Capitalism and Inequality in the Long Run

Thomas Piketty
Paris School of Economics
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Capitalism and inequality in the long run

- Long run distributional trends = key question asked by 19th century economists
- Many came with apocalyptic answers
- Ricardo-Marx: a small group in society (land owners or capitalists) will capture an ever growing share of income & wealth
  → no “balanced development path” can occur
- During 20th century, a more optimistic consensus emerged:
  “growth is a rising tide that lifts all boats”
  (Kuznets 1953; cold war context)
• But inequality ↑ since 1970s destroyed this fragile consensus (US 1976-2007: ≈60% of total growth was absorbed by top 1%)
→ 19C economists raised the right questions; we need to address these questions again; we have no strong reason to believe in balanced development path

• 2007-2011 world financial crisis also raised doubts about balanced devt path… will stock options & bonuses, or oil-rich countries, or China, or tax havens, absorb an ever growing share of world resources in 21C capitalism?
Convergence vs divergence

• Convergence forces do exist: diffusion of knowledge between countries (fostered by econ & fin integration) & within countries (fostered by adequate educ institutions)

• But divergence forces can be stronger:
  (1) When top earners set their own pay, there’s no limit to rent extraction → top income shares can diverge
  (2) The wealth accumulation process contains several divergence forces, especially with $r > g$ → a lot depends on the net-of-tax global rate of return $r$ on large diversified portfolios: if $r=5\%-6\%$ in 2010-2050 (=what we observe in 1980-2010 for large Forbes fortunes, or Abu Dhabi sovereign fund, or Harvard endowment), then global wealth divergence is very likely
This lecture: two issues

• **1. The rise of the working rich**
  - New results from *World Top Incomes Database (WTID)*
    (key mechanism: grabbing hand)

• **2. The return of wealth & inheritance**
    (key mechanism: \( r > g \))
    \( (r = \text{rate of return to wealth}, \ g = \text{growth rate}) \)
1. The Rise of the Working Rich

- **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

  → what happened?
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).
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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
Top 1% share: English Speaking countries (U-shaped), 1910-2010
Top Decile Income Shares 1910-2010

Why did top incomes rise so much?

• 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 could well be that prices are distorted upwards…
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)

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)
→ see Piketty-Saez-Stantcheva, NBER WP 2011
2. The return of wealth & inheritance

• The rise of top incomes should fuel the rise of top wealth

• But there are other long-run effects explaining the return of wealth & inheritance

• Two different effects (could go separately):

(2a) The return of wealth
(Be careful with « human capital » illusion: human k did not replace old-style financial & real estate wealth)

(2b) The return of inherited wealth
(Be careful with « war of ages » illusion: the war of ages did not replace class war)
2a. The Return of wealth

• Main results from Piketty-Zucman, « Capital is Back: Wealth-Income Ratios in Rich Countries 1870-2010 »

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

• Until recently, it was impossible to adress properly this basic question: national accounts were mostly about flows on income, output, savings, etc., and very little about stocks of assets and liabilities

• In this paper we compile a new data set of national balance sheets in order to adress this question:
  - 1970-2010: US, Japan, Germany, France, UK, Italy, Canada, Australia (= top 8 rich countries)
  - 1870-2010: US, Germany, France, UK (official national accounts + historical estimates)
• **Result 1**: we find in every country a gradual rise of wealth-income ratios over 1970-2010 period, from about 200%-300% in 1970 to 400%-600% in 2010

• **Result 2**: in effect, today’s ratios seem to be returning towards the high values observed in 19\textsuperscript{c} Europe (600%-700%)

• This can be accounted for by a combination of factors:
  - Politics: long run asset price recovery effect (itself driven by changes in capital policies since WWs)
  - Economics: slowdown of productivity and pop growth

Harrod-Domar-Solow: wealth-income ratio $\beta = \frac{s}{g}$

If saving rate $s=10\%$ & growth rate $g=3\%$, then $\beta \approx 300\%$

But if $s=10\%$ & $g=1.5\%$, then $\beta \approx 600\%$

**Explains long run change & level diff Europe vs US**
Private wealth / national income ratios, 1970-2010

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. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
Private wealth / national income ratios in Europe, 1870-2010

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. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
• **Lesson 1**: one-good capital accumulation model with factor substitution works relatively well in the long run; but in short & medium run, volume effects (saving flows) can be vastly dominated by relative price effects (capital gains or losses)

• **Lesson 2**: long run wealth-income ratios $\beta=s/g$ can vary a lot btw countries: $s$ and $g$ determined by diff. forces; countries with low $g$ and high $s$ naturally have high $\beta$; high $\beta$ is not bad per se (capital is useful); but **high $\beta$ raises new issues about capital regulation and taxation**:  
  
  • With integrated capital markets, this can generate large net foreign asset positions, even in the absence of income diff (or reverse to income diff); so far net positions are smaller than during colonial period; but some countries positions are rising fast (Japan, Germany,..)

  • With limited capital mobility, and/or home portfolio biais, high $\beta$ can lead to large domestic asset price bubbles: see Japan, UK, Italy, France, Spain,..
**Lesson 3: wealth and technology in 21c : σ>1**

Global rate of return $r$ doesn’t seem to decline as much as the rise in global $\beta$, i.e. global capital share $\alpha = r\beta \uparrow$ as $\beta \uparrow$ since 1970 → long run $K/L$ elasticity of substitution $\sigma > 1$, or rising market power for $K$, or both?

**Lesson 4: wealth and technology in 18c : σ<1**

- In the very long run, i.e. using national wealth estimates over 1700-2010 for UK & France, we find $\beta$ stable around 600%-700%, in spite of huge changes in wealth composition, from agricultural land to manufacturing and housing.
- In agrarian, very-low-growth societies, however, it is unclear which forces dominate: $\beta = s/g$ or $\beta = \alpha/r$? Probably $\beta = \alpha/r$
- I.e. with $\alpha =$ capital share = mostly land rent: determined by technology, politics, & land availability ($\alpha \approx 30\%-40\%$ in Europe, vs $10\%-15\%$ in land-rich New world, i.e. elast. subst. $\sigma < 1$), and $r = \text{rate of return} = 4\%-5\% = \text{rate of time preference}$ → $\beta = 600\%-700\%$ in Europe, vs $200\%-300\%$ in New World (simply bc very abundant land is worthless; nothing to do with the $\beta = s/g$ mechanism, which bumped it in later, with migration)
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
2b. 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 wrong (except in the 50s-60s, when there’s not much left to inherit…)
• Inheritance flow-private 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 because of $\mu$: with $g$ low & $r>g$, $B/Y \to \beta/H$
  $\to$ with $\beta=600\%$ & $H=$generation length=30 years, then $B/Y\approx20\%$, i.e. annual inheritance flow $\approx 20\%$ national income
Figure 1: Annual inheritance flow as a fraction of national 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)
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 \( r > g \), inheritance is bound to dominate new wealth; the past eats up the future

  Note: \( r = \) rate of return to capital = \( \frac{\text{net profits + rents}}{\text{net financial + real estate wealth}} \); \( g = \) growth rate \((g+n)\)

• **Intuition:** with \( r > g \) & \( g \) low (say \( r = 4\%-5\% \) vs \( g = 1\%-2\% \)), 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 \( \rightarrow b_y = \beta/H \) (with \( \beta = W/Y \))

  \( \rightarrow \) with \( \beta = 600\% \) & \( H = 30 \), then \( b_y = 20\% \)

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

• \( r > g \) also has an amplifying effect on wealth inequality
Table 3: Intra-cohort distributions of labor income and inheritance, France, 1910 vs 2010

<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>Top 10% &quot;Upper Class&quot;</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>Middle 40% &quot;Middle Class&quot;</td>
<td>40%</td>
<td>5%</td>
</tr>
<tr>
<td>Bottom 50% &quot;Poor&quot;</td>
<td>30%</td>
<td>5%</td>
</tr>
</tbody>
</table>
What have we learned?

• One substantial conclusion: a world with \( g \) low & \( r > g \) 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 → divergence forces can be stronger than convergence forces.

• One methodological conclusion: there is a lot to learn from the long run evolution of income and wealth concentration; the analysis of socially optimal tax policy must be more closely related to empirical parameters.
Supplementary slides
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 $\rightarrow \approx 1.5$ in 2010s; $b = \frac{a}{a-1} \approx 1.5 \rightarrow \approx 3$)
    (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

Total elasticity \( e = e_1 + e_2 + e_3 = 0.5 \)

<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) current narrow tax base</td>
<td>( e_1 = 0.2 )</td>
</tr>
<tr>
<td>( e_2 = 0.0 )</td>
<td>( e_1 = 0.2 )</td>
<td>(b) after base broadening</td>
</tr>
<tr>
<td>( e_3 = 0.0 )</td>
<td>( e_2 = 0.3 )</td>
<td>( e_2 = 0.1 )</td>
</tr>
<tr>
<td></td>
<td>( e_3 = 0.0 )</td>
<td>( e_3 = 0.0 )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( e_1 = 0.2 )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( e_2 = 0.0 )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( e_3 = 0.3 )</td>
</tr>
</tbody>
</table>

Optimal top tax rate \( \tau^* = \frac{(1 + t_{ae_2} + a_{ae_3})}{(1+ae)} \)

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% ) ( \tau^* = 71% )</td>
<td>( \tau^* = 83% )</td>
</tr>
</tbody>
</table>
2c. Implications for optimal capital taxation

• Main results from Piketty-Saez, « A Theory of Optimal Capital Taxation »

• **Result 1: Optimal Inheritance Tax Formula**
• Simple formula for optimal bequest tax rate expressed in terms of estimable parameters:

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

with: \(b_y\) = 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\%)**
Top Inheritance Tax Rates 1900-2011

- U.S.
- U.K.
- France
- Germany
• **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 $\tau_B=18\%$ & $\tau_L=42\%$

$\rightarrow$ 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: \( e_B=0.1-0.2 \)
Concepts & methods for wealth decomposition

• National income $Y = \text{domestic output } Y_d + r \text{ NFA}$

• Private wealth $W = \text{non-financial assets } + \text{financial assets } - \text{financial liabilities}$ (household & non-profit sector)

• $\beta = W/Y = \text{private wealth-national income ratio}$

• Govt wealth $W_g = \text{non-fin } + \text{fin assets } - \text{fin liab }$ (govt sector)

• National wealth $W_n = W + W_g = K + \text{NFA}$
  with $K = \text{domestic capital } (= \text{land } + \text{housing } + \text{other domestic k})$
  $\text{NFA } = \text{net foreign assets}$

• $\beta_n = W_n/Y = \text{national wealth-national income ratio}$

• Domestic output $Y_d = F(K,L)$ ($L = \text{labor input}$) (e.g. $K^\alpha L^{1-\alpha}$)

• Capital share $\alpha = r \beta$ ($r = \text{average rate of return to wealth}$)
• **One-good capital accumulation model:** $W_{t+1} = W_t + s_t Y_t$
  \[ \rightarrow \beta_{t+1} = \beta_t \frac{1+g_{wt}}{1+g_t} \]
  With $1+g_{wt} = 1+s_t/\beta_t =$ saving-induced wealth growth rate
  $1+g_t = Y_{t+1}/Y_t =$ exogenous output growth rate (productiv.+pop)
  • With fixed saving rate $s_t=s$ and growth rate $g_t=g$, then:
  $\beta_t \rightarrow \beta = s/g$ (Harrod-Domar-Solow steady-state formula)
  • E.g. if $s=10\%$ & $g=2\%$, then $\beta = 500\%$

• **Pure accounting formula:** valid with any saving motive or utility function, i.e. wherever $s$ 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; then $\beta=s/g$ follows
  • Dynastic utility: rate or return $r$ set by $u()$; if $\alpha$ set by technology, then $\beta = \alpha/r$ follows ($s=\alpha g/r$, so $\beta=\alpha/r=s/g$)
  • With general utility functions, both $s$ and $r$ are jointly determined by $u()$ and technology
• **Two-good capital accumulation model**: one capital good, one consumption good

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

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

With $1+g_{wt} = 1+s_t/\beta_t =$ saving-induced wealth growth rate

$1+q_t =$ capital-gains-induced induced wealth growth rate

**Our empirical strategy:**

- we do not specify where $q_t$ come from (maybe stochastic production functions to produce capital vs consumption good, with diff. rates of technical progress);

- we observe $\beta_t,...,\beta_{t+n}$, $s_t,...,s_{t+n}$, $g_t,...,g_{t+n}$, and we decompose the wealth accumulation equation between years $t$ and $t+n$ into volume (saving) vs price effect (capital gain or loss)
Decomposition results: 1970-2010

- Annual series for top 8 rich countries, 1970-2010
- Additive vs multiplicative decomposition of wealth accumulation equation into volume vs price effects
- Private saving (personal + corporate) vs personal
- Private wealth vs national wealth accumulation
- Domestic capital vs foreign wealth accumulation

**Main conclusion**: capital gains account for a small part of the aggregate level of 2010 wealth accumulation (10%-20%), but for a significant part of the rise in wealth-income ratios between 1970 and 2010 (30%-50%+)

→ we need to put 1970-2010 period into longer perspective
Private wealth / national income ratios, 1970-2010

Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)
<table>
<thead>
<tr>
<th>Country</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>
</tr>
<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>
<td>2.2%</td>
<td>0.5%</td>
<td>1.7%</td>
<td>11.1%</td>
</tr>
<tr>
<td>U.K.</td>
<td>2.2%</td>
<td>0.3%</td>
<td>1.9%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Italy</td>
<td>1.9%</td>
<td>0.3%</td>
<td>1.6%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Australia</td>
<td>3.2%</td>
<td>1.4%</td>
<td>1.7%</td>
<td>9.9%</td>
</tr>
</tbody>
</table>
Observed vs predicted private wealth / national income ratio (2010)

Predicted wealth / income ratio 2010 (on the basis of 1970 initial wealth and 1970-2010 cumulated saving flows) (additive decomposition, incl. R&D)
<table>
<thead>
<tr>
<th>Country</th>
<th>Private wealth-national income ratios</th>
<th>Decomposition of 2010 private wealth-national income ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$ (1970)</td>
<td>$\beta$ (2010)</td>
</tr>
<tr>
<td>U.S.</td>
<td>342%</td>
<td>410%</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Japan</td>
<td>299%</td>
<td>601%</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>225%</td>
<td>415%</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>France</td>
<td>310%</td>
<td>575%</td>
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<tr>
<td>U.K.</td>
<td>306%</td>
<td>522%</td>
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</tr>
<tr>
<td>Italy</td>
<td>239%</td>
<td>676%</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Canada</td>
<td>247%</td>
<td>416%</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Australia</td>
<td>330%</td>
<td>518%</td>
</tr>
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<tr>
<td></td>
<td>Private wealth-national income ratios</td>
<td>Decomposition of 1970-2010 wealth growth rate</td>
</tr>
<tr>
<td>----------------</td>
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<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Real growth rate of private wealth</td>
</tr>
<tr>
<td></td>
<td>$\beta$ (1970)</td>
<td>$\beta$ (2010)</td>
</tr>
<tr>
<td>U.S.</td>
<td>342%</td>
<td>410%</td>
</tr>
<tr>
<td>Japan</td>
<td>299%</td>
<td>601%</td>
</tr>
<tr>
<td>Germany</td>
<td>225%</td>
<td>415%</td>
</tr>
<tr>
<td>France</td>
<td>310%</td>
<td>575%</td>
</tr>
<tr>
<td>U.K.</td>
<td>306%</td>
<td>522%</td>
</tr>
<tr>
<td>Italy</td>
<td>239%</td>
<td>676%</td>
</tr>
<tr>
<td>Canada</td>
<td>247%</td>
<td>416%</td>
</tr>
<tr>
<td>Australia</td>
<td>330%</td>
<td>518%</td>
</tr>
<tr>
<td>Average saving rates 1970-2010 (% national income)</td>
<td>Net private savings (personal + corporate)</td>
<td>incl. personal savings</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>U.S.</td>
<td>7.7%</td>
<td>4.6% 60%</td>
</tr>
<tr>
<td>Japan</td>
<td>14.6%</td>
<td>6.8% 47%</td>
</tr>
<tr>
<td>Germany</td>
<td>12.2%</td>
<td>9.4% 76%</td>
</tr>
<tr>
<td>France</td>
<td>11.1%</td>
<td>9.0% 81%</td>
</tr>
<tr>
<td>U.K.</td>
<td>7.3%</td>
<td>2.8% 38%</td>
</tr>
<tr>
<td>Italy</td>
<td>15.0%</td>
<td>14.6% 97%</td>
</tr>
<tr>
<td>Canada</td>
<td>12.1%</td>
<td>7.2% 60%</td>
</tr>
<tr>
<td>Australia</td>
<td>9.9%</td>
<td>5.9% 60%</td>
</tr>
</tbody>
</table>
Private vs governement wealth, 1970-2010 (% national income)

Authors’ computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)
National wealth / national income ratios, 1970-2010

National wealth = private wealth + government wealth

Authors’ computations using country national accounts.
Observed vs predicted national wealth/national income ratio (2010)

Predicted wealth / income ratio 2010 (on the basis of 1970 initial wealth and 1970-2010 cumulated saving flows) (additive decomposition, incl. R&D)
<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>
<td>-0.9%</td>
</tr>
</tbody>
</table>

Table 9: National saving 1970-2010: private vs government
Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors).
Table 12: National wealth accumulation in rich countries, 1970-2010: domestic capital vs foreign wealth

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>U.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>385%</td>
<td>381%</td>
<td>419%</td>
</tr>
<tr>
<td>Japan</td>
<td>359%</td>
<td>356%</td>
<td>616%</td>
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<tr>
<td>Germany</td>
<td>351%</td>
<td>304%</td>
<td>418%</td>
</tr>
<tr>
<td>France</td>
<td>340%</td>
<td>351%</td>
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<tr>
<td>U.K.</td>
<td>365%</td>
<td>365%</td>
<td>527%</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>259%</td>
<td>247%</td>
<td>609%</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>284%</td>
<td>325%</td>
<td>412%</td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>391%</td>
<td></td>
<td>584%</td>
</tr>
</tbody>
</table>


Authors' computations using country national accounts. National income = domestic product + net foreign income.
Domestic capital / output ratios, 1970-2010

Authors’ computations using country national accounts. Domestic capital/output ratio = (national wealth - foreign wealth)/domestic product
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>incl. Housing</td>
<td>incl. Other domestic capital</td>
<td>incl. Housing</td>
</tr>
<tr>
<td>U.S.</td>
<td>381%</td>
<td>142%</td>
<td>239%</td>
</tr>
<tr>
<td>Japan</td>
<td>356%</td>
<td>131%</td>
<td>225%</td>
</tr>
<tr>
<td>Germany</td>
<td>304%</td>
<td>129%</td>
<td>175%</td>
</tr>
<tr>
<td>France</td>
<td>340%</td>
<td>104%</td>
<td>236%</td>
</tr>
<tr>
<td>U.K.</td>
<td>359%</td>
<td>98%</td>
<td>261%</td>
</tr>
<tr>
<td>Italy</td>
<td>247%</td>
<td>107%</td>
<td>141%</td>
</tr>
<tr>
<td>Canada</td>
<td>325%</td>
<td>108%</td>
<td>217%</td>
</tr>
<tr>
<td>Australia</td>
<td>410%</td>
<td>172%</td>
<td>239%</td>
</tr>
</tbody>
</table>
Decomposition results: 1870-2010

- Annual series for US, Germany, France, UK, 1870-2010
- Additive vs multiplicative decomposition of wealth accumulation equation into volume vs price effects
- Private saving (personal + corporate) vs personal
- Private wealth vs national wealth accumulation
- Domestic vs foreign wealth accumulation

- **Main conclusion**: over the entire 1910-2010 period, capital gains wash out; i.e. 1910-1950 fall in relative asset price compensated by 1950-2010 (except in Germany, where asset prices seem abnormally low: stakeholder effect?)
- In the long run (1870-2010 or 1910-2010), changes in wealth-income ratios are well accounted for by $\beta=s/g$
Very long run results: 1700-2010

• For the UK and France, there are national balance sheets estimates starting around 1700-1750 (and for the US, starting around 1770-1800)
• These estimates are less precise than post-1870 series; in particular one cannot properly identify volume vs price effects in wealth accumulation equations: saving and investment series are too approximate, and with g very small (typically 1% or less), any small change in s generates huge changes in $\beta = s/g$
• However it is still interesting to use these estimates, because they reveal interesting patterns about the changing nature of wealth and technology in the very long run
• Main conclusion: In the very long run, we find $\beta$ relatively stable around 600%-700% in UK & France, in spite of huge changes in wealth composition, from agricultural land to manufacturing capital and housing
The changing nature of national wealth, UK 1700-2010

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets
The changing nature of national wealth, France 1700-2010

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

Net foreign assets
Other domestic capital
Housing
Slaves
Agricultural land
National wealth in 1770-1810: Old vs New world

UK
France
US South
US North

Other domestic capital
Housing
Slaves
Agricultural Land
National wealth = agricultural land + housing + other domestic capital - net foreign liabilities
• **Why is** $\beta$ **stable around 600%-700% in the very long run in UK & France?**
• In agrarian, very-low-growth societies, it is unclear which forces dominate: $\beta = s/g$ or $\beta = \alpha/r$ ? Probably $\beta = \alpha/r$
• I.e. with $\alpha = \text{capital share} = \text{mostly land rent}$: determined by technology, politics, & land availability ($\alpha \approx 30\%-40\%$ in Europe, vs $10\%-15\%$ in land-rich New world, i.e. elasticity of substitution $\sigma < 1$), and $r = \text{rate of return} = 4\%-5\% = \text{rate of time preference}$
  $\rightarrow \beta = 600\%-700\%$ in Europe, vs $200\%-300\%$ in New World
  (simply because very abundant land is worthless: new world had more land in volume, but less land in value)
  (nothing to do with the $\beta = s/g$ mechanism, which bumped it in later, with migration)
• **Capital is back**: the low wealth-income ratios observed in Europe in 1950s-1970s (200%-300%) were an anomaly; with low growth, long run wealth-income ratios are naturally very large (600%-700%); key is $\beta = s/g$

• There’s nothing bad about the return of capital: $k$ is useful; but it raises new issues about $k$ regulation & taxation

• National accounts used to be mostly about flows; we now need to focus on stocks

• Next steps: **Dynamics of world distribution of wealth**: Will China or global billionaires own the world? Both divergence can occur, but 2nd one more likely, esp. if $r > g$

• **Inherited vs self-made wealth**: long-run U-shaped pattern in France; on-going work on UK, Germany & US