Inequality & Capitalism in the Long Run

Thomas Piketty
Paris School of Economics
Lindahl Lectures, Part 1, April 24th 2013
These lectures: how do wealth-income and inheritance-income ratios evolve in the long run, and why?

The rise of top income shares will not be covered in these lectures: highly relevant for the US, but less so for Europe.

In Europe, and possibly everywhere in the very long run, the key issue the rise of wealth-income ratios and the possible return of inherited wealth

So this lecture will focus on the long run evolution of wealth and inheritance.

If you want to know more about top incomes, have a look at « World Top Incomes Database » website.
• Key issue today: wealth & inheritance in the long run

• **There are two ways to become rich**: either through one’s own work, or through inheritance

• In Ancien Regime societies, as well as in 19\textsuperscript{C} and early 20\textsuperscript{C}, it was obvious to everybody that the inheritance channel was important

• Inheritance and successors were everywhere in the 19\textsuperscript{C} literature: Balzac, Jane Austen, etc.

• Inheritance flows were huge not only in novels; but also in 19\textsuperscript{C} tax data: major economic, social and political issue
• Question: Does inheritance belong to the past? Did modern growth kill the inheritance channel? E.g. due to the natural rise of human capital and meritocracy? Or due to the rise of life expectancy?

• I will answer « NO » to this question: I find that inherited wealth will probably play as big a role in 21\textsuperscript{C} capitalism as it did in 19\textsuperscript{C} capitalism

• Key mechanism if low growth $g$ and $r > g$
Figure 2: Annual inheritance flow as a fraction of disposable income, France 1820-2008

- Economic flow (computed from national wealth estimates, mortality tables and observed age-wealth profiles)
- Fiscal flow (computed from observed bequest and gift tax data, inc. tax exempt assets)
An annual inheritance flow around 20%-25% of disposable income is a very large flow.

E.g. it is much larger than the annual flow of new savings (typically around 10%-15% of disposable income), which itself comes in part from the return to inheritance (it’s easier to save if you have inherited your house & have no rent to pay).

An annual inheritance flow around 20%-25% of disposable income means that total, cumulated inherited wealth represents the vast majority of aggregate wealth (typically above 80%-90% of aggregate wealth), and vastly dominates self-made wealth.
• **Main lesson:** with \(g\) low & \(r>g\), inheritance is bound to dominate new wealth; the past eats up the future

\(g\) = growth rate of national income and output

\(r\) = rate of return to wealth = \((\text{interest} + \text{dividend} + \text{rent} + \text{profits} + \text{capital gains etc.})/(\text{net financial} + \text{real estate wealth})\)

• **Intuition:** with \(r>g\) & \(g\) low (say \(r=4\%-5\%\) vs \(g=1\%-2\%\)) (=19\(^{\circ}\) & 21\(^{\circ}\)), wealth coming from the past is being capitalized faster than growth; heirs just need to save a fraction \(g/r\) of the return to inherited wealth

• It is only in countries and time periods with \(g\) exceptionally high that self-made wealth dominates inherited wealth (Europe in 1950s-70s or China today)

• \(r > g\) & \(g\) low might also lead to the return of extreme levels of wealth concentration (not yet: middle class bigger today)
Figure 10.1. Wealth inequality in France, 1810-2010

- Top 10% share in total wealth
- Top 1% share in total wealth
Figure 10.2. Wealth inequality: Paris vs. France, 1810-2010
Figure 10.3. Wealth inequality in the UK, 1810-2010

- Top 10% wealth share
- Top 1% wealth share
Figure 10.4. Wealth inequality in Sweden, 1810-2010 (Roine-Waldenstrom)
Figure 10.5. Wealth inequality in the US, 1810-2010
These lectures: three issues

(1) The return of wealth
(Be careful with « human capital » illusion: human k did not replace non-human financial & real estate capital)

(2) The return of inherited wealth
(Be careful with « war of ages » illusion: the war of ages did not replace class war; inter-generational inequality did not replace intra-generational inequality)

(3) The optimal taxation of wealth & inheritance
(With two-dimensional inequality, wealth taxation is useful)

(1) : covered in Part 1 (today)
(2)-(3) : mostly covered in Part 2 (come back tomorrow!)
• Lectures based upon:
• « On the long-run evolution of inheritance: France 1820-2050 », QJE 2011
• « Capital is back: wealth-income ratios in rich countries 1700-2010 » (with Zucman, WP 2013)
• « Inherited vs self-made wealth: theory & evidence from a rentier society » (with Postel-Vinay & Rosenthal, 2011)
• On-going work on other countries (Atkinson UK, Schinke Germany, Roine-Waldenstrom Sweden, Alvaredo US) → towards a World Wealth & Income Database
• « A Theory of Optimal Inheritance Taxation » (with Saez, Econometrica 2013)

(all papers are available on line at piketty.pse.ens.fr)
1. The return of wealth

• How do aggregate wealth-income ratios evolve in the long-run, and why?

• Impossible to address this basic question until recently: national accounts were mostly about flows, not stocks

• We compile a new dataset to address this question:

  - **1970-2010**: Official balance sheets for US, Japan, Germany, France, UK, Italy, Canada, Australia
  - **1870-**: Historical estimates for US, Germany, France, UK
  - **1700-**: Historical estimates for France, UK
We Find a Gradual Rise of Private Wealth-National Income Ratios over 1970-2010

Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
European Wealth-Income Ratios Appear to be Returning to Their High 18c-19c Values...

Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
...Despite Considerable Changes in the Nature of Wealth: UK, 1700-2010

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets
In the US, the Wealth-Income Ratio Also Followed a U-Shaped Evolution, But Less Marked
How Can We Explain the 1970-2010 Evolution?

1. **An asset price effect**: long run asset price recovery driven by changes in capital policies since world wars

1. **A real economic effect**: slowdown of productivity and pop growth:
   - Harrod-Domar-Solow: wealth-income ratio $\beta = s/g$
   - If saving rate $s = 10\%$ and growth rate $g = 3\%$, then $\beta \approx 300\%$
   - But if $s = 10\%$ and $g = 1.5\%$, then $\beta \approx 600\%$

Countries with low $g$ are bound to have high $\beta$. Strong effect in Europe, ultimately everywhere.
How Can We Explain Return to 19c Levels?

In very long run, limited role of asset price divergence

- In short/medium run, war destructions & valuation effects paramount
- But in the very long run, no significant divergence between price of consumption and capital goods
- Key long-run force is $\beta = s/g$

One sector model accounts reasonably well for long run dynamics & level differences Europe vs. US
Three models delivering the same result

**BU: Bequest-in-utility-function model**
Max $U(c,b)=c^{1-s}b^s$ (or $\Delta b^s$)
c = lifetime consumption, b = end-of-life wealth (bequest)
s = bequest taste = saving rate $\rightarrow \beta = s/g$

**DM: Dynastic model:**
Max $\sum U(c_t)/(1+\delta)^t$
$\rightarrow r = \delta + \rho g$, $s = g\alpha/r$, $\beta = \alpha/r = s/g$ ($\beta \uparrow$ as $g \downarrow$)
$U(c)=c^{1-\rho}/(1-\rho)$, $F(K,L)=K^\alpha L^{1-\alpha}$

**OLG model:** low growth implies higher life-cycle savings

$\rightarrow$ in all three models, $\beta = s/g$ rises as $g$ declines
### Growth Rates and Private Saving Rates in Rich Countries, 1970-2010

<table>
<thead>
<tr>
<th></th>
<th>Real growth rate of national income</th>
<th>Population growth rate</th>
<th>Real growth rate of per capita national income</th>
<th>Net private saving rate (personal + corporate) (% national income)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>2.8%</td>
<td>1.0%</td>
<td>1.8%</td>
<td>7.7%</td>
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<tr>
<td>Japan</td>
<td>2.5%</td>
<td>0.5%</td>
<td>2.0%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Germany</td>
<td>2.0%</td>
<td>0.2%</td>
<td>1.8%</td>
<td>12.2%</td>
</tr>
<tr>
<td>France</td>
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</tbody>
</table>
Lesson 1a: Capital is Back

- Low $\beta$ in mid-20c were an anomaly
  - Anti-capital policies depressed asset prices
  - Unlikely to happen again with free markets
  - Who owns wealth will become again very important

- $\beta$ can vary a lot between countries
  - $s$ and $g$ determined by different forces
  - With perfect markets: scope for very large net foreign asset positions
  - With imperfect markets: domestic asset price bubbles

High $\beta$ raise new issues about capital regulation & taxation
Private Wealth-National Income Ratios, 1970-2010, including Spain

Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)

Authors' computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)
National vs. Foreign Wealth, 1970-2010
(\% National Income)

Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors).
Lesson 1b: The Changing Nature of Wealth and Technology

- **In 21st century: \( \sigma > 1 \)**
  - Rising \( \beta \) come with decline in average return to wealth \( r \)
  - But decline in \( r \) smaller than increase in \( \beta \) \( \rightarrow \) capital shares \( \alpha = r\beta \) increase
  \( \rightarrow \) Consistent with K/L elasticity of substitution \( \sigma > 1 \)

- **In 18th century: \( \sigma < 1 \)**
  - In 18c, K = mostly land
  - In land-scarce Old World, \( \alpha \approx 30\% \)
  - In land-rich New World, \( \alpha \approx 15\% \)
  \( \rightarrow \) Consistent with \( \sigma < 1 \): when low substitutability, \( \alpha \) large when K relatively scarce
The changing nature of national wealth, UK 1700-2010

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets

Net foreign assets
Other domestic capital
Housing
Agricultural land
National wealth = agricultural land + housing + other domestic capital goods + net foreign assets
The changing nature of national wealth, US 1770-2010

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets
The changing nature of national wealth, US 1770-2010 (incl. slaves)

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets
Rising $\beta$ Come With Rising Capital Shares $\alpha$...
... And Slightly Declining Average Returns to Wealth $\Rightarrow \sigma > 1$ and Finite
End of Part 1: what have we learned?

- A world with g low & r>g leads to the return of non-human inherited wealth and can be gloomy for workers with zero initial wealth… especially if global tax competition drives capital taxes to 0%… especially if top labor incomes take a rising share of aggregate labor income

→ A world with g=1.5% (=long-run world technological frontier?) is not very different from a world with g=0% (Marx-Ricardo)

- From a r-vs-g viewpoint, 21c maybe not too different from 19c – but still better than Ancien Regime… except that nobody tried to depict AR as meritocratic…
Figure 10.10. World rate of return vs growth rate, 0-2200

- Private rate of return to wealth $r$ (after tax and capital loss)
- World output growth rate $g$
Inequality & Capitalism in the Long Run

Thomas Piketty
Paris School of Economics
Lindahl Lectures, Part 2, April 25th 2013
Roadmap of Part 2

(1) The return of wealth
(already covered in Part 1; I will just start by presenting a few more technical results)

(2) The return of inherited wealth

(3) The optimal taxation of wealth & inheritance
1. The Return of Wealth: W & Y Concepts

- **Wealth**
  - Private wealth $W = \text{assets} - \text{liabilities of households}$
  - Corporations valued at market prices through equities
  - Government wealth $W_g$
  - National wealth $W_n = W + W_g$
  - National wealth $W_n = K (\text{land + housing + other domestic capital}) + NFA (\text{net foreign assets})$

- **Income**
  - Domestic output $Y_d = F(K,L)$ (net of depreciation)
  - National income $Y = \text{domestic output } Y_d + r NFA$
  - Capital share $\alpha = r \beta$ ($r = \text{average rate of return}$)

$$\beta = \frac{W}{Y} = \text{private wealth-national income ratio}$$
$$\beta_n = \frac{W_n}{Y} = \text{national wealth-national income ratio}$$
Accounting for Wealth Accumulation: One Good Model

In any one-good model:

- At each date $t$: $W_{t+1} = W_t + s_t Y_t$
  \[ \beta_{t+1} = \beta_t \frac{1+g_{wst}}{1+g_t} \]

  - $1+g_{wst} = 1+s_t/\beta_t$ = saving-induced wealth growth rate
  - $1+g_t = Y_{t+1}/Y_t$ = output growth rate (productivity + pop.)

- In steady state, with fixed saving rate $s_t=s$ and growth rate $g_t=g$:
  \[ \beta_t \rightarrow \beta = s/g \] (Harrod-Domar-Solow formula)

  - Example: if $s = 10\%$ and $g = 2\%$, then $\beta = 500\%$
**Accounting for Wealth Accumulation: One Good Model**

\[ \beta = \frac{s}{g} \text{ is a pure accounting formula}, \text{ i.e. valid wherever } s \text{ comes from:} \]

- **Wealth or bequest in the utility function:** saving rate \( s \) set by \( u() \) (intensity of wealth or bequest taste) and/or demographic structure; \( \beta = \frac{s}{g} \) follows

- **Dynastic utility:** rate of return \( r \) set by \( u() \); if \( \alpha \) set by technology, then \( \beta = \frac{\alpha}{r} \) follows (\( s = \frac{\alpha g}{r} \), so \( \beta = \frac{\alpha}{r} = \frac{s}{g} \))

- **With general utility functions,** both \( s \) and \( r \) are jointly determined by \( u() \) and technology
Two goods: one capital good, one consumption good

• Define $1+q_t$ = real rate of capital gain (or loss)
  = excess of asset price inflation over consumer price inflation

• Then $\beta_{t+1} = \beta_t (1+g_{wst})(1+q_t)/(1+g_t)$

  $1+g_{wst} = 1+s_t/\beta_t = $ saving-induced wealth growth rate
  $1+q_t = $ capital-gains-induced wealth growth rate
Our Empirical Strategy

• We do not specify where $q_t$ come from
  - maybe stochastic production functions for capital vs. consumption good, with different rates of technical progress

• We observe $\beta_t, \ldots, \beta_{t+n}$
  $s_t, \ldots, s_{t+n}$
  $g_t, \ldots, g_{t+n}$

and we decompose the wealth accumulation equation between years $t$ and $t + n$ into:
  – Volume effect (saving) vs.
  – Price effect (capital gain or loss)
Data Sources and Method, 1970-2010

- **Official annual balance sheets for top 8 rich countries:**
  - Assets (incl. non produced) and liabilities at market value
  - Based on census-like methods: reports from financial institutions, housing surveys, etc.
  - Known issues (e.g., tax havens) but better than PIM

- **Extensive decompositions & sensitivity analysis:**
  - Private vs. national wealth
  - Domestic capital vs. foreign wealth
  - Private (personal + corporate) vs. personal saving
  - Multiplicative vs. additive decompositions
  - R&D
1970-2010: A Low Growth and Asset Price Recovery Story

- Key results of the 1970-2010 analysis:
  - Non-zero capital gains
  - Account for significant part of 1970-2010 increase
  - But significant increase in $\beta$ would have still occurred without K gains, just because of $s \& g$

The rise in $\beta$ is more than a bubble

Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
NB: The Rise Would be Even More Spectacular Should We Divide Wealth by Disposable Income

Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
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### A Pattern of Small, Positive Capital Gains on Private Wealth…

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<th>Private wealth-national income ratios</th>
<th>Decomposition of 1970-2010 wealth growth rate</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Real growth rate of private wealth $g_w$</td>
</tr>
<tr>
<td>U.S.</td>
<td>342% 410%</td>
</tr>
<tr>
<td>Japan</td>
<td>299% 601%</td>
</tr>
<tr>
<td>Germany</td>
<td>225% 412%</td>
</tr>
<tr>
<td>France</td>
<td>310% 575%</td>
</tr>
<tr>
<td>U.K.</td>
<td>306% 522%</td>
</tr>
<tr>
<td>Italy</td>
<td>239% 676%</td>
</tr>
<tr>
<td>Canada</td>
<td>247% 416%</td>
</tr>
<tr>
<td>Australia</td>
<td>330% 518%</td>
</tr>
</tbody>
</table>
... But Private Wealth / National Income Ratios Would Have Increased Without K Gains in Low Growth Countries

Simulated private wealth / national income ratios in the absence of valuation changes, based on 1970 wealth-income ratios, 1970-2010 private saving flows (including other volume changes) and real income growth rates

Authors' computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)
Decline in Gov Wealth Means National Wealth Has Been Rising a Bit Less than Private Wealth

Authors' computations using country national accounts. National wealth = private wealth + government wealth
## National Saving 1970-2010: Private vs Government

<table>
<thead>
<tr>
<th>Average saving rates 1970-2010 (% national income)</th>
<th>Net national saving (private + government)</th>
<th>incl. private saving</th>
<th>incl. government saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>5.2%</td>
<td>7.7%</td>
<td>-2.4%</td>
</tr>
<tr>
<td>Japan</td>
<td>14.6%</td>
<td>14.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Germany</td>
<td>10.2%</td>
<td>12.2%</td>
<td>-2.1%</td>
</tr>
<tr>
<td>France</td>
<td>9.2%</td>
<td>11.1%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>U.K.</td>
<td>5.3%</td>
<td>7.3%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Italy</td>
<td>8.5%</td>
<td>15.0%</td>
<td>-6.5%</td>
</tr>
<tr>
<td>Canada</td>
<td>10.1%</td>
<td>12.1%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Australia</td>
<td>8.9%</td>
<td>9.9%</td>
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### Robust Pattern of Positive Capital Gains on National Wealth

<table>
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<tbody>
<tr>
<td></td>
<td>Real growth rate of national wealth</td>
</tr>
<tr>
<td>β (1970)</td>
<td>β (2010)</td>
</tr>
<tr>
<td>U.S.</td>
<td>404%</td>
</tr>
<tr>
<td>Japan</td>
<td>359%</td>
</tr>
<tr>
<td>Germany</td>
<td>313%</td>
</tr>
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<td>France</td>
<td>351%</td>
</tr>
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<td>U.K.</td>
<td>346%</td>
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<td>Italy</td>
<td>259%</td>
</tr>
<tr>
<td>Canada</td>
<td>284%</td>
</tr>
<tr>
<td>Australia</td>
<td>391%</td>
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Pattern of Positive Capital Gains on National Wealth Largely Robust to Inclusion of R&D

Predicted wealth / income ratio 2010 (on the basis of 1970 initial wealth and 1970-2010 cumulated saving flows) (additive decomposition, incl. R&D)
National vs. Foreign Wealth, 1970-2010 (% National Income)

Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors).
The Role of Foreign Wealth Accumulation in Rising $\beta$

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<tbody>
<tr>
<td>U.S.</td>
<td>404% 4%</td>
<td>431% -25%</td>
<td>57% -30%</td>
</tr>
<tr>
<td>Japan</td>
<td>359% 3%</td>
<td>616% 67%</td>
<td>192% 64%</td>
</tr>
<tr>
<td>Germany</td>
<td>313% 8%</td>
<td>416% 39%</td>
<td>71% 31%</td>
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<tr>
<td>France</td>
<td>351% 11%</td>
<td>605% -13%</td>
<td>278% -24%</td>
</tr>
<tr>
<td>U.K.</td>
<td>365% 6%</td>
<td>527% -20%</td>
<td>189% -26%</td>
</tr>
<tr>
<td>Italy</td>
<td>259% 12%</td>
<td>609% -31%</td>
<td>392% -42%</td>
</tr>
<tr>
<td>Canada</td>
<td>284% -41%</td>
<td>412% -10%</td>
<td>97% 31%</td>
</tr>
<tr>
<td>Australia</td>
<td>391% -20%</td>
<td>584% -70%</td>
<td>244% -50%</td>
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Housing Has Played an Important Role in Many But Not All Countries

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<tbody>
<tr>
<td></td>
<td>incl. Housing incl. Other domestic capital</td>
<td>incl. Housing incl. Other domestic capital</td>
<td>incl. Housing incl. Other domestic capital</td>
</tr>
<tr>
<td>U.S.</td>
<td>399% 257%</td>
<td>456% 274%</td>
<td>57% 17%</td>
</tr>
<tr>
<td>Japan</td>
<td>356% 225%</td>
<td>548% 328%</td>
<td>192% 103%</td>
</tr>
<tr>
<td>Germany</td>
<td>305% 177%</td>
<td>377% 136%</td>
<td>71% -41%</td>
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<td>340% 236%</td>
<td>618% 247%</td>
<td>278% 11%</td>
</tr>
<tr>
<td>U.K.</td>
<td>359% 261%</td>
<td>548% 248%</td>
<td>189% -13%</td>
</tr>
<tr>
<td>Italy</td>
<td>247% 141%</td>
<td>640% 254%</td>
<td>392% 113%</td>
</tr>
<tr>
<td>Canada</td>
<td>325% 217%</td>
<td>422% 213%</td>
<td>97% -4%</td>
</tr>
<tr>
<td>Australia</td>
<td>410% 239%</td>
<td>655% 291%</td>
<td>244% 52%</td>
</tr>
</tbody>
</table>
2. The return of inherited wealth

• In principle, one could very well observe a return of wealth without a return of inherited wealth

• I.e. it could be that the rise of aggregate wealth-income ratio is due mostly to the rise of life-cycle wealth (pension funds)

• Modigliani life-cycle theory: people save for their old days and die with zero wealth, so that inheritance flows are small
• However the Modigliani story happens to be partly wrong (except in the 1950s-60s, when there’s not much left to inherit…): pension wealth is a limited part of wealth (<5% in France… but 20% in the UK)

• Bequest flow-national income ratio $B/Y = \mu \, m \, W/Y$
  (with $m =$ mortality rate, $\mu =$ relative wealth of decedents)

• $B/Y$ has almost returned to 1910 level, both because of $W/Y$ and of $\mu$

• Dynastic model: $\mu = (D-A)/H$, $m=1/(D-A)$, so that $\mu \, m = 1/H$
  and $B/Y = \beta/H$
  ($A =$ adulthood $= 20$, $H =$ parenthood $= 30$, $D =$death $= 60-80$)

• General saving model: with $g$ low & $r > g$, $B/Y \rightarrow \beta/H$
  $\rightarrow$ with $\beta=600\%$ & $H=$generation length$=30$ years, then
  $B/Y\approx20\%$, i.e. annual inheritance flow $\approx 20\%$ national income
Figure 10: Steady-state cross-sectional age-wealth profile in the dynastic model with demographic noise

(average wealth of age group)/(average wealth of adults)
Figure 8: The ratio between average wealth of decedents and average wealth of the living in France 1820-2008

- excluding inter-vivos gifts
- including inter-vivos gifts into decedents' wealth
Figure 9: Observed vs simulated inheritance flow B/Y, France 1820-2100

- Observed series
- Simulated series (2010-2100: g=1.7%, (1-t)r=3.0%)
- Simulated series (2010-2100: g=1.0%, (1-t)r=5.0%)
Figure 11.12. The inheritance flow in Europe 1900-2010

- **France**
- **United Kingdom (Atkinson)**
- **Germany (Schinke)**
The share of inherited wealth in total wealth

- Modigliani AER 1986, JEP 1988: inheritance = 20% of total U.S. wealth
- Kotlikoff-Summers JPE 1981, JEP 1988: inheritance = 80% of total U.S. wealth
- Three problems with this controversy:  
  - Bad data
  - We do not live in a stationary world: life-cycle wealth was much more important in the 1950s-1970s than it is today
  - We do not live in a representative-agent world → new definition of inherited share: partially capitalized inheritance (inheritance capitalized in the limit of today’s inheritor wealth)

→ our findings show that the share of inherited wealth has changed a lot over time, but that it is generally much closer to Kotlikoff-Summers (80%) than Modigliani (20%)
Figure S11.3. The share of inherited wealth in aggregate wealth, France 1850-2100 (2010-2100: g=1.7%, r=3.0%)
Figure S11.4. The share of inherited wealth in aggregate wealth, France 1850-2100 (2010-2100: g=1.7%, r=3.0%)

- Capitalized inheritance (KS1) (Kotlikoff-Summers, r=3%, 30yrs)
- Partially capitalized inheritance (PPVR definition)
- Non-capitalized inheritance (Modigliani)
Figure S11.1. The share of inherited wealth in aggregate wealth, Paris 1872-1937

- Capitalized inherited wealth (KS1) (Kotlikoff-Summers, r=3%, 30yrs)
- Partially capitalized inherited wealth (PPVR definition)
- Non-capitalized inherited wealth (Modigliani)
Figure S11.2. The share of inherited wealth in aggregate wealth, Paris 1872-1937
Back to distributional analysis: macro ratios determine who is the dominant social class

- 19\textsuperscript{c}: top successors dominate top labor earners
  → rentier society (Balzac, Jane Austen, etc.)
- For cohorts born in 1910s-1950s, inheritance did not matter too much → labor-based, meritocratic society
- But for cohorts born in the 1970s-1980s & after, inheritance matters a lot
  → 21\textsuperscript{c} class structure will be intermediate between 19\textsuperscript{c} rentier society than to 20\textsuperscript{c} meritocratic society – and possibly closer to the former (more unequal in some dimens., less in others)
- The rise of human capital & meritocracy was an illusion .. especially with a labor-based tax system
<table>
<thead>
<tr>
<th>Shares in aggregate labor income or inherited wealth</th>
<th>Labor income 1910-2010</th>
<th>Inherited wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top 10% &quot;Upper Class&quot;</strong></td>
<td>30%</td>
<td>90%</td>
</tr>
<tr>
<td>incl. Top 1% &quot;Very Rich&quot;</td>
<td>6%</td>
<td>50%</td>
</tr>
<tr>
<td>incl. Other 9% &quot;Rich&quot;</td>
<td>24%</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Middle 40% &quot;Middle Class&quot;</strong></td>
<td>40%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Bottom 50% &quot;Poor&quot;</strong></td>
<td>30%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Figure 15: Cohort fraction inheriting more than bottom 50% lifetime labor resources (cohorts born in 1820-2020)

- benchmark scenario
- low-growth, high-return scenario
Figure 14: Top 1% successors vs top 1% labor income earners (cohorts born in 1820-2020)

- ■ top 1% inheritance resources as a fraction of bottom 50% labor resources
- □ top 1% labor resources as a fraction of bottom 50% labor resources
- △ low-growth, high-return scenario
3. The optimal taxation of wealth & inheritance

• Summary of main results from Piketty-Saez, « A Theory of Optimal Inheritance Taxation », Econometrica 2013

• **Result 1: Optimal Inheritance Tax Formula** (macro version)

• Simple formula for optimal bequest tax rate expressed in terms of estimable macro parameters:

\[
\tau_B = \frac{1 - (1 - \alpha - \tau) s_{b0} / b_y}{1 + e_B + s_{b0}}
\]

with: \( b_y \) = macro bequest flow, \( e_B \) = elasticity, \( s_{b0} \) = bequest taste

\( \rightarrow \) \( \tau_B \) increases with \( b_y \) and decreases with \( e_B \) and \( s_{b0} \)

• For realistic parameters: \( \tau_B = 50-60\% \) (or more..or less...)

\( \rightarrow \) our theory can account for the variety of observed top bequest tax rates (30%-80%)
• **Result 2: Optimal Capital Tax Mix**

• **K market imperfections** (e.g. uninsurable idiosyncratic shocks to rates of return) can justify shifting one-off inheritance taxation toward lifetime capital taxation (property tax, K income tax,..)

• **Intuition**: what matters is capitalized bequest, not raw bequest; but at the time of setting the bequest tax rate, there is a lot of uncertainty about what the rate of return is going to be during the next 30 years → so it is more efficient to split the tax burden

→ **our theory can explain the actual structure & mix of inheritance vs lifetime capital taxation**

(& why high top inheritance and top capital income tax rates often come together, e.g. US-UK 1930s-1980s)
• Meritocratic rawlsian optimum, i.e. social optimum from the viewpoint of zero bequest receivers (z=0):

**Proposition** (zero-receivers tax optimum)

\[ \tau_B = \frac{1-(1-\alpha-\tau)s_{b0}/b_y}{1+e_B+s_{b0}} \]

with: \( s_{b0} = \) average bequest taste of zero receivers

• \( \tau_B \) increases with \( b_y \) and decreases with \( e_B \) and \( s_{b0} \)

• If bequest taste \( s_{b0}=0 \), then \( \tau_B = 1/(1+e_B) \)
  \( \rightarrow \) standard revenue-maximizing formula

• If \( e_B \rightarrow +\infty \), then \( \tau_B \rightarrow 0 \) : back to Chamley-Judd

• If \( e_B=0 \), then \( \tau_B < 1 \) as long as \( s_{b0}>0 \)

• I.e. zero receivers do not want to tax bequests at 100%, because they themselves want to leave bequests
  \( \rightarrow \) **trade-off between taxing rich successors from my cohort vs taxing my own children**
**Example 1:** $\tau=30\%, \alpha=30\%, s_{bo}=10\%, e_B=0$

- If $b_y=20\%$, then $\tau_B=73\%$ & $\tau_L=22\%$
- If $b_y=15\%$, then $\tau_B=67\%$ & $\tau_L=29\%$
- If $b_y=10\%$, then $\tau_B=55\%$ & $\tau_L=35\%$
- If $b_y=5\%$, then $\tau_B=18\%$ & $\tau_L=42\%$

→ with high bequest flow $b_y$, zero receivers want to tax inherited wealth at a higher rate than labor income (73% vs 22%); with low bequest flow they want the opposite (18% vs 42%)

**Intuition:** with low $b_y$ (high $g$), not much to gain from taxing bequests, and this is bad for my own children

With high $b_y$ (low $g$), it’s the opposite: it’s worth taxing bequests, so as to reduce labor taxation and allow zero receivers to leave a bequest
Example 2: $\tau = 30\%$, $\alpha = 30\%$, $s_{bo} = 10\%$, $b_y = 15\%$

- If $e_B = 0$, then $\tau_B = 67\%$ & $\tau_L = 29\%$
- If $e_B = 0.2$, then $\tau_B = 56\%$ & $\tau_L = 31\%$
- If $e_B = 0.5$, then $\tau_B = 46\%$ & $\tau_L = 33\%$
- If $e_B = 1$, then $\tau_B = 35\%$ & $\tau_L = 35\%$

→ behavioral responses matter but not hugely as long as the elasticity $e_B$ is reasonable

Kopczuk-Slemrod 2001: $e_B = 0.2$ (US)
(French experiments with zero-children savers: $e_B = 0.1-0.2$)
• **Optimal Inheritance Tax Formula (micro version)**
  • The formula can be rewritten so as to be based solely upon estimable distributional parameters and upon $r$ vs $g$:
  
  $$\tau_B = \frac{(1 - G b^*/R y_L^*)}{(1+e_B)}$$
  
  With:
  - $b^*$ = average bequest left by zero-bequest receivers as a fraction of average bequest left
  - $y_L^*$ = average labor income earned by zero-bequest receivers as a fraction of average labor income
  - $G$ = generational growth rate, $R$ = generational rate of return
  
  • If $e_B=0$ & $G=R$, then $\tau_B = 1 - b^*/y_L^*$ (pure distribution effect)
    → if $b^*=0.5$ and $y_L^*=1$, $\tau_B = 0.5$ : if zero receivers have same labor income as rest of the pop and expect to leave 50% of average bequest, then it is optimal from their viewpoint to tax bequests at 50% rate
  
  • If $e_B=0$ & $b^*=y_L^*=1$, then $\tau_B = 1 - G/R$ (fiscal Golden rule)
    → if $R \rightarrow +\infty$, $\tau_B \rightarrow 1$: zero receivers want to tax bequest at 100%, even if they plan to leave as much bequest as rest of the pop
Figure 1: Optimal linear inheritance tax rates, by percentile of bequest received (calibration of optimal tax formulas using 2010 micro data)

Percentile of the distribution of bequest received (P1 = bottom 1%, P100 = top 1%)
Figure 2: Optimal top inheritance tax rates, by percentile of bequest received (1m€ or $+) (calibration using 2010 micro data)

Percentile of the distribution of bequest received (P1 = bottom 1%, P100 = top 1%)

- France
- U.S.
What have we learned? (Part 2)

• A world with $g \text{ low} & \ r \text{>g}$ is gloomy for workers with zero initial wealth… especially if global tax competition drives capital taxes to 0%… especially if top labor incomes take a rising share of aggregate labor income

• Better integration between empirical & theoretical research is badly needed
Supplementary slides on the evolution of top income shares
The Continuing Rise of Top Income Shares

- **World top incomes database**: 25 countries, annual series over most of 20C, largest historical data set
- **Two main findings**:
  - **The fall of rentiers**: inequality ↓ during first half of 20C = top capital incomes hit by 1914-1945 capital shocks; did not fully recover so far (long lasting shock + progressive taxation)
    → without war-induced economic & political shock, there would have been no long run decline of inequality; nothing to do with a Kuznets-type spontaneous process
  - **The rise of working rich**: inequality ↑ since 1970s; mostly due to top labor incomes, which rose to unprecedented levels; top wealth & capital incomes also recovering, though less fast; top shares ↓ ’08-09, but ↑ ’10; **Great Recession is unlikely to reverse the long run trend**
    → what happened?
The World Top Incomes Database

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FIGURE 1
The Top Decile Income Share in the United States, 1917-2010

Source: Piketty and Saez (2003), series updated to 2010.
Income is defined as market income including realized capital gains (excludes government transfers).
FIGURE 1
The Top Decile Income Share in the United States, 1917-2010

Source: Piketty and Saez (2003), series updated to 2010.
Income is defined as market income including realized capital gains (excludes government transfers).
FIGURE 2
Decomposing the Top Decile US Income Share into 3 Groups, 1913-2010
How much should we use progressive taxation to reverse the trend?

- Hard to account for observed cross-country variations with a pure technological, marginal-product story

- One popular view: US today = working rich get their marginal product (globalization, superstars); Europe today (& US 1970s) = market prices for high skills are distorted downwards (social norms, etc.)

→ very naïve view of the top end labor market

& very ideological: we have zero evidence on the marginal product of top executives; it may well be that prices are distorted upwards (more natural for price setters to bias their own price upwards rather than downwards)
• A more realistic view: grabbing hand model = marginal products are unobservable; top executives have an obvious incentive to convince shareholders & subordinates that they are worth a lot; no market convergence because constantly changing corporate & job structure (& costs of experimentation → competition not enough to converge to full information)

→ when pay setters set their own pay, there’s no limit to rent extraction... unless confiscatory tax rates at the very top
(memo: US top tax rate (1m$+) 1932-1980 = 82%)
(no more fringe benefits than today)
(macro & micro evidence on rising CEO pay for luck)
Top marginal income tax rate applying to top income

U.S.  
U.K.  
Germany  
France

Figure 3: Changes in Top Income Shares and Top Marginal Tax Rates
Optimal Taxation of Top Labor Incomes

• **Standard optimal top tax rate formula:** \( \tau = \frac{1}{1+ae} \)
  With: \( e \) = elasticity of labor supply, \( a \) = Pareto coefficient
  • \( \tau \downarrow \) as elasticity \( e \uparrow \): don’t tax elastic tax base
  • \( \tau \uparrow \) as inequality \( \uparrow \), i.e. as Pareto coefficient \( a \downarrow \)
    (US: \( a \approx 3 \) in 1970s → \( \approx 1.5 \) in 2010s; \( b = a/(a-1) \approx 1.5 \rightarrow \approx 3 \))
    (memo: \( b = E(y|y>y_0)/y_0 \) = measures fatness of the top)

• **Augmented formula:** \( \tau = \frac{1+tae_2+ae_3}{1+ae} \)
  With \( e = e_1 + e_2 + e_3 = \) labor supply elasticity + income shifting elasticity + bargaining elasticity (rent extraction)
  • **Key point:** \( \tau \uparrow \) as elasticity \( e_3 \uparrow \)
Table 4: How Much Should We Tax Top Incomes?  
A Tale of Three Elasticities

<table>
<thead>
<tr>
<th>Scenario 1: Standard supply side tax effects</th>
<th>Scenario 2: Tax avoidance effects</th>
<th>Scenario 3: Compensation bargaining effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>$e_1 = 0.5$</td>
<td>$(a) e_1 = 0.2$</td>
<td>$e_1 = 0.2$</td>
</tr>
<tr>
<td>$e_2 = 0.0$</td>
<td>$(b) e_2 = 0.3$</td>
<td>$e_2 = 0.0$</td>
</tr>
<tr>
<td>$e_3 = 0.0$</td>
<td>$(a) e_3 = 0.0$</td>
<td>$e_3 = 0.0$</td>
</tr>
<tr>
<td></td>
<td>$(b) e_3 = 0.1$</td>
<td></td>
</tr>
</tbody>
</table>

Optimal top tax rate $\tau^* = \frac{(1 + tae_2 + ae_3)/(1+ae)}$

| Pareto coefficient $a = 1.5$               |
| Alternative tax rate $t = 20\%$           |

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau^* = 57%$</td>
<td>$(a) \tau^* = 62%$</td>
<td>$\tau^* = 83%$</td>
</tr>
<tr>
<td>$(b) \tau^* = 71%$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>