Inequality, Leverage and Crises

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November 24, 2014
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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.*
  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: $\varphi$.
  - Utility curvature with respect to wealth: $\eta$.
  - 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

Great Recession

- Household Debt to GDP (l.h.s.)
- Share of Top 5% in Income Distribution (r.h.s.)

Great Depression

- Household Debt to GDP (l.h.s.)
- Share of Top 5% in Income Distribution (r.h.s.)

Income Inequality and Household Leverage:
(i) Moved up together pre-crisis.
(ii) Both pre-1929 and pre-2007.
Debt to Income Ratios by Income Group:
(i) Lower or flat for the rich.
(ii) Sharply higher for the remainder.
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
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.
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} = \text{Present Discounted Value of Consumption}^{top} \text{ and Wealth}^{top}

Utility^{bottom} = \text{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

\[ \text{Consumption}^{\text{top}} = \text{Income}^{\text{top}} \]

- Net New Lending to Bottom Earners

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

+ 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.
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.
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.
Figure 2: Global Current Account Balances, 1980-2010 (billions of U.S. dollars)

Figure 3: Changes in Current Accounts and Top Income Shares, 1980-2000 (percent)