Econ 133 – Global Inequality and Growth

Models of the wealth distribution

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Roadmap

- The precautionary saving model

- The life-cycle model

- Dynamic random shock models

Key question for the study of wealth inequality: why is wealth much more concentrated than labor income?

- Precautionary saving models: wealth less unequally distributed than income

- Life-cycle saving models: wealth as unequally distributed as labor income

- To generate a higher concentration of wealth, one needs dynamic models with cumulative shocks over long horizons

1 Precautionary saving model

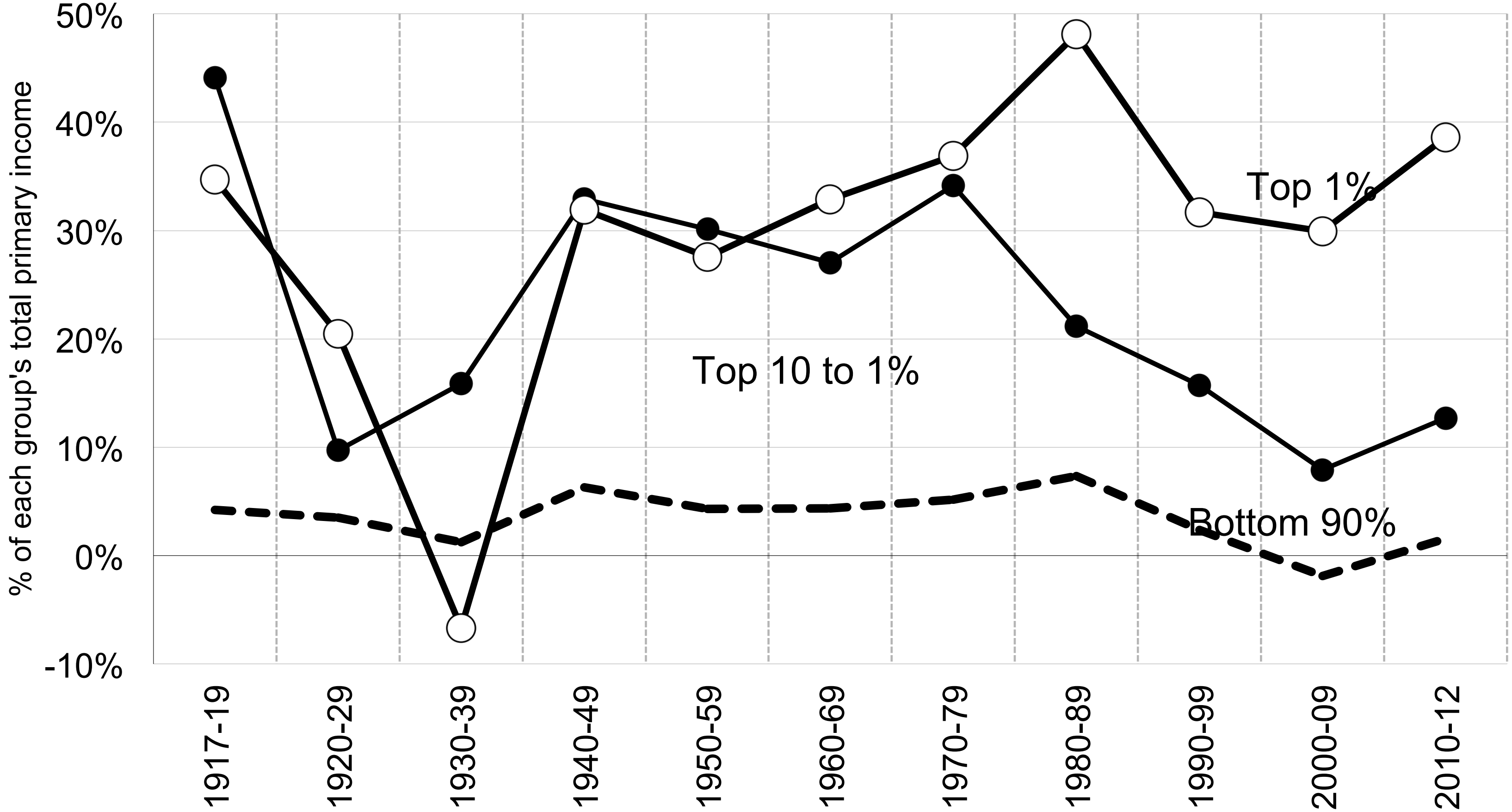
- Income is uncertain → hold wealth as precaution for "rainy days"

- Main uncertainty: job loss → labor income risk

- As one gets richer, less need to insure against labor income risk → model predicts that saving rate falls with income

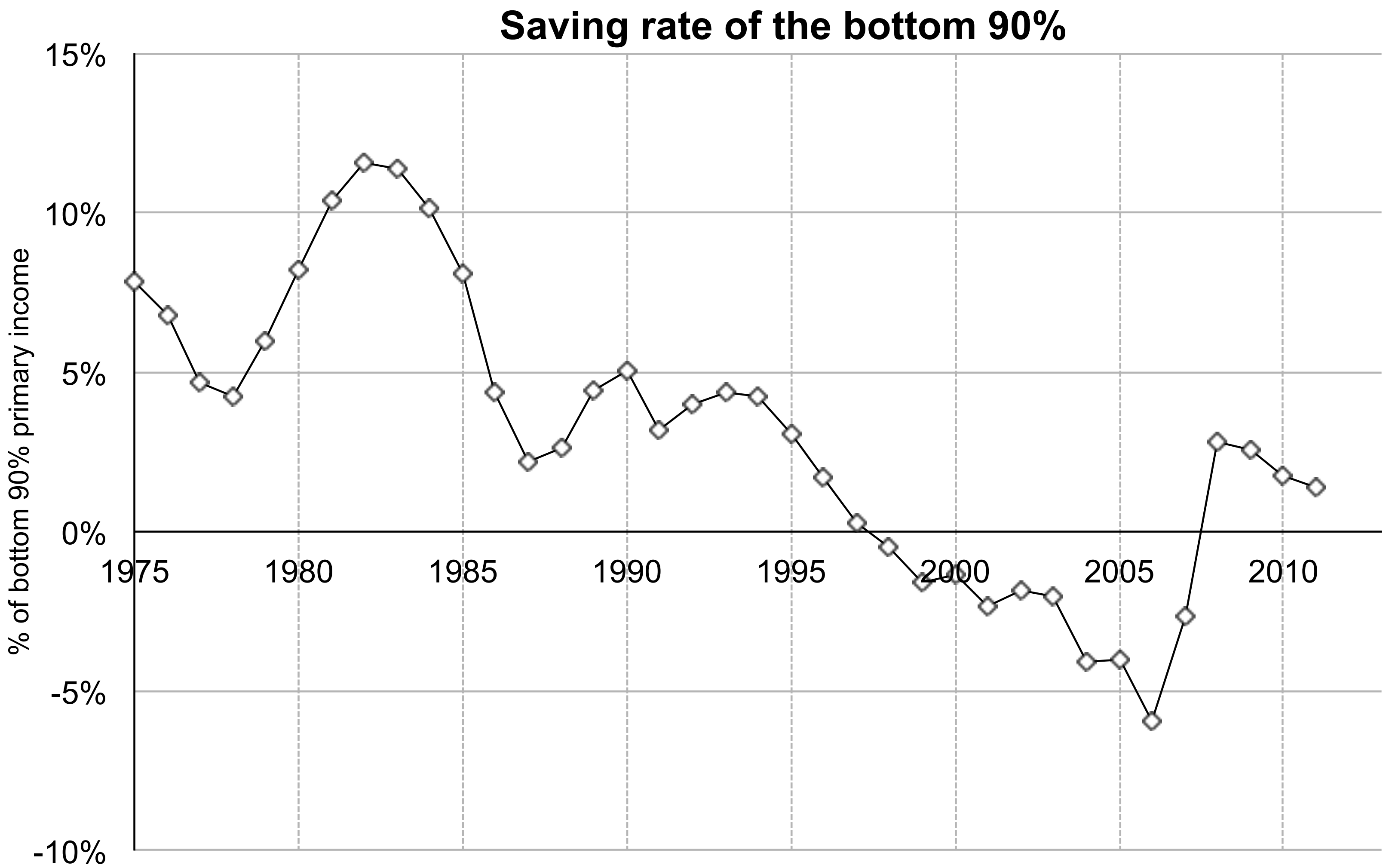
- Not consistent with the data

Saving rates by wealth class (decennial averages)



The rich save more as a fraction of their income, except in the 1930s when there was large dis-saving through corporations. NB: The average private saving rate has been 9.8% over 1913-2013.

Source: Saez and Zucman (2016)



Source: Saez and Zucman (2016)

2 Life-cycle saving models

Main idea: people save to spread resources over the life-cycle

2.1 A simple life-cycle model

- Individuals die with 0 wealth, wealth accumulation entirely driven by need to save for retirement

- Assume that everybody starts working at age 0, works for N years, dies at age L, and that there is no growth ($n = g = r = 0$)

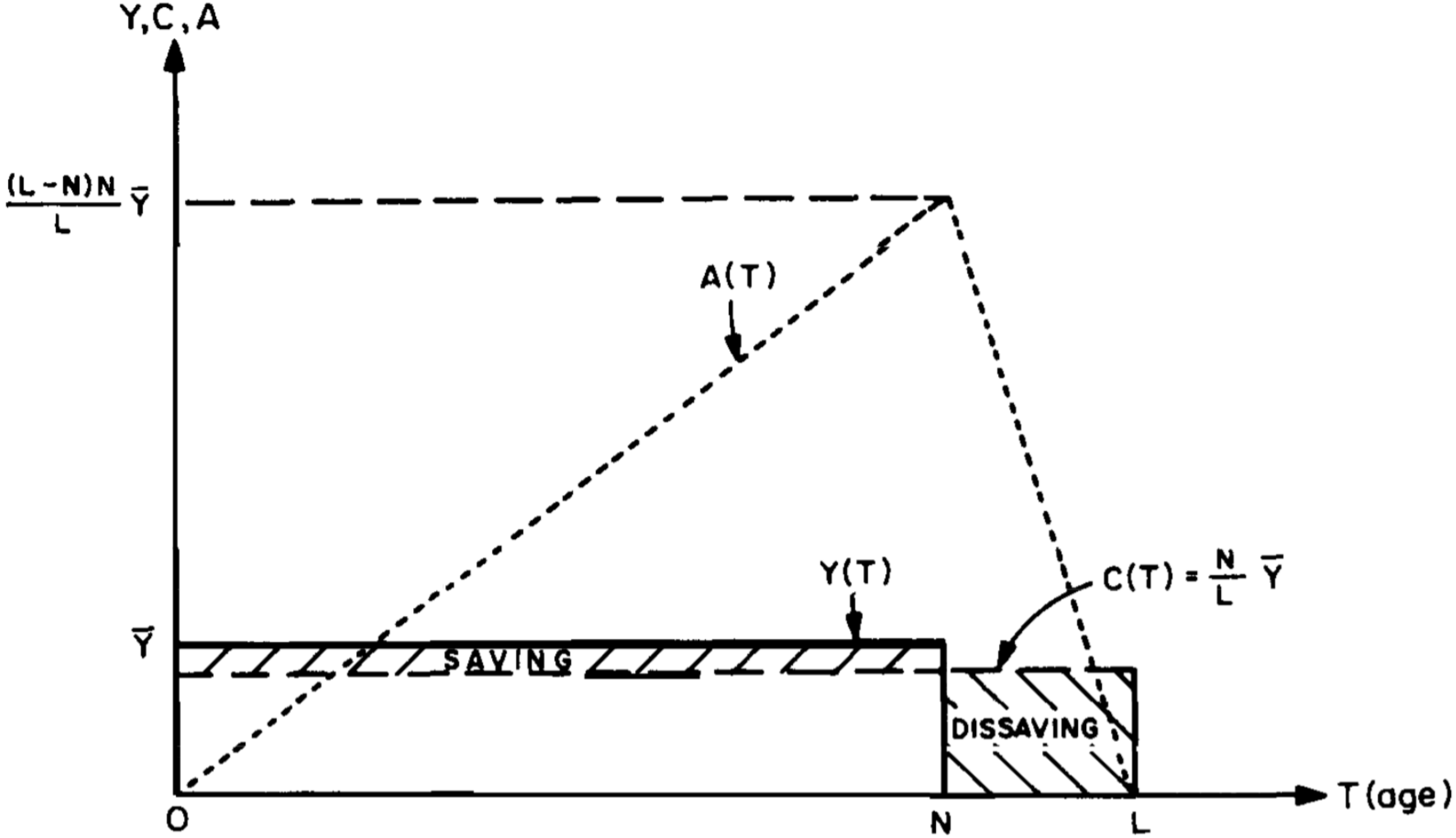
- Ex: $N = 60$, $L = 70 \rightarrow$ retirement length $L - N = 10$ years

- Labor income is constant at $\bar{Y}$ during working age period, then 0 during retirement

- Everybody fully smoothes annual consumption so that C is always equal to average per capita output: $C = \bar{Y} \cdot N/L$

- While working, people save $S = (1 - N/L) \cdot \bar{Y}$

- Then during retirement people dis-save $S = -N/L \cdot \bar{Y}$



INCOME, CONSUMPTION, SAVING AND WEALTH AS A FUNCTION OF AGE

Source: Modigliani (1985)

2.2 The Modigliani triangle formula

Aggregate wealth/income ratio = half of retirement length

$$\frac{W}{Y} = \frac{1}{2} \cdot (L - N)$$

Proof:

2.3 Predictions of simple life-cycle model

- If retirement length $L - N = 10$ years, then W/Y $=$ 500% $\rightarrow$ model can generate large and reasonable wealth/income ratios

- Aggregate wealth/income ratio is independent of income level and solely depends on demographics

- Model can be extended to $n > 0$, $g > 0$, $r > 0$

Consider an economy with $n = g = r = 0$, $N = 60$, $L = 70$, and assume that between age 60 and 70, people work just as much as before 60. Then according to the Modigliani model, the aggregate wealth/income ratio will be:

A — 0%

B — 250%

C — Indeterminate (can take any value)

D — 500%

2.4 Limits of simple life-cycle model

- Social Security $\rightarrow$ reduces need to save for retirement

- What fraction of aggregate wealth comes from life-cycle savers? Modigliani vs. Kotlikoff-Summers controversey

- Main limit: life-cycle model generates too little wealth inequality: wealth inequality simply the mirror image of income inequality

3 Dynamic random shock models

3.1 Different types of shocks

- Shocks to rates of return

- Shocks to number of children

- Shocks to saving taste across generations

3.2 Sketch of a simple dynamic random shock model

Let's consider a model where random shock is a saving taste shock:

- Each period is a generation (30 years)

- Each individual i receives same labor income $y_{Lti} = y_{Lt}$ in period t and has same annual rate of return $r_{ti} = r_t$

- Each agent chooses c_{ti} (life-time consumption) and w_{t+1i} (bequest left to children) so as to maximize a utility function

$$U(c_{ti}, w_{ti}) = c_{ti}^{1-s_{ti}} w_{ti}^{s_{ti}}$$

- where s_{ti}: bequest taste parameter

- Budget constraint: $c_{ti} + w_{t+1i} \leq y_{Lt} + (1 + r_t) \cdot w_{ti}$

- Random shocks come from idiosyncratic variations in the saving taste parameter s_{ti}

- s_{ti} drawn from some random process with mean $s = E(s_{ti}) < 1$

Theorem: under a certain number of assumptions, wealth converges to a steady-state distribution that has the following properties:

- It follows a Pareto law at the top
- The Pareto exponent a depends on taste shocks s_{ti}
- The higher the variance of shocks, the lower a
- $a \to 1$ (and thus wealth inequality tends to infinity) if the variance of shocks goes to infinity, and $a \to \infty$ if the variance goes to zero

A realistic theory of the wealth distribution has the following property:

A — Wealth inequality rises forever

B — Wealth is more unequally distributed than labor income

C — People mostly save for retirement

D — People mostly save to insure themselves against unemployment risk

4 Summary

- There are different saving motives: precautionary, life-cycle, bequest

- Life-cycle and precautionary saving alone cannot explain the level of wealth concentration

- Wealth is very concentrated because of dynamic, random shocks

References

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