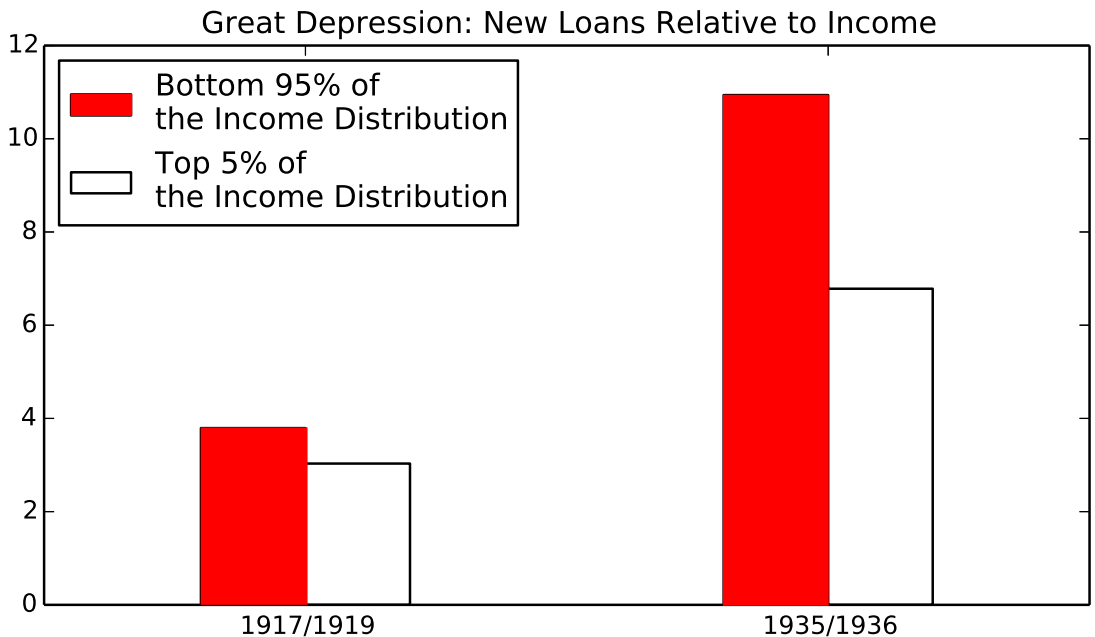
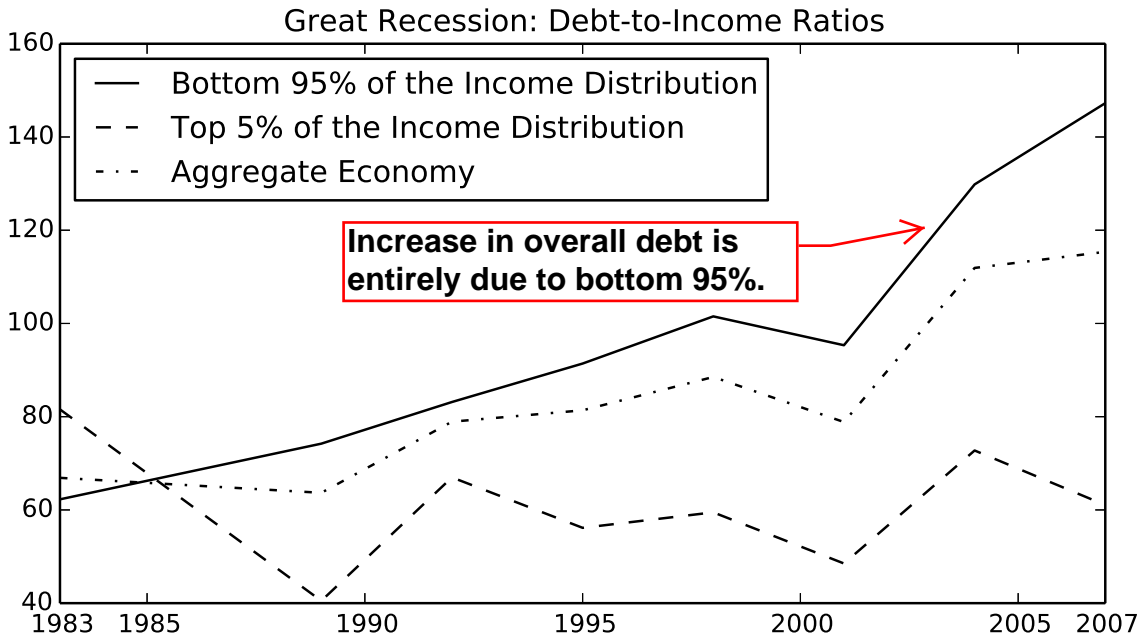
A. Income Inequality and Aggregate Household Debt



Income Inequality and Household Leverage:

- (i) Moved up together pre-crisis.
- (ii) Both pre-1929 and pre-2007.

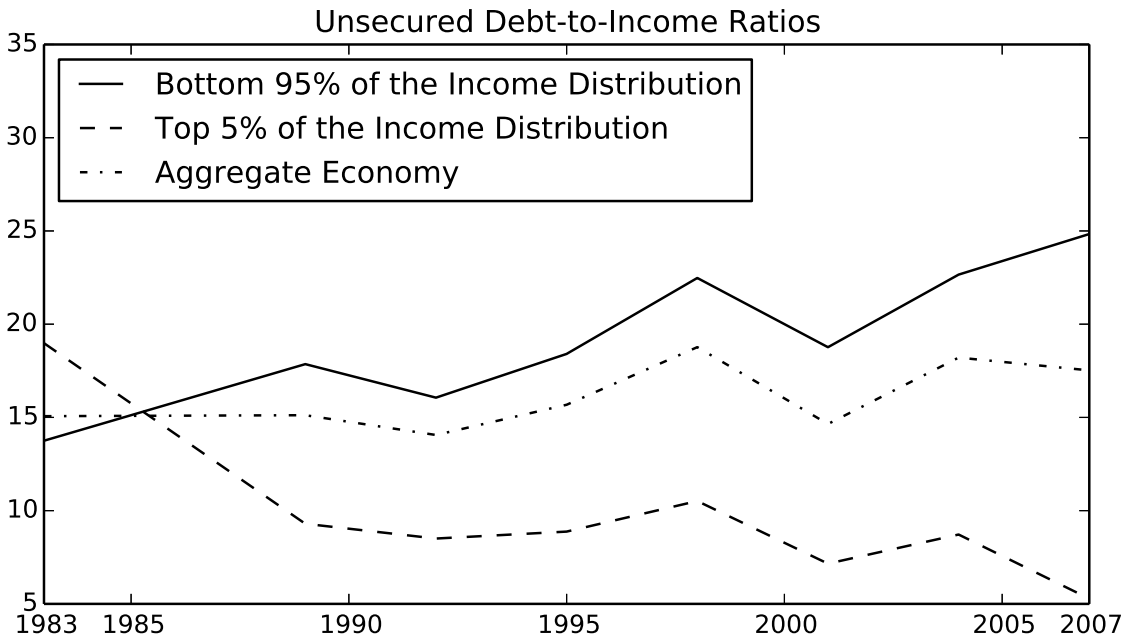
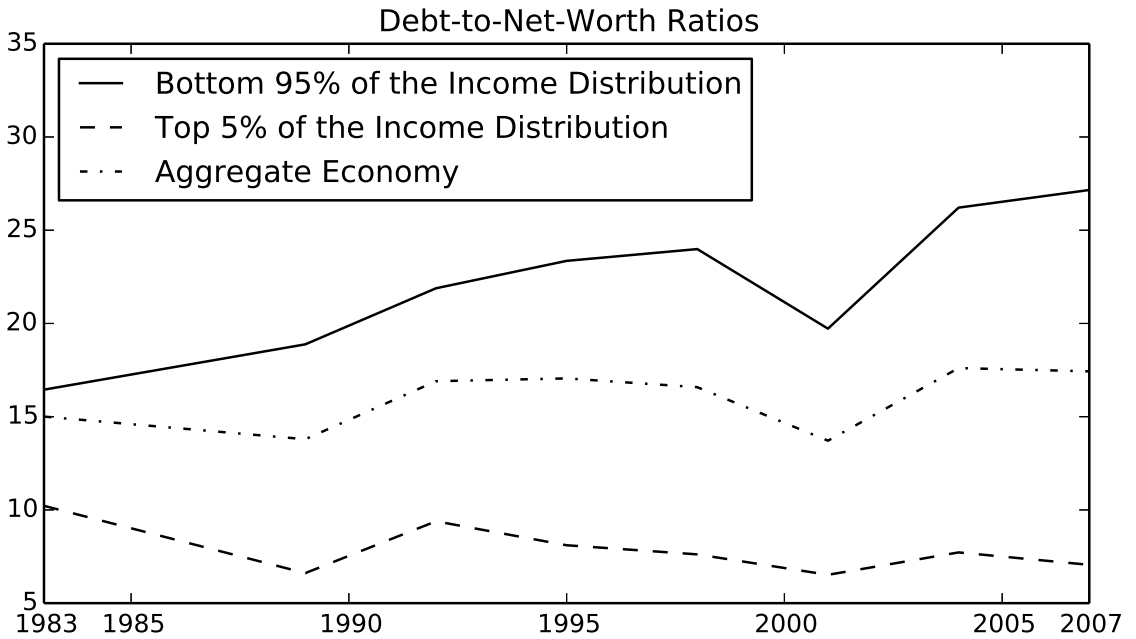
B. Debt by Income Group



Debt to Income Ratios by Income Group:

- (i) Lower or flat for the rich.
- (ii) Sharply higher for the remainder.

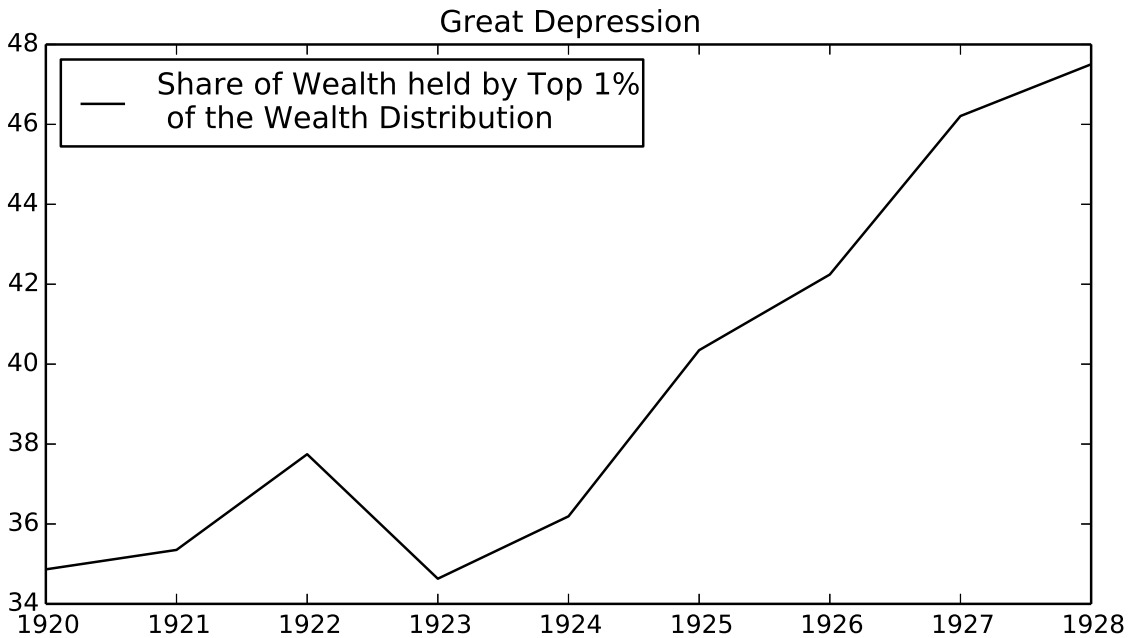
Alternative Debt Ratios



Alternative Debt Ratios Show the Same Pattern:

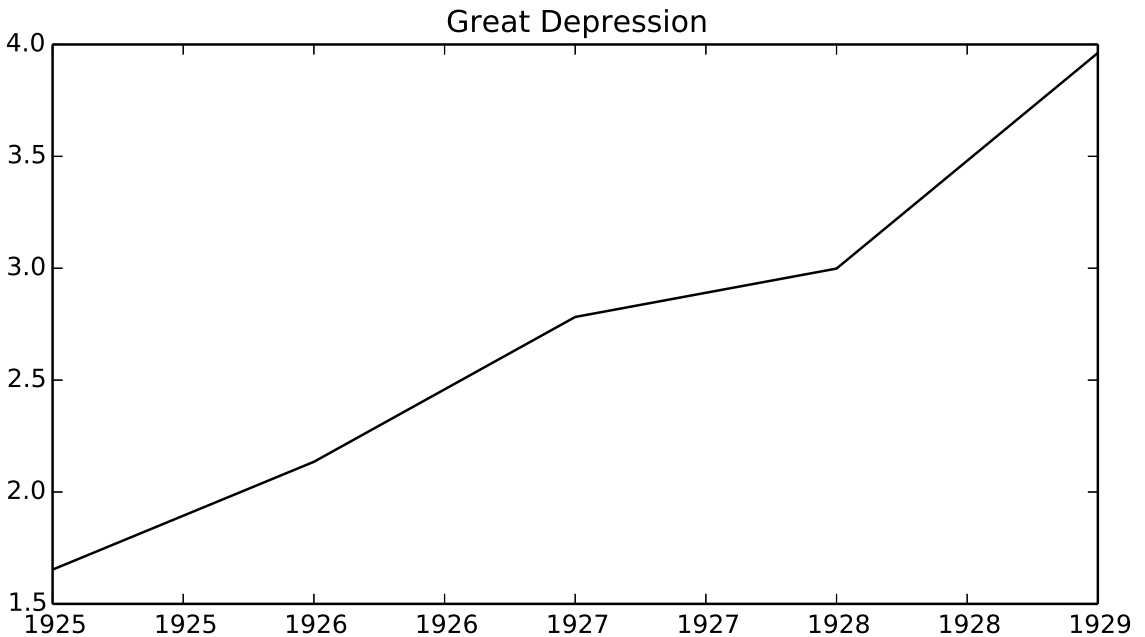
- (i) Debt-to-Net-Worth:
Increasing Only for Bottom 95%.
- (ii) Unsecured Debt-to-Income:
Increasing Only for Bottom 95%.

C. Wealth by Income Group



Wealth Inequality Increased with Income Inequality

D. Leverage and Crisis Probability

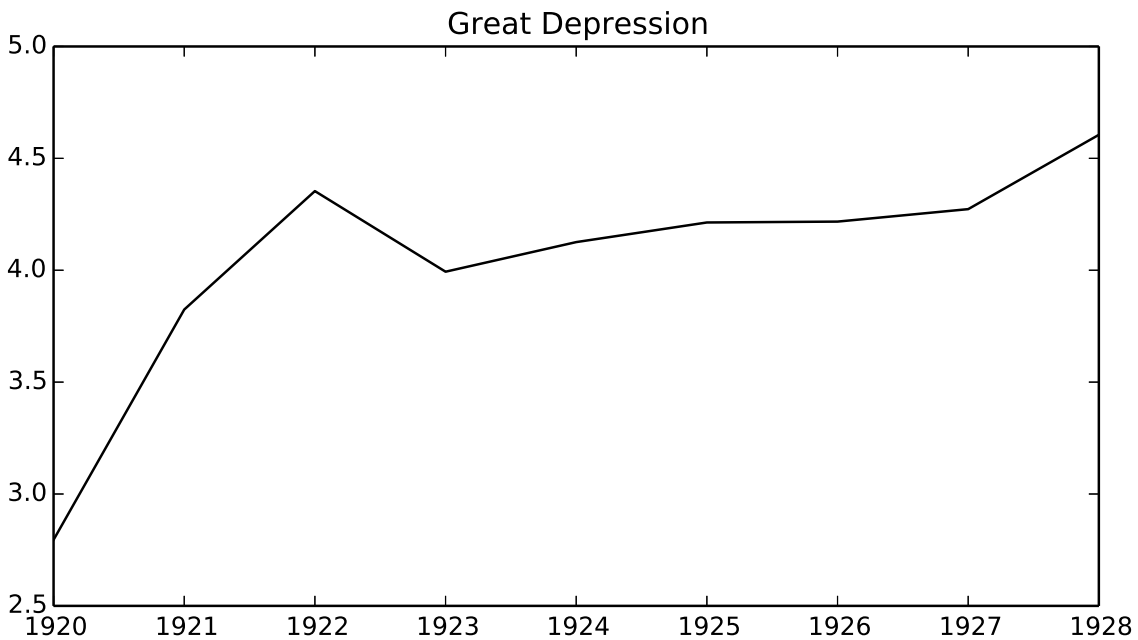
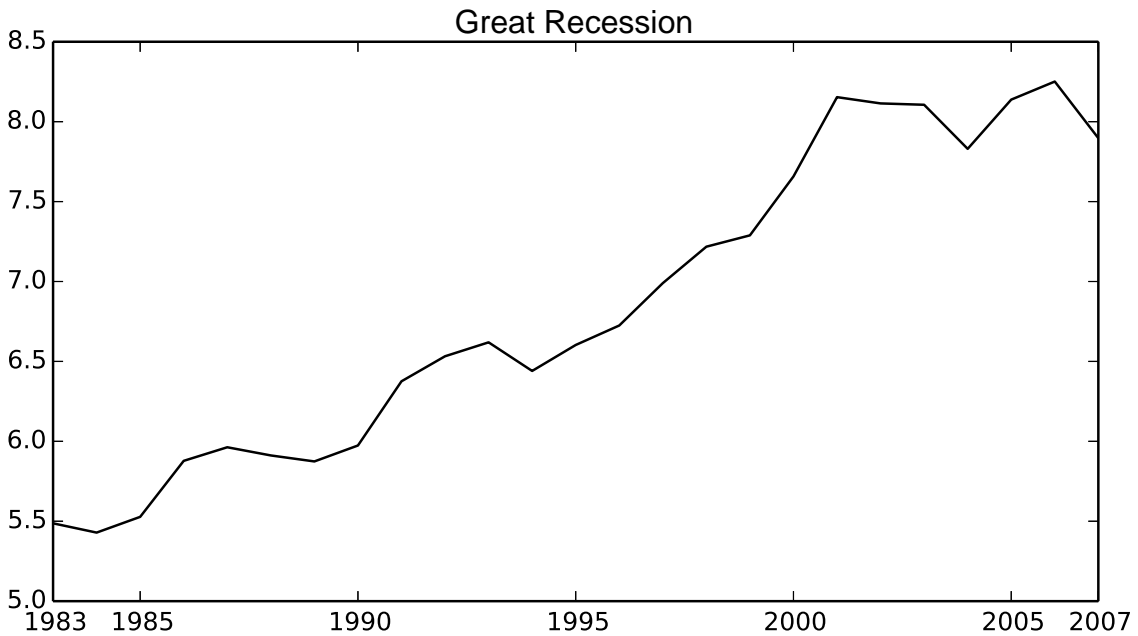


Schularick and Taylor (2012)

Crisis Probabilities Increased Dramatically:

- (i) From 2% to 5% prior to the Great Recession.
- (ii) From 1.5% to 4% prior to the Great Depression.

E. Size of the Financial Sector



The Size of the Financial System Increased Dramatically:

- (i) From 5.5% to 8.0% of GDP pre-Great-Recession.
- (ii) From 2.8% to 4.6% of GDP pre-Great-Depression.

4 The Model - Overview

- Economy consists of two separate household groups, top earners (top 5% of incomes) and bottom earners (everyone else).
- Economy experiences successive and permanent drops in the income share of bottom earners.
- Response of top earners:
 1. Higher consumption.
 2. Higher financial wealth accumulation = loans to bottom earners:

Why? Wealth in utility \implies positive marginal propensity to save.
- Response of bottom earners:
 1. Lower consumption.
 2. Much higher borrowing from top earners = higher risk of financial crisis.

Why? Rational default decision \implies growing benefits of default.
- Crisis: Debt default (10%) + output contraction.

5 The Model - Details

5.1 Preferences of Top and Bottom Earners

Utility^{top} = Present Discounted Value of Consumption^{top} and Wealth^{top}

Utility^{bottom} = Present Discounted Value of Consumption^{bottom}

- Difference justified by different empirical MPS of top and bottom earners.

5.2 Budget Constraints of Top and Bottom Earners

$$\text{Consumption}^{top} = \text{Income}^{top}$$

- Net New Lending to Bottom Earners

$$\text{Consumption}^{bottom} = \text{Income}^{bottom} - \text{Default Costs}$$

+ Net New Borrowing from Top Earners

5.3 Endogenous Default

- **Bottom Earners:** In each period decide whether to default or not.
 - *Benefits of Default:* Reduced debt service.
 - *Costs of Default:*
 1. Output costs of default = recession that mostly hits bottom earners.
 2. Random utility costs of default:
 - * Prohibitive costs in 85% of cases: No crisis.
 - * Random costs in 15% of cases: Single-digit crisis probability.

Parameters of 1 and 2 are calibrated to match Schularick and Taylor (2012) probability of crises: Always in single digits for U.S.

- **Top Earners:** Know crisis risk and price loans accordingly.

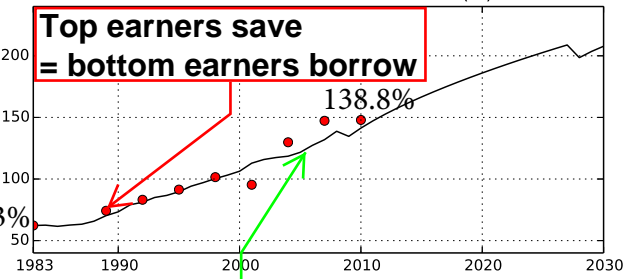
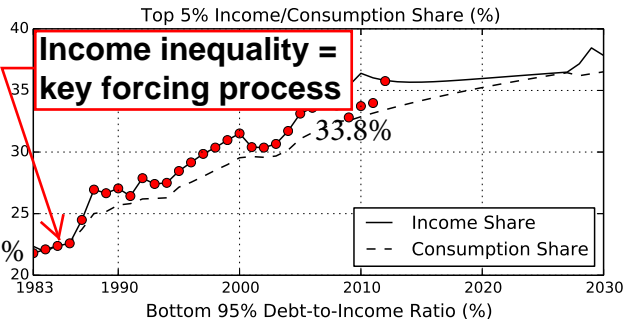
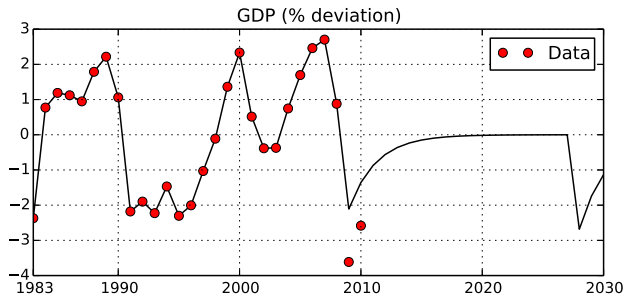
6 Results

6.1 Design of Baseline Scenario

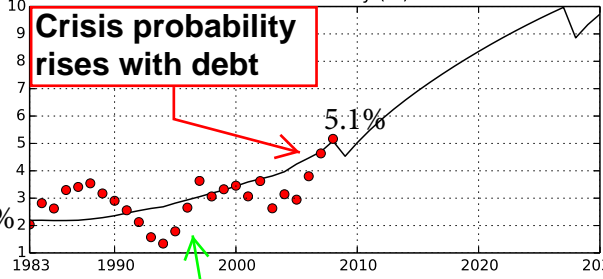
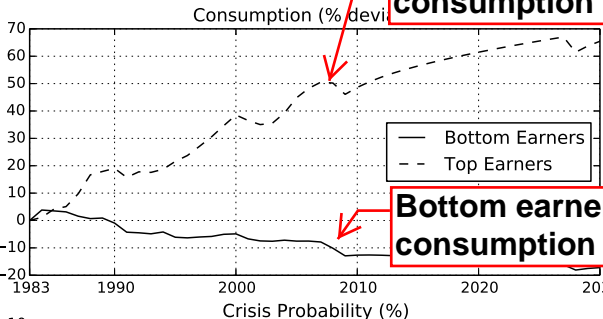
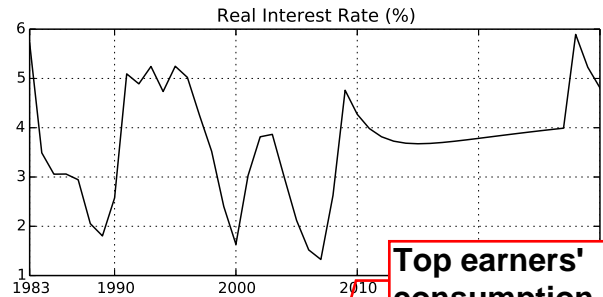
- Assumed exogenous processes 1983 – 2008 (pre-crisis):
 - Data for GDP.
 - Data for top 5% income share.
- Assumed crisis shock in 2009.
- 2009 – 2030:
 - No further realizations of output or output share shocks.
 - Random sequence of utility cost shocks continues.

6.2 Empirical Performance of the Model

- Debt-to-income ratios and crisis probabilities at different MPS:
 - Baseline tracks the data very well.
 - Except for around 25% - 30% of debt growth in the 2000s.
Explanation for the 2000s: Global saving glut.
- In other words:
 - Income inequality explains very large share of post-1983 debt growth.
 - Debt growth in turn explains growth in crisis probability.
 - **Conclusion: Income inequality = fundamental driver of the 2008 crisis.**



Debt evolution closely matches the data

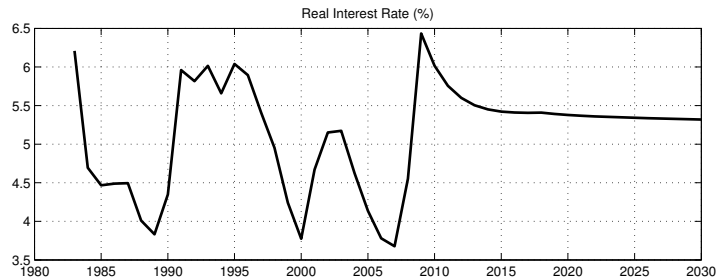
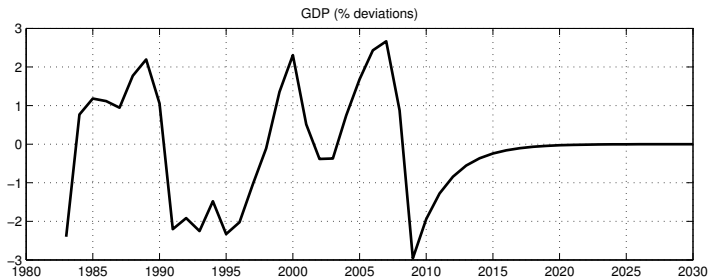


Crisis probability also matches the data

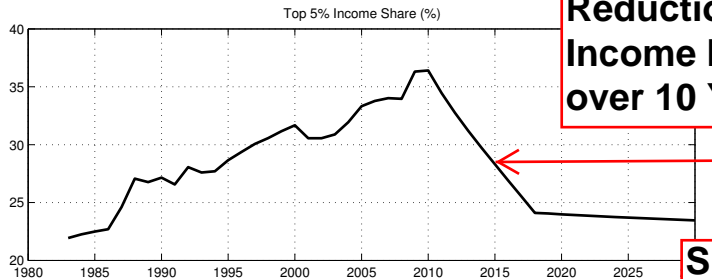
Baseline Scenario

7 Alternative Scenario: Gradual Reduction in Income Inequality Reduces Crisis Probability

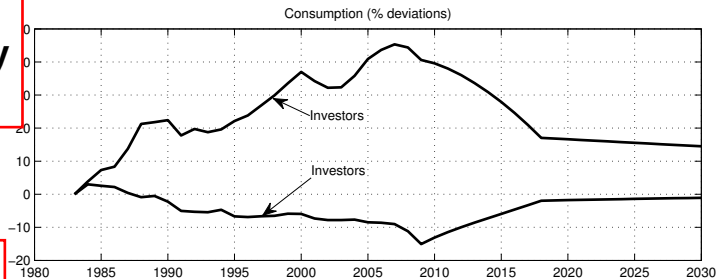
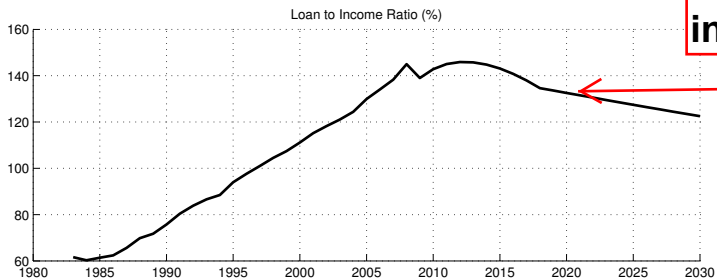
- **Roosevelt 1936-1944:**
 - Top 5% income share reversed the 1920s increase.
 - Household debt reversed the 1920s increase.
 - This started well before the war.
- **Scenario:** Bottom earner output share returns to 1983 value over 10 years.
- **Debt Level Reductions:**
 - Crisis Alone: Only very short-lived effects.
 - Reduced Income Inequality: Sustained and large effects.
 - Bottom earners now have the means to pay down their debt over time.
 - This also reduces crisis probability in a major way.



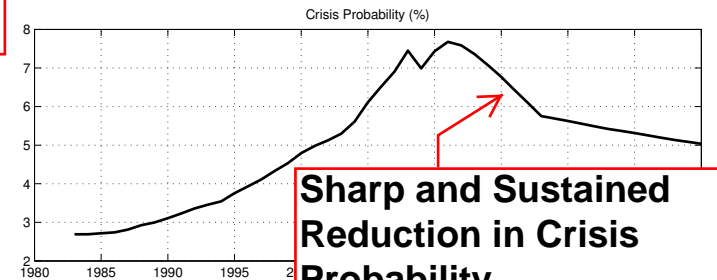
**Reduction in
Income Inequality
over 10 Years**



**Sustained
Reduction
in Debt**



**Sharp and Sustained
Reduction in Crisis
Probability**



8 Summary

- **Empirical Link in 1929 and 2008:**

Higher income inequality \Rightarrow higher leverage \Rightarrow large crises.

- **Theoretical Model:**

- Key Shock: Permanent drop in bottom earners' income share.

- Key Feature: Top earner preferences for wealth.

- Calibrated using a new methodology.

- Key Mechanism:

- * Recycling of top earners' gains back to bottom earners as loans.

- * Growing loans lead to growing crisis probability.

- **Conclusions:**

- Higher income inequality = main driver of higher household debt.

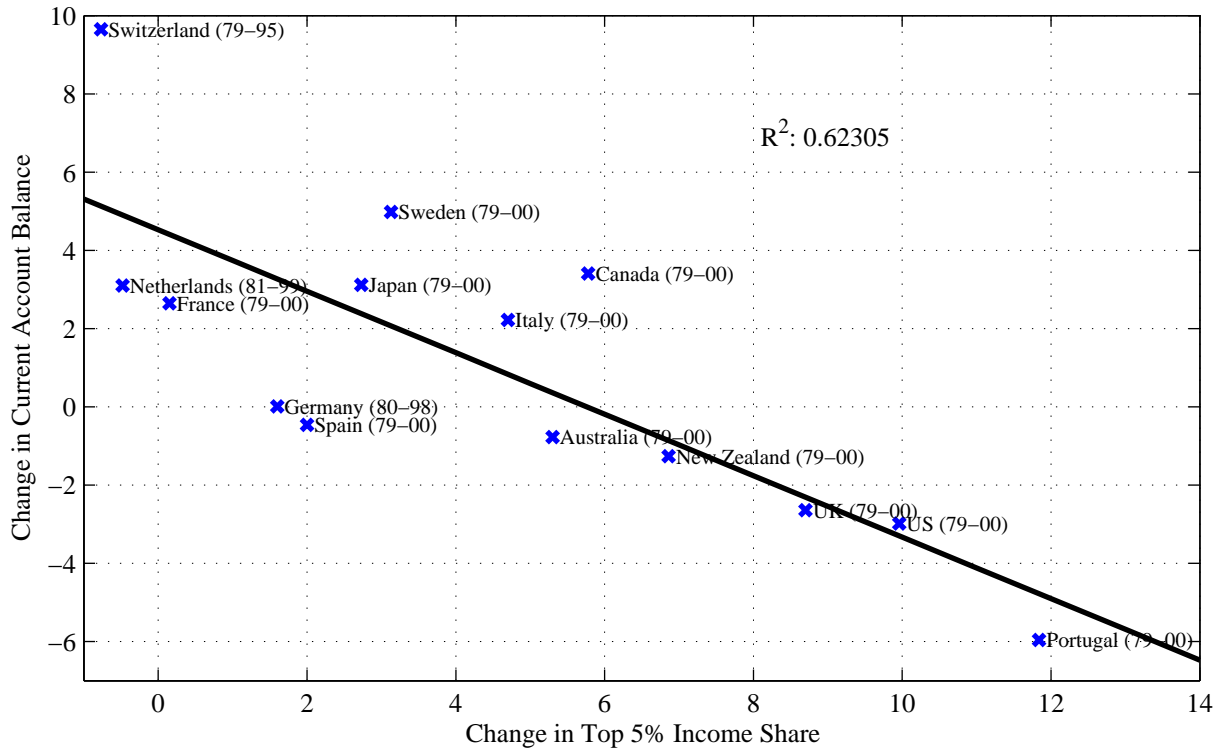
- Higher household debt in turn makes large crises more likely.

- Crises only reduce debt by little, and not for long.

- Only lower income inequality durably reduces crisis probability.

9 The Open Economy Dimension: Foreign Debt

- Empirical regularities for major economies:
 - More inequality almost always accompanied by CA deterioration.
 - But there are major exceptions: China, Germany.
- Explanation for CA Deficits (this is work in progress):
 - Higher inequality means higher returns to investors (top earners).
 - This includes foreign investors.
 - They may buy more domestic assets or loans.
 - The resulting capital account surplus implies a CA deficit.
- Explanations for CA Surpluses (this is work in progress):
 - Domestic investors face a thin domestic lending market.
 - So when their income rises they lend a lot to foreigners.
 - The resulting capital account deficit implies a CA surplus.
- Every economy will exhibit different combinations of the above effects.



Changes in Current Accounts and Top Income Shares, 1980-2000 (percent)