Capital in the 21st century

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• This presentation is based upon *Capital in the 21st century* (Harvard University Press, March 2014)
• This book studies the global dynamics of income and wealth distribution since 18c in 20+ countries; I use historical data collected over the past 15 years together with Atkinson, Saez, Postel-Vinay, Rosenthal, Alvaredo, Zucman, and 30+ others.

• The book includes four parts:
  Part 1. Income and capital
  Part 2. The dynamics of the capital/income ratio
  Part 3. The structure of inequalities
  Part 4. Regulating capital in the 21st century

• In this presentation I will present some results from Parts 2 & 3, focusing upon the long-run evolution of capital/income ratios and wealth concentration
  (all graphs and series are available on line: see [http://piketty.pse.ens.fr/capital21c](http://piketty.pse.ens.fr/capital21c))
Figure I.1. Income inequality in the United States, 1910-2010

The top decile share in U.S. national income dropped from 45-50% in the 1910s-1920s to less than 35% in the 1950s (this is the fall documented by Kuznets); it then rose from less than 35% in the 1970s to 45-50% in the 2000s-2010s. Sources and series: see piketty.pse.ens.fr/capital21c.
Figure I.2. The capital/income ratio in Europe, 1870-2010

Aggregate private wealth was worth about 6-7 years of national income in Europe in 1910, between 2 and 3 years in 1950, and between 4 and 6 years in 2010. Sources and series: see piketty.pse.ens.fr/capital21c.
This presentation: three points

- **1. The return of a patrimonial (or wealth-based) society** in the Old World (Europe, Japan). Wealth-income ratios seem to be returning to very high levels in low growth countries. Intuition: in a slow-growth society, wealth accumulated in the past can naturally become very important. In the very long run, this can be relevant for the entire world.

- **2. The future of wealth concentration**: with high $r - g$ during 21st ($r = \text{net-of-tax rate of return}, g = \text{growth rate}$), then wealth inequality might reach or surpass 19th oligarchic levels; conversely, suitable institutions can allow to democratize wealth.

- **3. Inequality in America**: is the New World developing a new inequality model that is based upon extreme labor income inequality more than upon wealth inequality? Is it more merit-based, or can it become the worst of all worlds?
1. The return of a wealth-based society

- Wealth = capital $K = \text{everything we own and that can be sold on a market (net of all debts)} \ (\text{excludes human} \ K, \text{except in slave societies})$
- In textbooks, wealth-income & capital-output ratios are supposed to be constant. But the so-called « Kaldor facts » actually rely on little historical evidence.

- In fact, we observe in Europe & Japan a large recovery of $\beta = K/Y$ in recent decades:
  \[ \beta = 200-300\% \text{ in } 1950-60s \rightarrow \beta = 500-600\% \text{ in } 2000-10s \]
  (i.e. average wealth $K$ was about 2-3 years of average income $Y$ around 1950-1960; it is about 5-6 years in 2000-2010)
  (with $\beta \approx 600\%$, if $Y \approx 30 000\text{€ per capita}$, then $K \approx 180 000\text{€ per capita}$)
  (currently, $K \approx \text{half real estate, half financial assets}$)

Are we heading back to the $\beta = 600-700\%$ observed in the wealth-based societies of 18$^{c}$-19$^{c}$? Or even more?
Figure 5.3. Private capital in rich countries, 1970-2010

Private capital is worth between 2 and 3.5 years of national income in rich countries in 1970, and between 4 and 7 years of national income in 2010. Sources and series: see piketty.pse.ens.fr/capital21c.
In Italy, private capital rose from 240% to 680% of national income between 1970 and 2010, while public capital dropped from 20% to -70%. Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 5.7. National capital in rich countries, 1970-2010

Net foreign assets held by Japan and Germany are worth between 0.5 and 1 year of national income in 2010.

Sources and series: see piketty.pse.ens.fr/capital21c.
National capital is worth about 7 years of national income in the United Kingdom in 1700 (including 4 in agricultural land). Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 3.2. Capital in France, 1700-2010

National capital is worth almost 7 years of national income in France in 1910 (including 1 invested abroad).

Sources and series: see piketty.pse.ens.fr/capital21c.
• The simplest way to think about this is the following: in the long-run, $\beta = s/g$ with $s$ = (net-of-depreciation) saving rate and $g$ = economy’s growth rate (population + productivity).

With $s=10\%$, $g=3\%$, $\beta \approx 300\%$; but if $s=10\%$, $g=1.5\%$, $\beta \approx 600\%$

= in slow-growth societies, the total stock of wealth accumulated in the past can naturally be very important.

→ capital is back because low growth is back
  (in particular because population growth $\downarrow 0$)
→ in the long run, this can be relevant for the entire planet

Note: $\beta = s/g$ = pure stock-flow accounting identity; it is true whatever the combination of saving motives.
Figure 12.5. The distribution of world capital 1870-2100

According to the central scenario, Asian countries should own about half of world capital by the end of the 21st century. Sources and series: piketty.pse.ens.fr/capital21c.
• Will the rise of capital income-ratio $\beta$ also lead to a rise of the capital share $\alpha$ in national income?
• If the capital stock equals $\beta=6$ years of income and the average return to capital is equal $r=5\%$ per year, then the share of capital income (rent, dividends, interest, profits, etc.) in national income equals $\alpha = r \times \beta = 30\%$
• Technically, whether a rise in $\beta$ also leads to a rise in capital share $\alpha = r \beta$ depends on the elasticity of substitution $\sigma$ between capital $K$ and labor $L$ in the production function $Y=F(K,L)$
• Intuition: $\sigma$ measures the extent to which workers can be replaced by machines (e.g. Amazon’s drones)
• Standard assumption: Cobb-Douglas production function ($\sigma=1$) = as the stock $\beta\uparrow$, the return $r\downarrow$ exactly in the same proportions, so that $\alpha = r \times \beta$ remains unchanged, like by magic = a stable world where the capital-labor split is entirely set by technology
• But if $\sigma>1$, then the return to capital $r\downarrow$ falls less than the volume of capital $\beta\uparrow$, so that the product $\alpha = r \times \beta \uparrow$
• Exactly what happened since the 1970s-80s: both the ratio $\beta$ and the capital share $\alpha$ have increased
Figure 6.5. The capital share in rich countries, 1975-2010

Capital income absorbs between 15% and 25% of national income in rich countries in 1970, and between 25% and 30% in 2000-2010. Sources and series: see piketty.pse.ens.fr/capital21c
• With a large rise in $\beta$, one can get large rise in $\alpha$ with a production function $F(K,L)$ that is just a little bit more substituable than in the standard Cobb-Douglas model (say if $\sigma=1.5$ instead of 1)

• Maybe it is natural to expect $\sigma \uparrow$ over the course of history: more and more diversified uses for capital; **extreme case: pure robot-economy** ($\sigma=\infty$)

• Less extreme case: there are many possible uses for capital (machines can replace cashiers, drones can replace Amazon’s delivery workers, etc.), so that the capital share $\alpha \uparrow$ continuously; there’s no natural corrective mechanism for this

• The rise of $\beta$ and $\alpha$ can be a good thing (we could all devote more time to culture, education, health..., rather than to our own subsistance), assuming one can answer the following question: **who owns the robots?**
2. The future of wealth concentration

- In all European countries (UK, France, Sweden...), wealth concentration was extremely high in 18\textsuperscript{c}-19\textsuperscript{c} & until WW1: about 90\% of aggregate wealth for top 10\% wealth holders about 60\% of aggregate wealth for top 1\% wealth-holders
  = the classic patrimonial (wealth-based) society: a minority lives off its wealth, while the rest of the population works (Austen, Balzac)

- Today wealth concentration is still very high, but less extreme: about 60-70\% for top 10\%; about 20-30\% for top 1\% the bottom 50\% still owns almost nothing (<5\%) but the middle 40\% now owns 20-30\% of aggregate wealth
  = the rise of a patrimonial middle class

- How did it happen, and will it last? Will the patrimonial middle class expend, or will it shrink?
Figure 10.1. Wealth inequality in France, 1810-2010

The top decile (the top 10% highest wealth holders) owns 80-90% of total wealth in 1810-1910, and 60-65% today. Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 10.2. Wealth inequality: Paris vs. France, 1810-2010

The top percentile (the top 1% wealth holders) owns 70% of aggregate wealth in Paris at the eve of World War I.

Sources and series: see piketty.pse.ens.fr/capital21c
Figure 10.3. Wealth inequality in the United Kingdom, 1810-2010

The top decile owns 80-90% of total wealth in 1810-1910, and 70% today.
Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 10.4. Wealth inequality in Sweden, 1810-2010

The top 10% holds 80-90% of total wealth in 1810-1910, and 55-60% today.

Sources and series: see piketty.pse.ens.fr/capital21c.
• Key finding: there was no decline in wealth concentration prior to World War shocks; was it just due to shocks?
• Q.: Apart from shocks, what forces determine the long-run level of wealth concentration?
• A.: In any dynamic, multiplicative wealth accumulation model with random individual shocks (tastes, demographic, returns, wages, ...), the steady-state level of wealth concentration is an increasing function of \( r - g \)
  
  (with \( r = \) net-of-tax rate of return and \( g = \) growth rate)
• With growth slowdown and rising tax competition to attract capital, \( r - g \) might well rise in the 21\(^{c}\) \( \to \) back to 19\(^{c}\) levels
• Future values of \( r \) also depend on technology (\( \sigma > 1? \))
• Under plausible assumptions, wealth concentration might reach or surpass 19\(^{c}\) record levels: see global wealth rankings
Figure 10.9. Rate of return vs. growth rate at the world level, from Antiquity until 2100

The rate of return to capital (pre-tax) has always been higher than the world growth rate, but the gap was reduced during the 20th century, and might widen again in the 21st century.

Sources and series: see piketty.pse.ens.fr/capital21c
Figure 2.2. The growth rate of world population from Antiquity to 2100

The growth rate of world population was above 1% per year from 1950 to 2012 and should return toward 0% by the end of the 21st century. Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 2.4. The growth rate of world per capita output since Antiquity until 2100.

The growth rate of per capita output surpassed 2% from 1950 to 2012. If the convergence process goes on, it will then drop below 1.5%.

Sources and series: see piketty.pse.ens.fr/capital21c.
Between 1987 and 2013, the number of $ billionaires rose according to Forbes from 140 to 1400, and their total wealth rose from 300 to 5400 billion dollars. Sources and series: see piketty.pse.ens.fr/capital21c.
Between 1987 and 2013, the number of billionaires per 100 million adults rose from 5 to 30, and their share in aggregate private wealth rose from 0.4% to 1.5%. Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 12.3. The share of top wealth fractiles in world wealth, 1987-2013

Between 1987 and 2013, the share of the top 1/20 million fractile rose from 0.3% to 0.9% of world wealth, and the share of the top 1/100 million fractile rose from 0.1% to 0.4%. Sources and series: see piketty.pse.ens.fr/capital21c.
### Table 12.1. The growth rate of top global wealth, 1987-2013

<table>
<thead>
<tr>
<th>Average real growth rate per year (after deduction of inflation)</th>
<th>1987-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>The top 1/(100 million) highest wealth holders (about 30 adults out of 3 billions in 1980s, and 45 adults out of 4.5 billions in 2010s)</td>
<td>6.8%</td>
</tr>
<tr>
<td>The top 1/(20 million) highest wealth holders (about 150 adults out of 3 billions in 1980s, and 225 adults out of 4.5 billions in 2010s)</td>
<td>6.4%</td>
</tr>
<tr>
<td>Average world wealth per adult</td>
<td>2.1%</td>
</tr>
<tr>
<td>Average world income per adult</td>
<td>1.4%</td>
</tr>
<tr>
<td>World adult population</td>
<td>1.9%</td>
</tr>
<tr>
<td>World GDP</td>
<td>3.3%</td>
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</tbody>
</table>

Between 1987 and 2013, the highest global wealth fractiles have grown at 6%-7% per year, vs. 2.1% for average world wealth and 1.4% for average world income. All growth rates are net of inflation (2.3% per year between 1987 and 2013). Sources: see piketty.pse.ens.fr/capital21c.
### Table 12.2. The return on the capital endowments of U.S. universities, 1980-2010

<table>
<thead>
<tr>
<th>Average real annual rate of return (after deduction of inflation and all administrative costs and financial fees)</th>
<th>Période 1980-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>All universities (850)</td>
<td>8.2%</td>
</tr>
<tr>
<td>incl.: Harvard-Yale-Princeton</td>
<td>10.2%</td>
</tr>
<tr>
<td>incl.: Endowments higher than 1 billion $ (60)</td>
<td>8.8%</td>
</tr>
<tr>
<td>incl. Endowments between 500 millions and 1 billion $ (66)</td>
<td>7.8%</td>
</tr>
<tr>
<td>incl. Endowments between 100 and 500 million $ (226)</td>
<td>7.1%</td>
</tr>
<tr>
<td>dont: Endowments less than 100 million $ (498)</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

Between 1980 and 2010, U.S. universities earned an average real return of 8.2% on their capital endowments, and all the more so for higher endowments. All returns reported here are net of inflation (2.4% per year between 1980 and 2010) and of all administrative costs and financial fees. Sources: see piketty.pse.ens.fr/capital21c.
3. Inequality in America

- Inequality in America = a different structure as in Europe: more egalitarian in some ways, more inegalitarian in some other dimensions
- The New World in the 19th century: the land of opportunity (capital accumulated in the past mattered much less than in Europe; perpetual demographic growth as a way to reduce the level of inherited wealth and wealth concentration)... and also the land of slavery
- Northern US were in many ways more egalitarian than Old Europe; but Southern US were more inegalitarian
- We still have the same ambiguous relationship of America with inequality today: in some ways more merit-based; in other ways more violent (prisons)
Figure 3.2. Capital in France, 1700-2010

National capital is worth almost 7 years of national income in France in 1910 (including 1 invested abroad).

Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 4.6. Capital in the United States, 1770-2010

National capital is worth 3 years of national income in the United States in 1770 (incl. 1.5 years in agricultural land). Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 5.2. National capital in Europe and America, 1870-2010

National capital (public and private) is worth 6.5 years of national income in Europe in 1910, vs. 4.5 years in America. Sources and series: see piketty.pse.ens.fr/capital21c.
The market value of slaves was about 1.5 years of U.S. national income around 1770 (as much as land).

Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 4.11. Capital around 1770-1810: Old an New World

The combined value of agricultural land and slaves in Southern United States surpassed 4 years of national income around 1770-1810. Sources and series: see piketty.pse.ens.fr/capital21c.
• The US distribution of income has become more unequal than in Europe over the course of the 20th century; it is now as unequal as pre-WW1 Europe

• But the structure of inequality is different: US 2013 has less wealth inequality than Europe 1913, but higher inequality of labor income
Figure 10.6. Wealth inequality: Europe and the U.S., 1810-2010

Until the mid 20th century, wealth inequality was higher in Europe than in the United States.

Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 8.5. Income inequality in the United States, 1910-2010

The top decile income share rose from less than 35% of total income in the 1970s to almost 50% in the 2000s-2010s. Sources and series: see piketty.pse.ens.fr/capital21c.
Figure 9.8. Income inequality: Europe vs. the United States, 1900-2010

The top decile income share was higher in Europe than in the U.S. in 1900-1910; it is a lot higher in the U.S. in 2000-2010. Sources and series: see piketty.pse.ens.fr/capital21c.
• Higher inequality of labor income in the US could reflect higher inequality in education investment; but it also reflects a huge rise of top executive compensation that it very hard to explain with education and productivity reasoning alone.

• In the US, this is sometime described as more merit-based: the rise of top labor incomes makes it possible to become rich with no inheritance (≈Napoleonic prefets).

• Pb = this can be the worst of all worlds for those who are neither top income earners nor top successors: they are poor, and they are depicted as dump & undeserving (at least, nobody was trying to depict Ancien Regime inequality as fair).

• It is unclear whether rise of top incomes has a lot to do with merit or productivity: sharp decline in top tax rates & rise of CEO bargaining power are more convincing explanations; chaotic US history of social norms regarding inequality.
The top marginal tax rate of the income tax (applying to the highest incomes) in the U.S. dropped from 70% in 1980 to 28% in 1988. Sources and series: see piketty.pse.ens.fr/capital21c.
The top marginal tax rate of the inheritance tax (applying to the highest inheritances) in the U.S. dropped from 70% in 1980 to 35% in 2013. Sources and series: see piketty.pse.ens.fr/capital21c.
Conclusions

• The history of income and wealth inequality is always political, chaotic and unpredictable; it involves national identities and sharp reversals; nobody can predict the reversals of the future

• Marx: with $g=0$, $\beta \uparrow \infty$, $r \to 0$: revolution, war

• My conclusions are less apocalyptic: with $g>0$, at least we have a steady-state $\beta = s/g$

• But with $g>0$ & small, this steady-state can be rather gloomy: it can involve a very large capital-income ratio $\beta$ and capital share $\alpha$, as well as extreme wealth concentration due to high $r-g$

• This has nothing to do with a market imperfection: the more perfect the capital market, the higher $r-g$

• The ideal solution: progressive wealth tax at the global scale, based upon automatic exchange of bank information

• Other solutions involve authoritarian political & capital controls (China, Russia..), or perpetual population growth (US), or inflation, or some mixture of all