Capital in the 21st Century

Thomas Piketty[1][2]

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Sao Paulo, 26 November 2014

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Based on collaborative effort led by Jeff Leek
https://github.com/jtleek/capitalIn21stCenturyinR

December 2014

Presention layout

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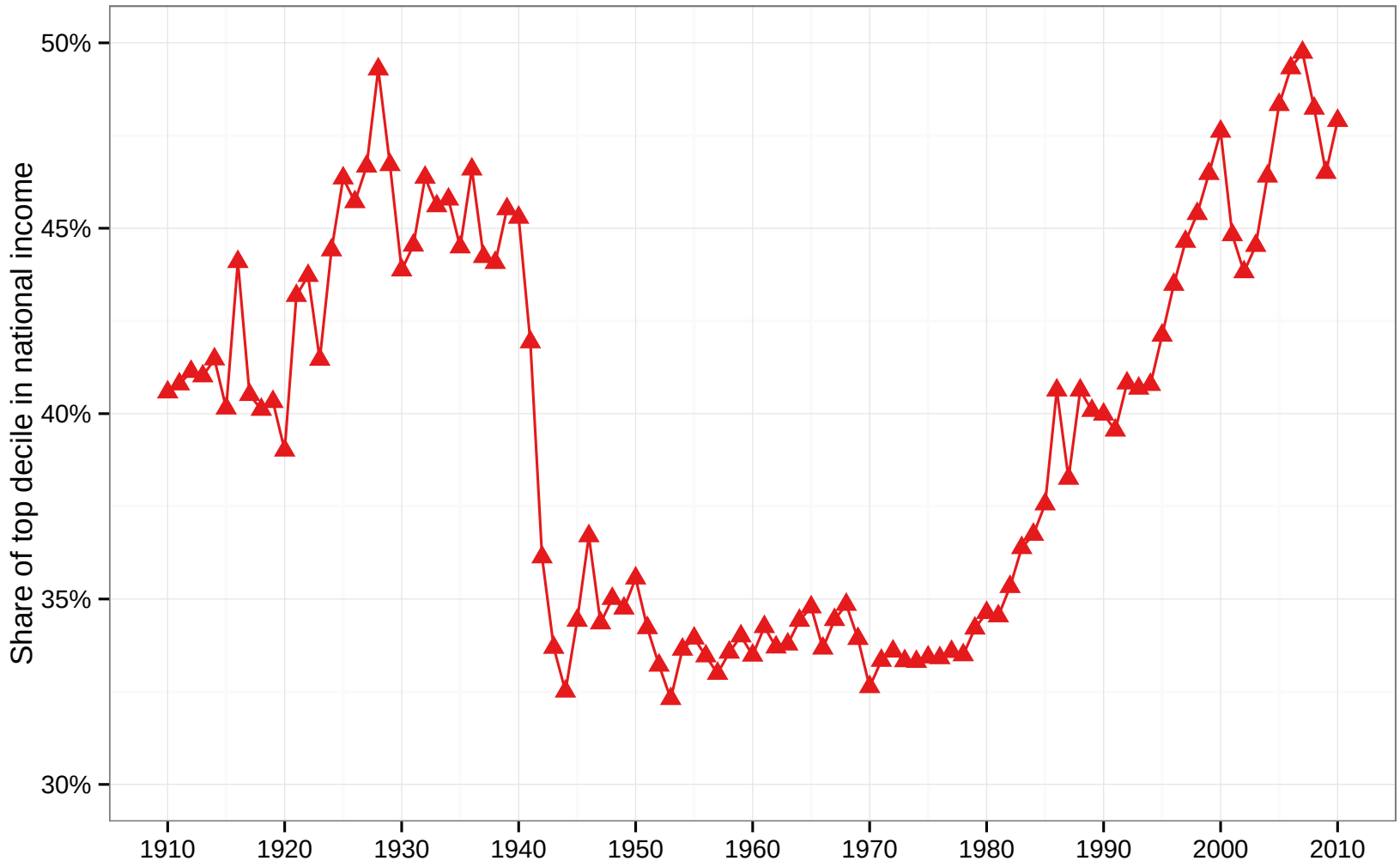
  - Part 3. The structure of inequalities
  - Part 4. Regulating capital in the 21st century
- I will present some results from Parts 2 & 3, focusing upon the long-run evolution of capital/income ratios and wealth concentration (http://piketty.pse.ens.fr/capital21c.

The World Top Incomes Database

http://topincomes.parisschoolofeconomics.eu

http://piketty.pse.ens.fr/fr/capital21c

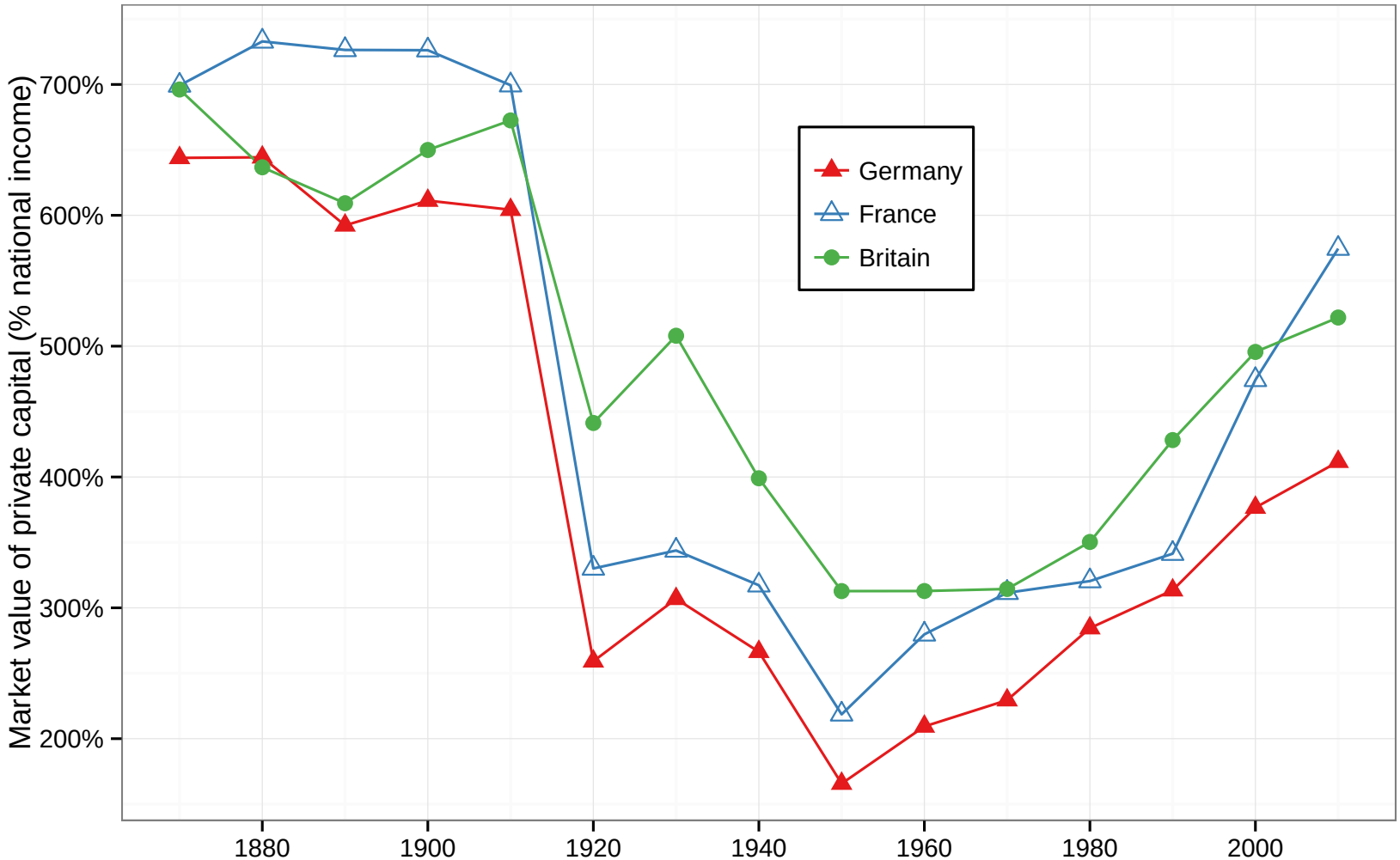
Figure I.1: Income inequality in the United States, 1910–2012



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 1950 1960 fall documented by Kuznets); it then rose from less than 35% in the 1970s to 45–50% in the 2000s–2010s.

http://piketty.pse.ens.fr/fr/capital21c

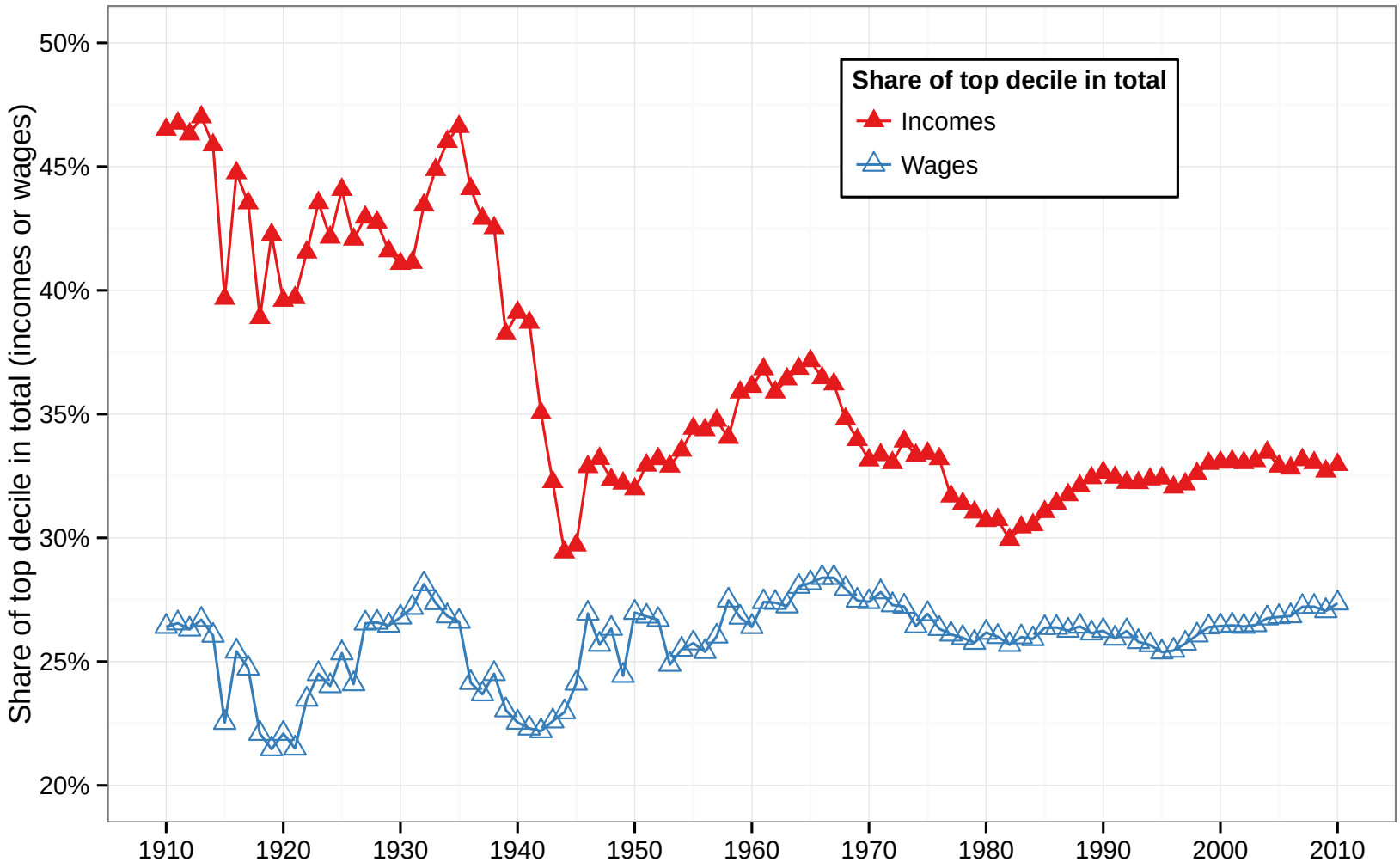
Figure I.2. The capital–income ratio in Europe, 1870–2012



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.

http://piketty.pse.ens.fr/fr/capital21c

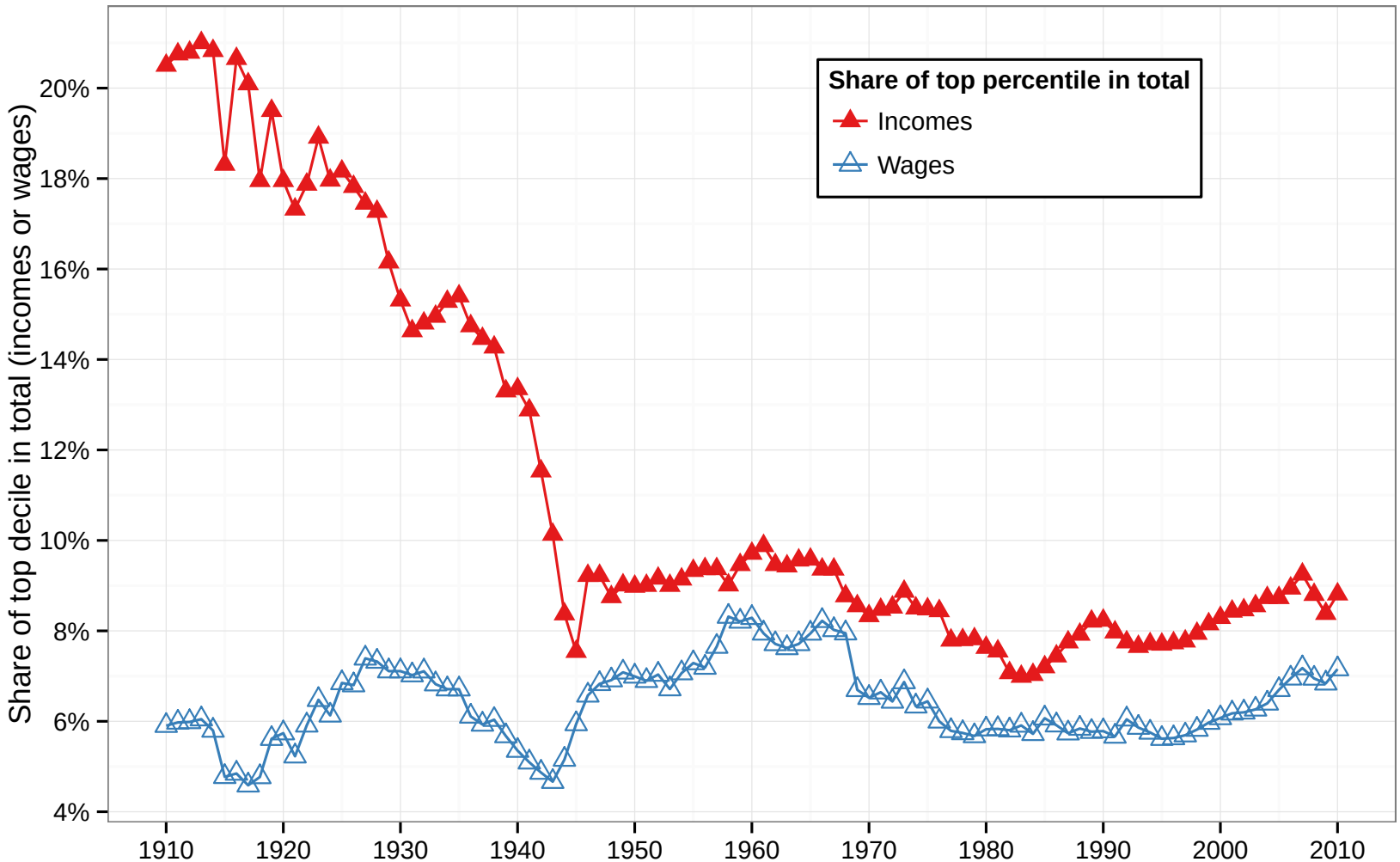
Figure 8.1. Income inequality in France, 1910–2010



Inequality of total income (labor and capital) has dropped in France during the twentieth century, while wage inequality has remained the same.

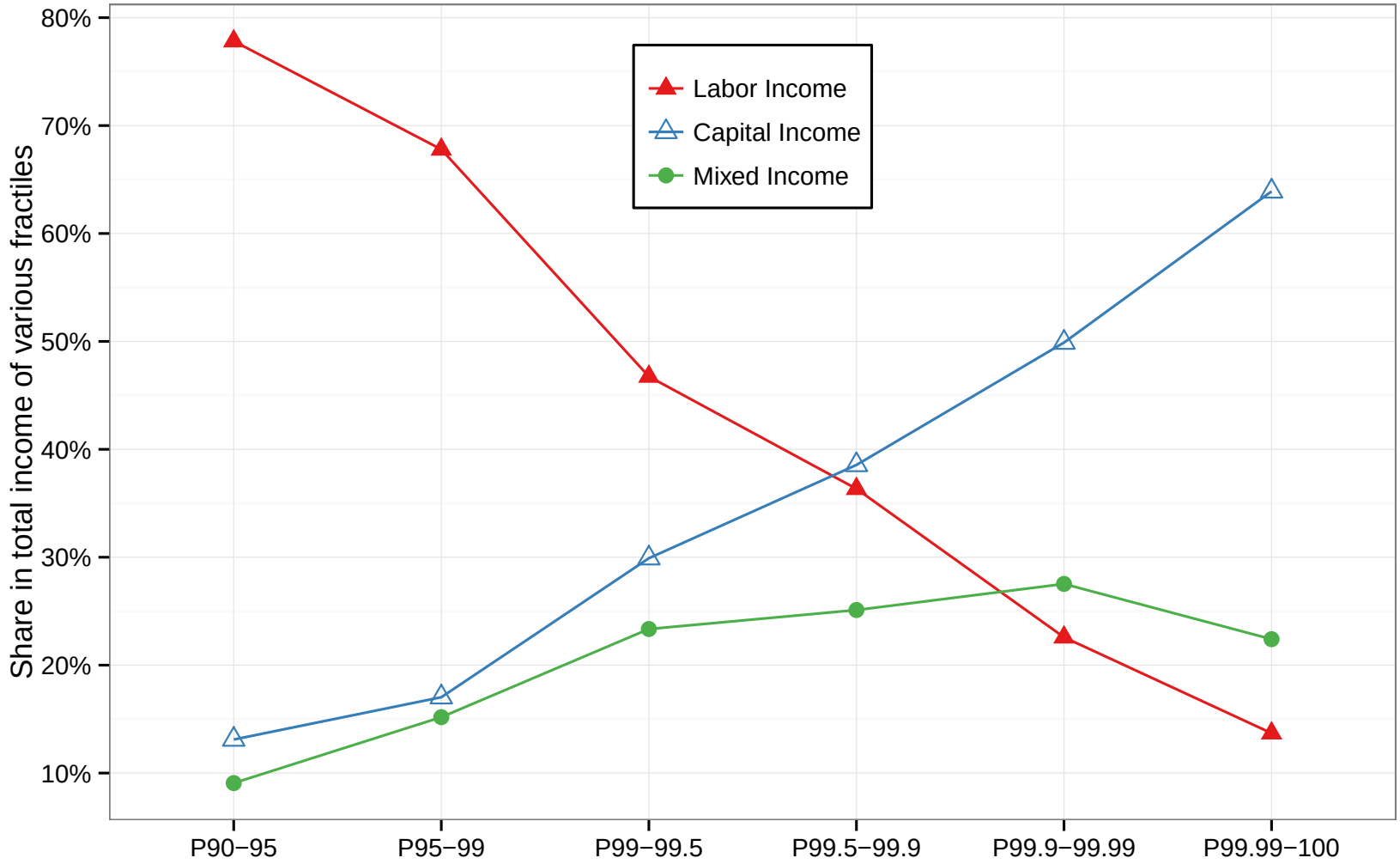
http://piketty.pse.ens.fr/fr/capital21c

Figure 8.2. The fall of rentiers in France, 1910–2010



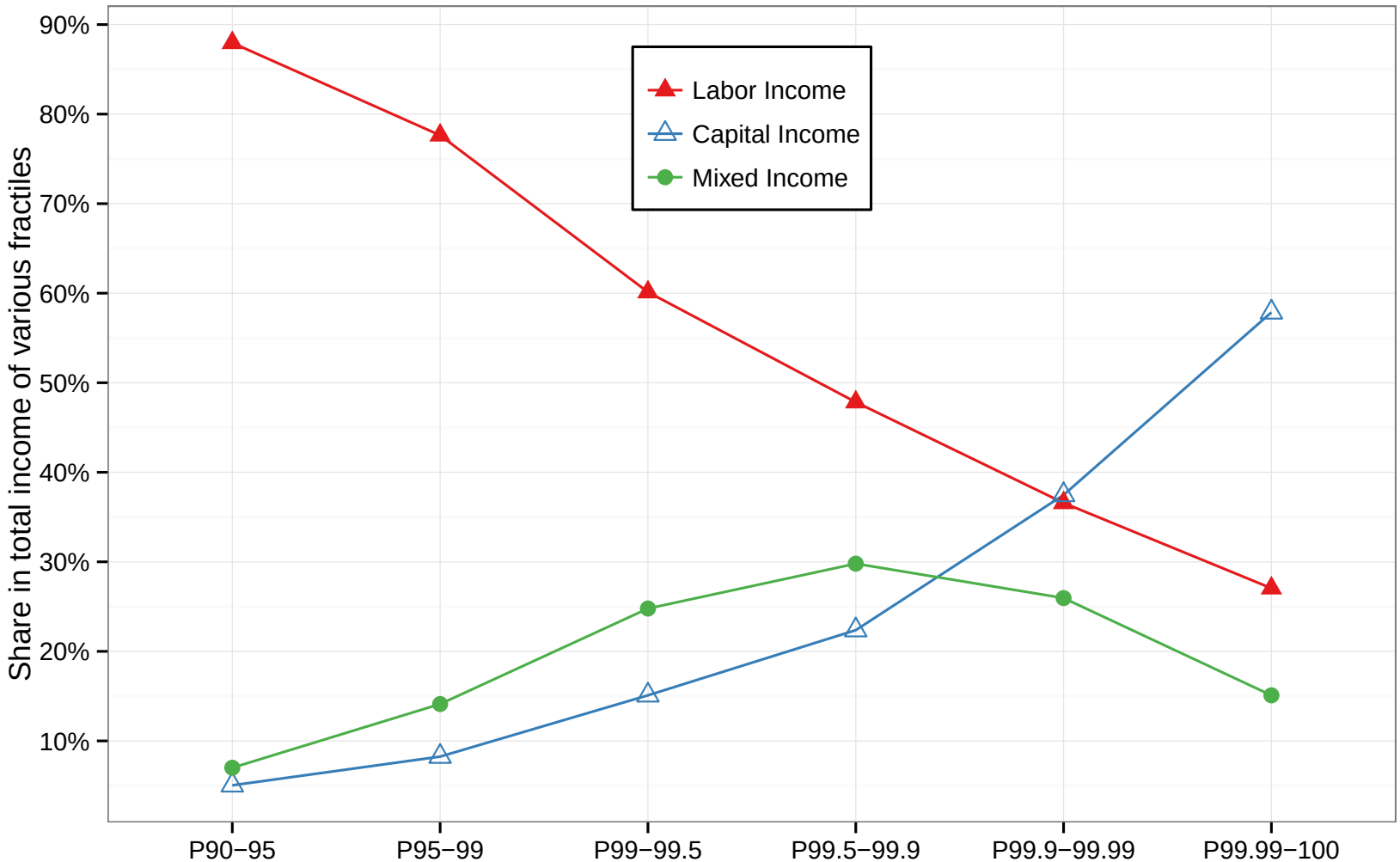
The fall in the top percentile share (the top 1 percent highest incomes) in France between 1914 and 1945 is due to the fall of top capital incomes.

Figure 8.3. The composition of top incomes in France in 1932



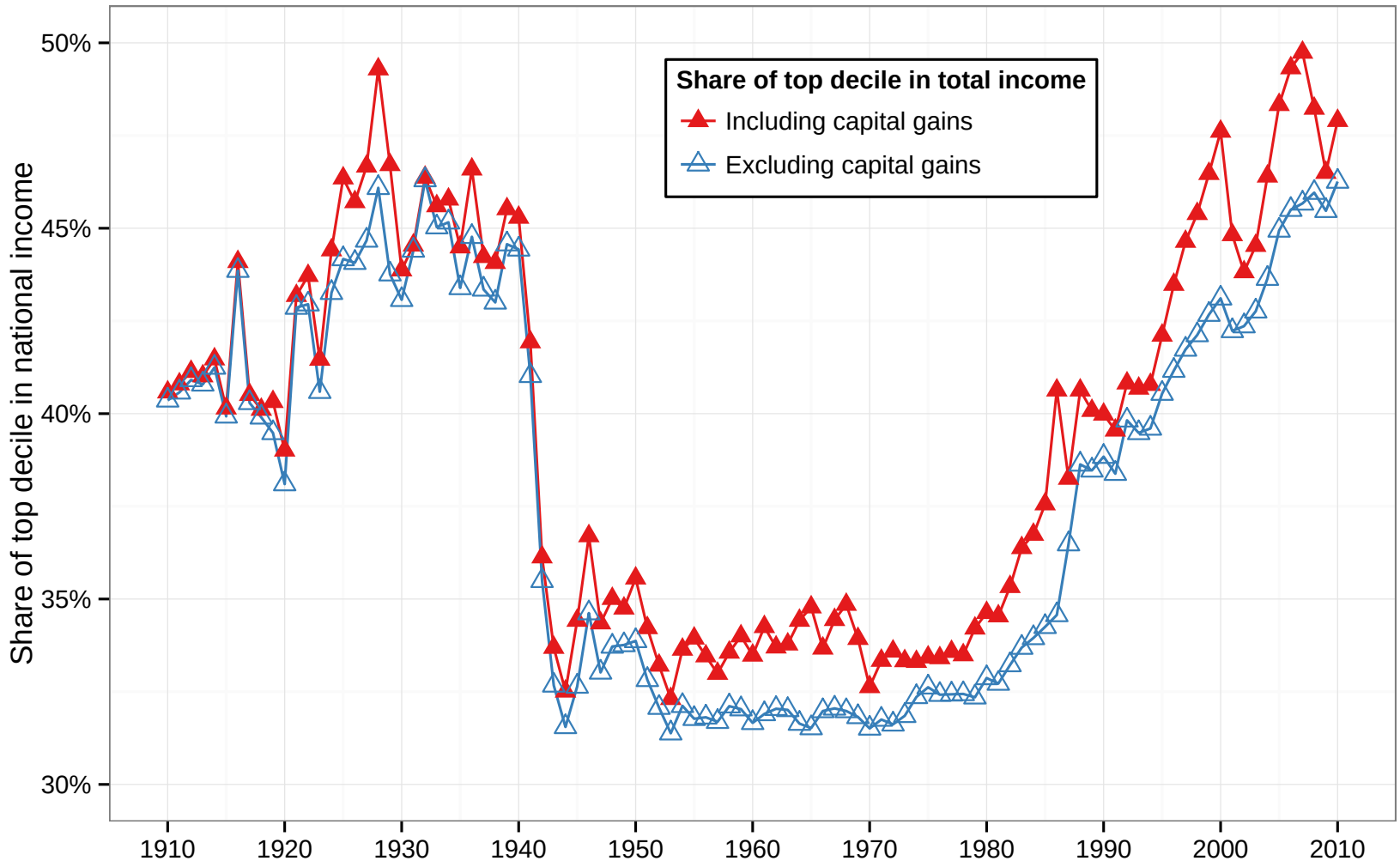
Labor income becomes less and less important as one goes up within the top decile of total income. Notes: (i) "P90–95" includes individuals between percentiles 90 to 95, "P95–99" includes the next 4 percent, "P99–99.5" the next 0.5 percent, etc.; (ii) Labor income: wages, bonuses, pensions. Capital

Figure 8.4. The composition of top incomes in France in 2005



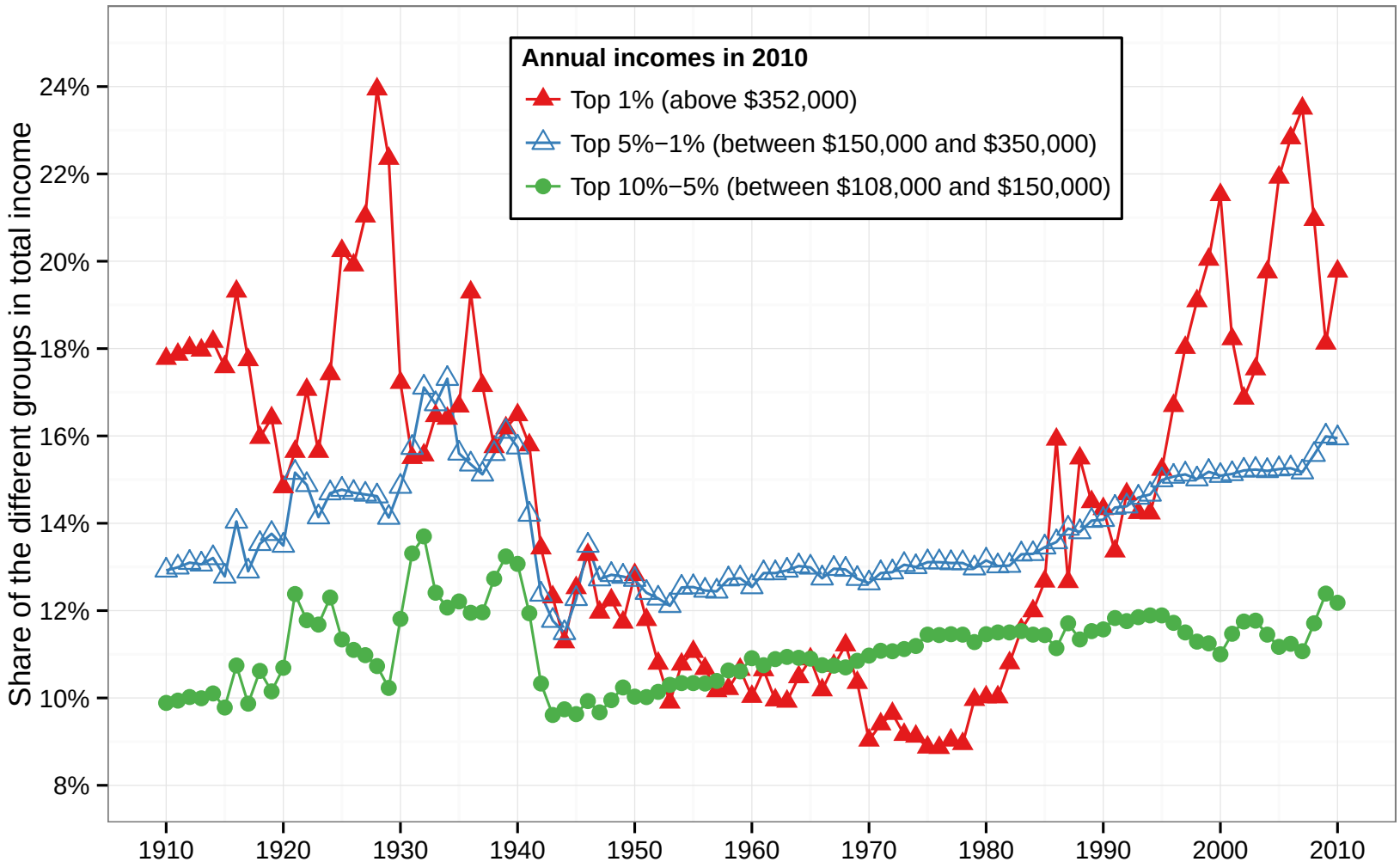
Capital income becomes dominant at the level of the top 0.1 percent in France in 2005, as opposed to the top 0.5 percent in 1932.

Figure 8.5. Income inequality in the United States, 1910–2010



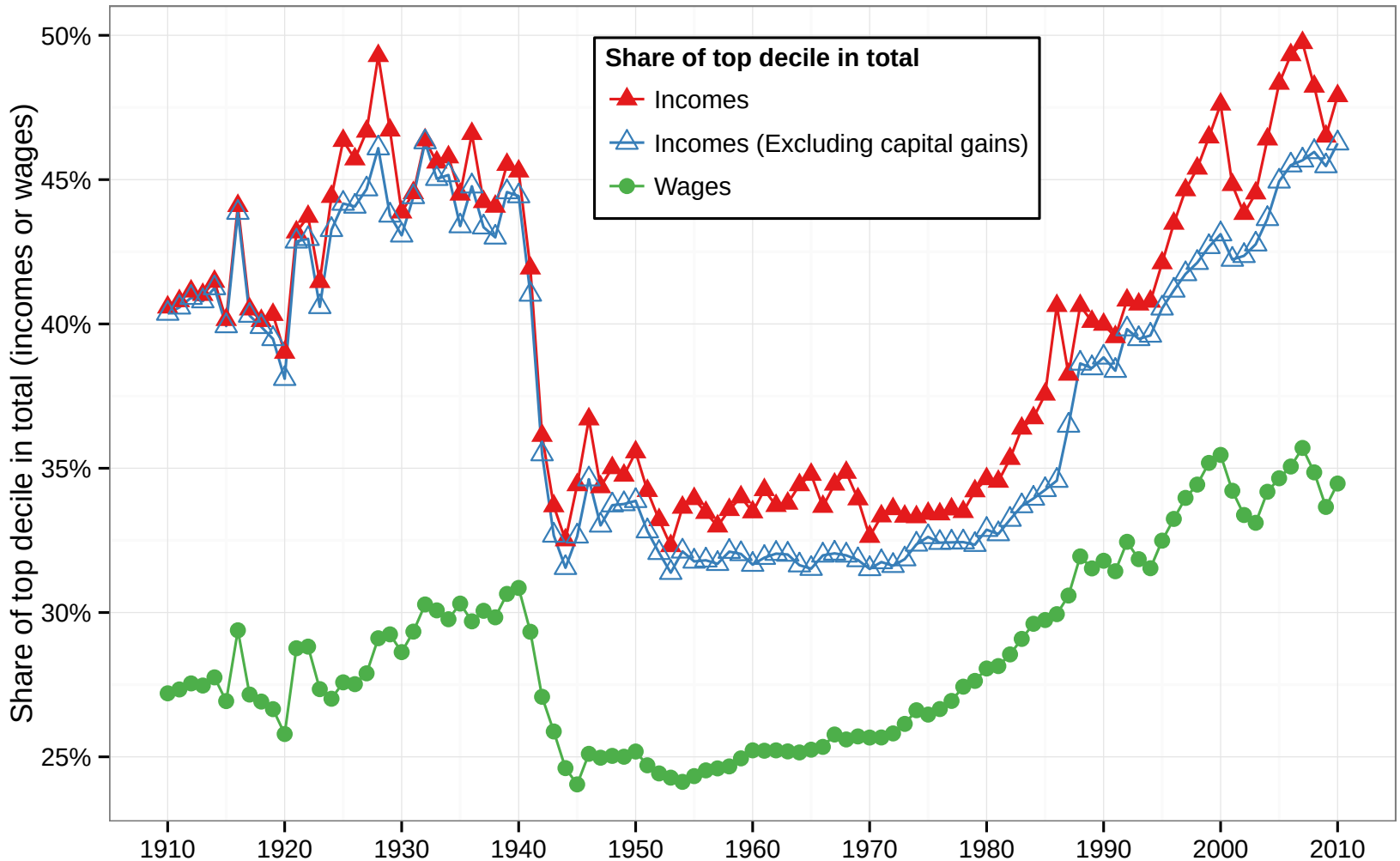
The top decile share in U.S. national income dropped from 45–50% in the 1910s–1920s to less than 35% in the 1950s (this is the 1950 1960 fall documented by Kuznets); it then rose from less than 35% in the 1970s to 45–50% in the 2000s–2010s.

Figure 8.6. Decomposition of the top decile, United States, 1910–2010



The rise of the top decile income share since the 1970s is mostly due to the top percentile.

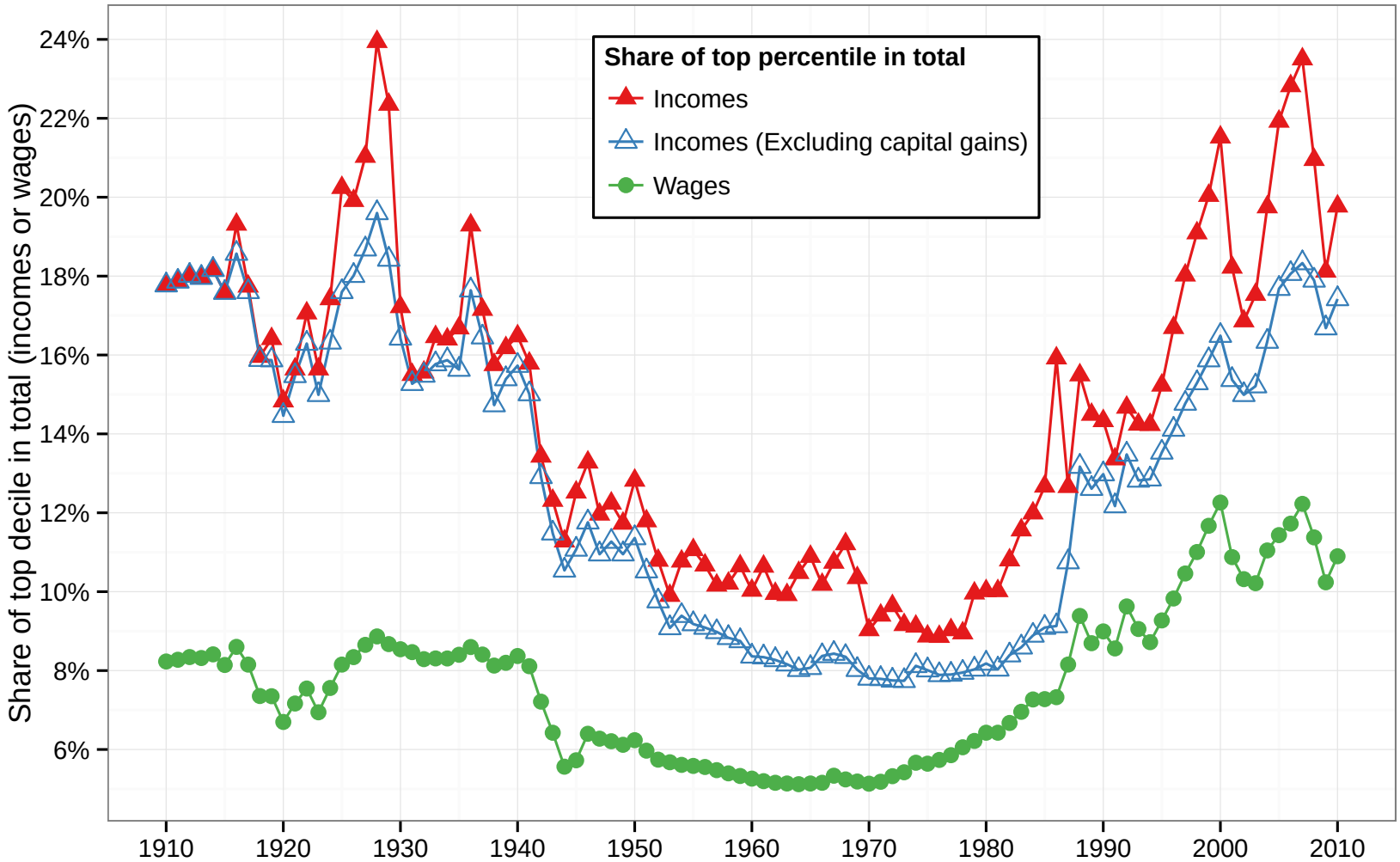
Figure 8.7. High incomes and high wages in the United States, 1910–2010



The rise of income inequality since the 1970s is largely due to the rise of wage inequality.

http://piketty.pse.ens.fr/fr/capital21c

Figure 8.8. The transformation of the top 1 percent in the United States, 1910–2010



The rise in the top 1 percent highest incomes since the 1970s is largely due to the rise in the top 1 percent highest wages.

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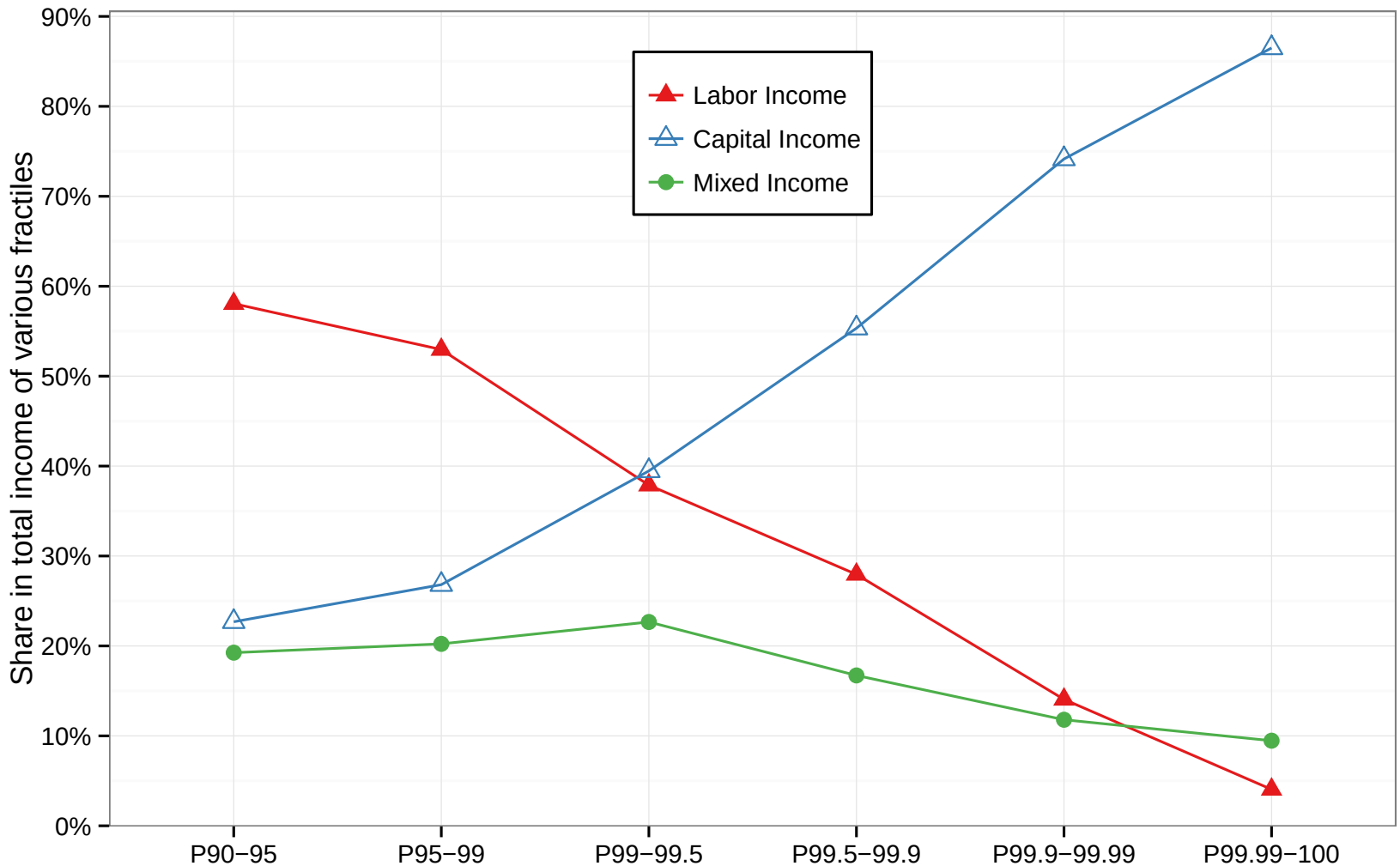
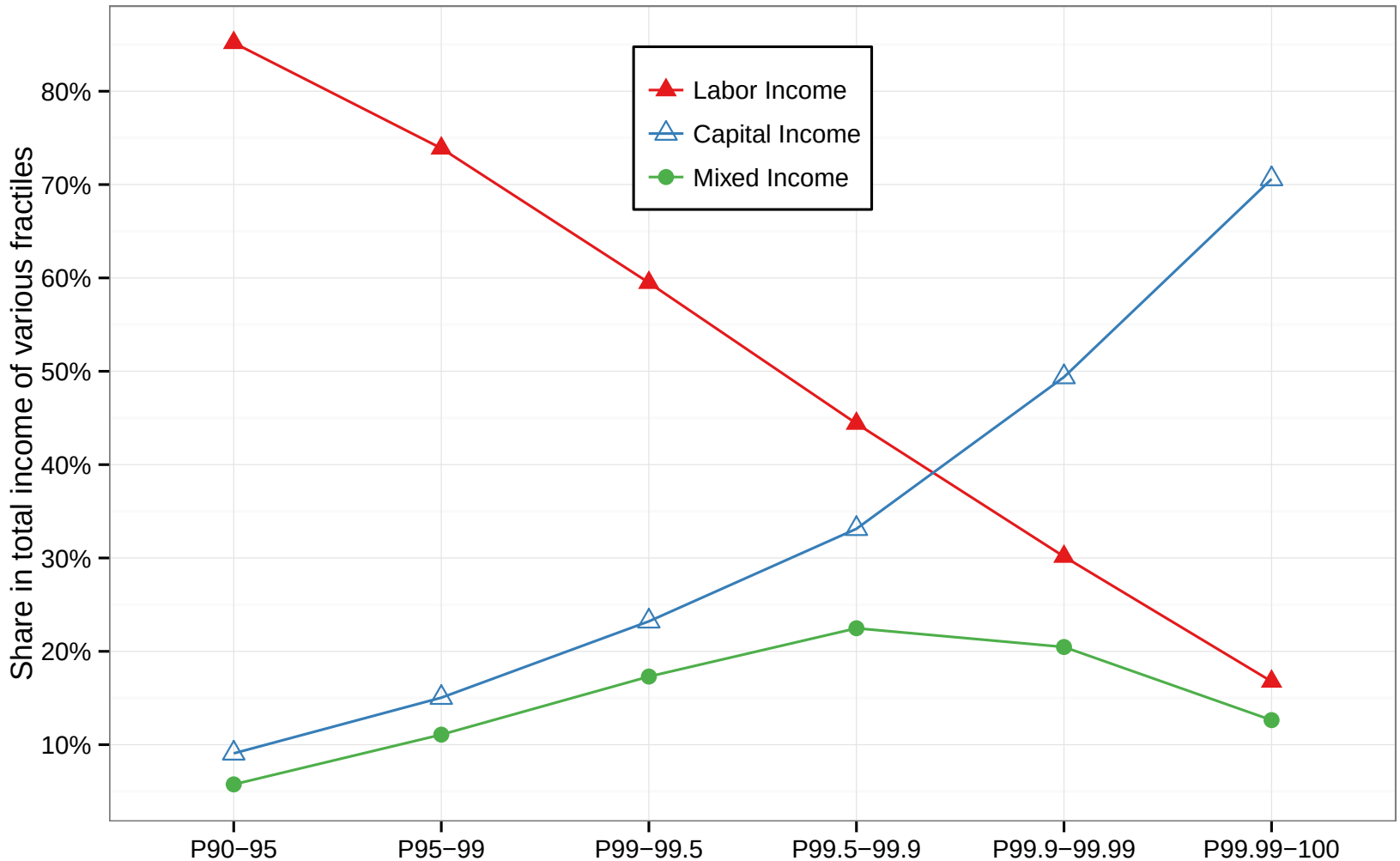
Figure 8.9. The composition of top incomes in the United States in 1929



Labor income becomes less and less important as one moves up within the top income decile.

Figure 8.10. The composition of top incomes in the United States in 2007



Capital income becomes dominant at the level of top 0.1 percent in 2007, as opposed to the top 1 percent in 1929.

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 21c ($r =$ 'net-of-tax rate of return', $g =$ 'growth rate'), then wealth inequality might reach or surpass 19c oligarchic levels; conversely, suitable institutions can allow to democratize wealth.
3. **Inequality in America** ("meritocratic extremism"): 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?

Brasil vs Europe–US–Japan

- **Top income shares**: income inequality is known to be high in Brasil; but it is probably underestimated (problem with household surveys); little access to fiscal data in Brasil.

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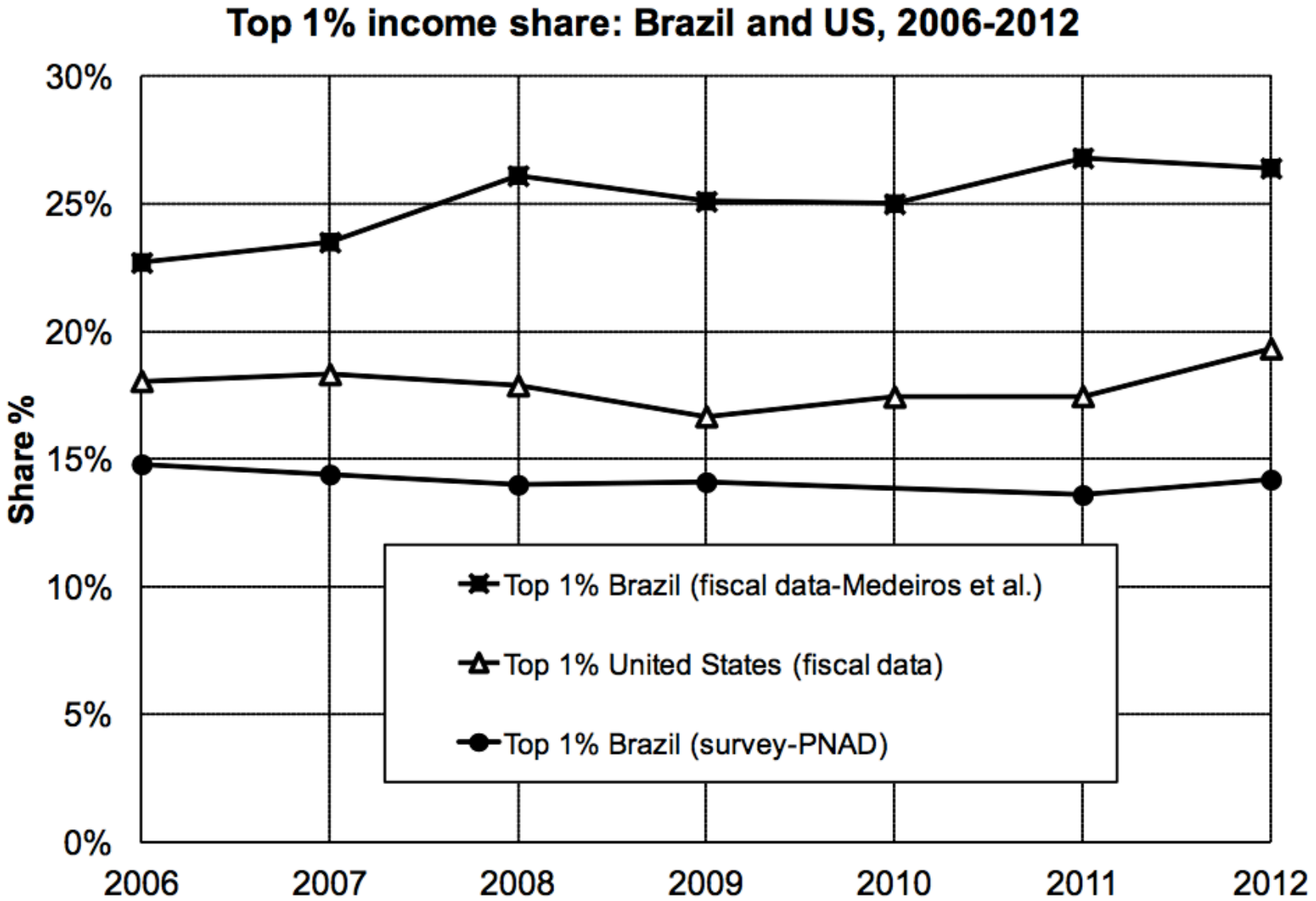
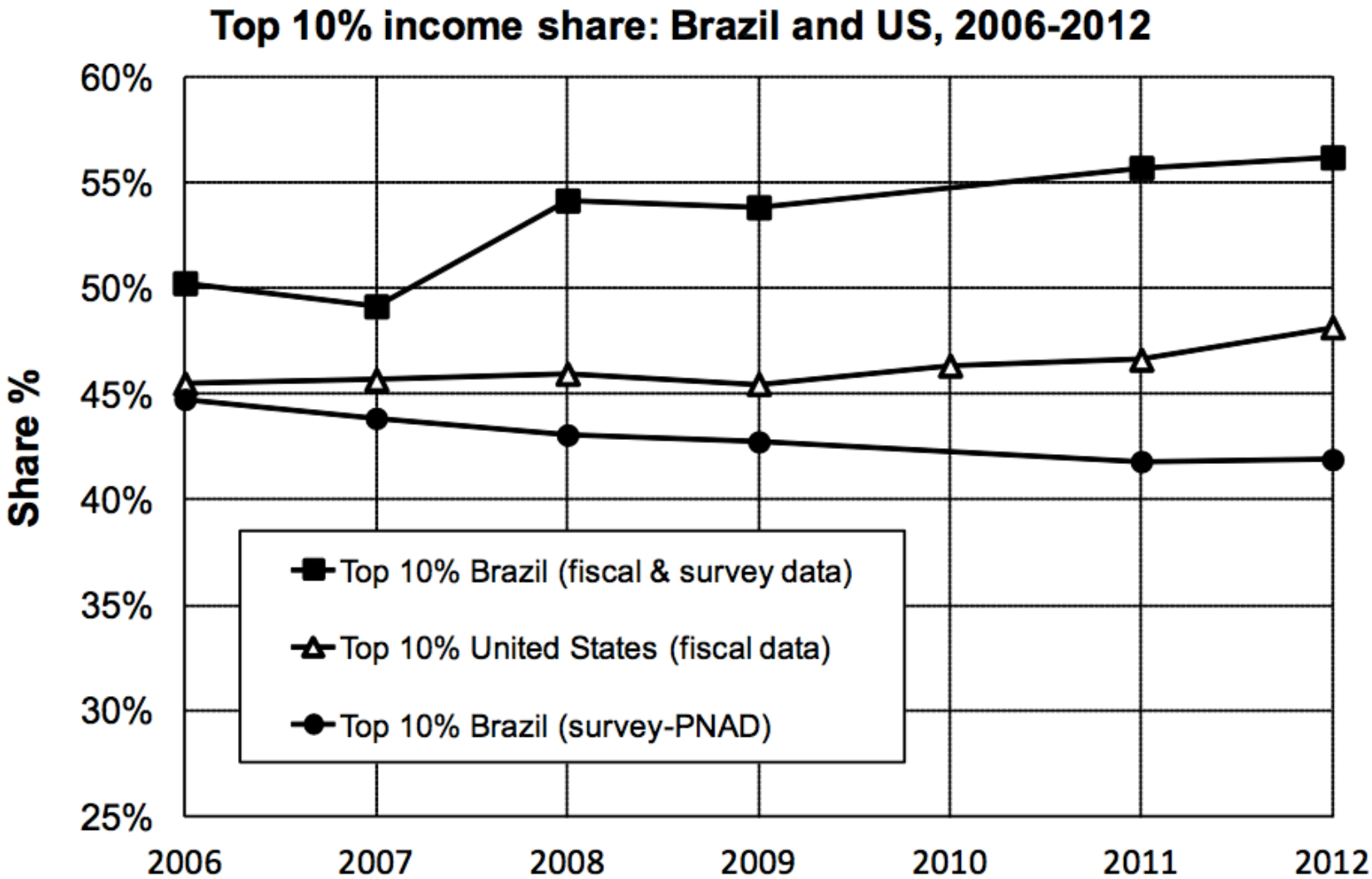
- **Wealth inequality**: probably very high, but we do not really know; no access to property tax and inheritance tax statistics.
- **Like other countries, Brasil needs more transparency about income and wealth**; progressive tax on income, inheritance and wealth would be a powerful way to produce information about how the different income and wealth groups are benefiting from growth.

Top 1% income share: Brazil and United States, 2006–2012



To Do: Get Data to Recreate Figure

Top 10% income share: Brazil and United States, 2006–2012



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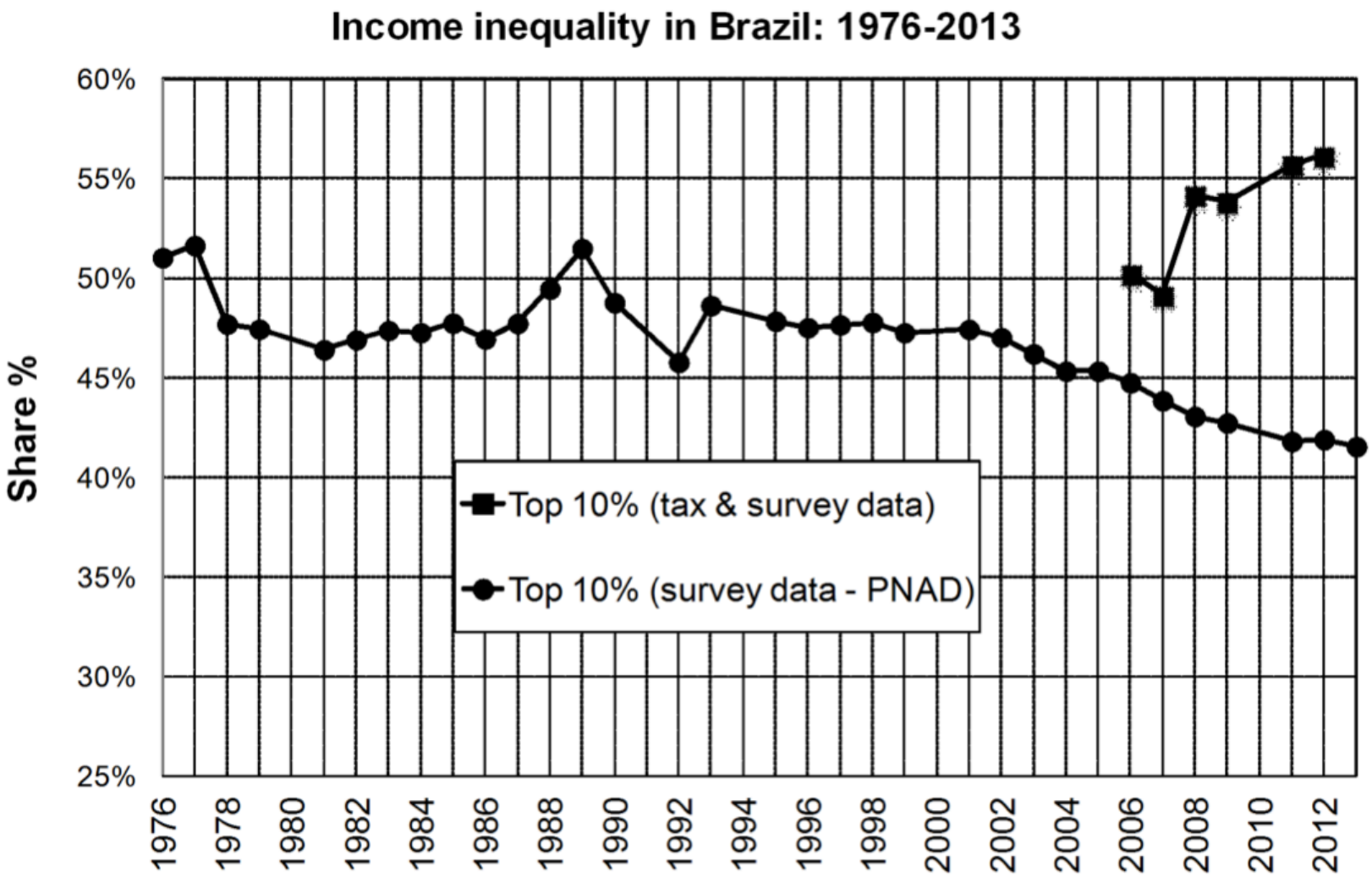
Income Inequality in Brazil: 1976–2013



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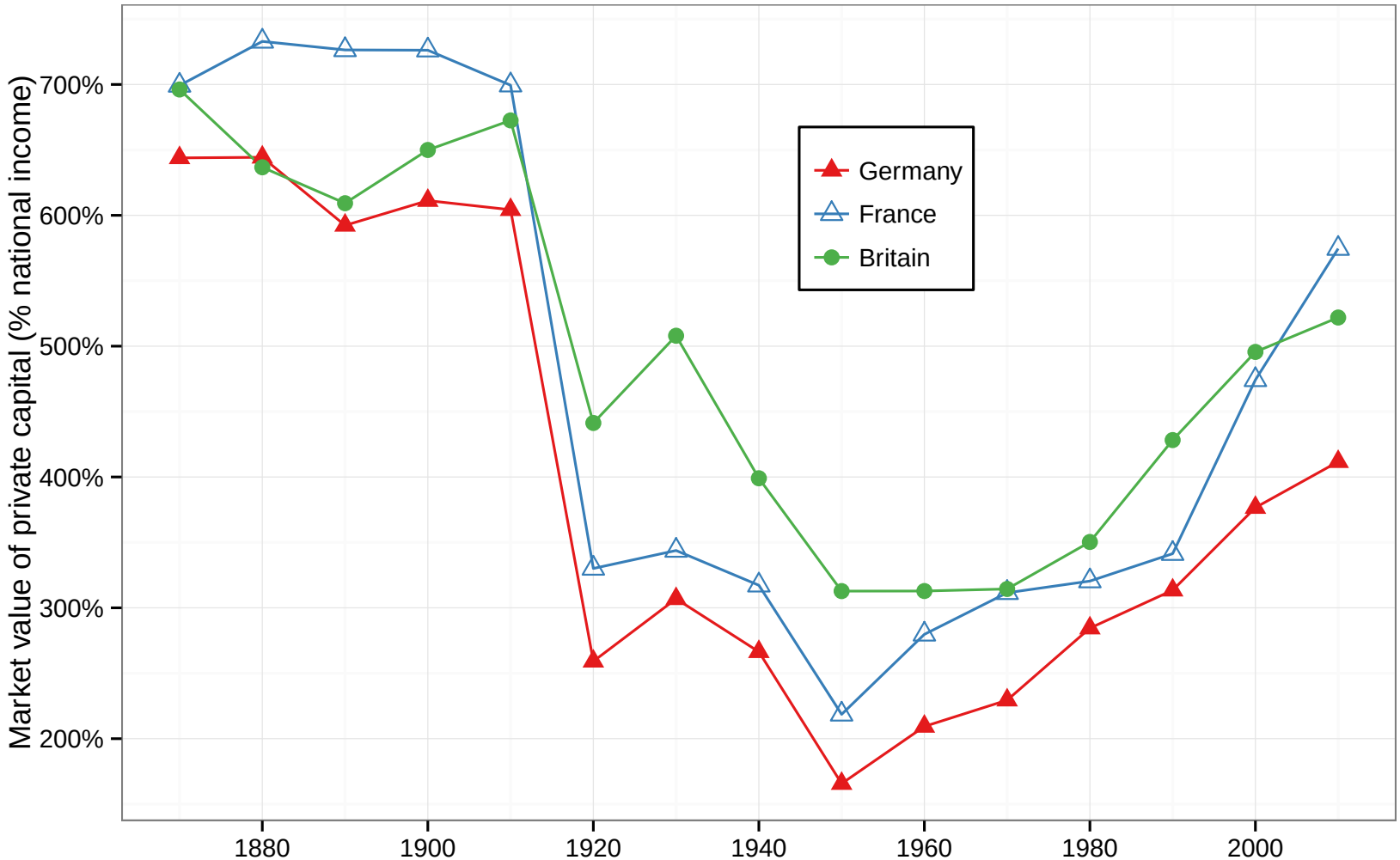
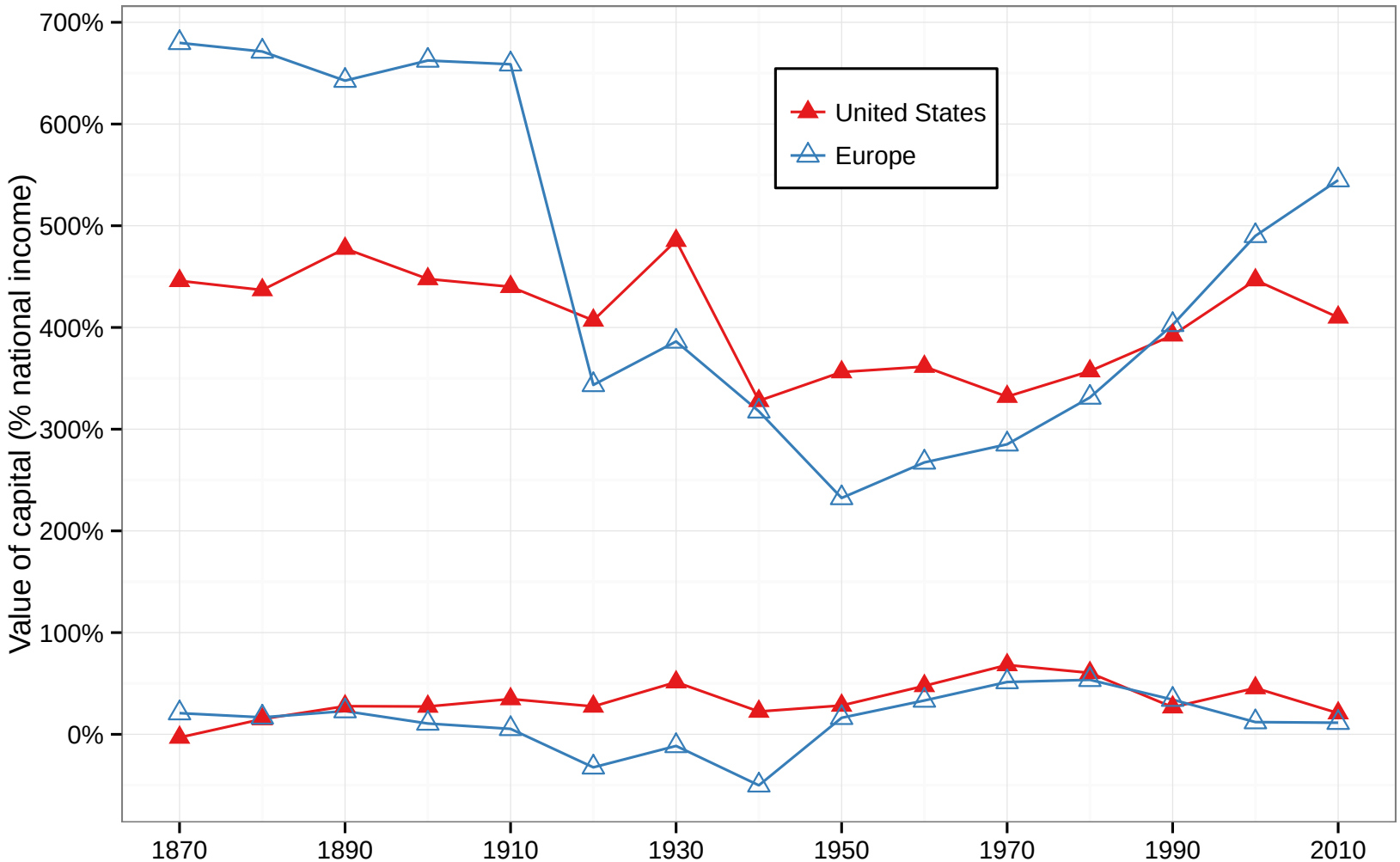


Aggregate private wealth was worth about 6–7 years of national income in Europe in 1910, between 2 and 3 years in 1950, and between 4 and 6 years in 2010.

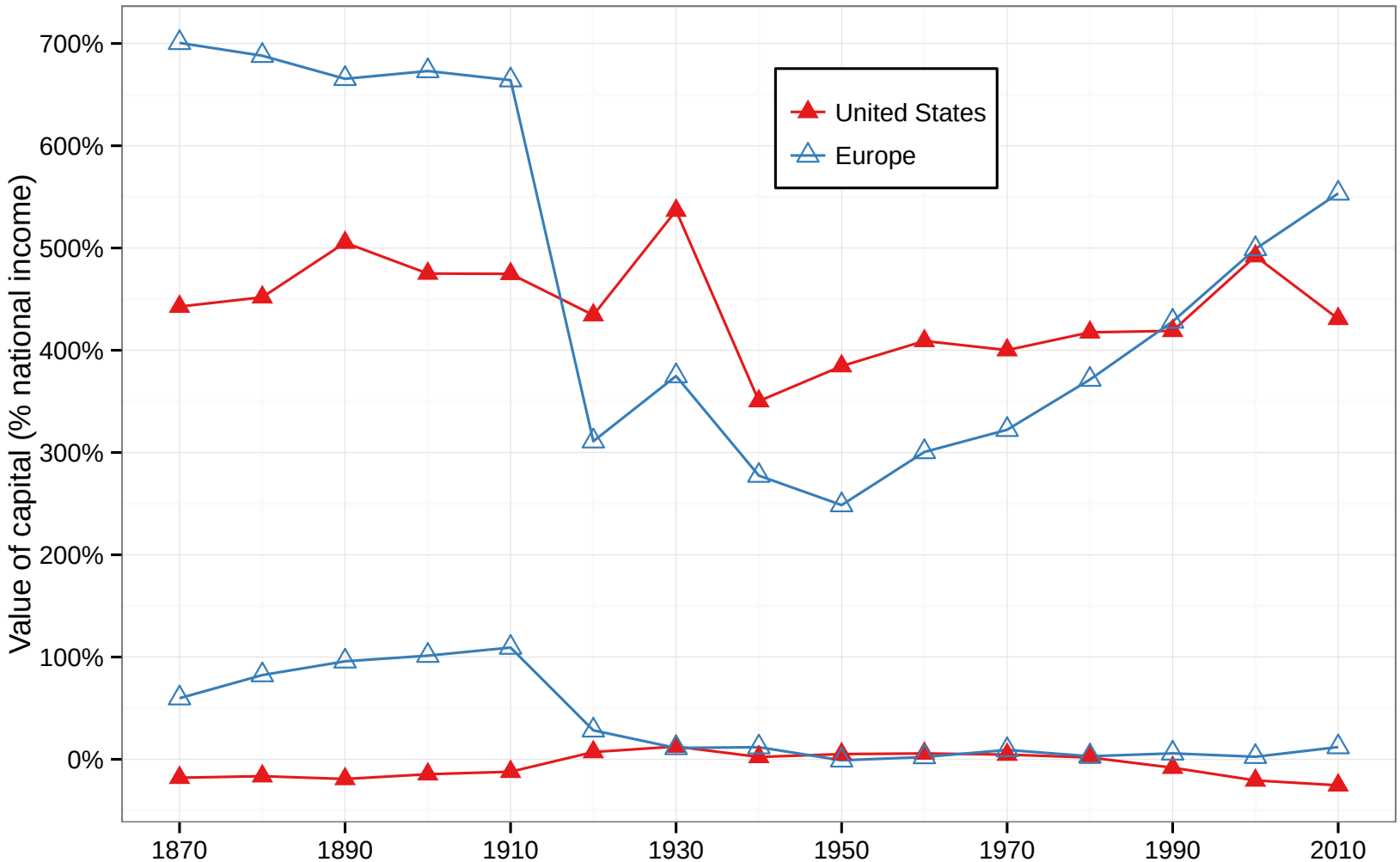
http://piketty.pse.ens.fr/fr/capital21c

Figure 5.1: Private & public capital in Europe & United States, 1870–2010



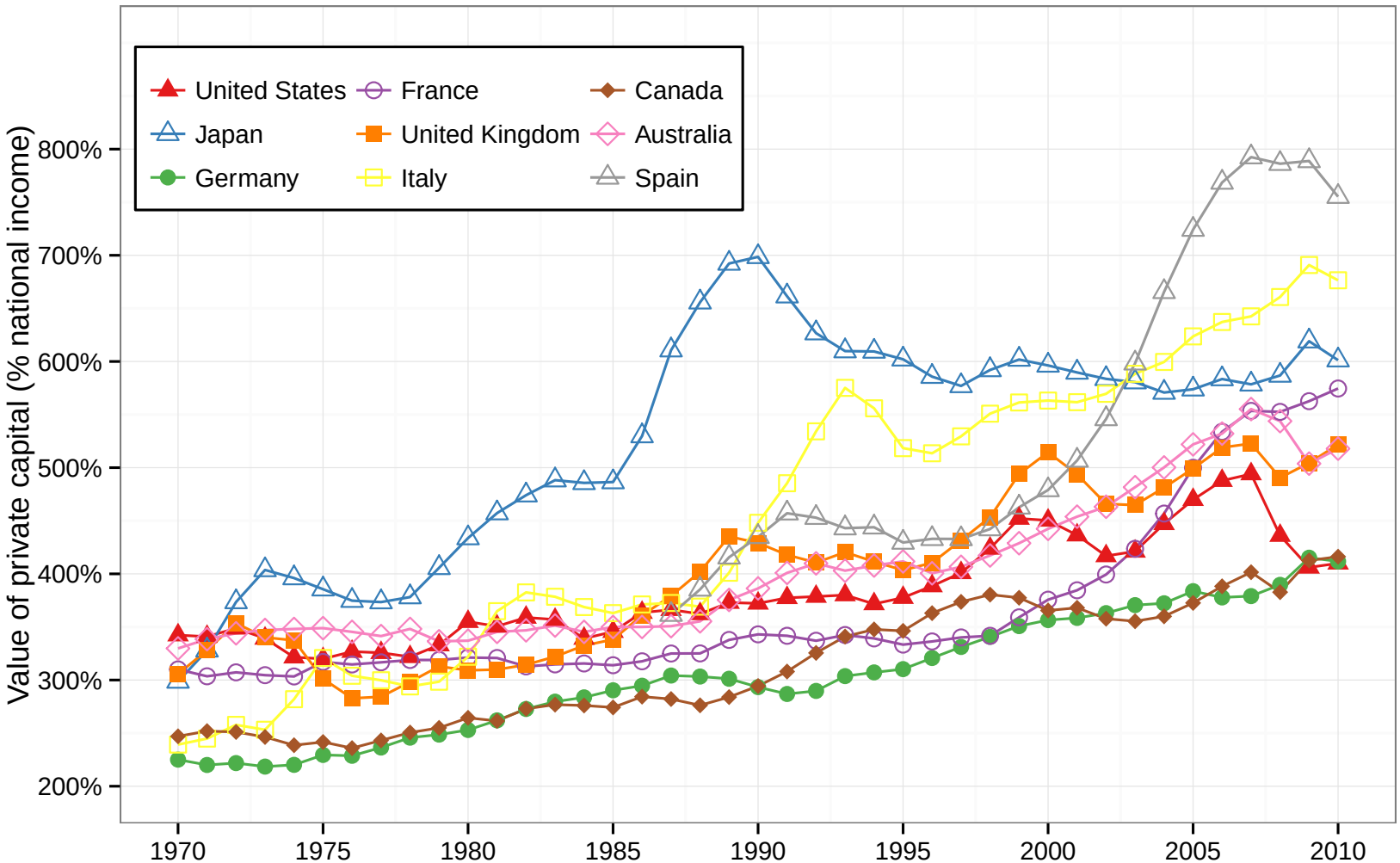
The fluctuations of national capital in the long run correspond mostly to the fluctuations of private capital (both in Europe and in the United States).

Figure 5.2: National capital in Europe & United States, 1870–2010



National capital (public and private) is worth 6.5 years of national income in Europe in 1910, versus 4.5 years in the United States.

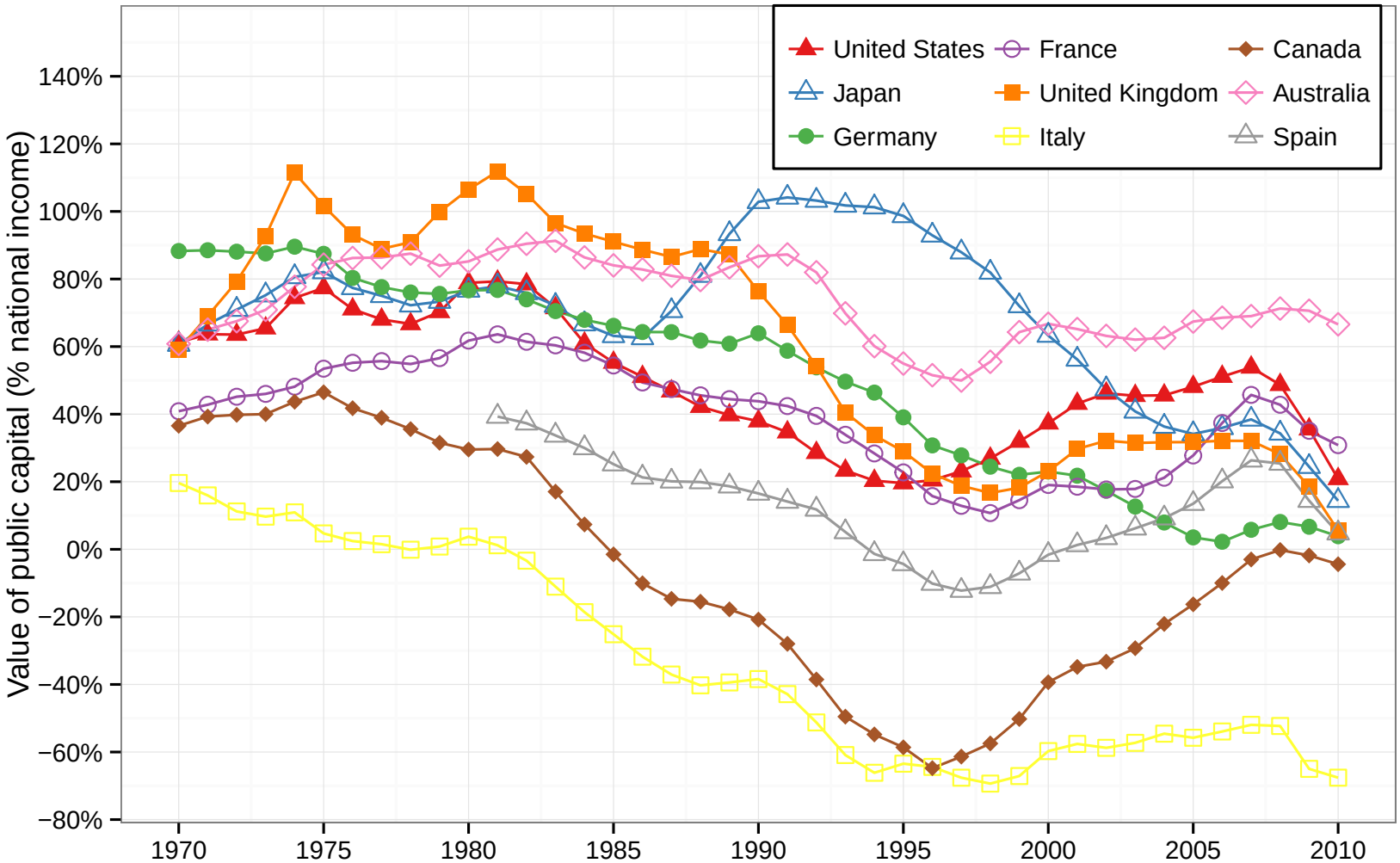
Figure 5.3: Private capital in rich countries, 1970–2010



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.

http://piketty.pse.ens.fr/fr/capital21c

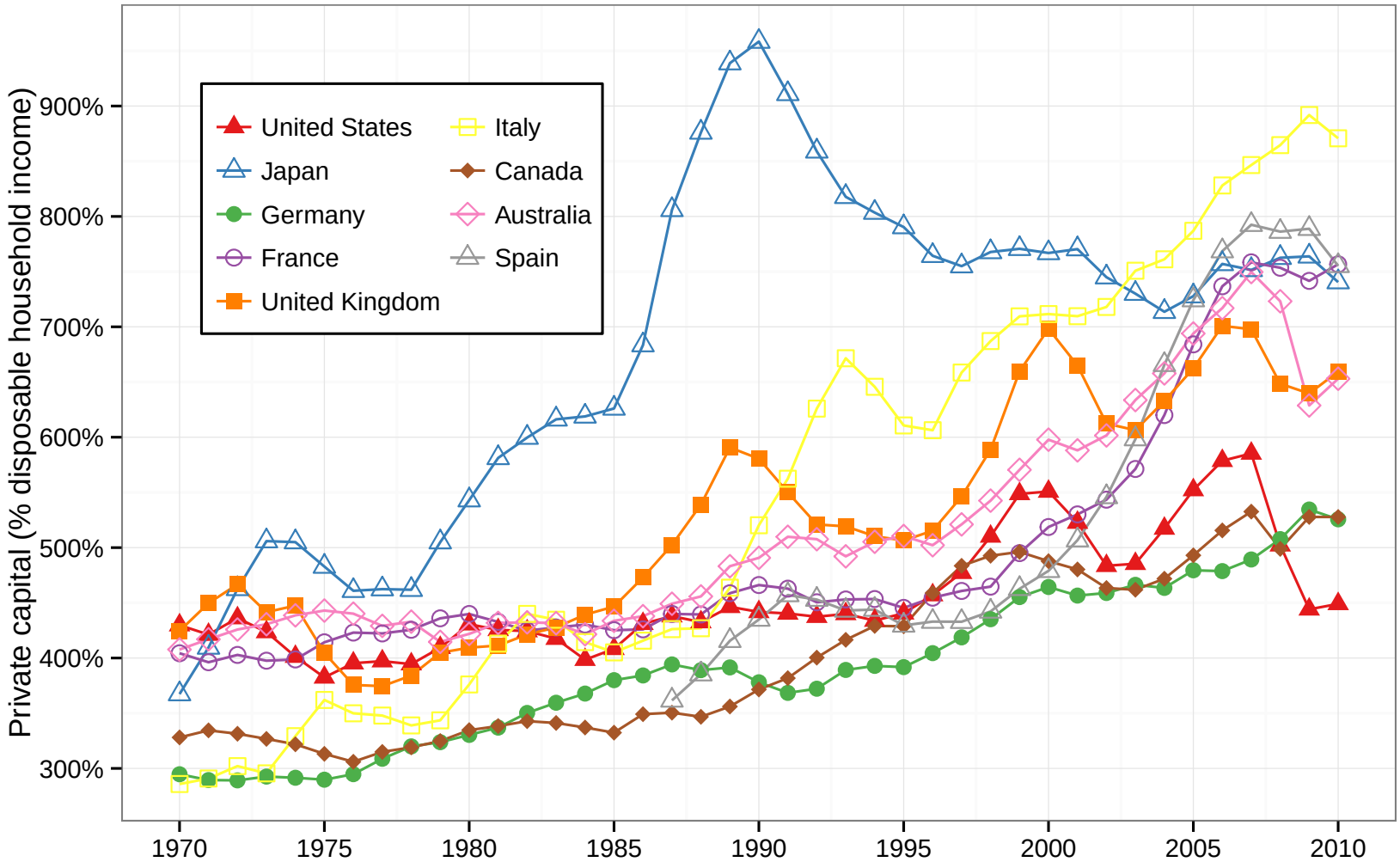
Figure 5.3b: Public capital in rich countries, 1970–2010



In France, Britain, Germany, and the United States, government deficits exceeded public investment by 2–3% of national income on average over the period 1970–2010, compared with more than 6% in Italy.

http://piketty.pse.ens.fr/fr/capital21c

Figure 5.4: Private capital in rich countries (ratio), 1970–2010



Expressed in years of household disposable income (about 70–80% of national income), the capital/income ratio appears to be larger than when it is expressed in years of national income.

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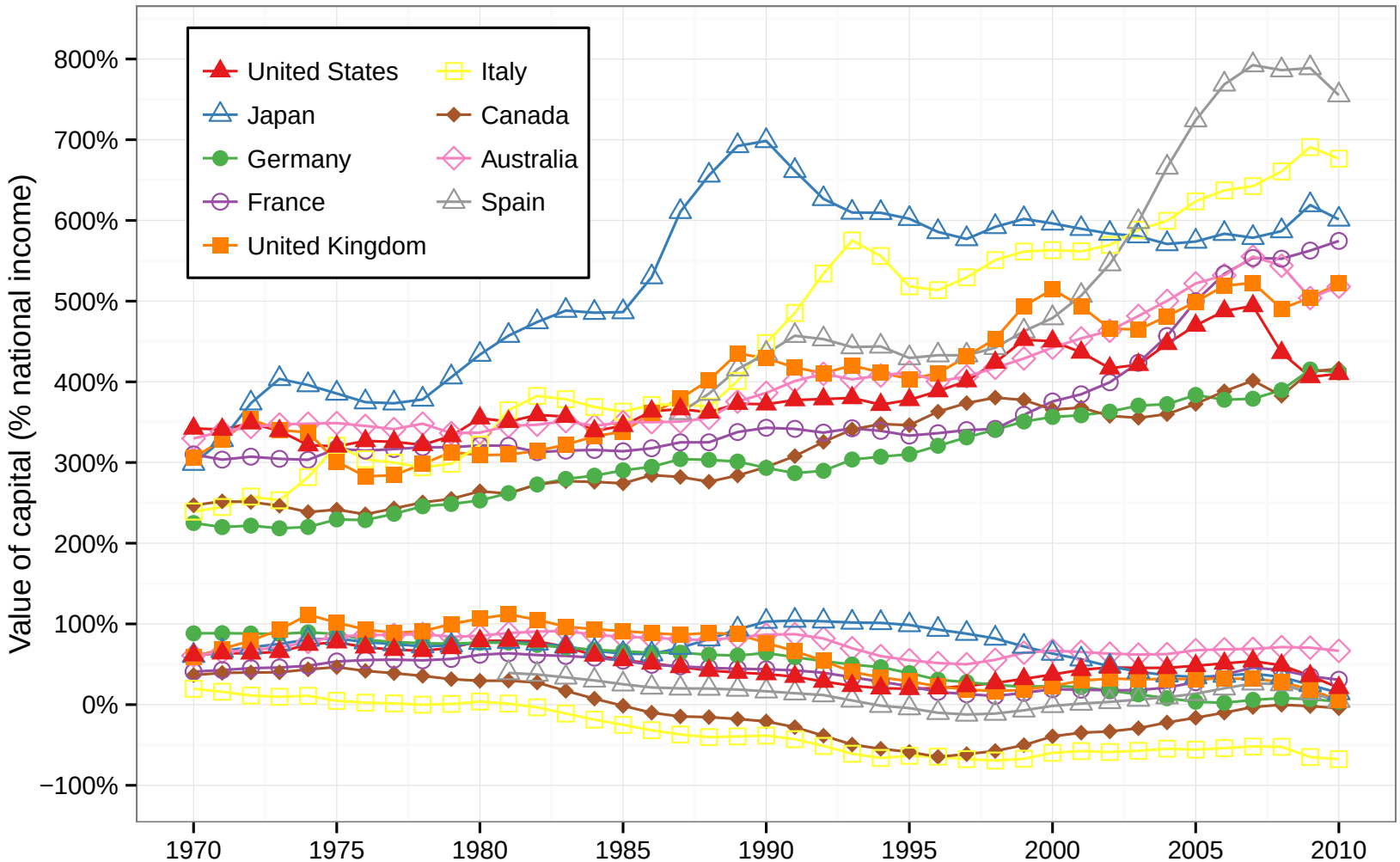
Figure 5.5: Private and public capital in rich countries, 1970–2010



In Italy, private capital rose from 240% to 680% in national income between 1970 and 2010, while public capital dropped from 20% to -70%.

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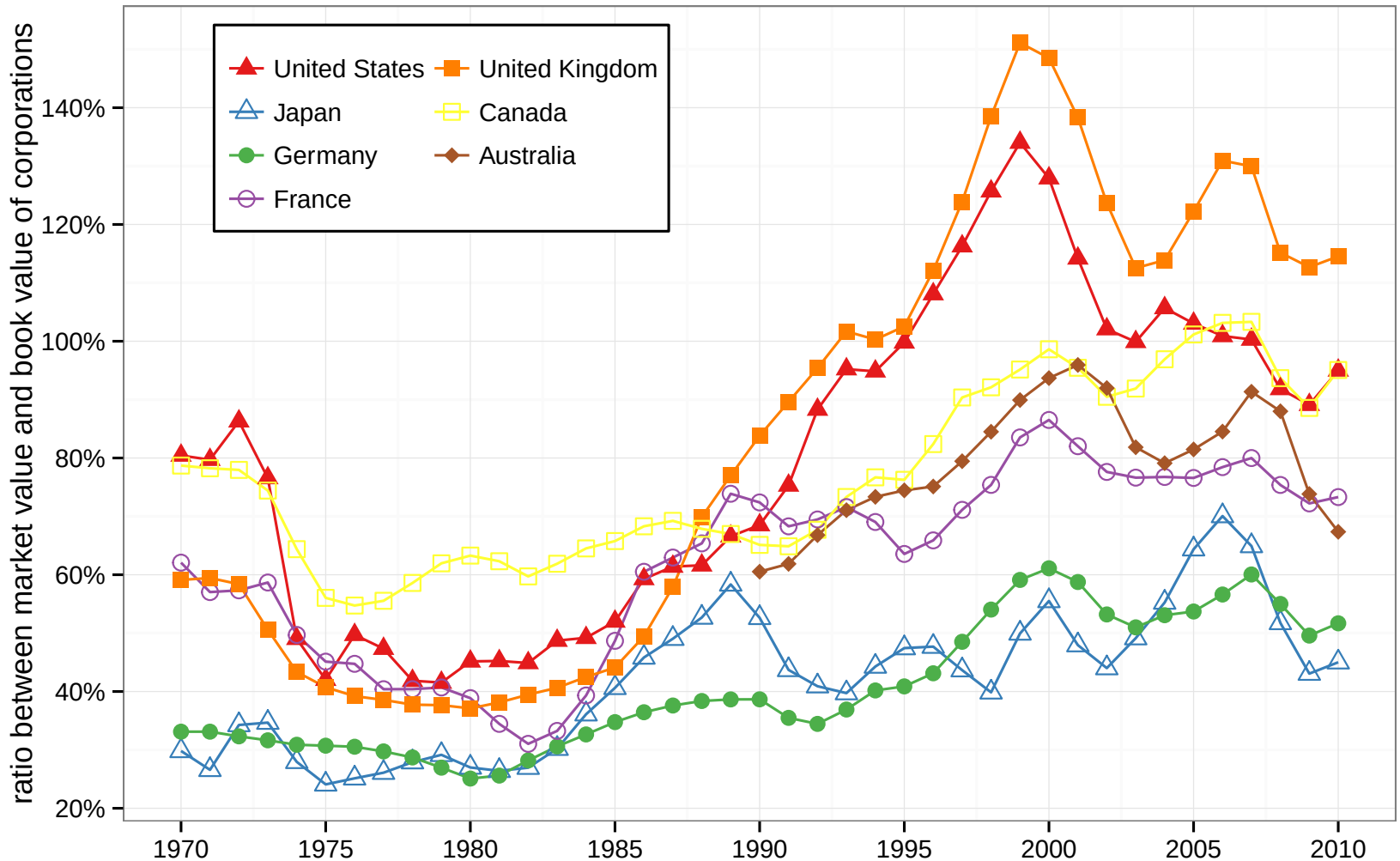
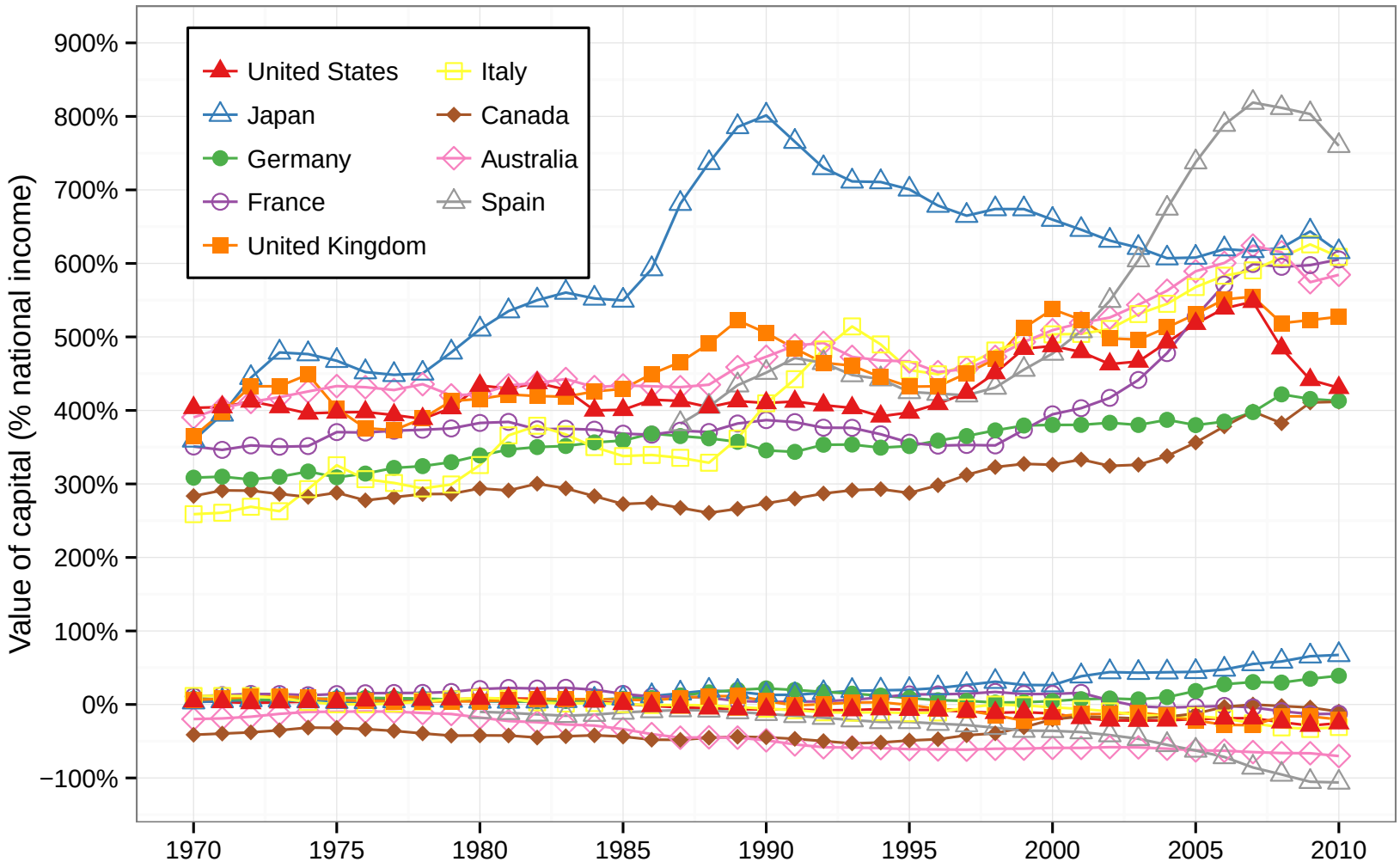
Figure 5.6: Market value and book value of corporations, 1970–2010



Tobin's Q (i.e. the ratio between market value and book value of corporations) has risen in rich countries since the 1970s–1980s.

Figure 5.7: National capital in rich countries, 1970–2010



Net foreign assets held by Japan and Germany are worth between 6 months and one year of national income in 2010.

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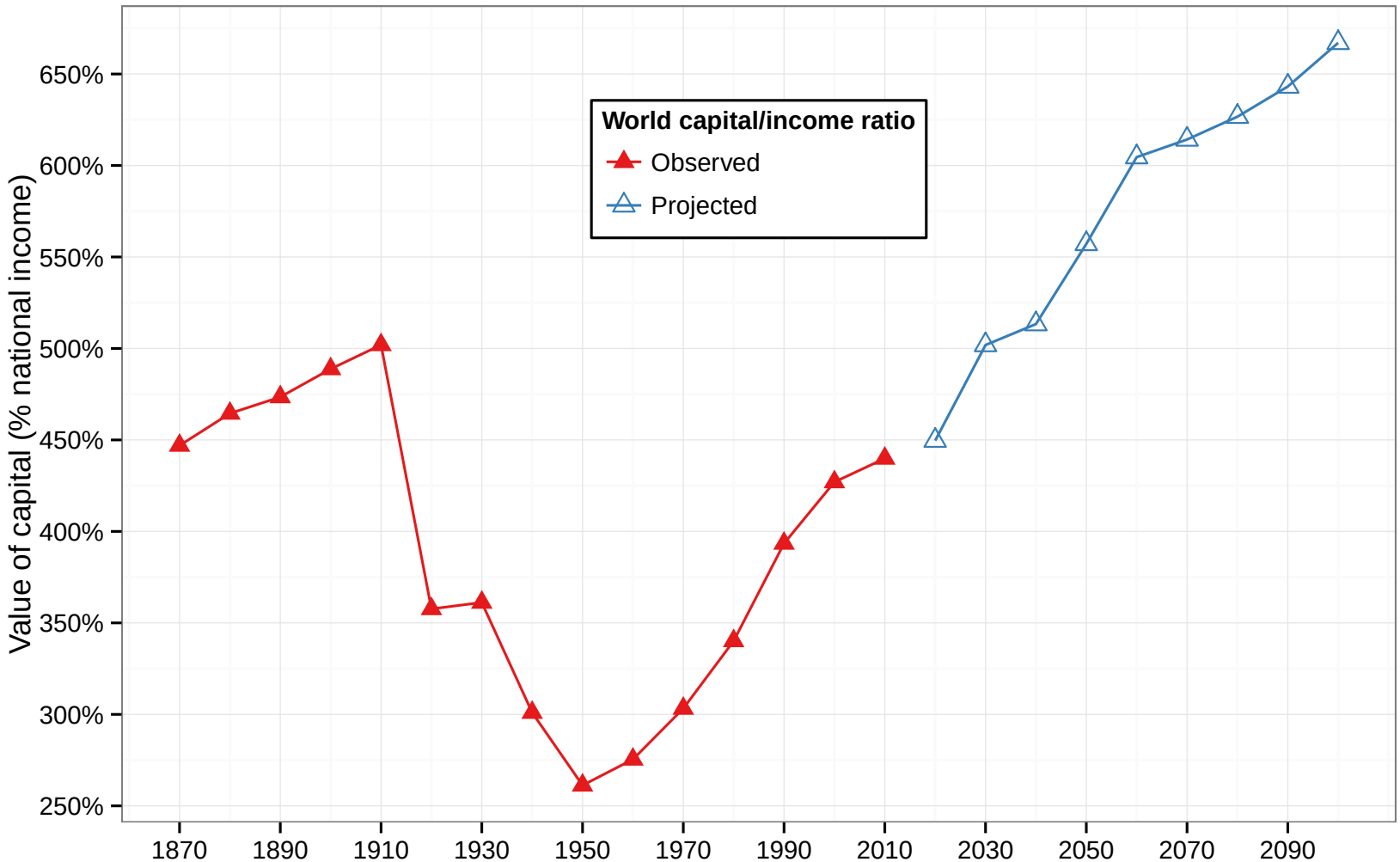
Figure 5.8: The world capital/income ratio, 1870–2100



According to simulations (central scenario), the world capital/income ratio could be close to 700 percent by the end of the twenty-first century.

http://piketty.pse.ens.fr/fr/capital21c

Table 12.1: The growth rate of top global wealth, 1987–2013

	Average real growth rate per year (after deduction of inflation) (%)
The top 1/(100 million) highest wealth holders [a]	6.8
The top 1/(20 million) highest wealth holders [b]	6.4
Average world wealth per adult	2.1
Average world income per adult	1.4
World adult population	1.9
World GDP	3.3

Between 1987 and 2013, the highest global wealth fractiles have grown at 6–7% per year versus 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).

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[a] About 30 adults out of 3 billion in the 1980s, and 45 adults out of 4.5 billion in 2010.

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[a] About 30 adults out of 3 billion in the 1980s, and 45 adults out of 4.5 billion in 2010.

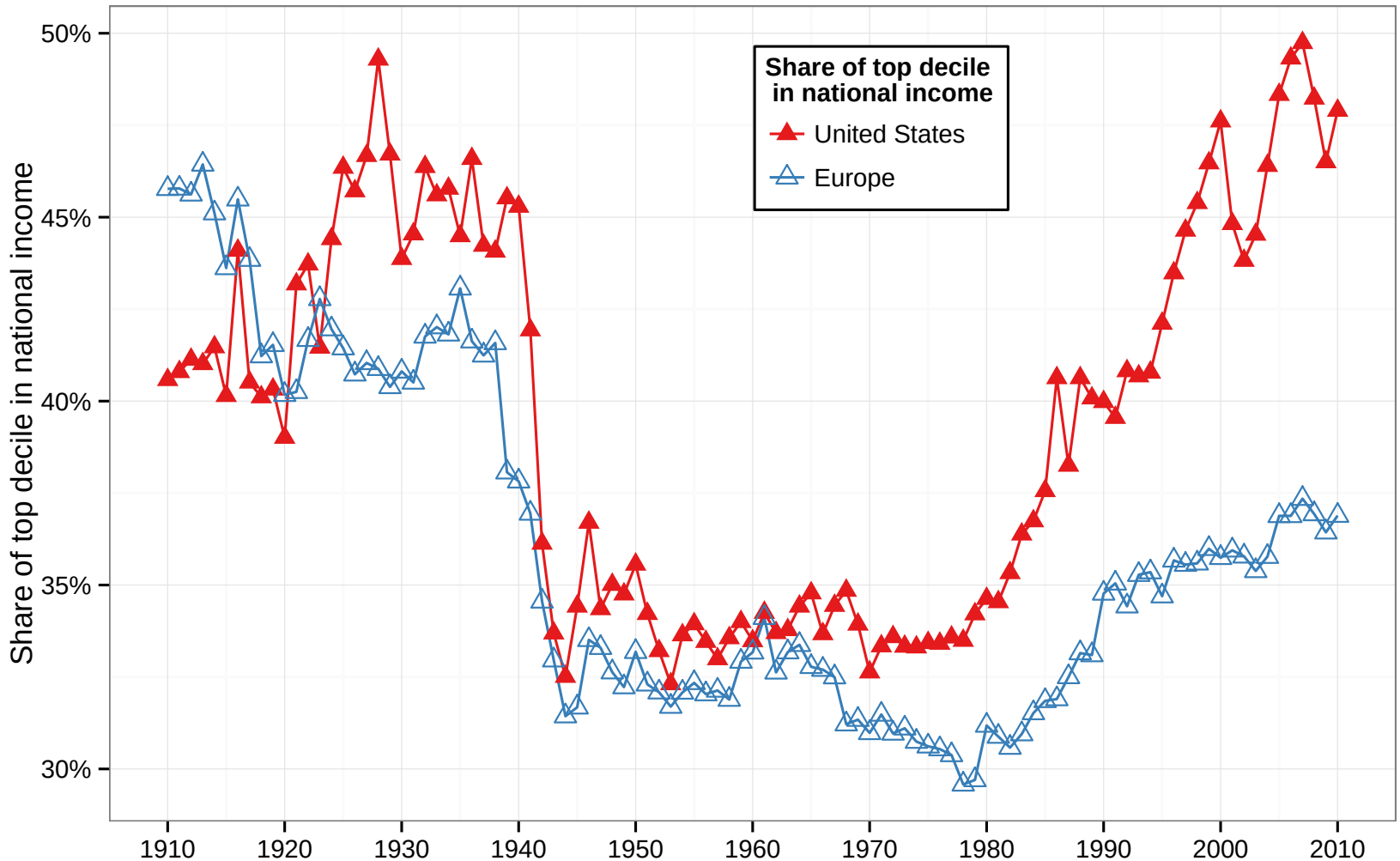
[b] About 150 adults out of 3 billion in the 1980s, and 225 adults out of 4.5 billion in the 2010s.

Table 12.2: The return on the capital endowments of U.S. universities, 1980–2010

	Average real annual rate of return (after deduction of inflation and all administrative costs and financial fees) (%)
All universities (850)	8.2
Harvard, Yale, and Princeton	10.2
Endowments higher than $1 billion (60)	8.8
Endowments between $500 million and 1 billion (66)	7.8
Endowments between $100 and $500 million (226)	7.1
Endowments less than $100 million (498)	6.2

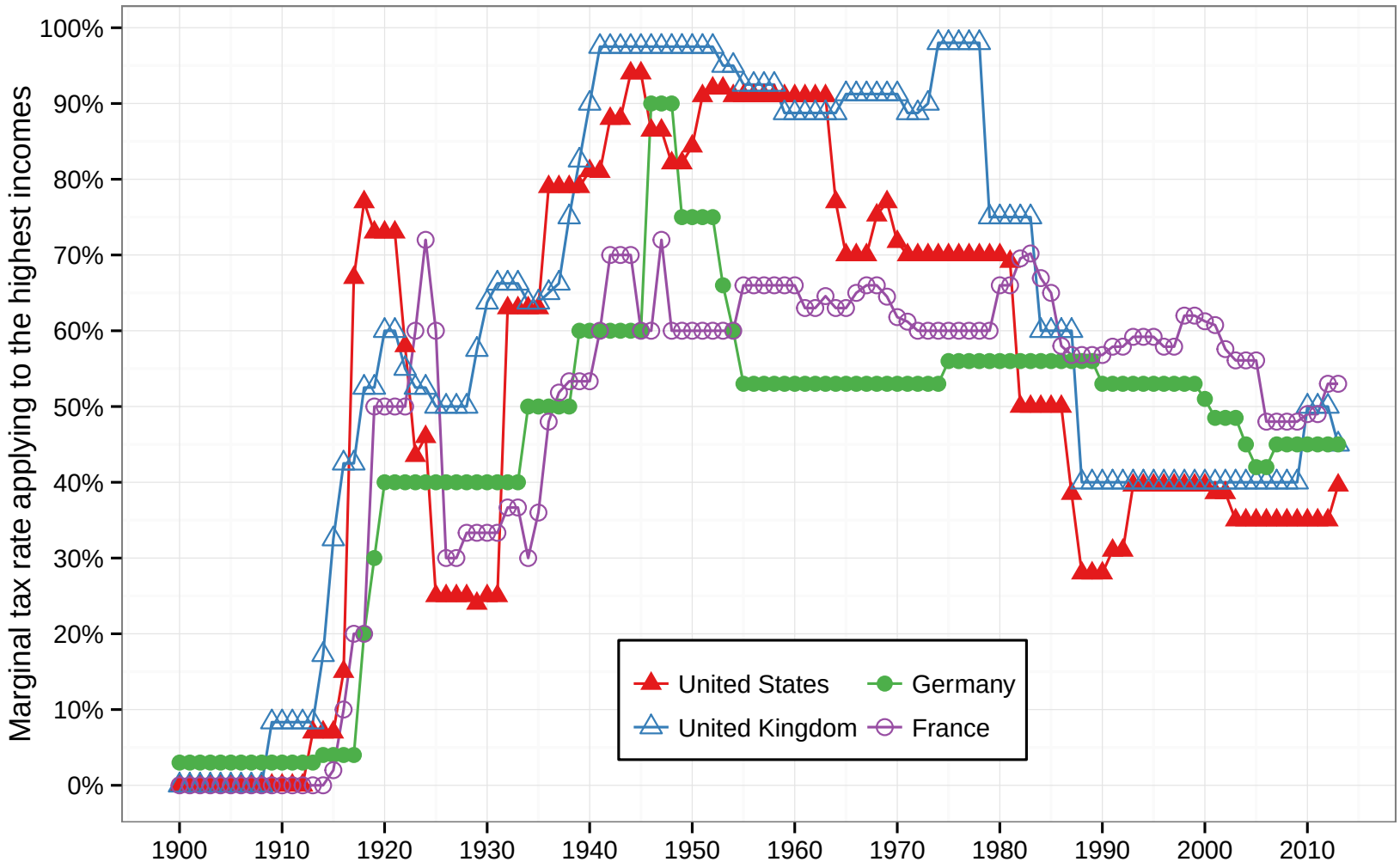
Between 1980 and 2010, U.S. universities earned an average real rate of return of 8.2% on their capital endowments, and more for the greater endowments. All returns are reported net of inflation (2.4% per year between 1980 and 2010) and net of administrative costs and financial fees.

Figure 9.8: Income inequality: Europe vs. United States, 1900–2010



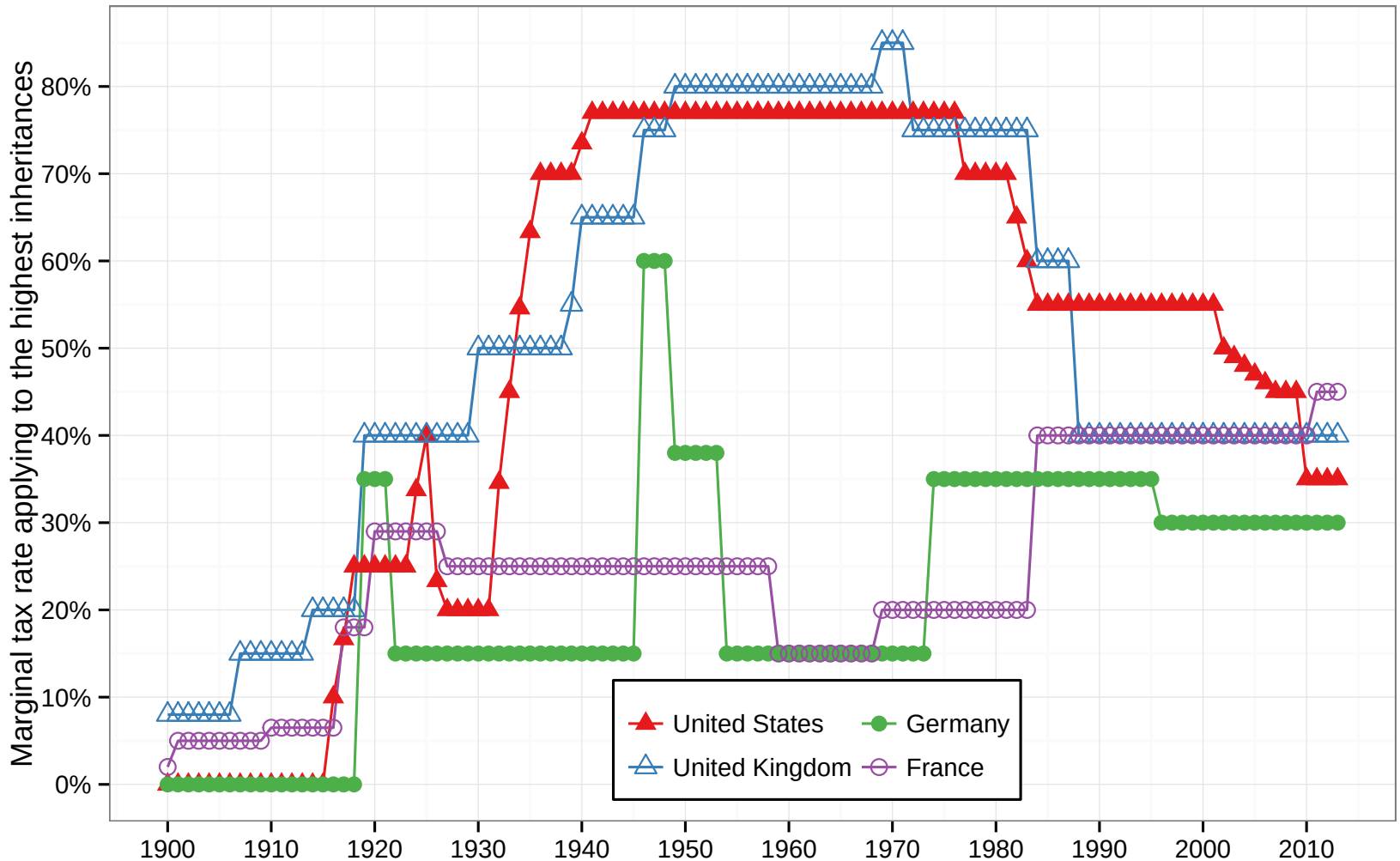
The top decile income share was higher in Europe than in the U.S. in 1900–2010. It is much higher in the U.S. in 2000–2010.

Figure 14.1: Top income tax rates, 1900–2013



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.

Figure 14.2: Top inheritance tax rates, 1900–2013



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.

http://piketty.pse.ens.fr/fr/capital21c

Conclusions

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- 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.

Supplementary Slides

(long lecture version)

1. The return of a wealth-based society

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- In textbooks, wealth-income & capital-ouput 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:

$$\beta = 200 - 300\% \text{ in } 1950 - 1960$$
$$\beta = 500 - 600\% \text{ in } 2000 - 2010$$

(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 $\beta \simeq 600\%$, if $Y \simeq €30,000$ per capita, then $K \simeq €180,000$ per capita)
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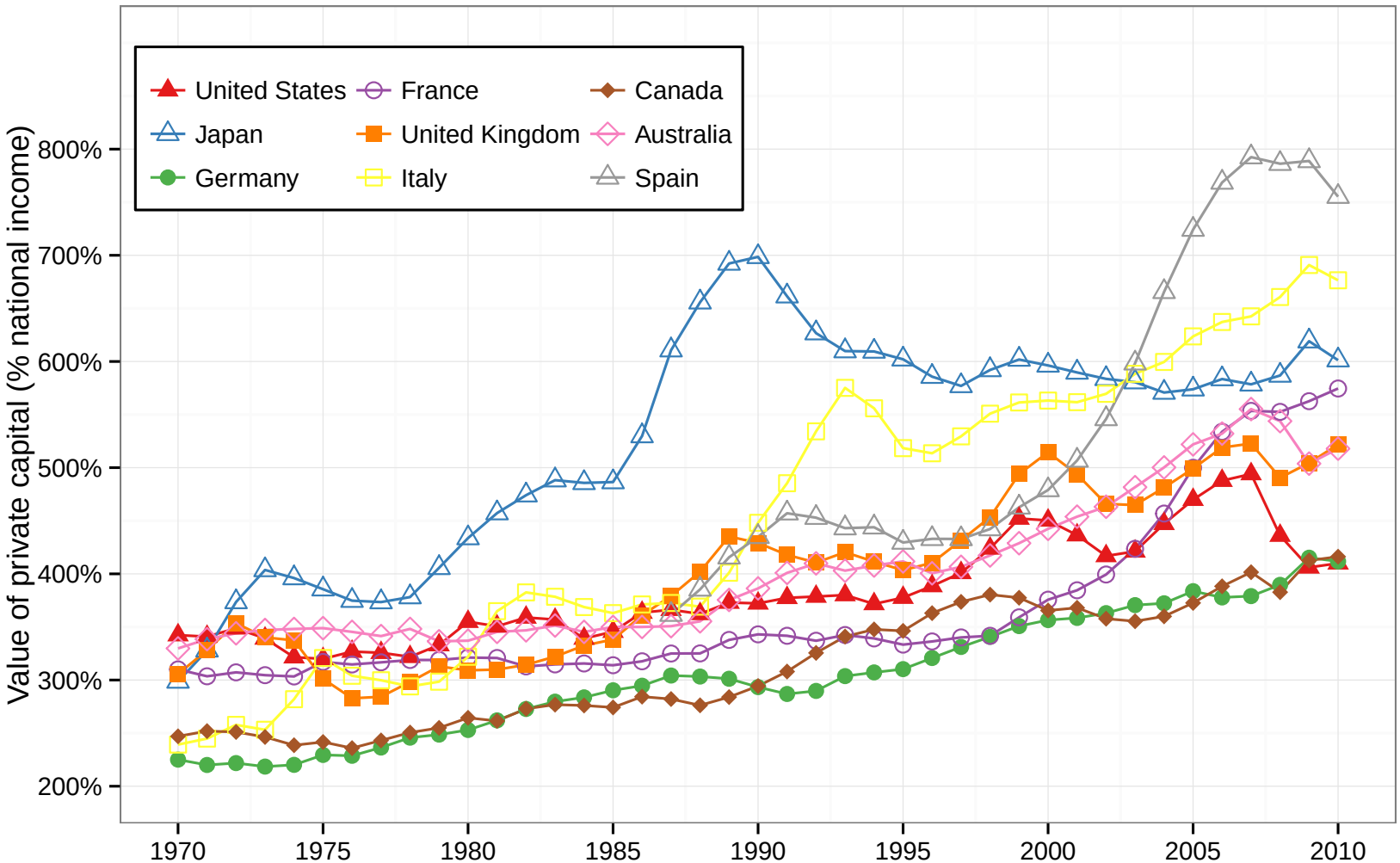
(currently, $K \simeq$ half real estate, half financial assets)

- **Are we heading back to the $\beta = 600 - 700\%$ observed in the wealth-based societies of 18c-19c? Or even more?**

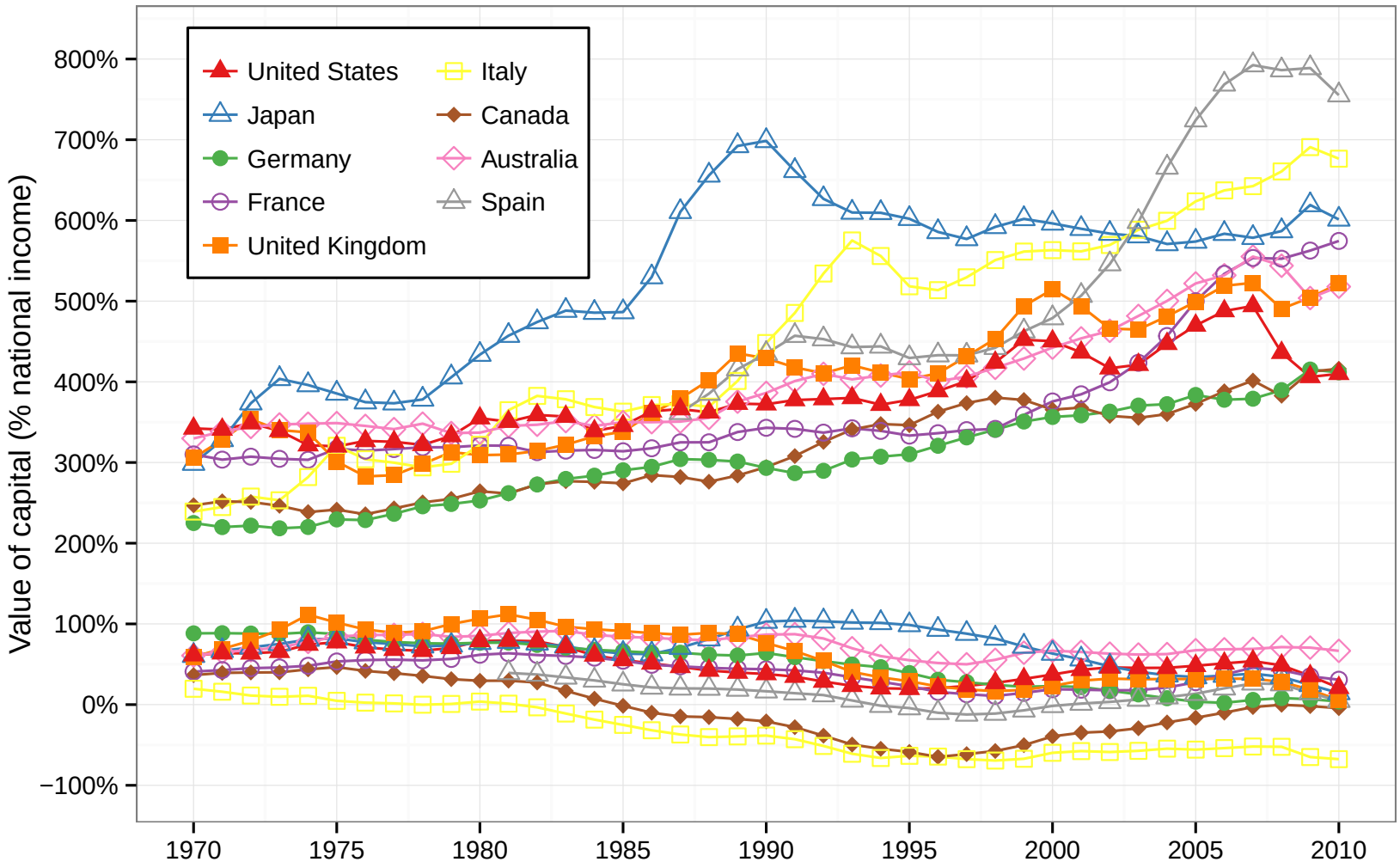
Figure 5.3: Private capital in rich countries, 1970–2010



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.

http://piketty.pse.ens.fr/fr/capital21c

Figure 5.5: Private and public capital in rich countries, 1970–2010



In Italy, private capital rose from 240% to 680% in national income between 1970 and 2010, while public capital dropped from 20% to -70%.

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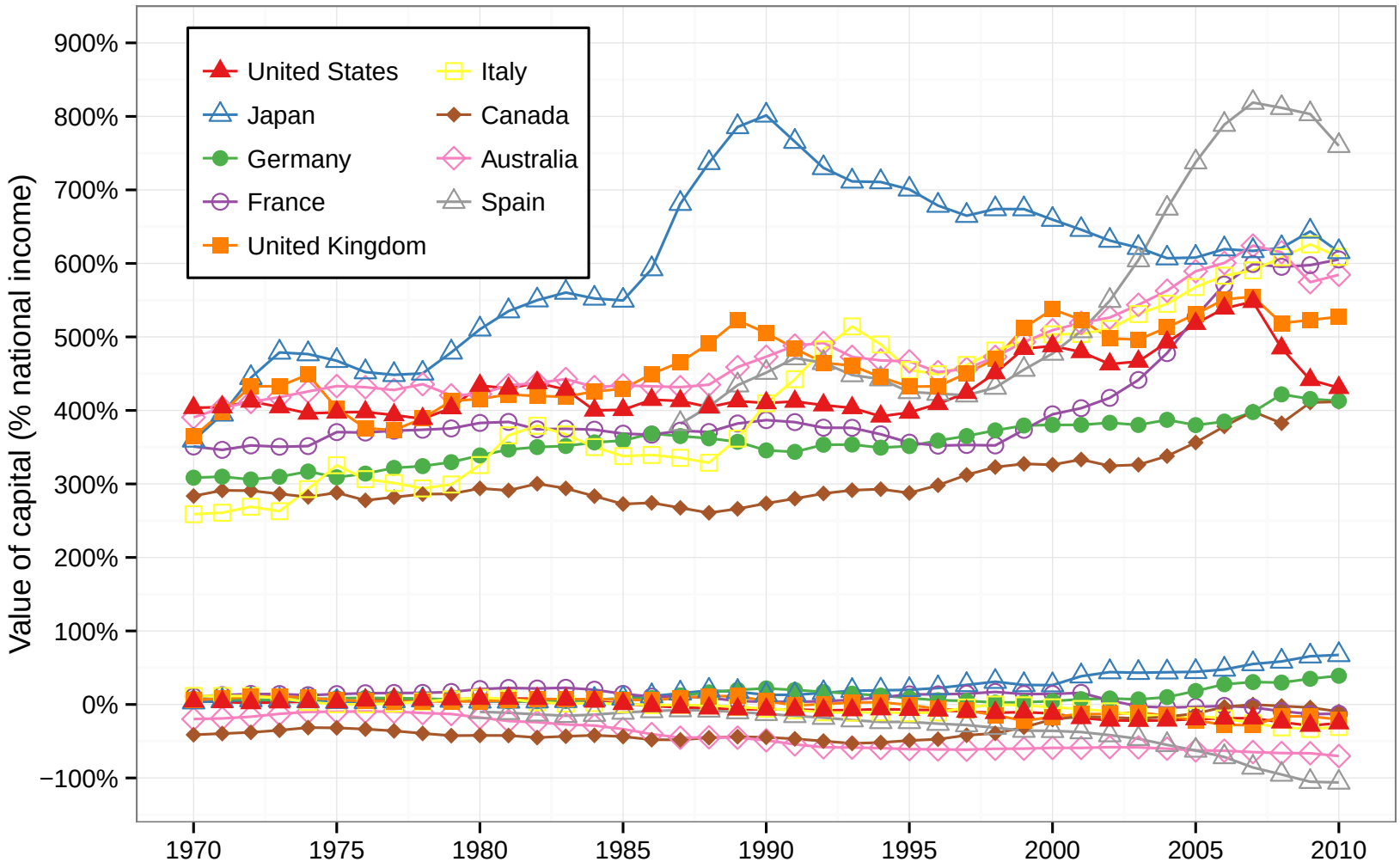
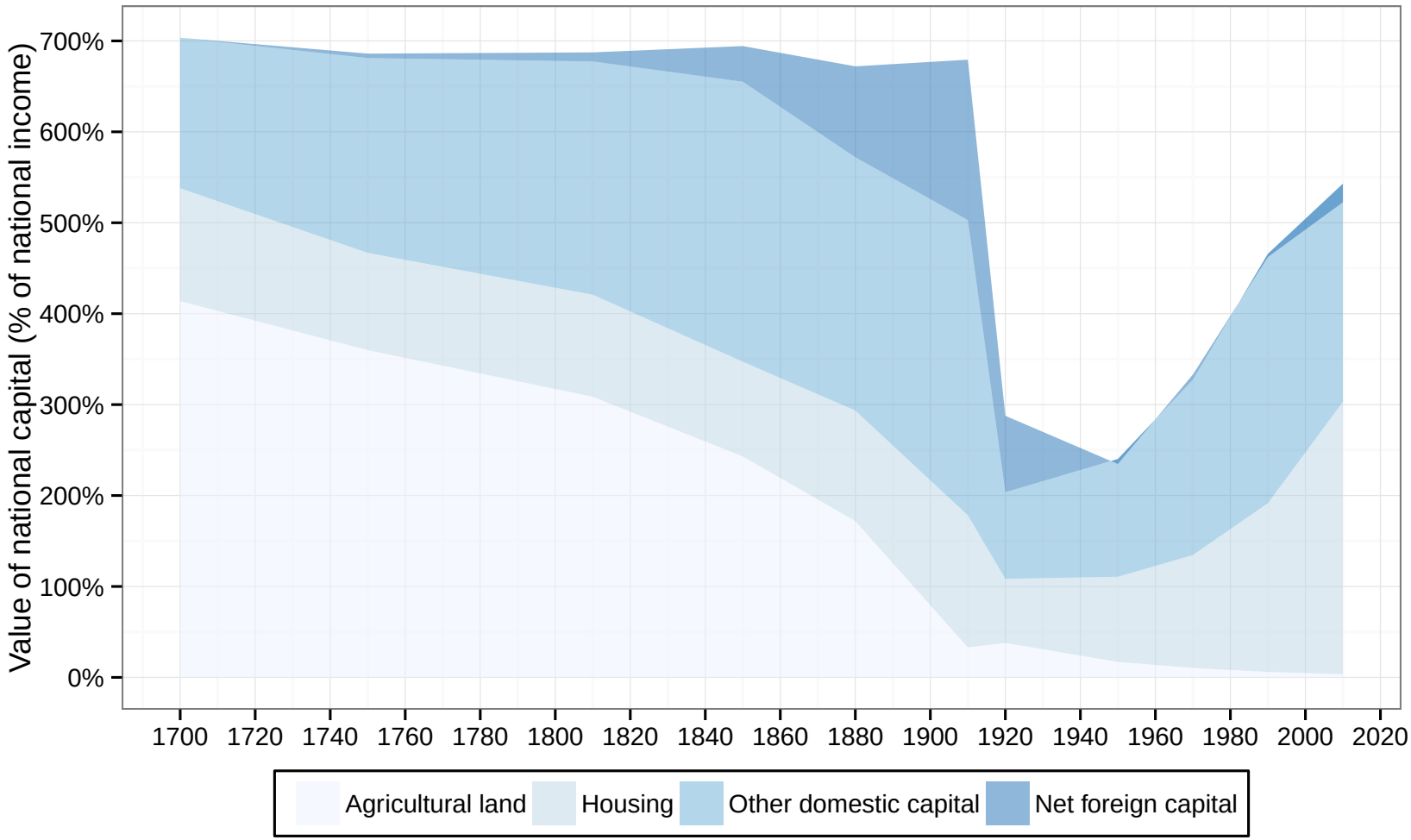
Figure 5.7: National capital in rich countries, 1970–2010



Net foreign assets held by Japan and Germany are worth between 6 months and one year of national income in 2010.

http://piketty.pse.ens.fr/fr/capital21c

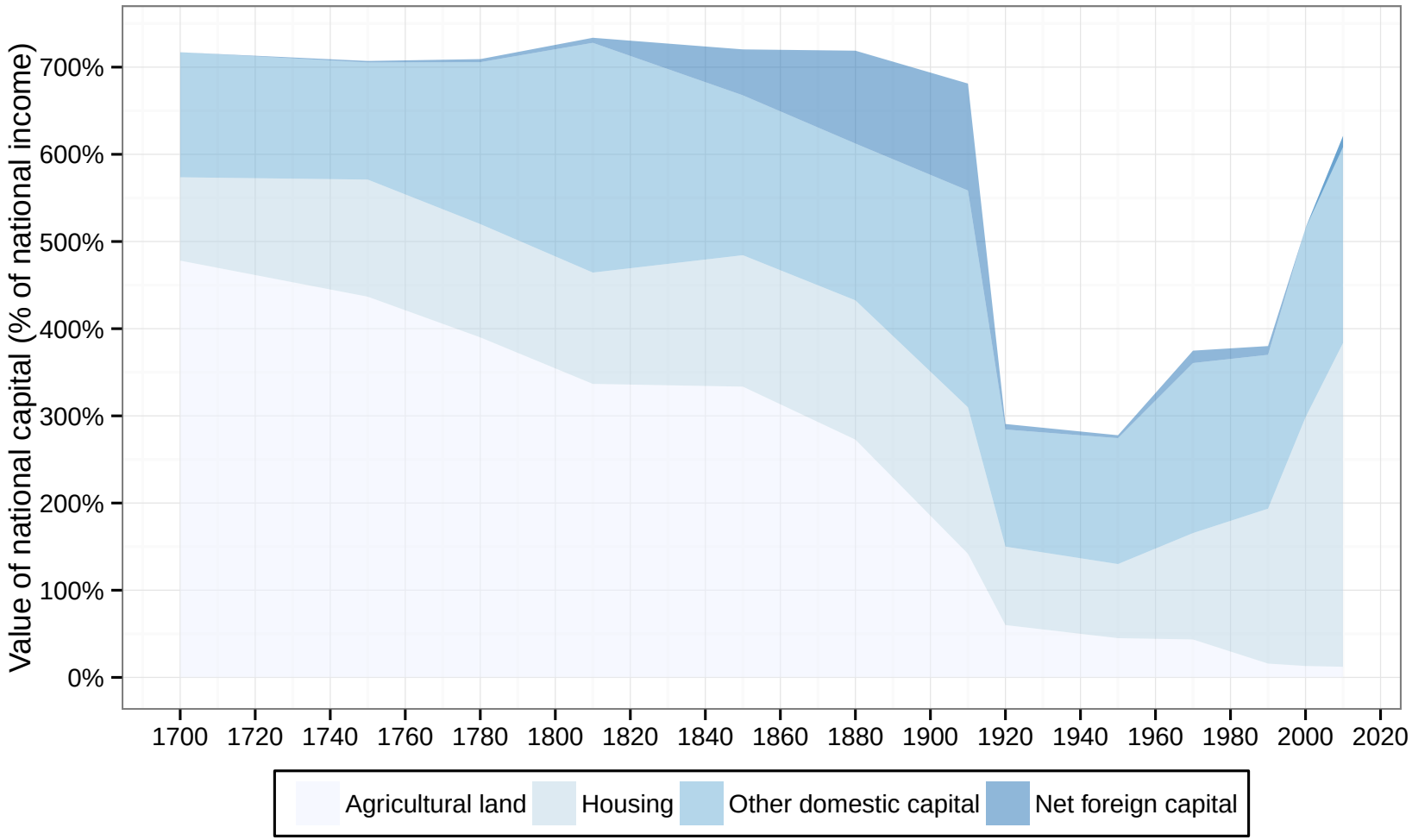
Figure 3.1: Capital in Britain, 1700–2010



National capital is worth about seven years of national income in Britain in 1700 (including four in agricultural land).

http://piketty.pse.ens.fr/fr/capital21c

Figure 3.2: Capital in France, 1700–2010



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

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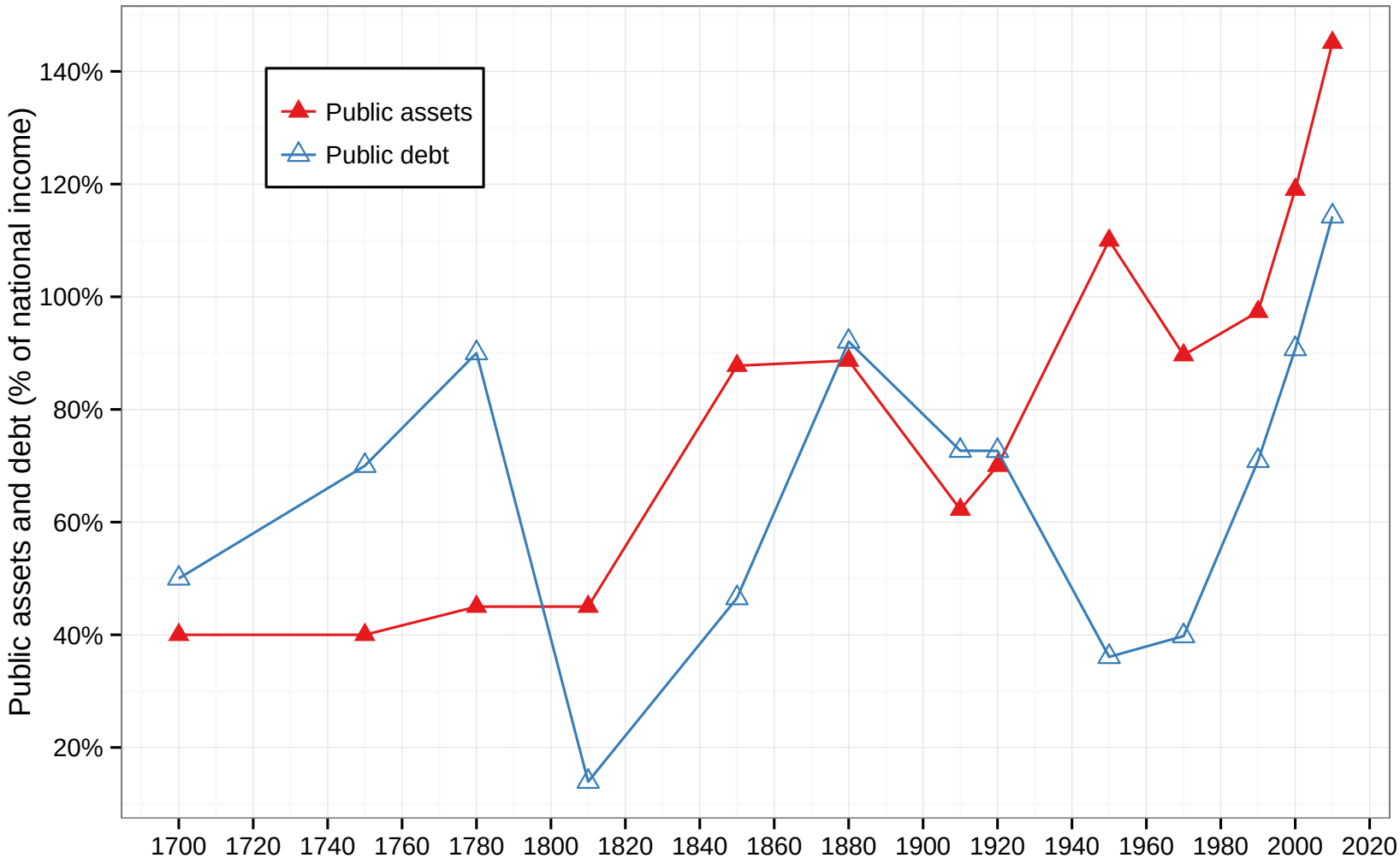
Figure 3.3: Public wealth in Britain, 1700–2010

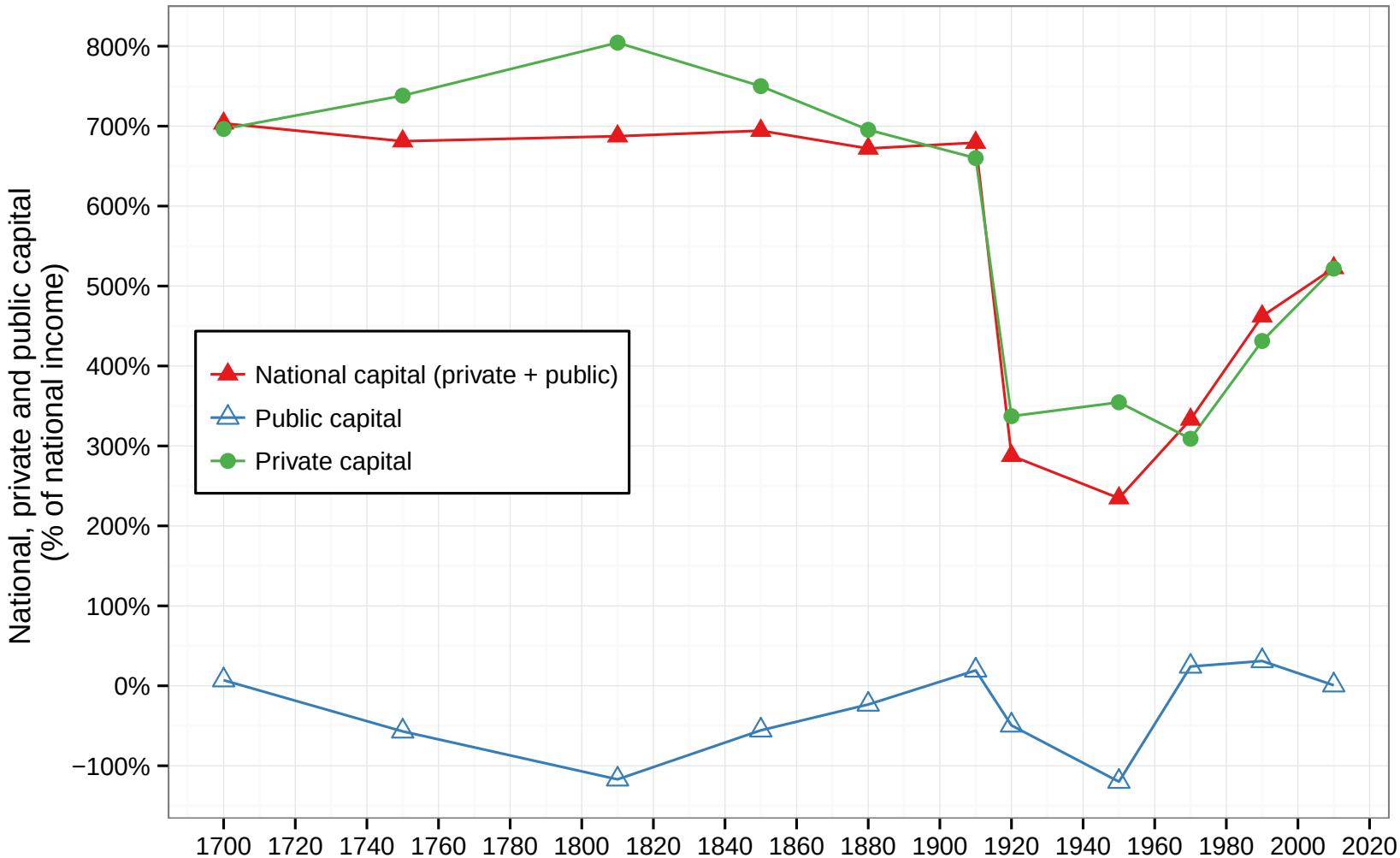
Public debt surpassed two years of national income in 1950 (versus one year for public assets).

Figure 3.4: Public wealth in France, 1700–2010



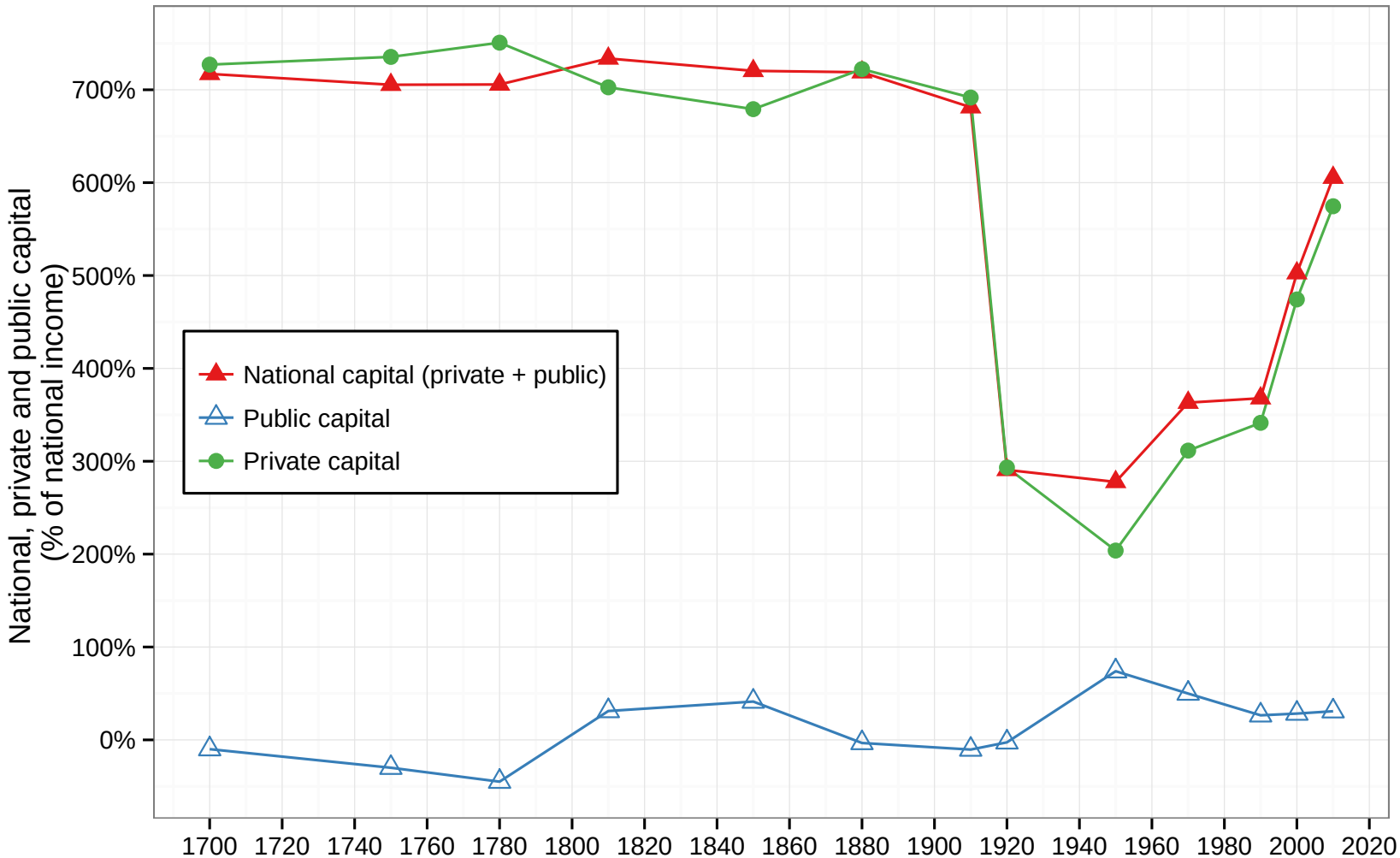
Public debt is about one year of national income in France in 1780 as well as in 1880 and in 2000–2010.

Figure 3.5: Private and public capital in Britain, 1700–2010



In 1810, private capital is worth eight years of national income in Britain (versus seven years for national capital).

Figure 3.6: Private and public capital in France, 1700–2010



In 1950, public capital is worth almost one year of national income versus two years for private capital.

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- Note: $\beta = s/g =$ pure stock-flow accounting identity; it is true whatever the combination of saving motives.

Figure 12.5:

The capital–labor elasticity of substitution

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- **Exactly what happened since the 1970s–80s: both the ratio β and the capital share α have increased.**

Figure 6.5:

Towards a world of robots?

- With a large rise in β, one can get large rise in α 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).

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- 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 β and α 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?**

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  - 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**.

2. The future of wealth concentration

- In all European countries (UK, France, Sweden...), wealth concentration was extremely high in 18c-19c & 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 populaton works (Austen, Balzac)
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  - 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:

Figure 10.2:

Figure 10.3:

Figure 10.4:

Wealth shocks

- **Key finding: there was no decline in wealth concentration prior to World War shocks; was it just due to shocks?**

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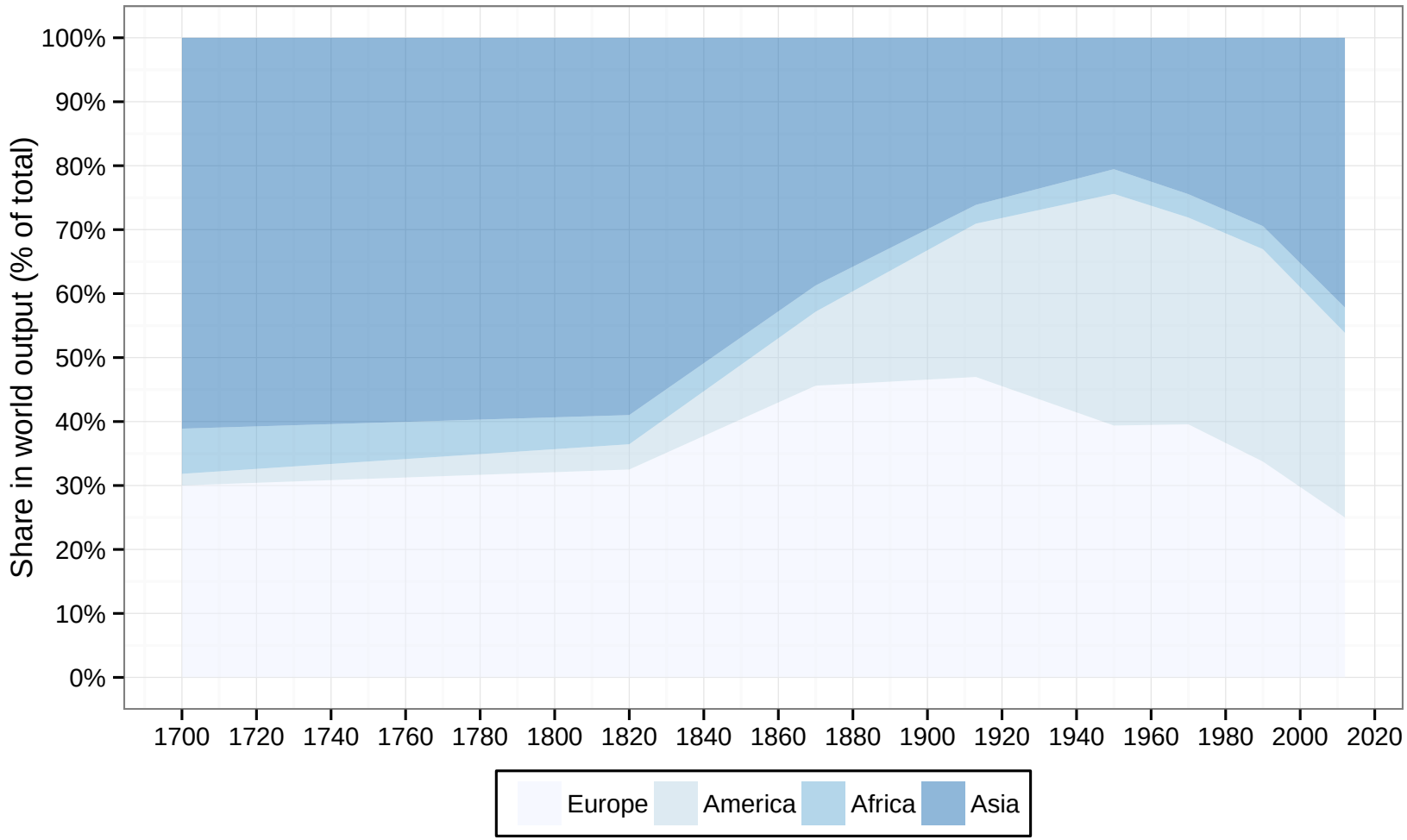
- With growth slowdown and rising tax competition to attract capital, $r - g$ might well rise in the 21c $\rightarrow$ back to 19c levels.
- Future values of r also depend on technology ($\sigma > 1$?)
- Under plausible assumptions, wealth concentration might reach or surpass 19c record levels: see global wealth rankings

Figure 10.9:

Figure 10.10:

Figure 1.1: The distribution of world output, 1700–2012

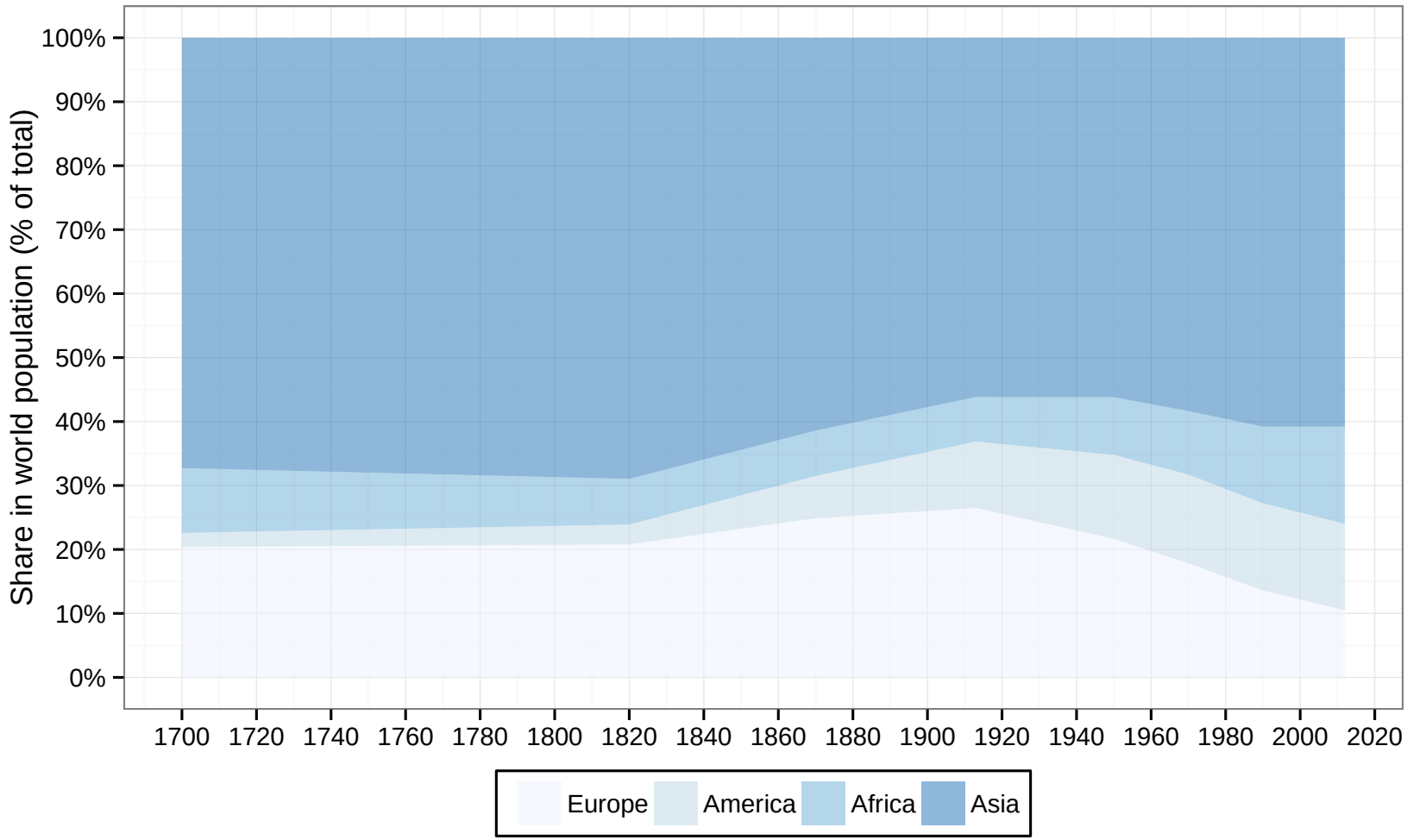


Europe's GDP made 47 percent of world GDP in 1913, down to 25 percent in 2012.

http://piketty.pse.ens.fr/fr/capital21c

Thomas Piketty

Figure 1.2: The distribution of world population, 1700–2012



Europe's population made 26 percent of world population in 1913, down to 10 percent in 2012.

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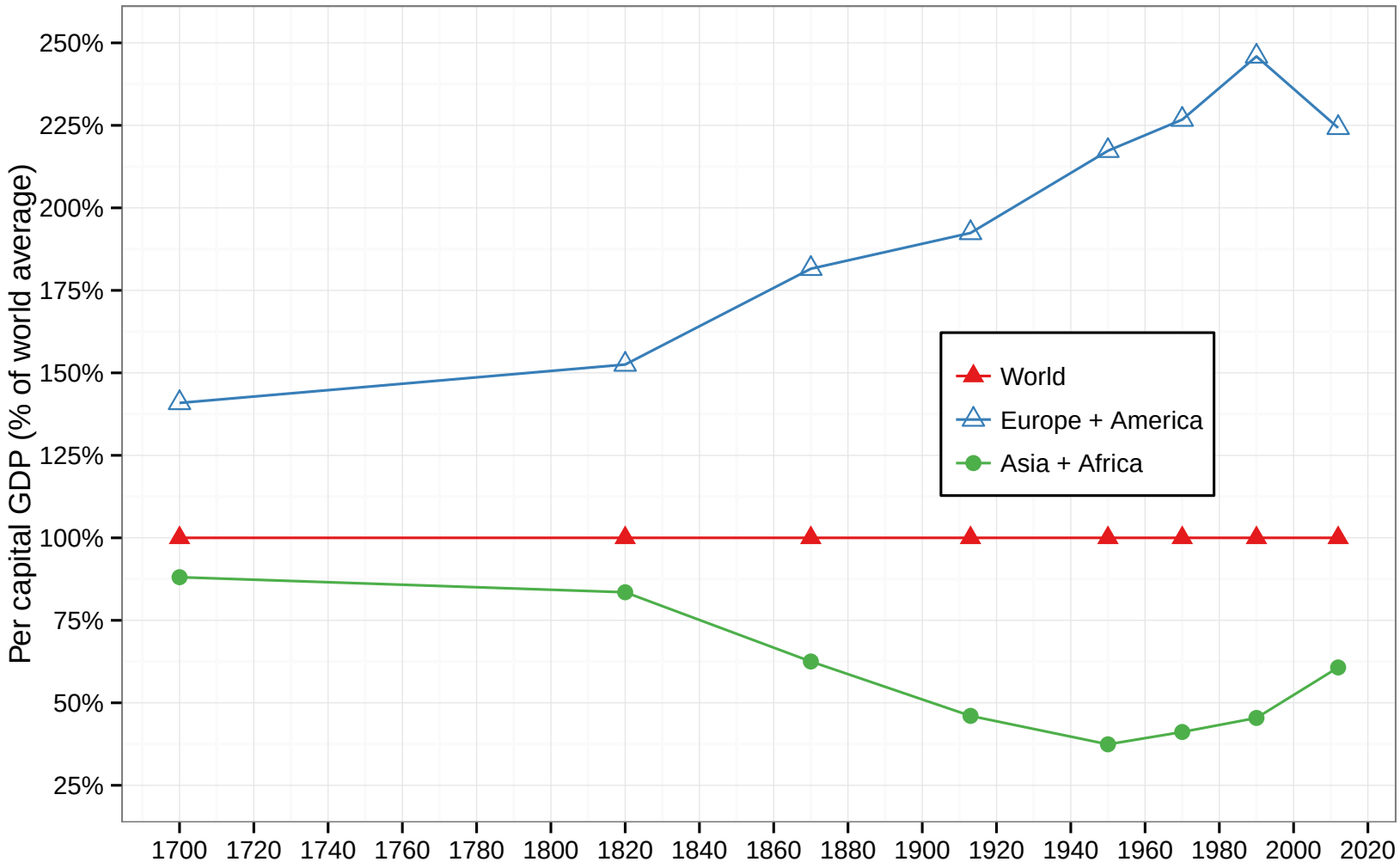
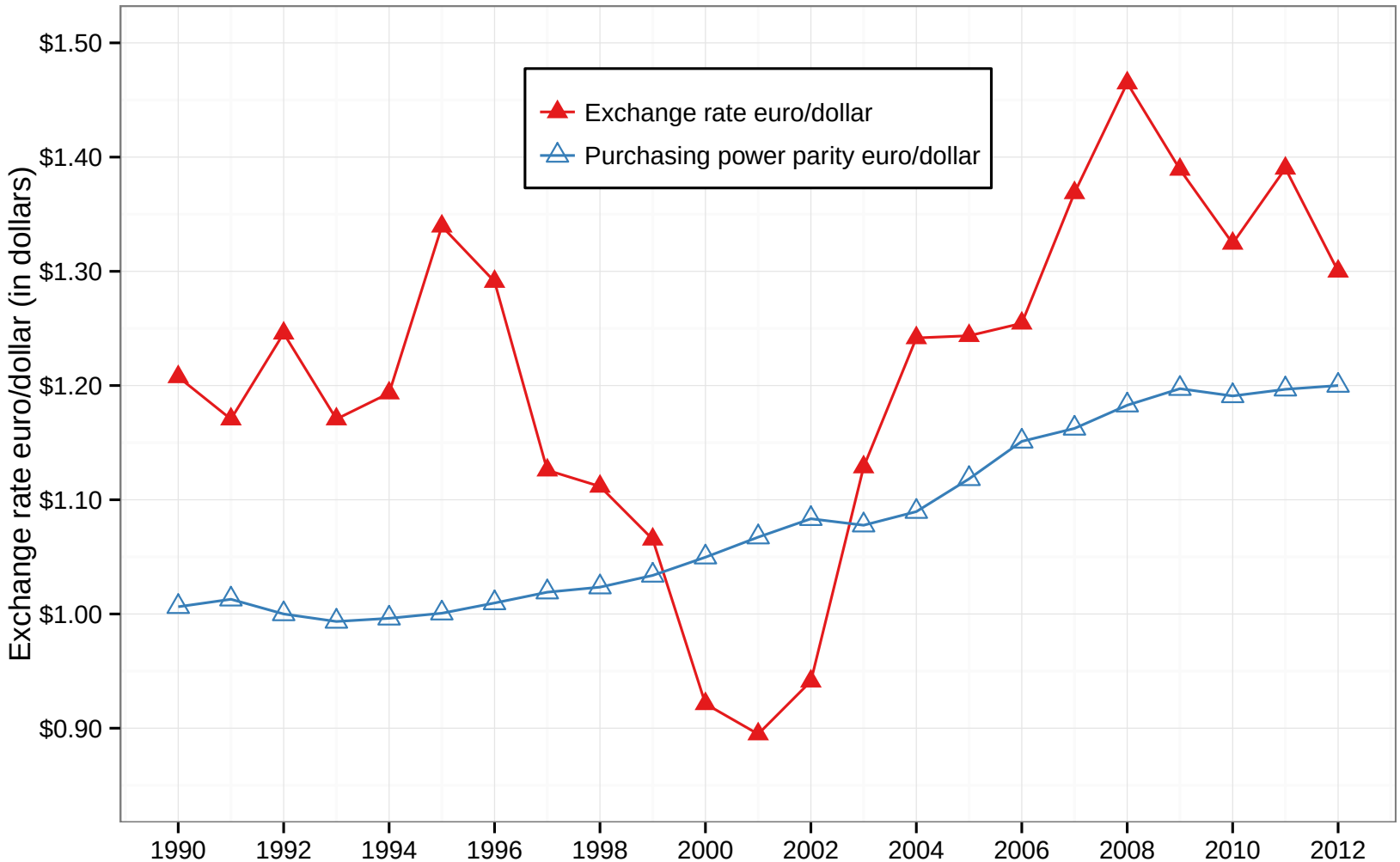
Thomas Piketty

Figure 1.3. Global Inequality, 1700–2012



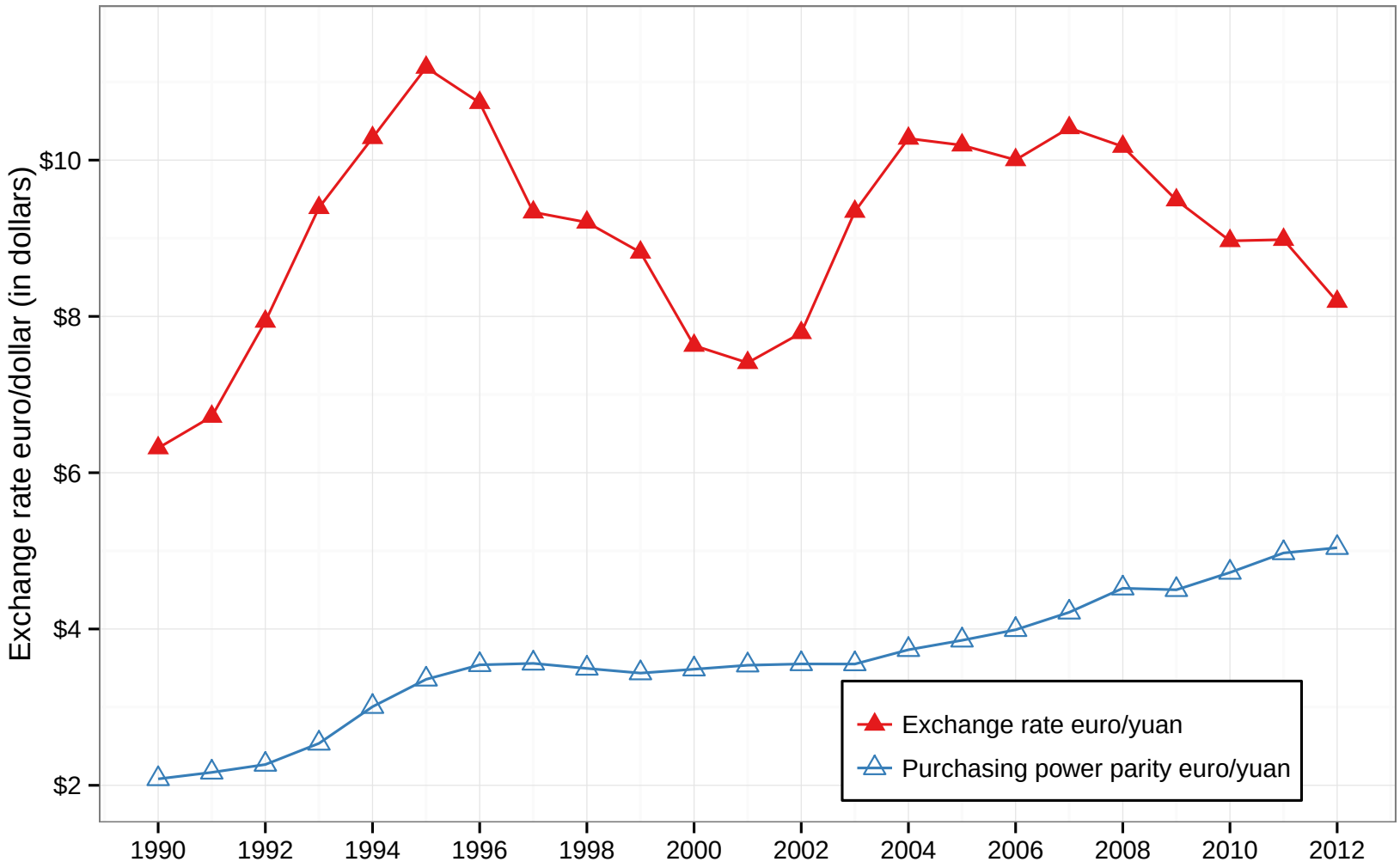
Per capita GDP in Asia–Africa went from 37 percent of world average in 1950 to 61 percent in 2012. Divergence then convergence?

Figure 1.4. Global Inequality, 1700–2012



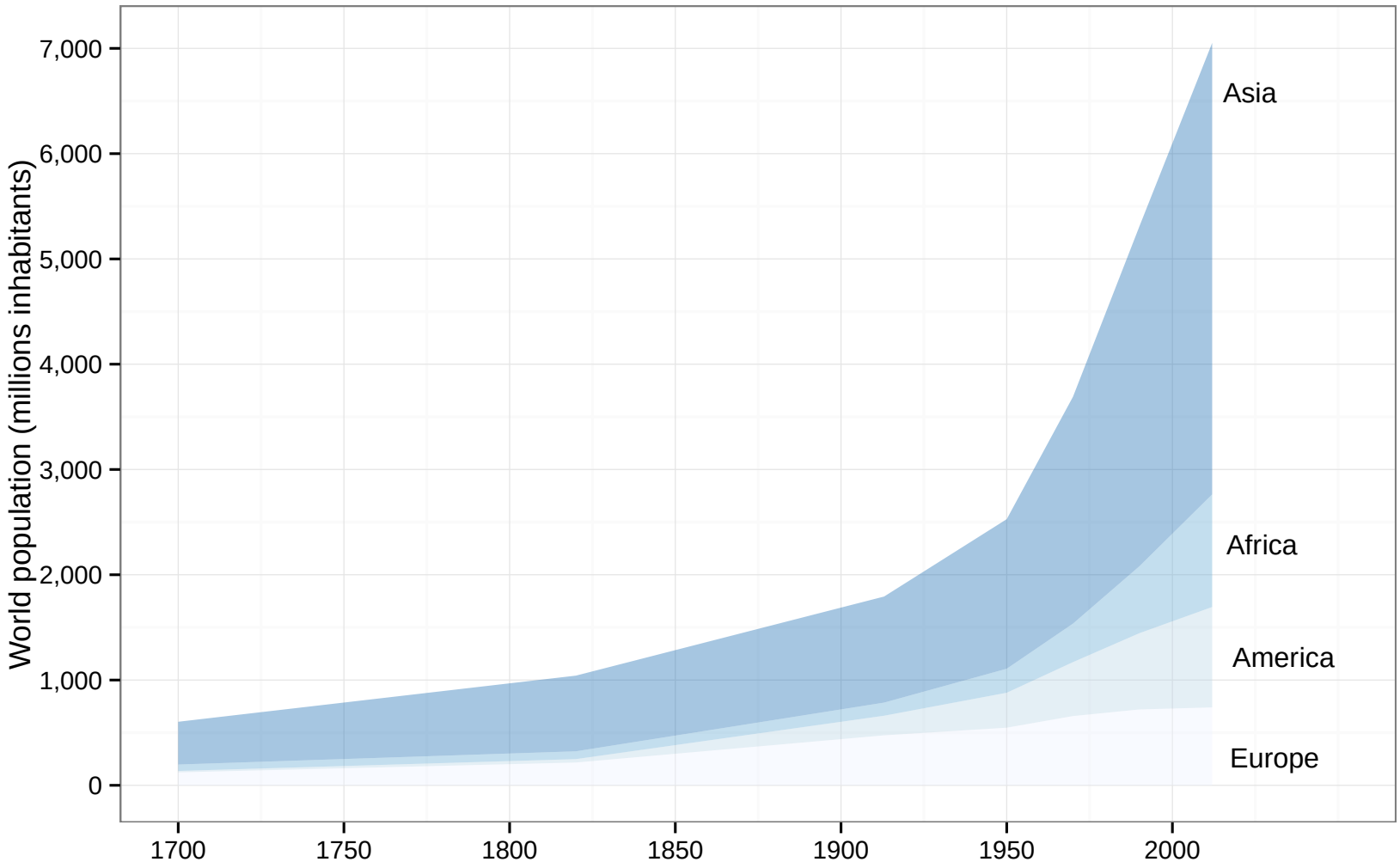
In 2012, 1 euro was worth $1.30 according to current exchange rate, but $1.20 in purchasing power parity.

Figure 1.5. Exchange rate and purchasing power parity: euro/yuan



In 2012, 1 euro was worth 8 yuan according to current exchange rate, but 5 yuan in purchasing power parity.

Figure 2.1: The growth of world population, 1700–2012



World population rose from 600 million inhabitants in 1700 to 7 billion in 2012.

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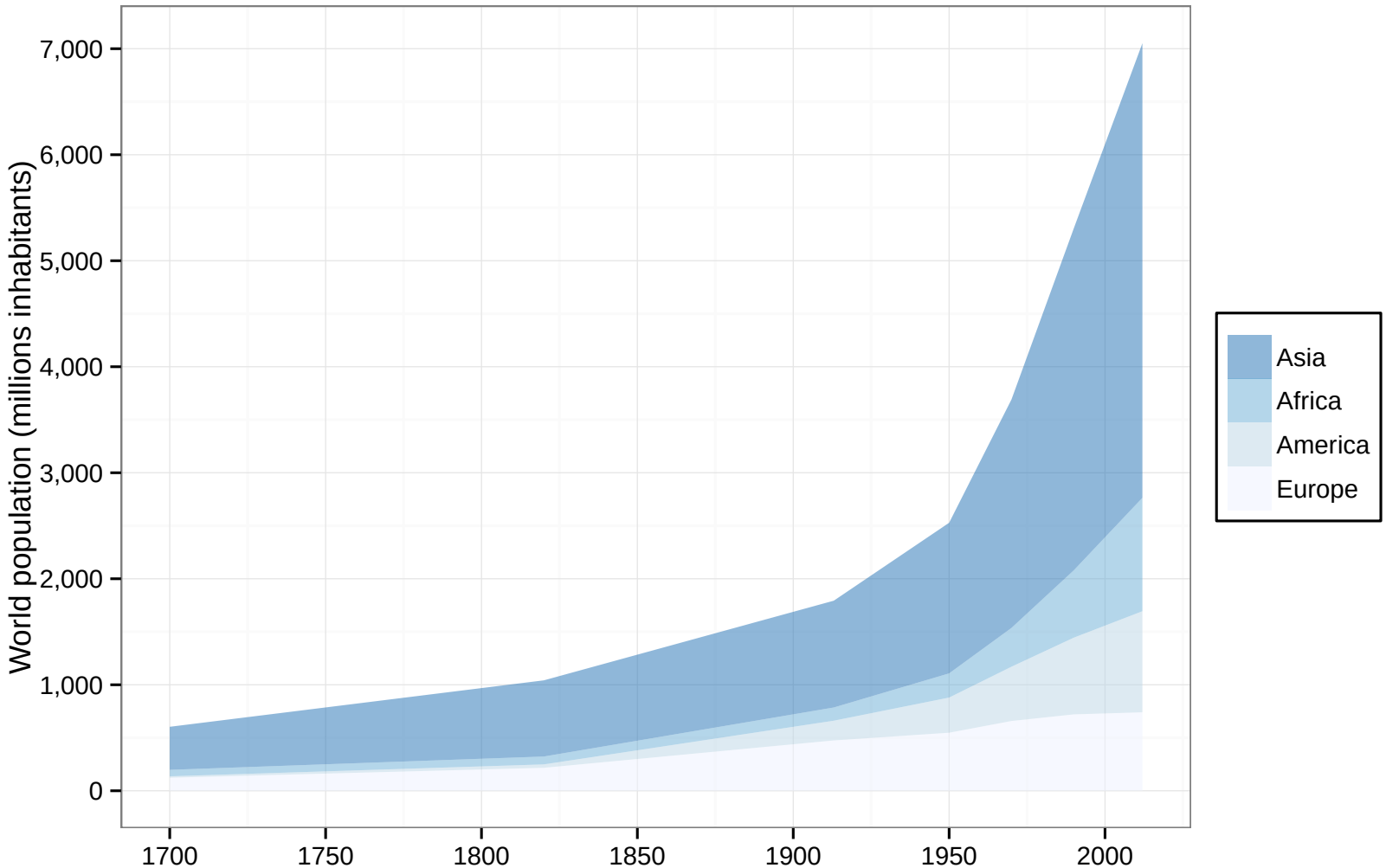


World population rose from 600 million inhabitants in 1700 to 7 billion in 2012.

Figure 2.2a: The growth rate of population from Antiquity to 2100

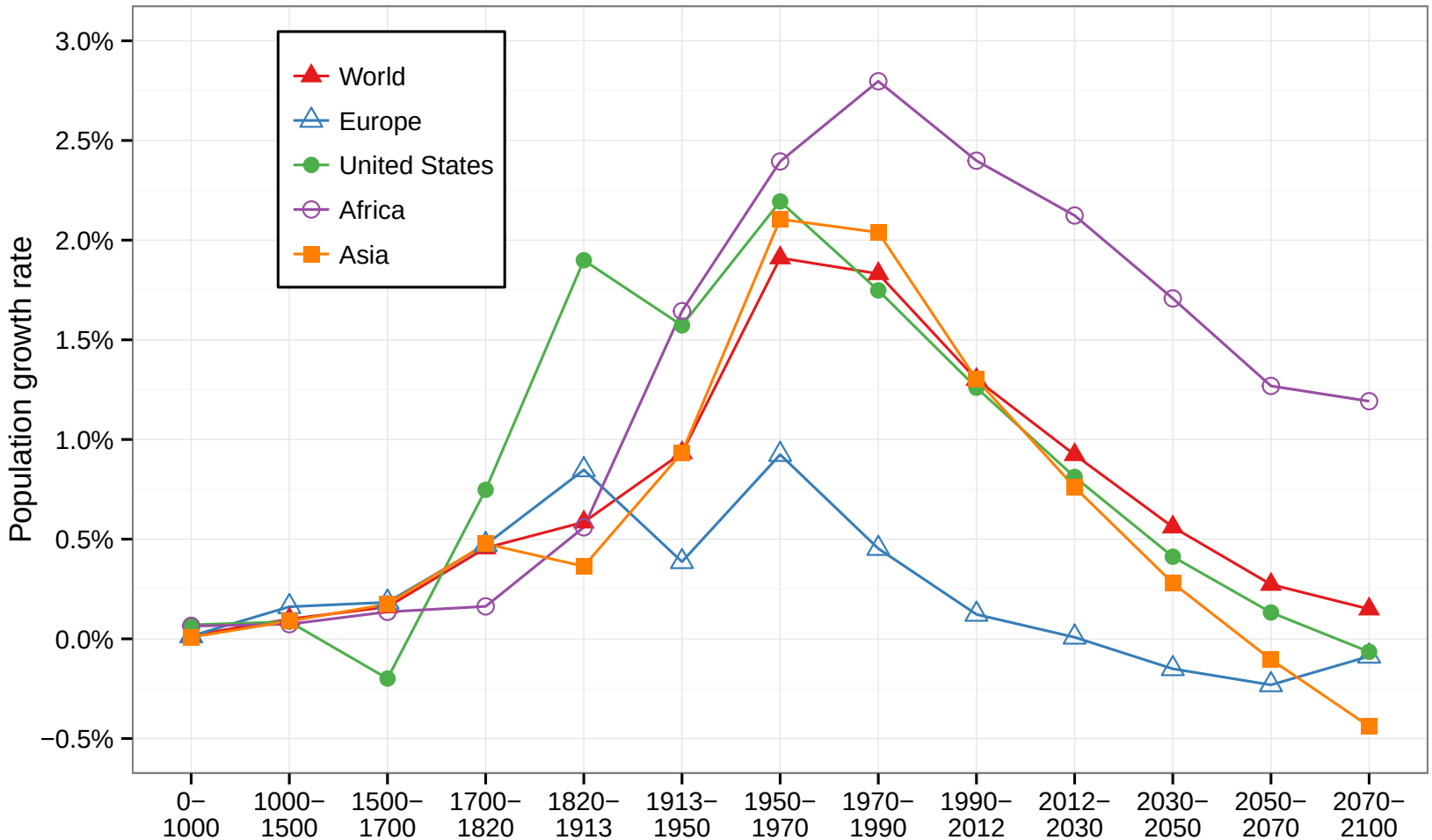
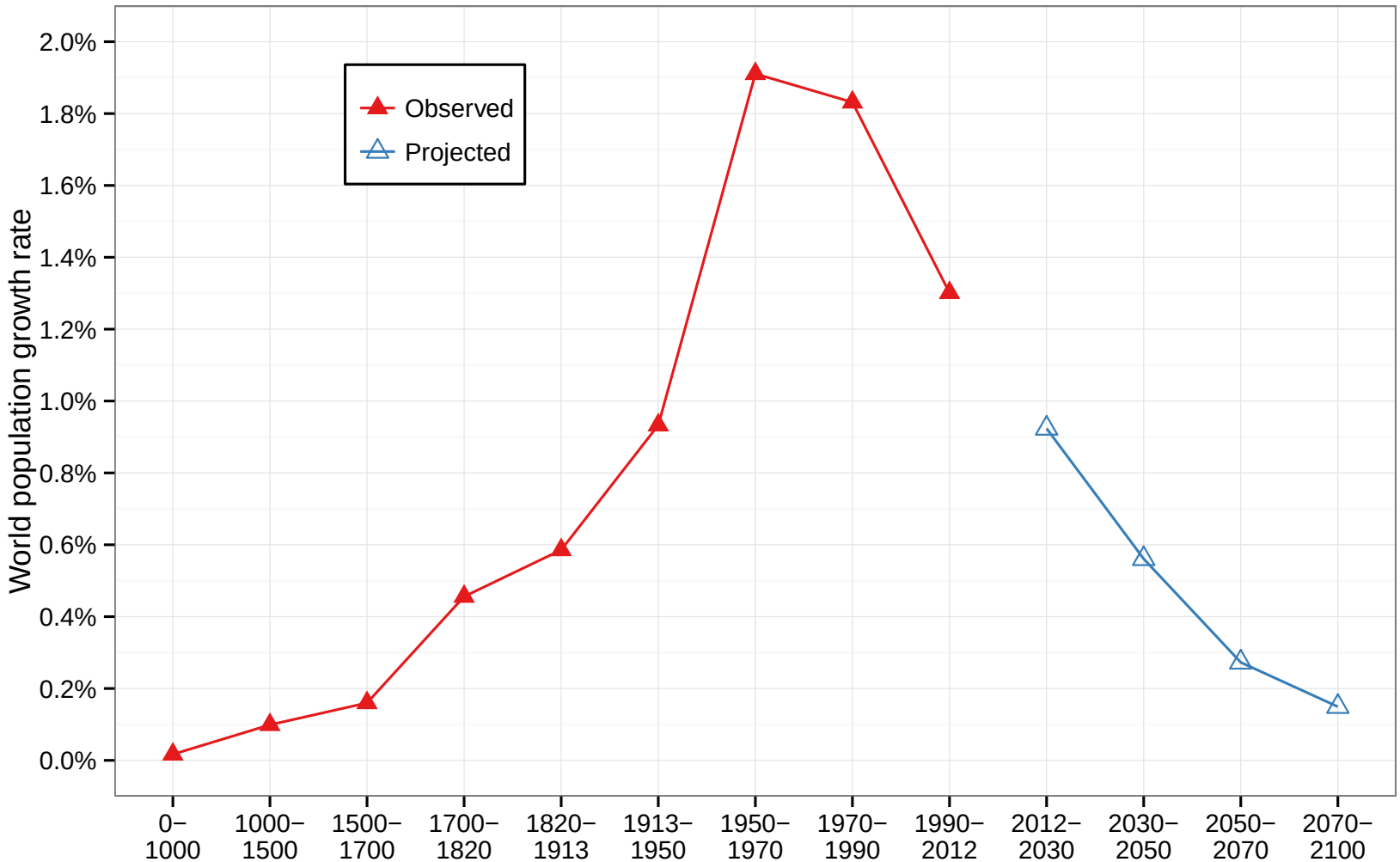
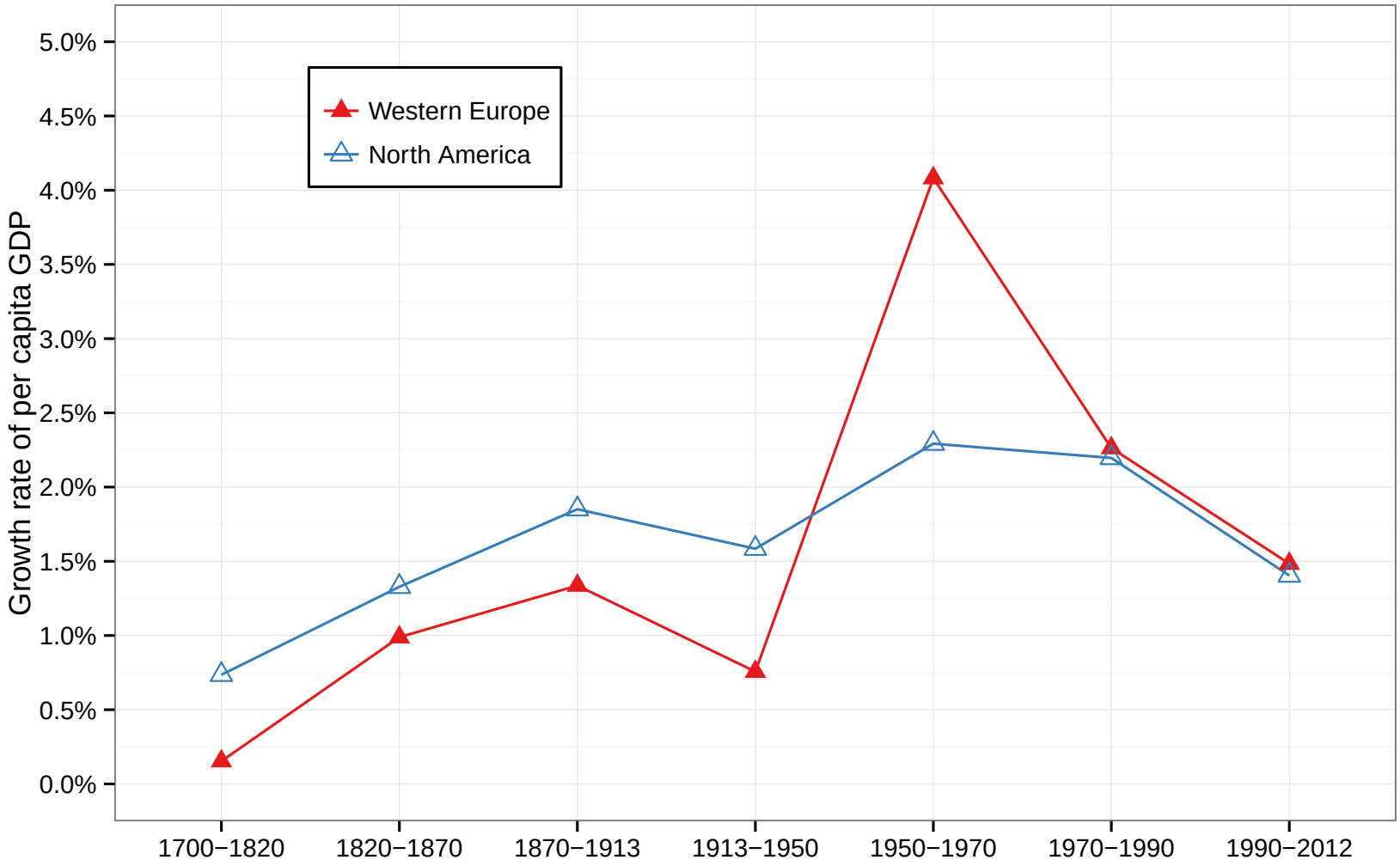


Figure 2.2: The growth rate of world population from Antiquity to 2100



The growth rate of world population was above 1 percent per year from 1950 to 2012 and should return toward 0 percent by the end of the twenty-first century.

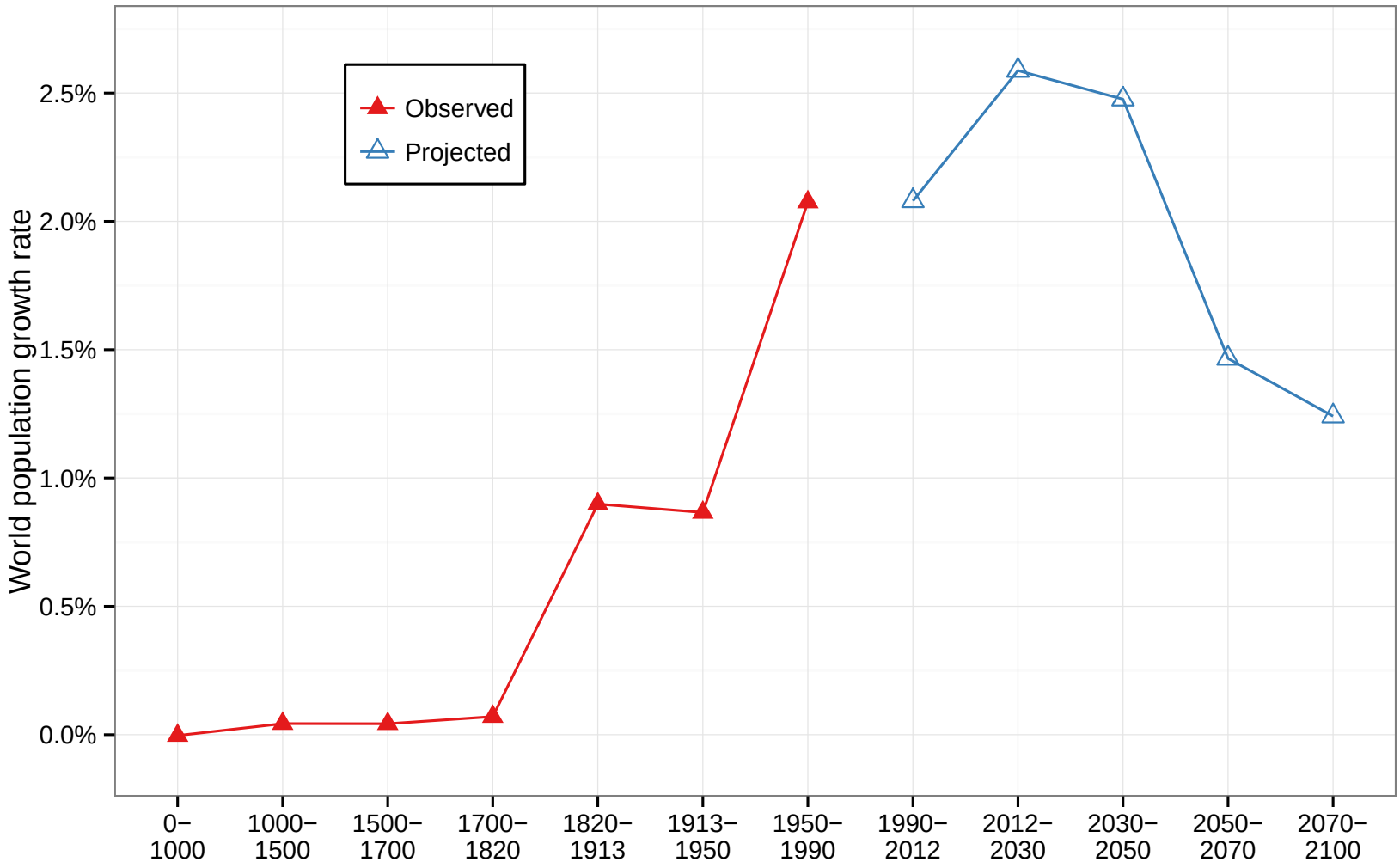
Figure 2.3: The growth rate of per capita output since the Industrial Revolution



The growth rate of per capita output surpassed 4 percent per year in Europe between 1950 and 1970, before returning to American levels.

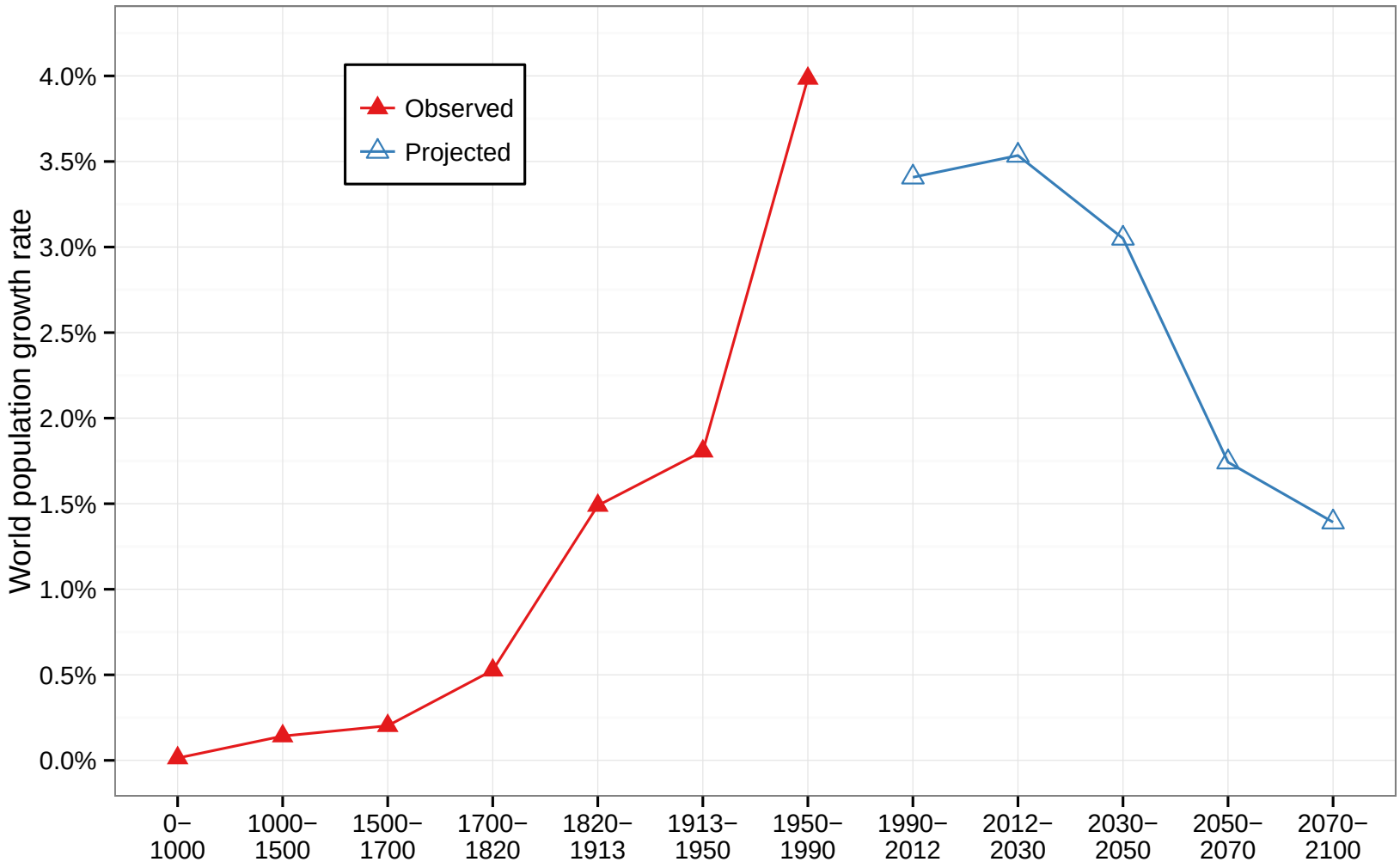
http://piketty.pse.ens.fr/fr/capital21c

Figure 2.4: The growth rate of world per capita output from Antiquity to 2100



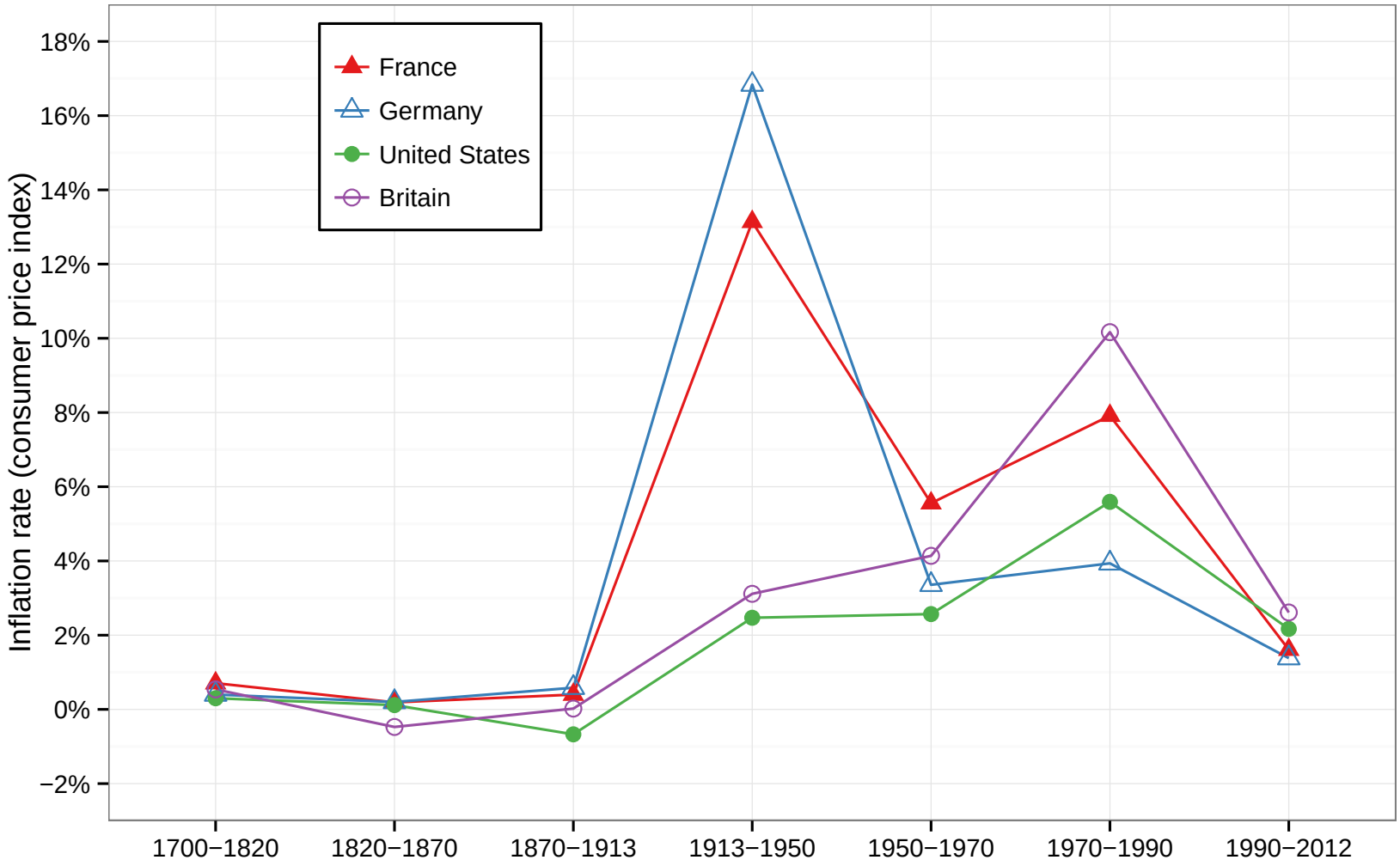
The growth rate of per capita output surpassed 2 percent from 1950 to 2012. If the convergence process goes on, it will surpass 2.5 percent from 2012 to 2050, and then will drop below 1.5 percent.

Figure 2.5: The growth rate of world output from Antiquity to 2100



The growth rate of world output surpassed 4 percent from 1950 to 1990. If the convergence process goes on, it will drop below 2 percent by 2050.

Figure 2.6. Inflation since the Industrial Revolution



Inflation in the rich countries was zero in the eighteenth and nineteenth centuries, high in the twentieth century, and roughly 2 percent a year since 1990.

http://piketty.pse.ens.fr/fr/capital21c

Figure 12.1:

Figure 12.2:

Figure 12.3:

Table 12.1: The growth rate of top global wealth, 1987–2013

	Average real growth rate per year (after deduction of inflation) (%)
The top 1/(100 million) highest wealth holders [a]	6.8
The top 1/(20 million) highest wealth holders [b]	6.4
Average world wealth per adult	2.1
Average world income per adult	1.4
World adult population	1.9
World GDP	3.3

Between 1987 and 2013, the highest global wealth fractiles have grown at 6–7% per year versus 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).

[a] About 30 adults out of 3 billion in the 1980s, and 45 adults out of 4.5 billion in 2010.

[b] About 150 adults out of 3 billion in the 1980s, and 225 adults out of 4.5 billion in the 2010s.

Table 12.2: The return on the capital endowments of U.S. universities, 1980–2010

	Average real annual rate of return (after deduction of inflation and all administrative costs and financial fees) (%)
All universities (850)	8.2
Harvard, Yale, and Princeton	10.2
Endowments higher than $1 billion (60)	8.8
Endowments between $500 million and 1 billion (66)	7.8
Endowments between $100 and $500 million (226)	7.1
Endowments less than $100 million (498)	6.2

Between 1980 and 2010, U.S. universities earned an average real rate of return of 8.2% on their capital endowments, and more for the greater endowments. All returns are reported net of inflation (2.4% per year between 1980 and 2010) and net of administrative costs and financial fees.

3. Inequality in America

"meritocratic extremism"

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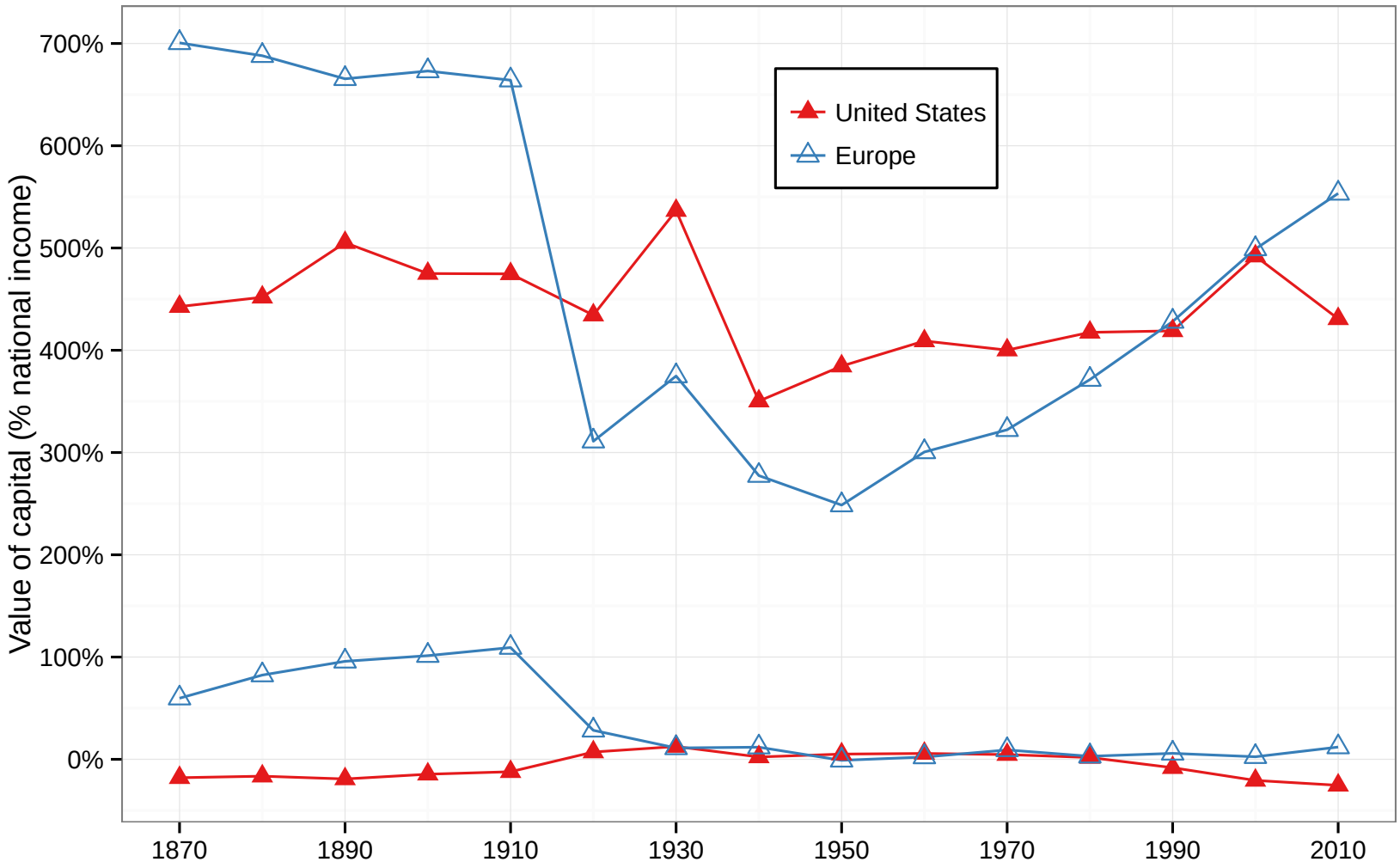
- Northern US were in many ways more egalitarian than Old Europe; but Southern US were more inegalitarian.
- We still have the same ambiguous relationship of America with inequality today: in some ways more merit-based; in other ways more violent (prisons).

Figure 4.6:

Figure 5.2: National capital in Europe & United States, 1870–2010



National capital (public and private) is worth 6.5 years of national income in Europe in 1910, versus 4.5 years in the United States.

Figure 4.10:

Figure 4.11:

America Versus Europe

- 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.

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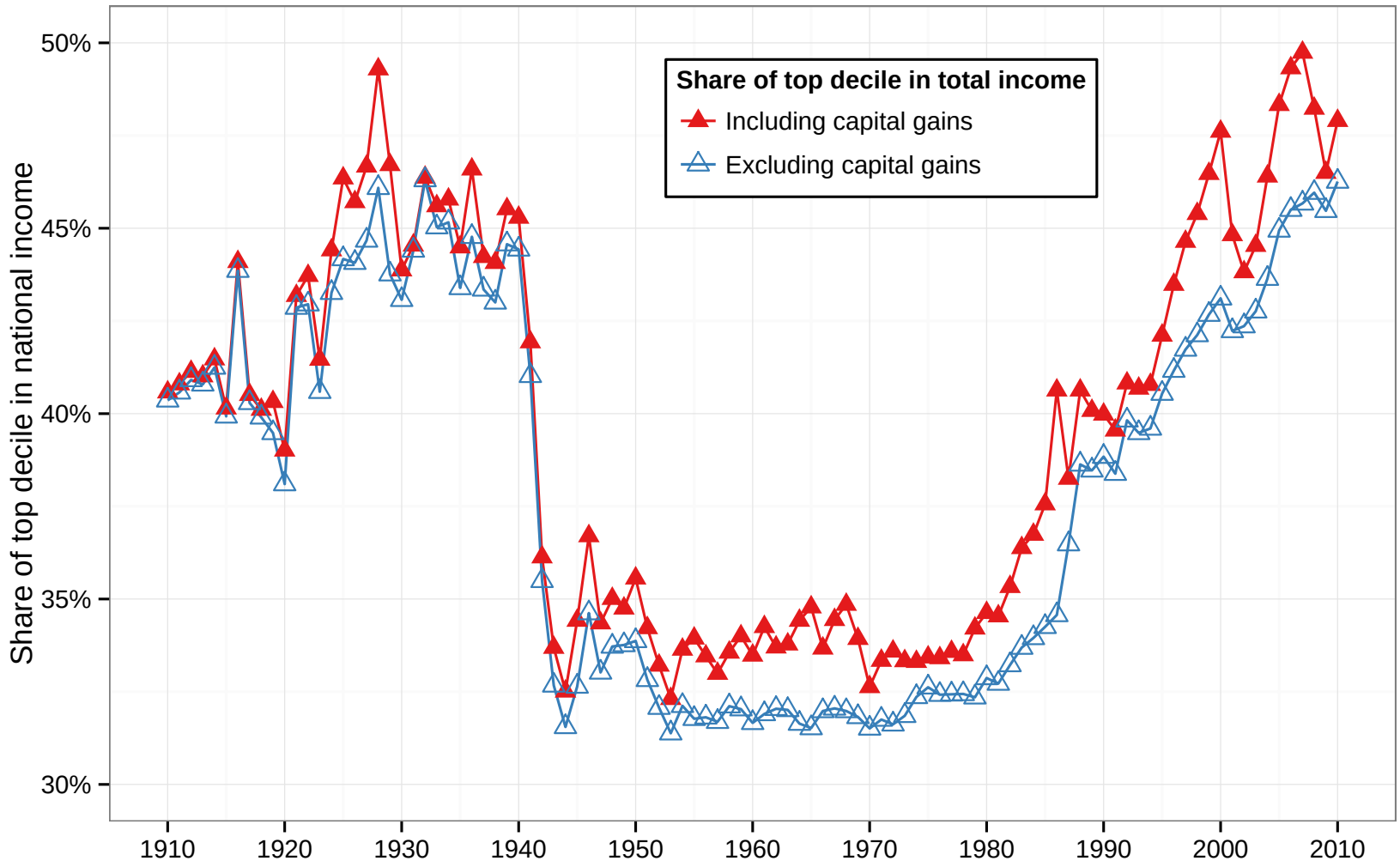
- The US distribution of income has become more unequal than in Europe over the course of the 20th century; it is now as unequal as pre–WW1 Europe.
- But the structure of inequality is different: US 2013 has less wealth inequality than Europe 1913, but higher inequality of labor income.

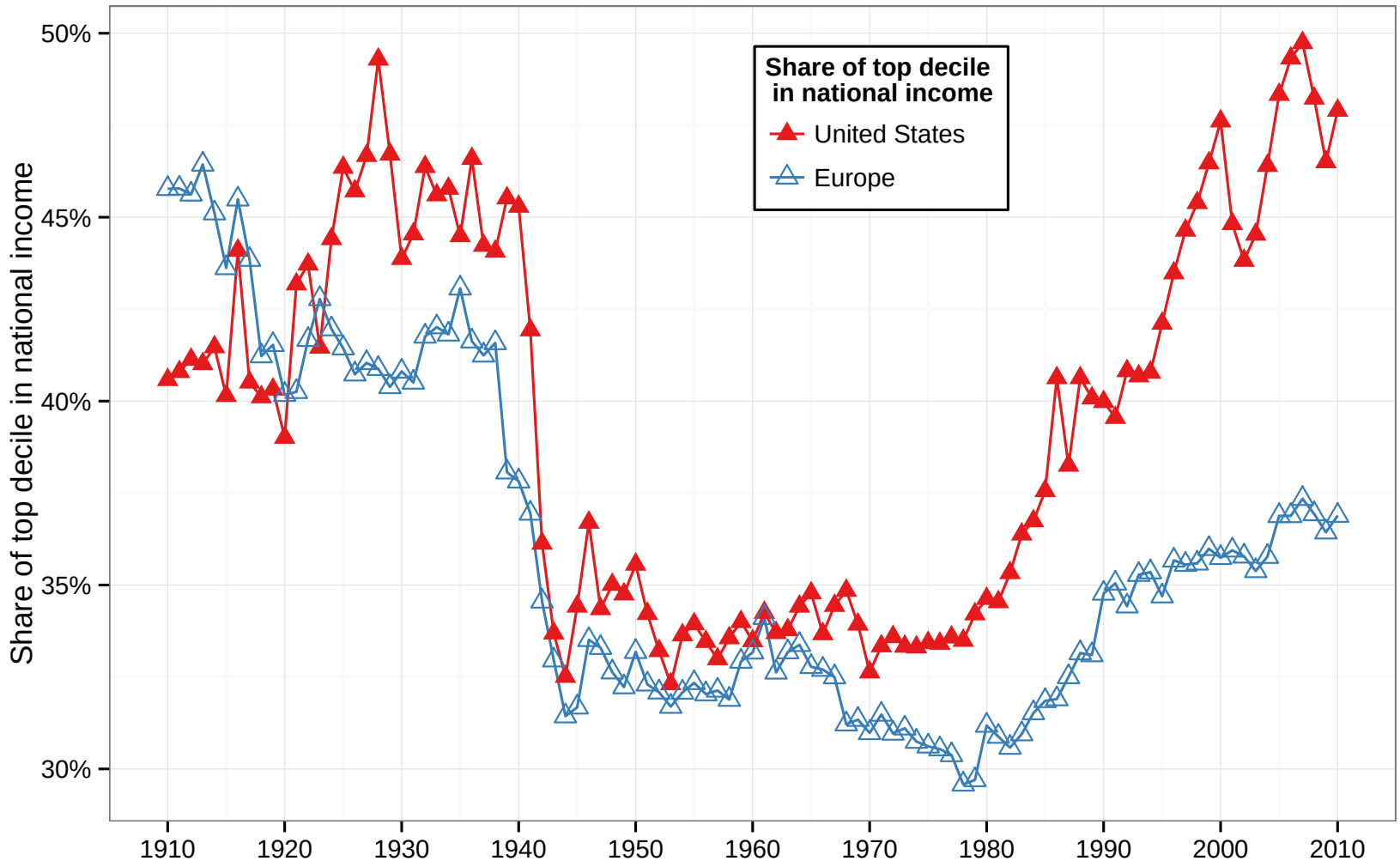
Figure 10.6:

Figure 8.5. 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 1950 1960 fall documented by Kuznets); it then rose from less than 35% in the 1970s to 45–50% in the 2000s–2010s.

Figure 9.8: Income inequality: Europe vs. United States, 1900–2010



The top decile income share was higher in Europe than in the U.S. in 1900–2010. It is much higher in the U.S. in 2000–2010.

Merit or Social Norms?

- 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.

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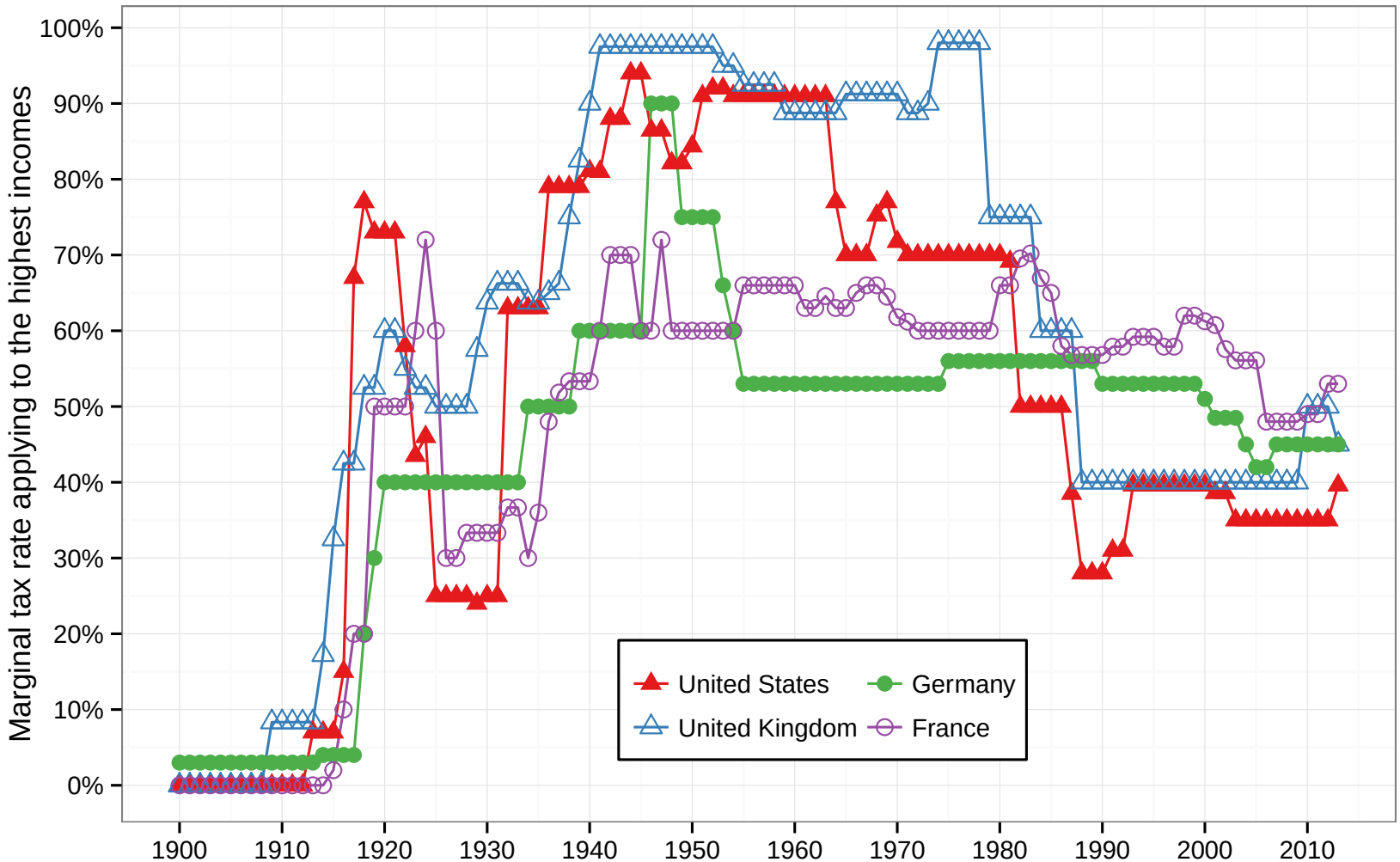
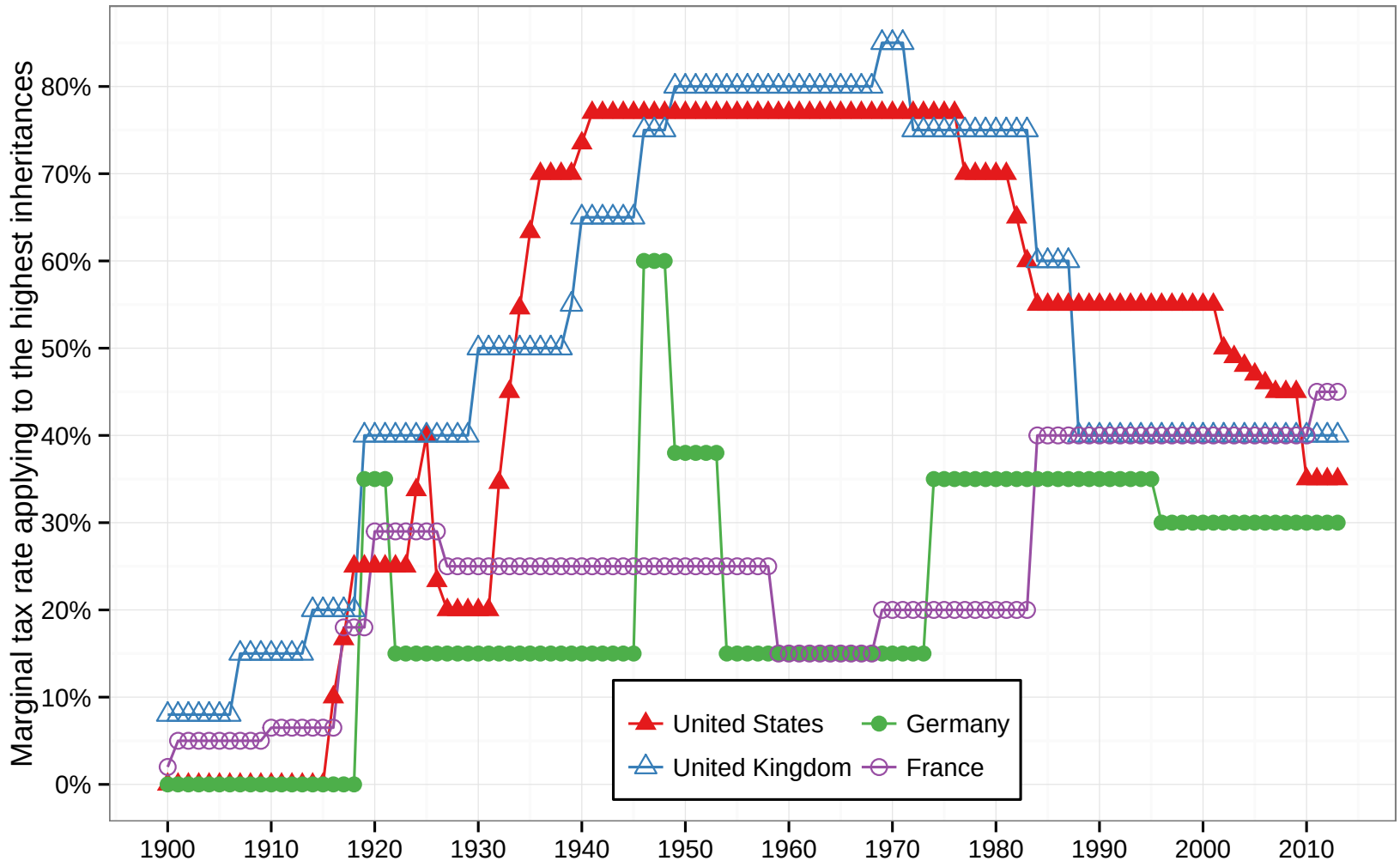
- **Problem: this can be the worst of all worlds for those who are neither top income earners nor top successors**: they are poor, and they are depicted as dump & undeserving (by contrast, nobody was trying to depict Ancien Regime inequality as fair!).
- It is unclear whether rise of top incomes has 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.

Figure 14.1: Top income tax rates, 1900–2013



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.

Figure 14.2: Top inheritance tax rates, 1900–2013



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.

http://piketty.pse.ens.fr/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 $g = 0$, $\beta \to \infty$, $r \to 0$: 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 β and capital share α, 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.