Lectures on Economic Inequality

Warwick, Summer 2018, Slides 1

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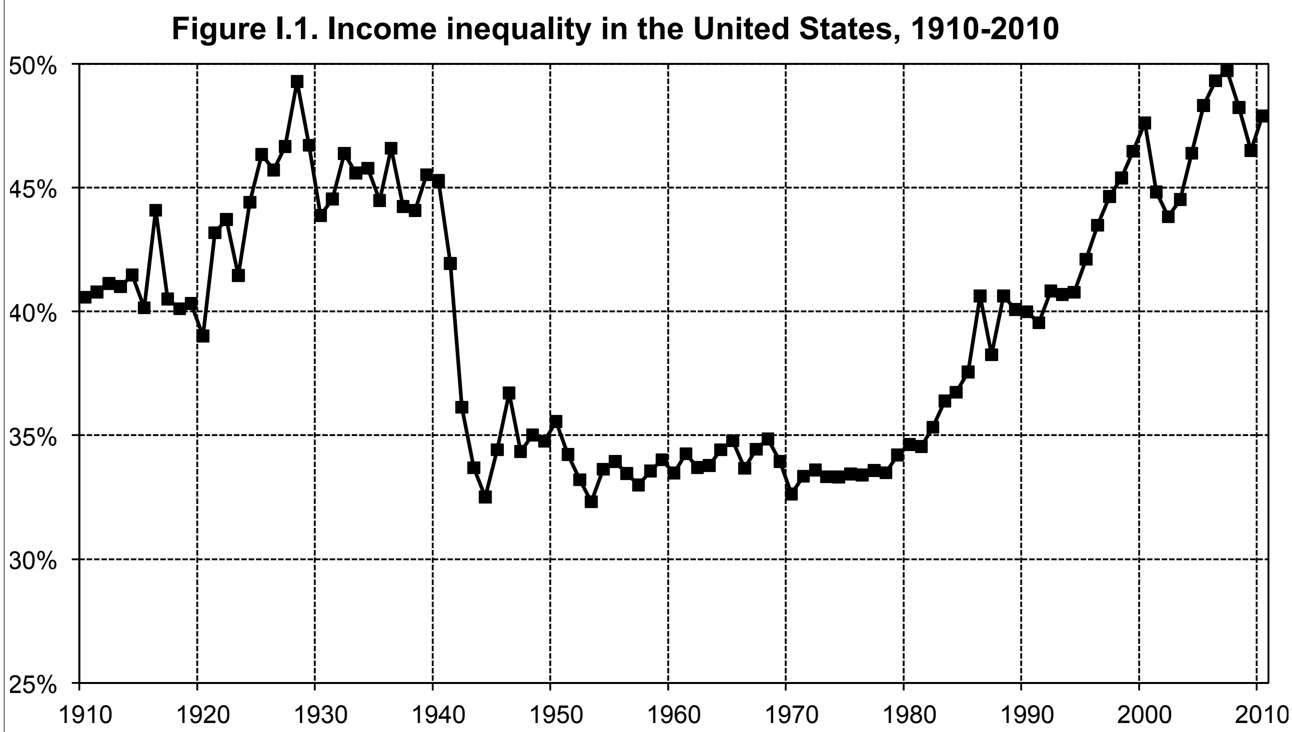
- Inequality and Divergence I. Personal Inequalities, Slides 1 and 2
- Inequality and Divergence II. Functional Inequalities
- Inequality and Conflict I. Polarization and Fractionalization
- Inequality and Conflict II. Some Empirical Findings
- Inequality and Conflict III. Towards a Theory of Class Conflict

Slides I. Background Notes on Personal Inequality

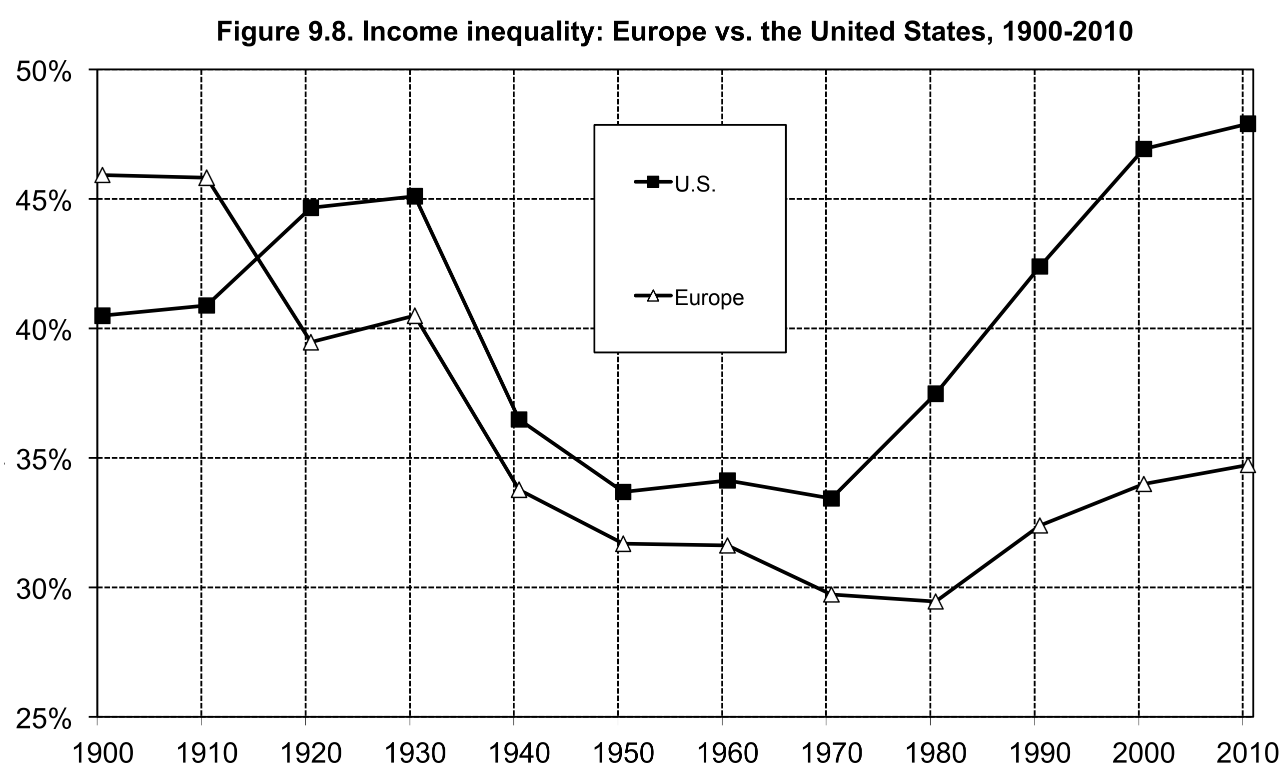
- The financial crisis sparked a new interest in inequality.
- But inequality has been historically high
- Growing steadily through late 20th century

  Wolff, Piketty, Saez, Atkinson, many others

- A classical view (due to Kuznets 1955, 1963)
- Inequality rises and then falls with development
- Instead: The Great U-Turn
- Uneven versus compensatory changes

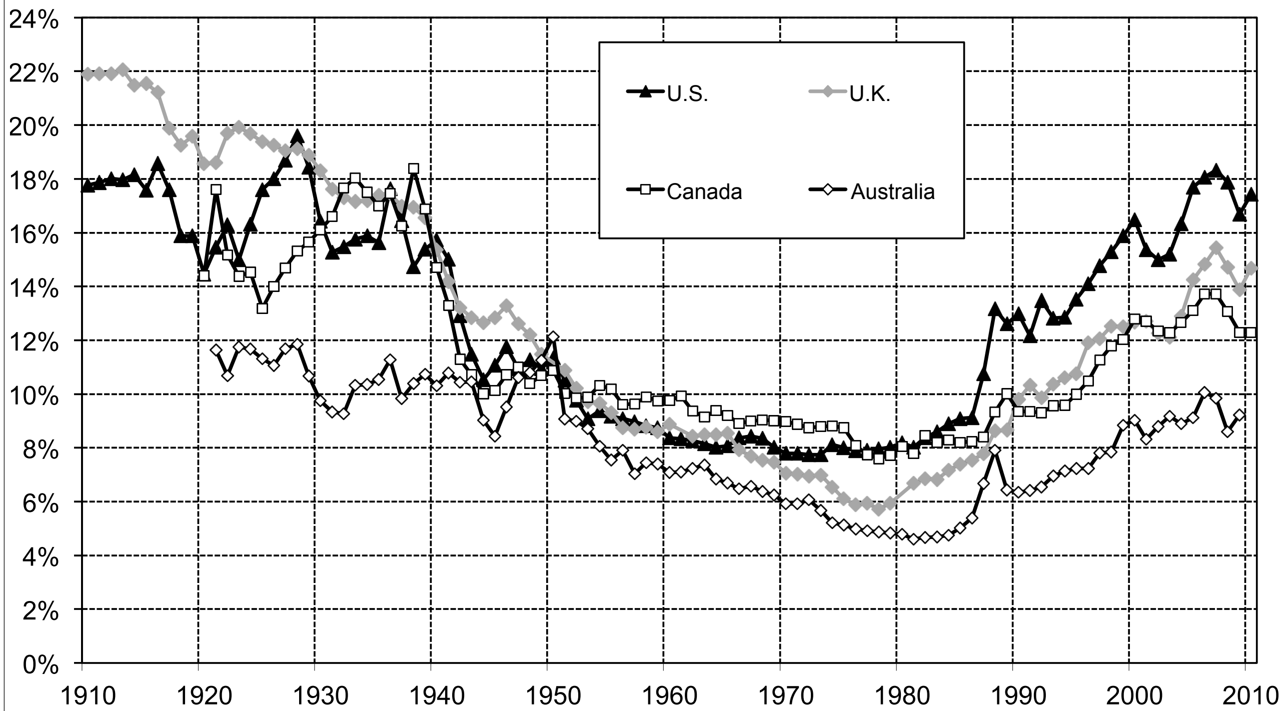


Source: Piketty (2014)



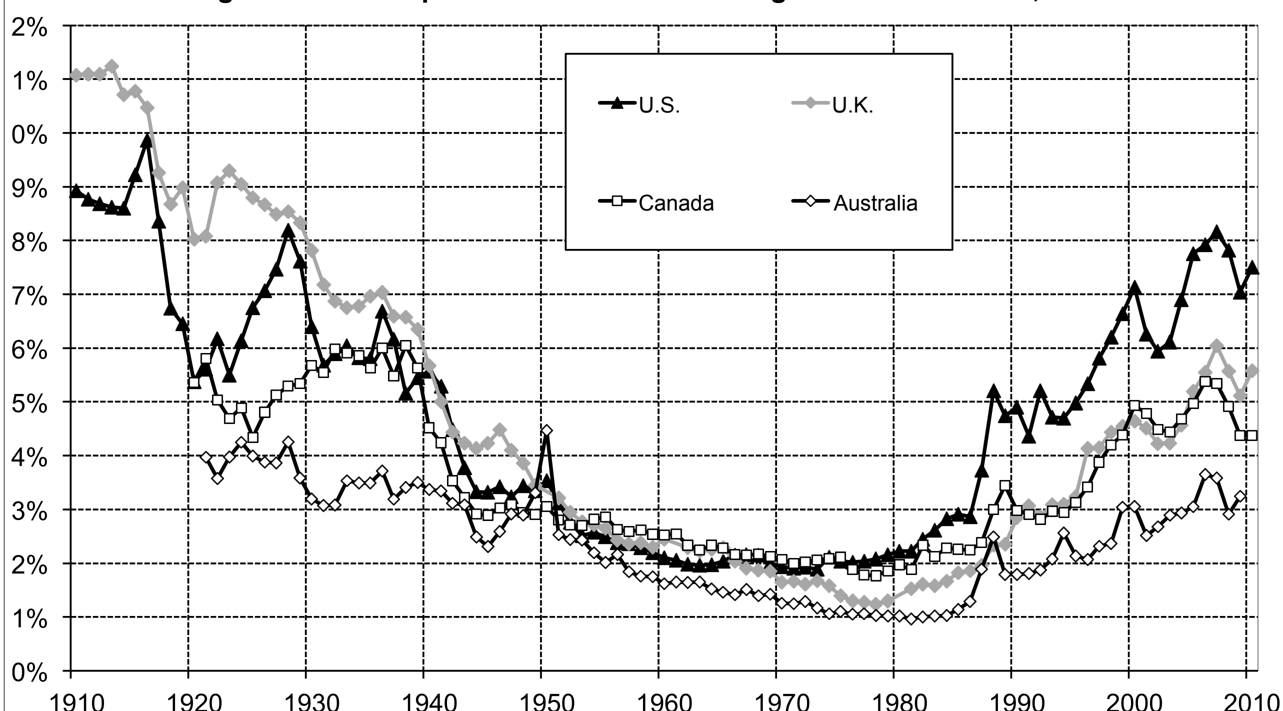
Source: Piketty (2014)

Figure 9.2. Income inequality in Anglo-saxon countries, 1910-2010



Source: Piketty (2014)

Figure 9.5. The top 0.1% income share in Anglo-saxon countries, 1910-2010



Source: Piketty (2014)

Parallels With Inter-Country Inequality

- Within-country:
  - Kuznets
- Cross-country:
  - Solow
- Neither story appears to work too well.

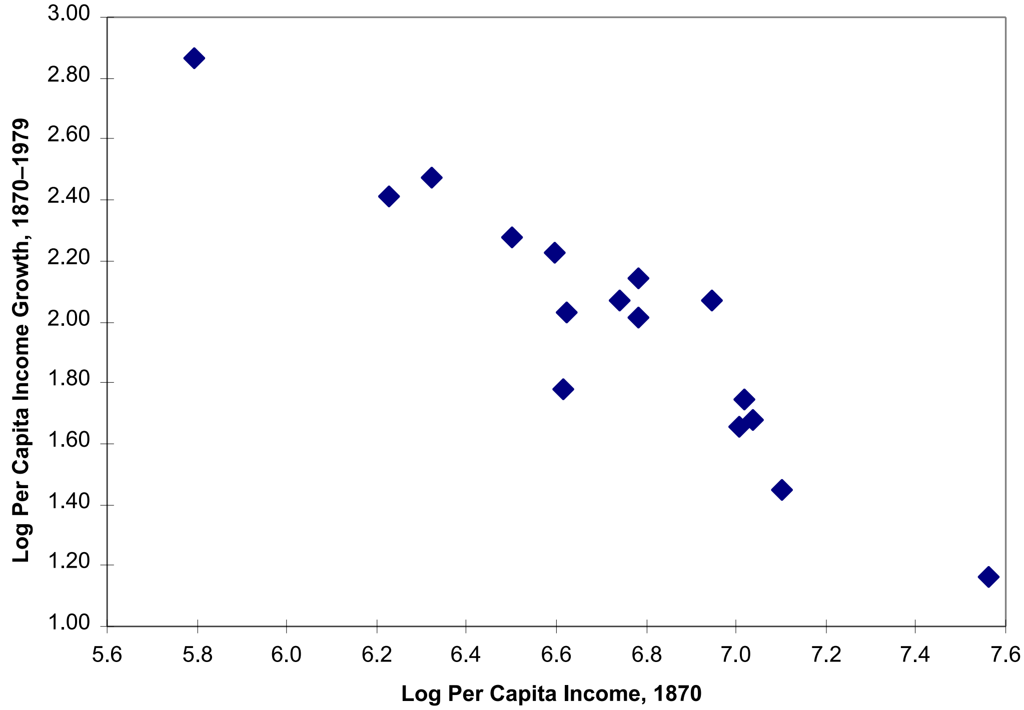
Cross-Country Convergence: The Perils of Hopeful Regressions

- Baumol (AER 1986): 16 countries, among the richest in the world today.
  - In order of poorest to richest in 1870: Japan, Finland, Sweden, Norway, Germany, Italy, Austria, France, Canada, Denmark, the United States, the Netherlands, Switzerland, Belgium, the United Kingdom, and Australia.
  - Angus Maddison: per-capita incomes for 1870.
  - Idea: regress 1870–1979 growth rate on 1870 incomes.

$$\ln y_i^{1979} - \ln y_i^{1870} = A + b \ln y_i^{1870} + \varepsilon_i$$

  - Unconditional convergence $\Rightarrow b \simeq -1$.
  - Get $b = -0.995$, $R^2 = 0.88$.

- What's wrong with this picture?



- De Long critique (AER 1988):

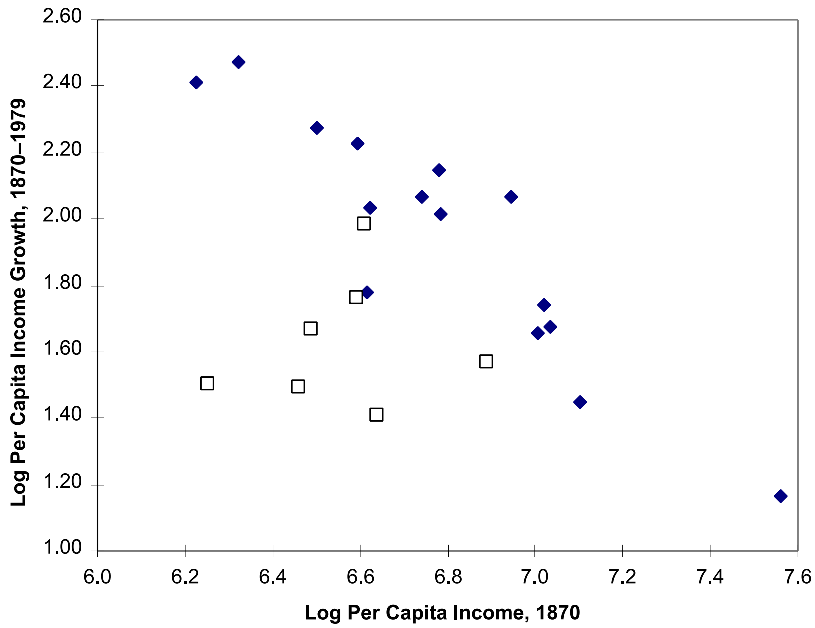
  - Add seven more countries to Maddison's 16.

  - In 1870, they had as much claim to membership in the "convergence club" as any included in the 16: Argentina, Chile, East Germany, Ireland, New Zealand, Portugal, and Spain.

  - New Zealand, Argentina, and Chile were in the list of top ten recipients of British and French overseas investment (in per capita terms) as late as 1913.

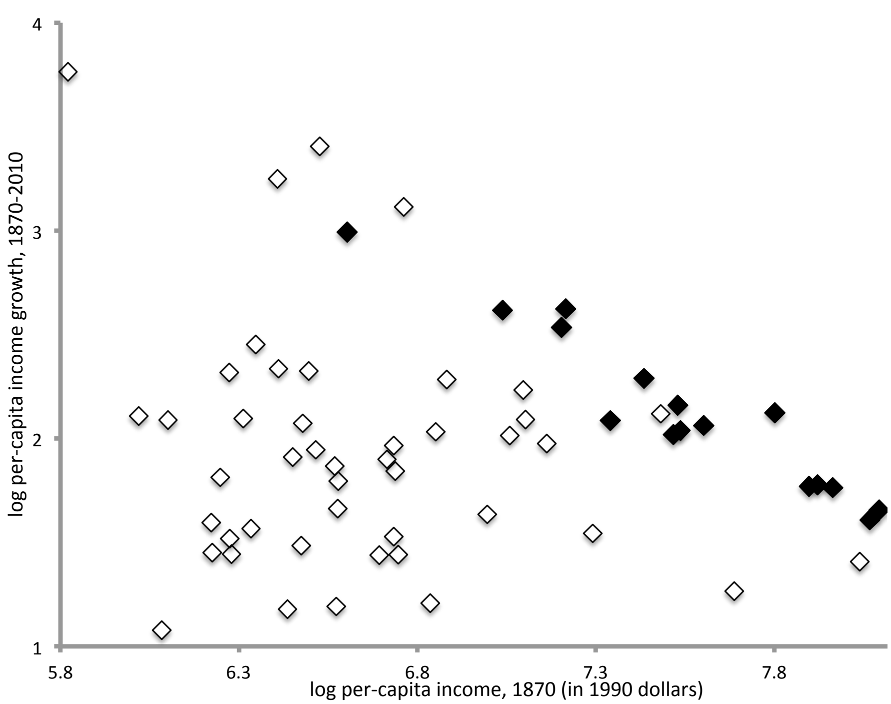
  - All had per capita GDP higher than Finland in 1870.

  - Strategy: drop Japan (why?), add the 7.



- Slope still negative, though loses significance.
- Correct for measurement error, game over.

- Updated Maddison dataset 2013, 60 countries:



- Black points are Maddison's 16 on which Baumol (1986) was based.

Capital in the 21st Century

- A recent book by Piketty:
  - summarizes the evidence (compelling and useful)
  - describes three "fundamental laws"
  - is a runaway hit in the United States, touching a raw nerve

Piketty's Three Fundamental Laws

- The First Fundamental Law:

$$\frac{\text{Capital Income}}{\text{Total Income}} = \frac{\text{Capital Income}}{\text{Capital Stock}} \times \frac{\text{Capital Stock}}{\text{Total Income}}.$$

- Share of capital income equals rate of return on capital multiplied by the capital-output ratio.
  - Useful in organizing our mental accounting system.
  - But it explains nothing.

- The Second Fundamental Law:

- Growth rate equals savings rate divided by capital-output ratio.

- Basic capital accumulation equation:

$$K(t+1) = [1-\delta(t)]K(t) + I(t) = [1-\delta(t)]K(t) + s(t)Y(t)$$

- Convert to growth rates:

$$G(t) = \frac{s(t)}{\theta(t)} - \delta(t),$$

where $G(t) = [K(t+1) - K(t))]/K(t)$ and $\theta(t) = K(t)/Y(t)$.

- Approximate per-capita version: subtract $n(t)$, the rate of population growth.

$$g(t) \simeq \frac{s(t)}{\theta(t)} - \delta(t) - n(t),$$

- Note: This isn't a theory unless you take a stand on one or more of the variables.

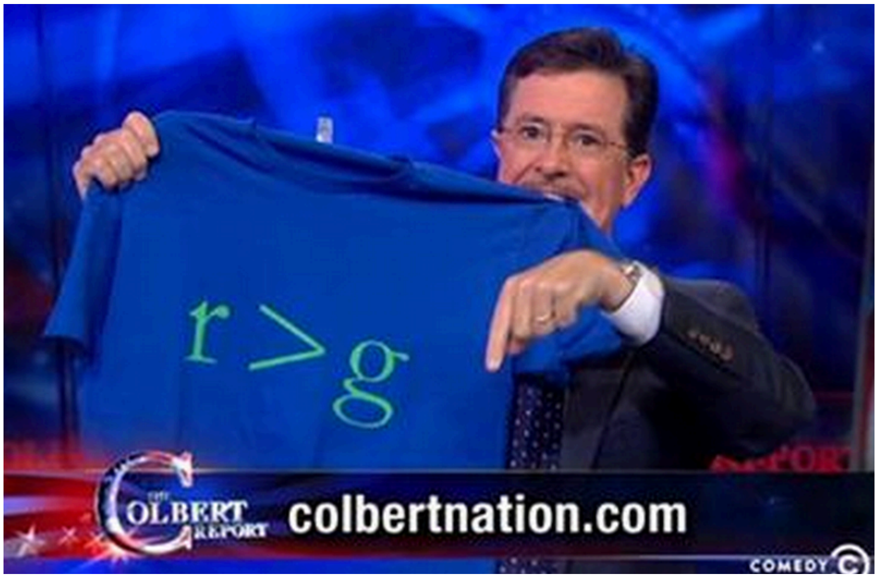
Backwards: "Explaining" Capital-Output Ratios Using Growth Rates!

- Piketty:

"If one now combines variations in growth rates with variations in savings rate, it is easy to explain why different countries accumulate very different quantities of capital, and why the capital-income ratio has risen sharply since 1970. One particularly clear case is that of Japan: with a savings rate close to 15 percent a year and a growth rate barely above 2 percent, it is hardly surprising that Japan has over the long run accumulated a capital stock worth six to seven years of national income. This is an automatic consequence of the [second] dynamic law of accumulation." (p.175)

"The very sharp increase in private wealth observed in the rich countries, and especially in Europe and Japan, between 1970 and 2010 thus can be explained largely by slower growth coupled with continued high savings, using the [second] law …" (p. 183)

- The Third Fundamental Law:
  - $r > g$



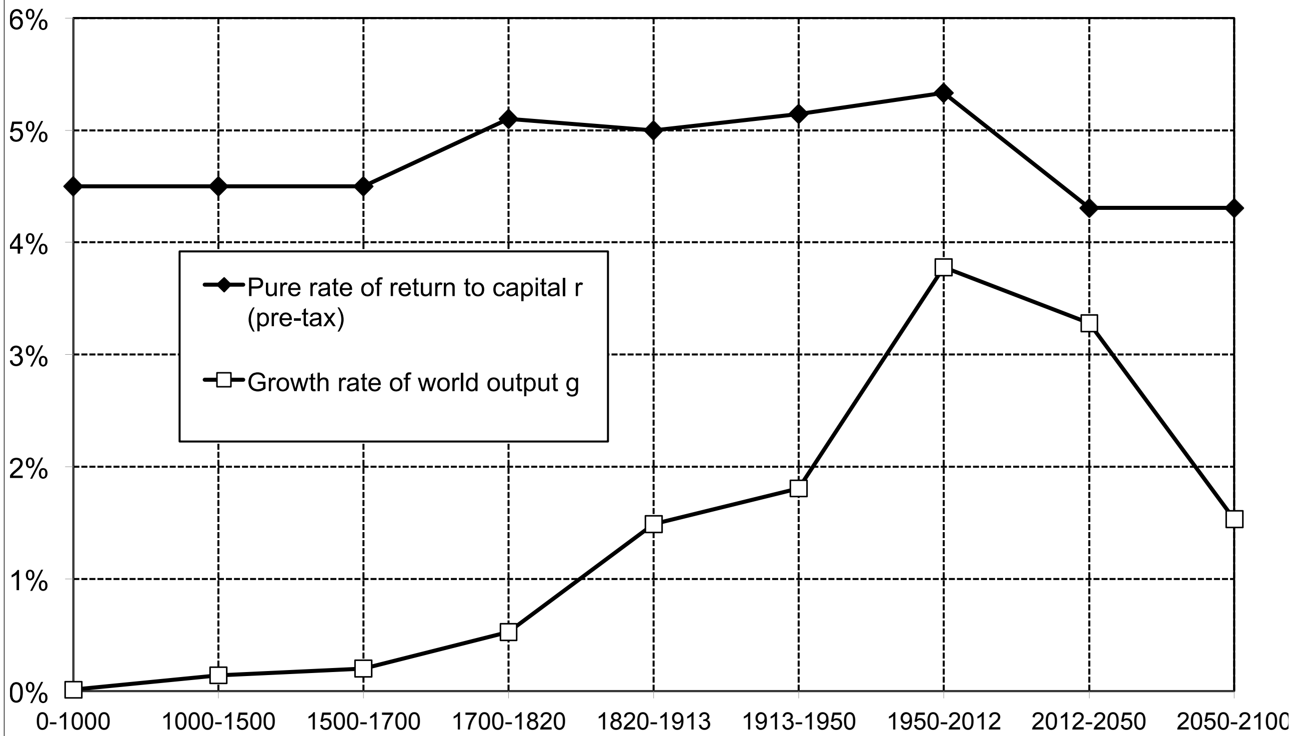
$r > g$: "The Central Contradiction of Capitalism"

"Whenever the rate of return on capital is significantly and durably higher than the growth rate of the economy, ... wealth originating in the past automatically grows more rapidly than wealth stemming from work."

"This inequality expresses a fundamental logical contradiction ... the past devours the future ... the consequences are potentially terrifying, etc."

?

- $r > g$ in the data.



Not a Tautology, True, But an Efficiency Condition

- Recall: $K(t+1) = [1-\delta(t)]K(t) + s(t)Y(t)$. ▪ Impose $s(t) = s$, $\delta(t) = \delta$, and

$$Y_t = AK_t^{\theta}[(1+\gamma)^t L_t]^{1-\theta},$$

where L_t grows at rate n, and γ is technical progress.

- Normalize: $k_t \equiv K_t/L_t(1+\gamma)^t$ and $y_t \equiv Y_t/L_t(1+\gamma)^t$; then

$$y_t = Ak_t^{\theta}.$$

▪ and

$$(1+n)(1+\gamma)k_{t+1} = (1-\delta)k_t + sAk_t^{\theta},$$

Not a Tautology, True, But an Efficiency Condition

- So far: $y_t = Ak_t^\theta$ and $(1+n)(1+\gamma)k_{t+1} = (1-\delta)k_t + sAk_t^\theta$, so that

$$k_t \to k^* \simeq \left[\frac{sA}{n+\gamma+\delta}\right]^{1/(1-\theta)}$$

  - and

$$y_t \to y^* \simeq A^{1/(1-\theta)} \left[\frac{s}{n+\gamma+\delta}\right]^{\theta/(1-\theta)}.$$

  - So the overall rate of growth converges to $n+\gamma$.

- On the other hand, r is given by the marginal product:

$$\begin{aligned} r_t &= \theta A \left[K_t/(1+\gamma)^t L_t\right]^{\theta-1} \\ &= \theta A k_t^{\theta-1} \\ &\to \theta A \left[\frac{sA}{n+\gamma+\delta}\right]^{-1} \\ &= \frac{\theta}{s}[n+\gamma+\delta], \end{aligned}$$

Not a Tautology, True, But an Efficiency Condition

- So down to comparing $r = \frac{\theta}{s}[n+\gamma+\delta]$ with $g = n+\gamma$.
  - $\Rightarrow r > g$ if $\theta \geq s$ (surely true empirically, but also for deeper reasons):
- s is inefficient if consumption can be improved in all periods.
  - Easy example: $s = 1$, but there are others.
- Recall that Y_t/L_t converges to

$$A^{1/(1-\theta)}(1+\gamma)^t \left(\frac{s}{n+\gamma+\delta}\right)^{\theta/(1-\theta)}$$

  - and per-capita consumption converges to the path

$$A^{1/(1-\theta)}(1+\gamma)^t \left(\frac{s}{n+\gamma+\delta}\right)^{\theta/(1-\theta)} (1-s).$$

- It follows that if $s > \theta$, the growth path is inefficient.

Differential Savings Rates

- The Third Law is really a simple statement about differential savings rates.

- For instance, assume that the rich earn predominantly capital income

$$y_t = c_t + k_t$$

$$k_t = sy_t, \quad y_{t+1} = rk_t$$

$$y(t) = y(0)(1+sr)^t$$

- If initial rich share is $x(0)$, and g is rate of growth, then t periods later:

$$x(t) = x(0)\left(\frac{1+sr}{1+g}\right)^t$$

- Can back out r if we know s and $\{x(t)\}$:

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g)-1}{s}$$

Differential Savings Rates

- Do the rich save more than the poor?

- Unclear: out of lifetime income or current income?

Friedman (1957), see discussion in Dynan-Skinner-Zeldes (2004)

- Estimates from Survey of Consumer Finances (SCF):

	6-Yr Income Average	Instrumented By Vehicle Consumption
Quintile 1	1.4	2.8
Quintile 2	9.0	14.0
Quintile 3	11.1	13.4
Quintile 4	17.3	17.3
Quintile 5	23.6	28.6
Top 5%	37.2	50.5
Top 1%	51.2	35.6

Source: Dynan-Skinner-Zeldes (2004), they provide other estimates

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g)-1}{s}$$

- Some quick calculations for top 10% in the US:
  - $x_0 = 1/3$ in 1970, rises to $x_t = 47/100$ in 2000.
  - Estimate for g: 2% per year.
  - Estimate from Dynan et al for s: 35% (optimistic).
  - Can back out for r: $r = 9.7\%$.
- Inflation-adjusted rate of return on US stocks over 20th century: 6.5%
  - Much lower in the 1970s and 2000s, higher in the 1980s and 1990s.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g)-1}{s}$$

- Similar calculations for top 1% in the US:
  - $x_0 = 8/100$ in 1980, rises to $x_t = 18/100$ in 2005.
  - Estimate for g: 2% per year.
  - Estimate from Dynan et al for s: 51%.
  - Can back out for r: $r = 10.5\%$.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s}$$

- Try the top 0.1% for the United States:
  - $x_0 = 2.2/100$ in 1980, rises to $x_t = 8/100$ in 2007.
  - Estimate for g: 2% per year.
  - If these guys also save at 0.5, then $r = 14.4\%$!
  - If they save $3/4$ of their income, then $r = 9.6\%$.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s}$$

- Slightly better job for Europe, but not much. Top 10%:
  - $x_0 = 29/100$ in 1980, rises to $x_t = 35/100$ in 2010.
  - Estimate for g: 2% per year.
  - Estimate from Dynan et al for s: 35%.
  - Can back out for r: $r = 7.5\%$.
- High relative to r in Europe.
  - UK the highest at 5.3% over 20th century, others appreciably lower.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g)-1}{s}$$

- Finally, top 1% for the UK:
  - $x_0 = 6/100$ in 1980, rises to $x_t = 15/100$ in 2005.
  - Estimate for g: 2% per year.
  - Estimate from Dynan et al for s: 51%.
  - Can back out for r: $r = 11.4\%$.
- Summary
- Differential savings rates explain some of the inequality, but far from all of it.

What Explains the High Rates of Return to the Rich?

- Two broad groups of answers:
  - The rich have information on higher rates of return (see Supplement)
  - The rich have physical access to higher rates of return.
- Better physical access: imperfect capital markets and nonconvexities:
  - Stocks (no problem)
  - Hedge funds?
  - Private unincorporated businesses (moral hazard, adverse selection)
  - Human capital (inalienability, holding children responsible for debt)

- Human capital should get more attention as a fundamental vehicle for inequality:
  - "Labor income inequality is as important or more important than all other income sources combined in explaining total income inequality." Fields (2004)
  - Even Piketty backs away when it comes to U.S. inequality:

"a very substantial and growing inequality of capital income since 1980 accounts for about one-third of the increase in inequality in the United States — a far from negligible amount." See also Saez and Zucman (2014)

  - Labor income inequality accounts for the bulk of it.
- The deeper point: unincorporated economic activity is important for inequality.
  - This is what we turn to next.