Introduction to Economic History

(Master PPD & APE)

(EHESS & Paris School of Economics)

Thomas Piketty

Academic year 2017-2018

Lecture 3: The dynamics of capital accumulation: private vs public capital and the Great Transformation

(check on line for updated versions)

Roadmap of lecture 3

- The measurement of national wealth
- The very long run: Britain and France, 1700-2010
- The rise and fall (and return?) of foreign assets
- Private vs public capital: the Great transformation
- France, Britain, Germany, US: similarities & diffs
- Market vs book corporate values: capital & power
- Property regimes in history: from feudal to social
- Intellectual property and the public domain
- Natural capital and land prices
- From capital-income ratios to capital shares

A quick summary of lecture 3

- Today we study the historical evolution of capital accumulation
- Brief consensus during 1950s-1980s: steady-state balanced-growth model, constant capital-output ratios $\beta=K/Y$ and capital shares $\alpha=Y_K/Y$
- However if we take a longer run historical perspective, we find large variations in both β and α, due to many economic and political factors
- Main lesson: asset prices and capital shares depend on the state of property relations, legal systems and bargaining power
- « The Great Transformation » (Polanyi 1944): radical changes in attitudes toward private property during 1914-1945 period: WW1-WW2, Great Depression, Bolshevik Revolution, etc.
- 1980s-1990s: fall of communism, financial deregulation, etc.: return to 19^c private-property-sacralization regime?
- Yes to some extent, but not so simple

The measurement of national wealth

- Long tradition of national wealth estimates in Britain and France in the 18th-19th centuries: Britain: Petty, King, Giffen, etc.; France: Vauban, Lavoisier, Colson, etc
- See R. Giffen, *The Growth of Capital*, 1889

  = most sophisticated 19th century estimates
- National balance sheets = estimates of all assets and liabilities held by residents of a country (and by the government) (« Bilans patrimoniaux par pays »)
- See R. Goldsmith, *Comparative National Balance Sheets: A Study of Twenty Countries, 1688–1978*, Chicago UP 1985
- R. Goldsmith, *Pre-Modern Financial Systems*, CUP, 1991

- Historical estimates are not sufficientely precise to study short-run fluctuations; but they are fine to study broad orders of magnitudes and long-run evolutions
- Recent estimates can be used to study short-run fluctuations: return to national balance sheets in recent decades
- But it took a long time: post-WW2 national accounts were centered on output flows, very little on capital and wealth

(e.g. one needs to wait until 2010 to see the first official balance sheet for Germany…)

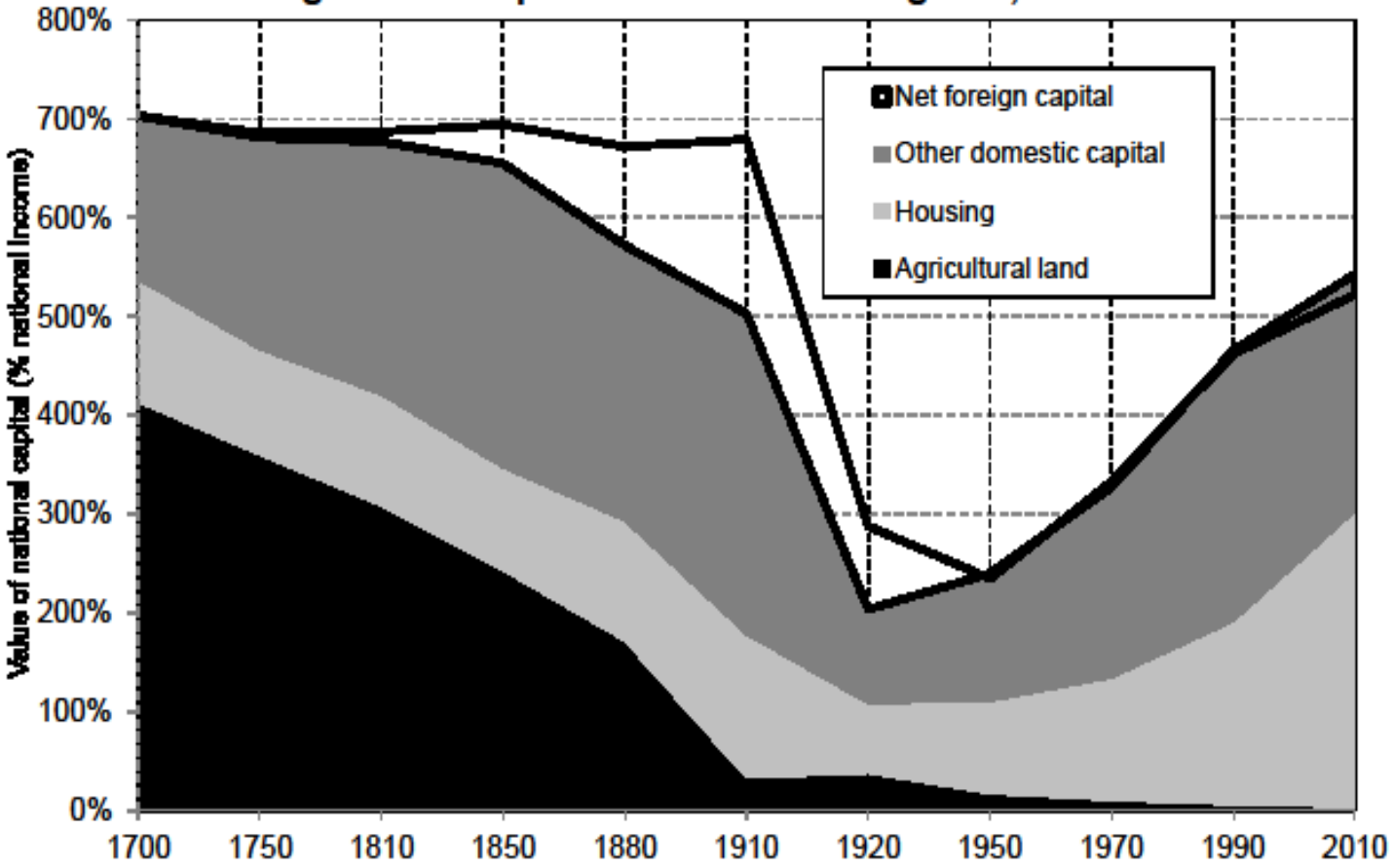
- See official UN methodological guides for measurement of national income and wealth: System of National Accounts 2008
- See Piketty-Zucman « Capital is Back – Wealth-Income Ratios in Rich Countries 1700-2010 », QJE 2014, Data Appendix, Database, for detailed bibliography and methodological issues
- See Capital…, chap.3-6, for a more detailed historical narrative

The very long-run: Britain and France 1700-2010

- Longest series: Britain and France national wealth/national income ratio $\beta_n = W_n/Y$ over 1700-2010
- National wealth W_n = Private wealth W + Public (or government) wealth W_g
- W_n = Domestic capital K + Net foreign assets NFA
- Domestic capital K = agricultural land + residential housing + other domestic k (=offices, structures, machines, patents, etc. used by firms and administrations)
- **Two major facts: (1)** huge U-shaped curve: $\beta_n \approx 700\%$ over 1700-1910, down to 200-300% around 1950, up to 500-600% in 2000-2010

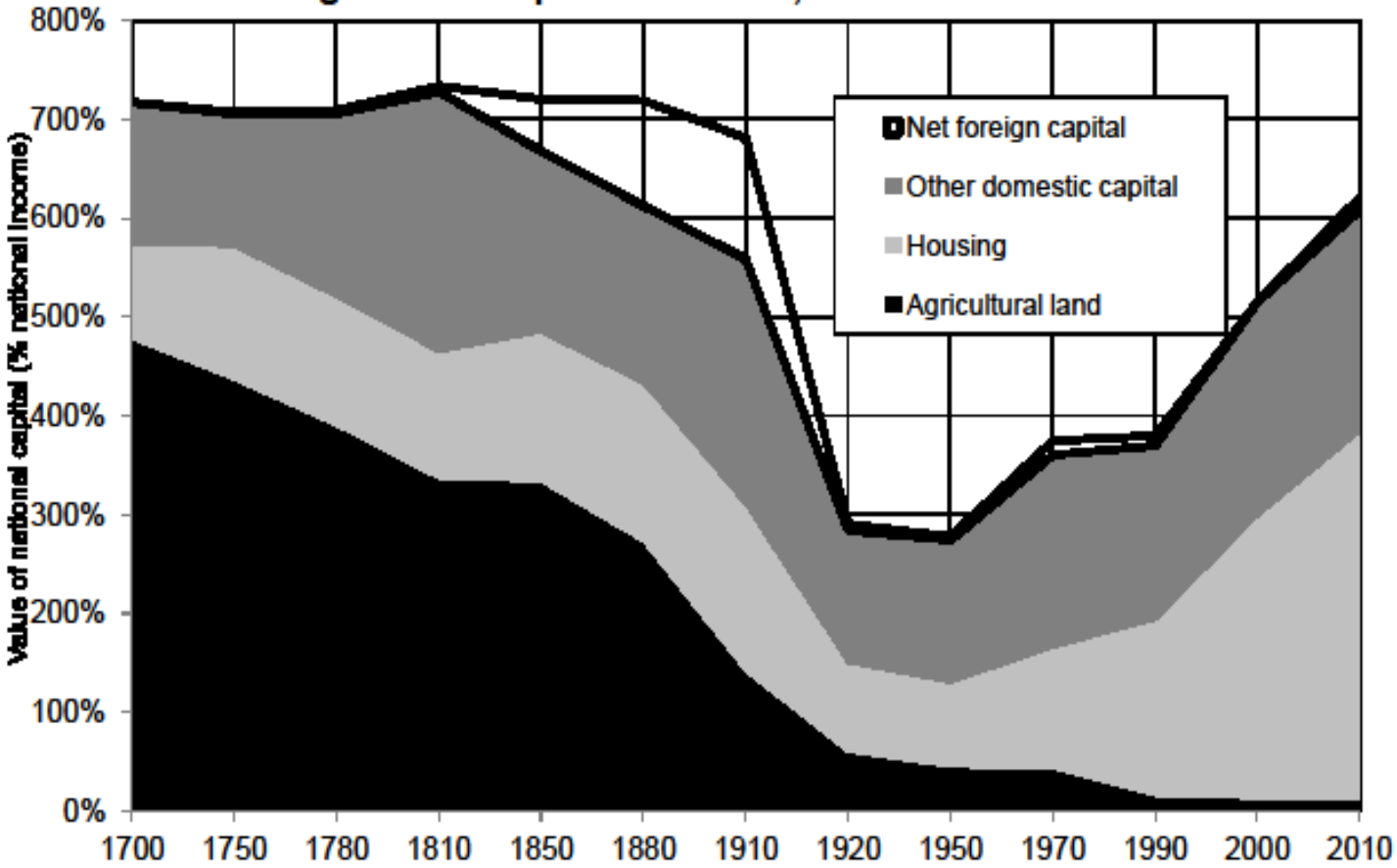
  (2) Radical change in the nature of wealth (agricultural land has been gradually replaced by housing, business and financial capital), but total value of wealth did not change that much in the very long run

Figure 3.1. Capital in the United Kingdom, 1700-2010



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 rise and fall of foreign assets

- NFA close to 0 in 1700-1800 and 1950-2010, but very large in 1870-1910 = the height of the « first globalization » and of colonial empires
- In 1910, NFA≈200% of Y in UK, ≈100% in France
- These enormous net foreign assets disappeared between 1910 and 1950 and never reappeared (but large cross-border gross positions developed since 1970s-80s: « second globalization »)
- 2010: Y ≈ 30 000€, W_n ≈ 180 000€ ($\beta_n \approx 6$), including 90 000€ in housing and 90 000€ in other domestic k (financial assets invested in firms and govt)
- 1700: assume Y ≈ 30 000€, then W_n ≈ 210 000€ ($\beta_n \approx 7$), including 150 000€ in agricultural land and 60 000€ in housing and other domestic capital
- 1910 (UK): assume Y ≈ 30 000€, then W_n ≈ 210 000€ ($\beta_n \approx 7$), including 60 000€ in housing, 90 000€ in other domestic capital and 60 000€ in net foreign assets

- With NFA as large as 100-200% Y, the net foreign capital income is very large: around 1900-1910, as large as 5% Y in France and 10% Y in Britain (average rate of return r=5%)
- In effect, both countries were able to have permanent trade deficits (about 2% Y in 1870-1910) and still to have a current account surplus and to accumulate more foreign reserves; i.e. they were consuming more than they what were producing, and at the same time they were getting richer
- Today's NFA for Japan-Germany-China (50-100% Y) are smaller than Britain-France 1910, but are rising fast (more on this below, see figures 1970-2010)

- Three conclusions: (1) it's nice to be a owner;
  (2) there's no point accumulating trade surpluses for ever;
  (3) capital & property relations are also about power

The return of foreign assets ?

- How big were foreign assets in 1913, and how do they compare to today? Some simple computations (see Capital…, chap.1)

- In 1913, rich countries (Europe-America) made about 70% of world GDP, but about 75% of world income; poor countries (Asia-Africa) made about 30% of world GDP, but 25% of world income; this would mean that about 15% of poor countries' output output went abroad, i.e. 50% of their k income (assuming k share ≈ 30% GDP): **rich countries owned about 50% of poor countries capital in 1913**

- Today: in Africa, GNI/GDP ratios have fluctuated around 95% over 1970-2010 period according to WB series; this would mean that **rich countries own about 20% of Africa's capital today** (and maybe 30-50% if we exclude housing & land) (aid flows here)
- Very approximate, ignores tax havens, includes only official flows

Gross vs net foreign assets: financial globalization in action

- Net foreign asset positions are smaller today than what they were in 1900-1910
- But they are rising fast in Germany, Japan and oil countries
- **And gross foreign assets and liabilities are a lot larger than they have ever been**, especially in small countries
- This potentially creates substantial financial fragility (especially if link between private risk and sovereign risk)
- This destabilizing force is probably even more important than the rise of inequality: **see lecture 6**
- The structural evolution of NFA is determined not only by volume effects (trade & income balance) but also by price effects: capital gains and losses on foreign assets & liabilities
(see PZ QJE 2014 and internat'l macro litterature: Gourinchas-Rey, « From World Banker to World Venture Capitalist: U.S. External Adjustment and the Exorbitant Privilege », NBER 2007)

Private versus public wealth

- National wealth W_n = Private wealth W + Public wealth W_g
- Private wealth = private assets – private debt
- Public wealth = public assets – public debt
- Today, in most rich countries, public wealth close to 0 (public assets ≈ public debt ≈ 100% Y), and private wealth ≈ 95-100% of national wealth
- But it has not always been like this: sometime the govt owns a significant part of national wealth (20-30% in 1950s-60s in W. Europe; 80% in USSR); sometime govt wealth<0 (huge debt), so that private wealth is significantly larger than national wealth

Table 3.1: Public wealth and private wealth in France in 2012

	Value of capital (% national income)		Value of capital (% national capital)	
National capital (public capital + private capital)	**605%**		**100%**	
Public capital (net public wealth: difference between assets and debt held by government and other public agencies)	**31%**		**5%**	
	Assets	Debt	Assets	Debt
	145%	114%	24%	19%
Private capital (net private wealth: difference between assets and debt held by private individuals (households))	**574%**		**95%**	
	Assets	Debt	Assets	Debt
	646%	72%	107%	12%

In 2012, the total value of national capital in France was equal to 605% of national income (6,05 of national income), including 31% for public capital (5% of total) and 574% for private capital (95% of total).

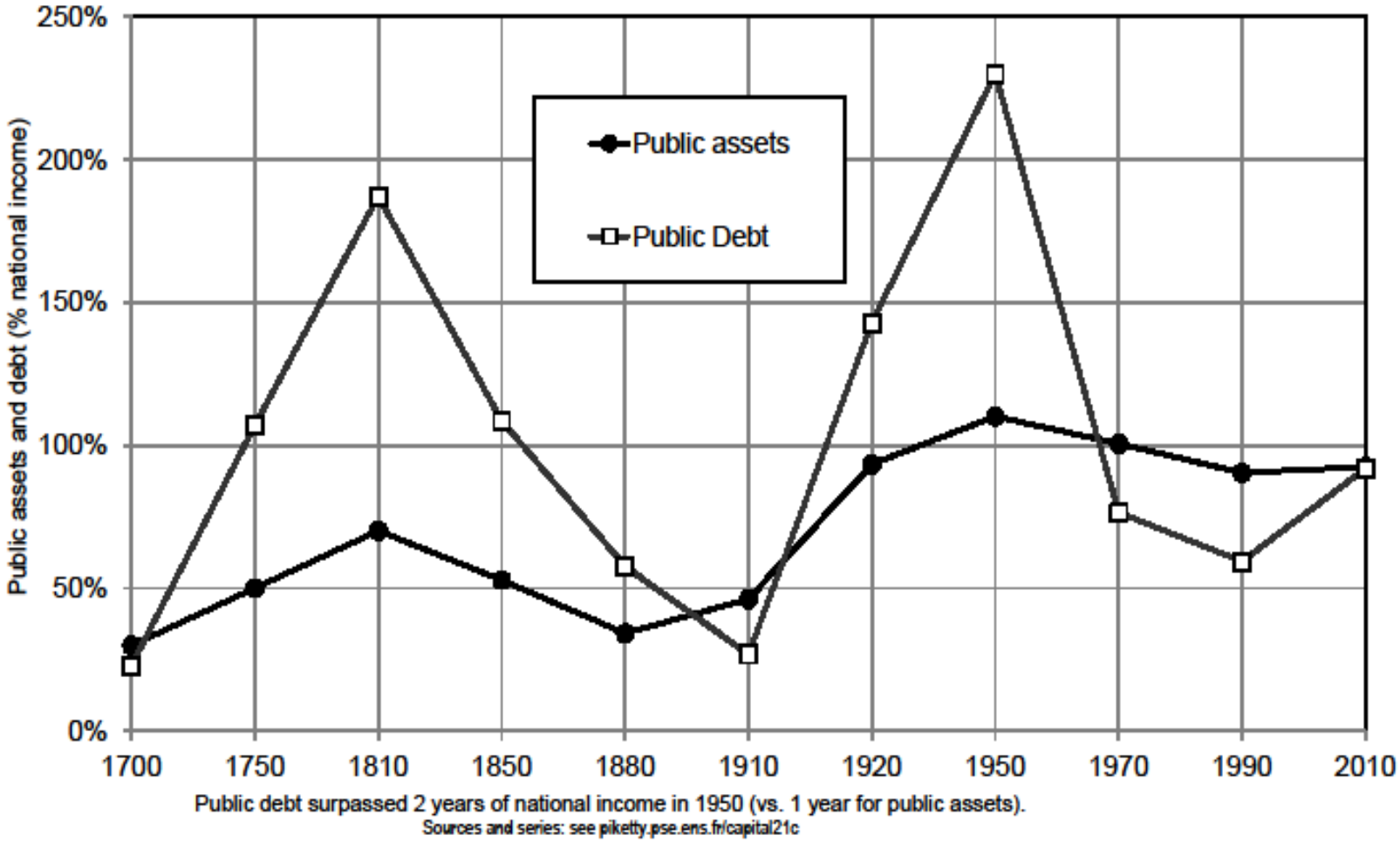
Sources: see piketty.pse.ens.fr/capital21c.

Note: national income is equal to gross domestic product (GDP), minus capital depreciation, plus net foreign income; in practice, it is typically equal to about 90% of GDP in France in 2012; see chapter 1 and technical appendix.

Britain: public debt and Ricardian equivalence

- Britain = the country with the longest historical episodes of public debt: about 200% of Y around 1810-1820 (it took a century to reduce it below 50% by 1910, after a century of budget surpluses), and about 200% of Y again around 1950 (it was reduced faster, thanks to inflation)
- Big difference with France (large inflation and/or repudiation during 1790s & World Wars 1 and 2) and Germany (the country with the largest inflation in 1910-1950, even excluding 1924)
- Britain always paid back its debt (limited inflation, except 1950-1980); this is why it took so long to reduce debt, especially during 19c

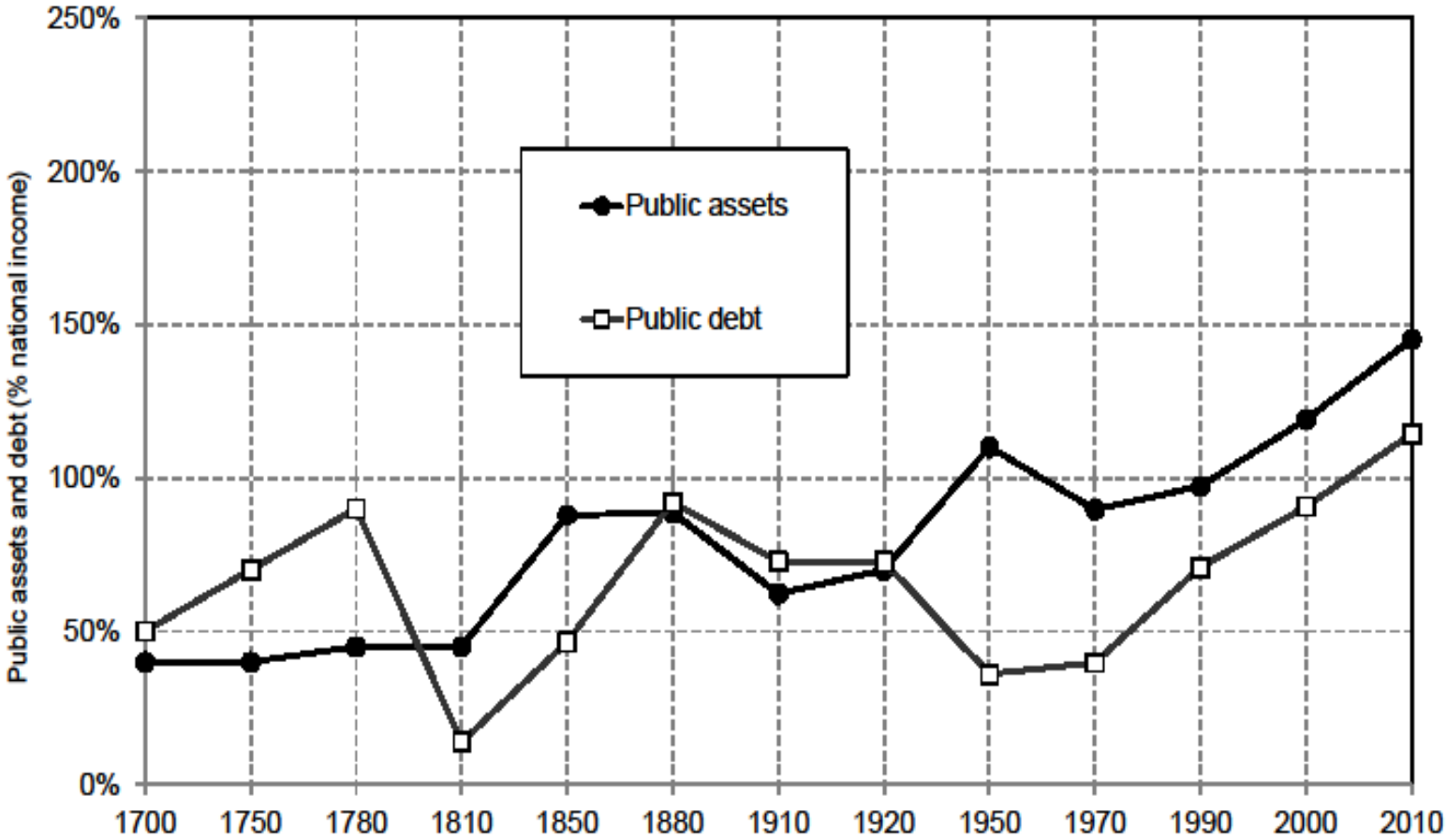
Figure 3.3. Public wealth in the United Kingdom, 1700-2010



Public debt surpassed 2 years of national income in 1950 (vs. 1 year for public assets).

Sources and series: see piketty.pse.ens.fr/capital21c

Figure 3.4. Public wealth in France, 1700-2010



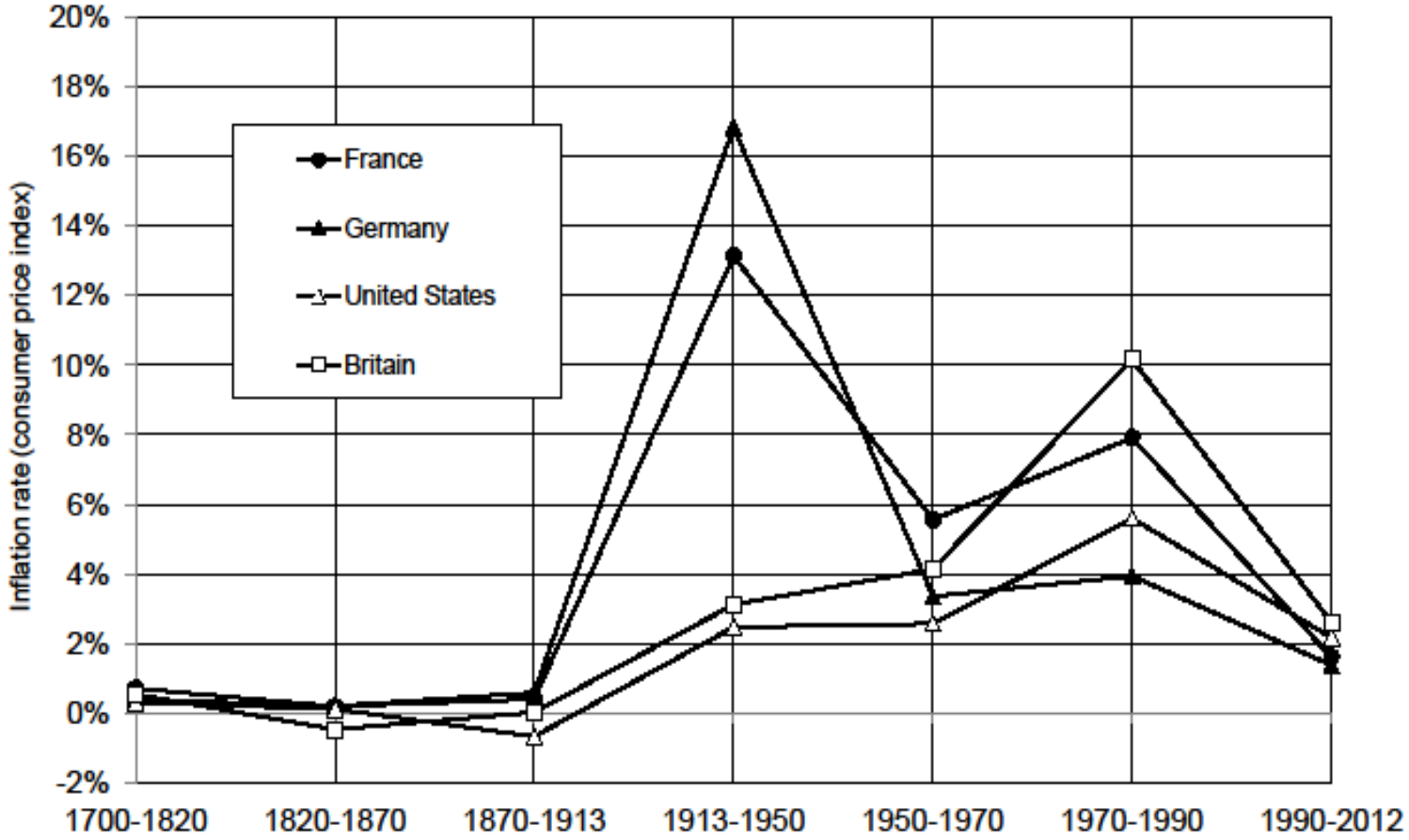
Public debt is about 1 year of national income in Frabce in 1780 as in 1880 and in 2000-2010.

Sources and series: see piketty.pse.ens.fr/capital21c

War tributes, debt & state coercion

- Rise of public debt in France 1815-1880: war indemnities 1815 + « milliard des émigrés » 1825 (compensation to aristocrats for lost land rent during Revolution) + war tributes to Germany 1870 (about 30% Y in 1815-1825 + 30% Y 1871=most of the rise)
- War tributes are very common in history, particular in the context of colonial coercion: France and Spain against Morocco (Barbe 2016), Britain and France against China (Truong 2015), France against Haïti 1825 (Henochsberg 2016), etc.
- 19^{c} = Gold standard = zero inflation: debt had to be repaid in full, so sacralization of public debt and private property had a real meaning
- Most importantly, a country trying to default was immediately subject to military pressure, and sometime invasion = the standard justification for colonial expansion
- 20^{c} = age of inflation and large debt repudiation
- 21^{c} = back to 19^{c} sacralization of public debt & private property, but with economic/financial/legal threats rather than military?

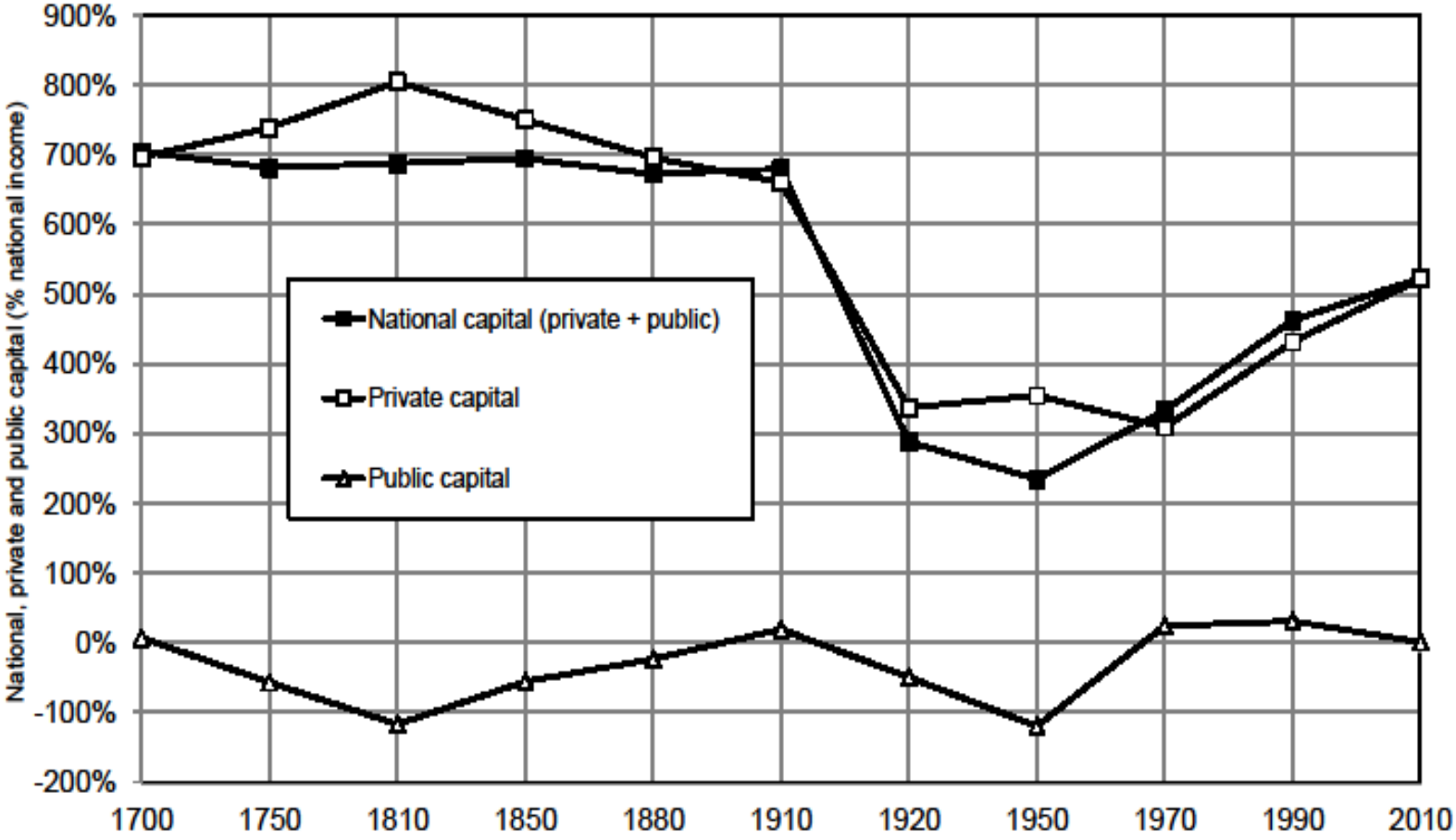
Figure 2.6. Inflation since the industrial revolution



Inflation in rich countries was null during 18th-19th centuries, high during 20th century, and is about 2% per year since 1990. Sources and series: see piketty.pse.ens.fr/capital21c.

- **Q.: What is the impact of public debt on capital accumulation?**
- A.: It depends on how the private saving responds to public deficit
- National saving S_n = private saving S + public saving S_g (<0 if public deficit)
- Suppose $dS_g<0$ (public deficit↑)
- If dS=0 (no private saving response), then $dS_n<0$ → decline in national wealth W_n : in effect public deficits absorb part of private saving (=« crowding out »)
- But if dS>0, i.e. private saving increase in order to absorb the extra deficit, then crowding-out might be limited
- In case $dS=-dS_g$, then $dS_n=0$: national saving and national wealth are unaffected by public deficit
- = apparently what happened in UK 1810-1830: huge public debt, but no decline in private investment; extra private saving by British wealth holders, so that we observe a rise in private wealth, and no decline in national wealth = what Ricardo observes in 1817

Figure 3.5. Private and public capital in the U.K., 1700-2010



In 1810, private capital is worth 8 years of national income in the United Kingdom (vs. 7 years for national capital).
Sources and series: see piketty.pse.ens.fr/capital21c.

- Key question: why was there no crowding out?

- R. Barro, “Are governement bonds net wealth?”, JPE 1974 : in a representative agent model, rational agents should anticipate that they will pay more taxes in the future if today’s public deficit increase, so they save more in order to make reserves (for themselves or their successors) so as to pay these taxes in the future → the timing of taxes is irrelevant, « debt neutrality »

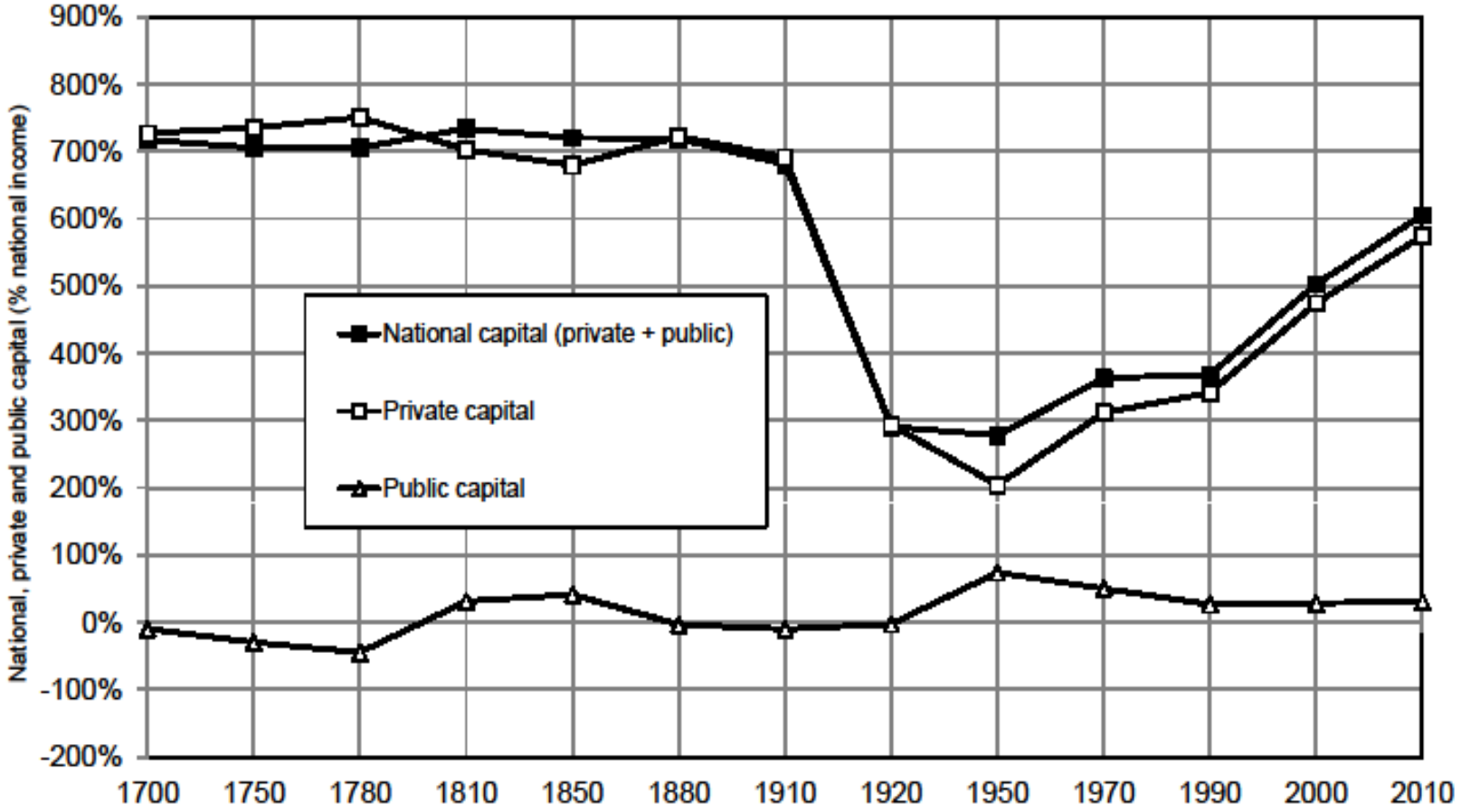
- See also R. Barro « Governement spending, interest rates, prices and budget deficits in the UK 1701-1918 », JME 1987 ; G. Clark, «Debt, deficits and crowding out: England 1727-1840”, EREH 2001

- **Pb: the representative agent model does not make much sense to study these issues**; in 19c Britain, the agents holding public debt (=top 1% or top 10% wealth holders) are not the same as those paying taxes (=the entire population) (see Amoureux 2014)
- **Public debt always involves large transfers between different social groups**: for high wealth agents, it is better to lend money than to pay taxes… as long as the debt is paid back = big difference between 19c and 20c; will 21c be more like 19c, i.e. debt will be paid back?
- Whether the Ricardian equivalence holds depends on the prosperity of private savers, the rate of return that they are being offered, the ability of the govt to convince them that they will be paid back; in 19c UK, r was high, and govt highly credible

France: a mixed economy in 1950-1980

- Historically, high public debt in France was always inflated away (more difficult with €)
- In 1950, public debt<30% Y, and public assets >120% Y (public buildings + nationalized firms), so that net public wealth close to 100% Y; given that private wealth was close to 200% Y at that time, this means that in effect the govt owned about 1/3 of national wealth (and over 2/3 of large companies)
- Same pattern in Germany 1950 (and Britain 1970) = the postwar mixed economy
- Rise in public debt + privatization of public assets played a big role in rise of private wealth since 1980

Figure 3.6. Private and public capital in France, 1700-2010



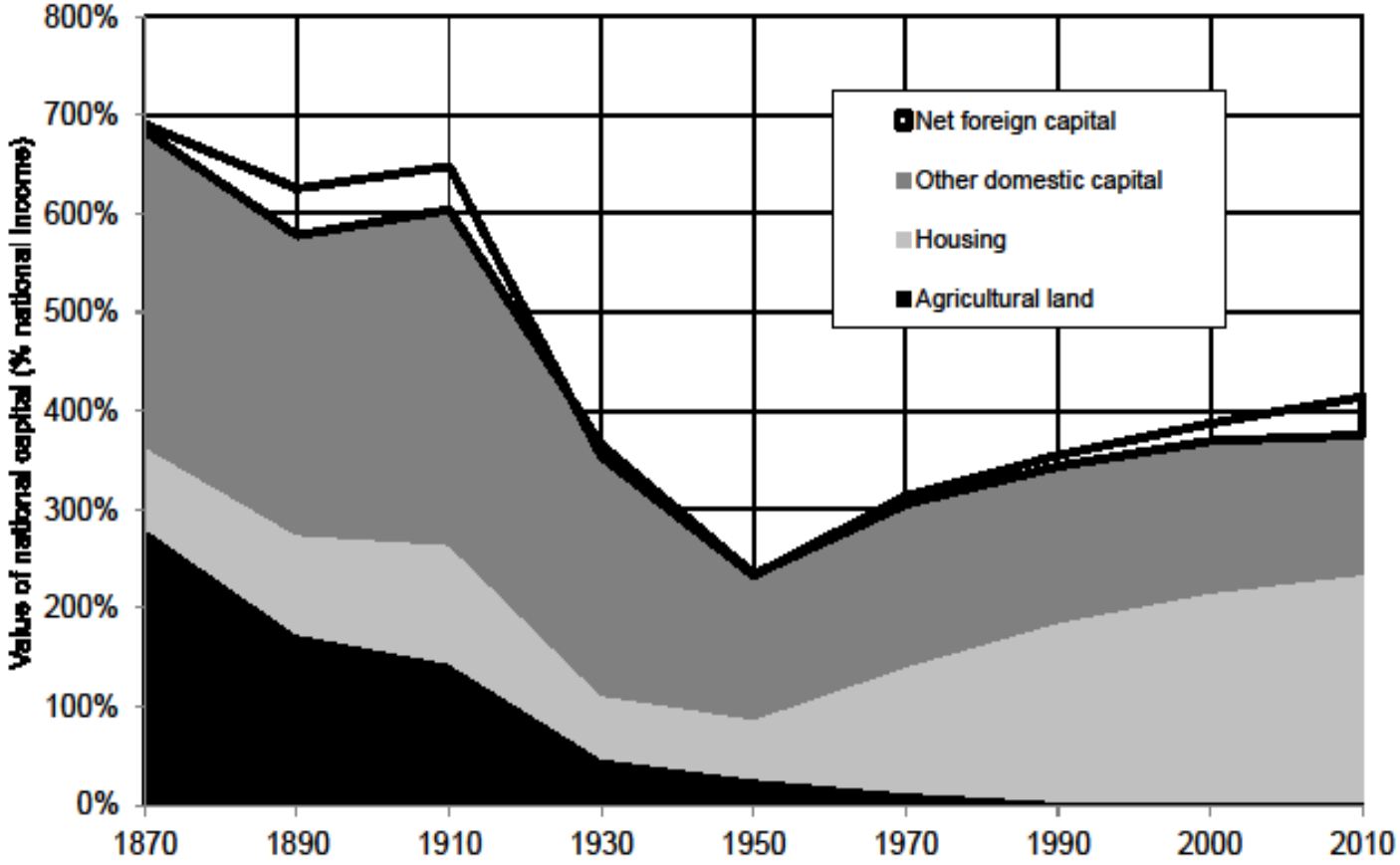
In 1950, public capital is worth almost 1 year of national income, vs. 2 years for private capital.

Sources and series: see piketty.pse.ens.fr/capital21c

Capital in Germany: stakeholder capitalism?

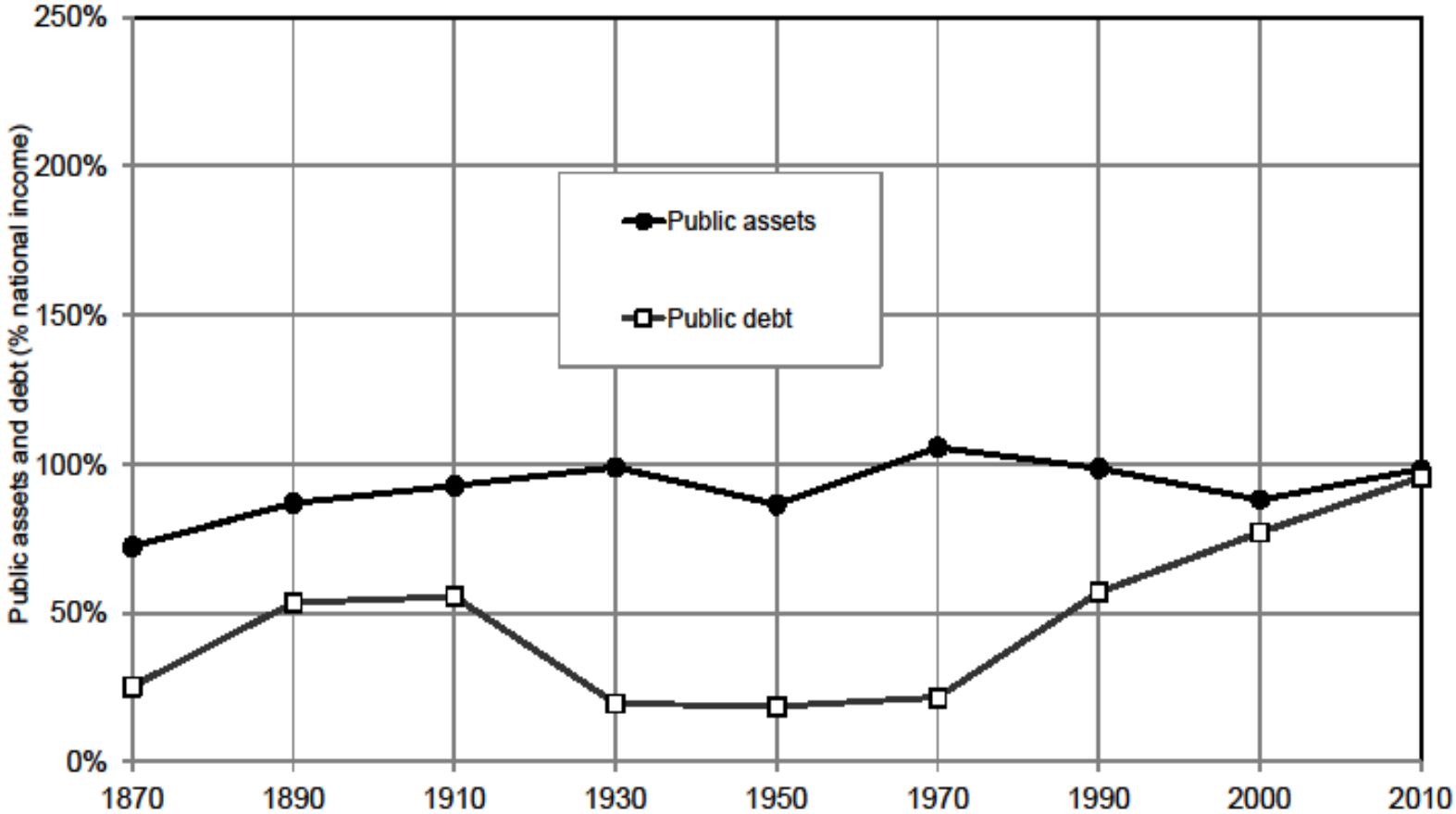
- Same general pattern as in Britain and France
- Except that NFA smaller in Germany in 1870-1910 (no colonial empire, late industrialization)
- Except that the level of β_n is lower in Germany during 1950-2010 period: lower real estate prices (rent control, other regulations, geography?), lower stock market prices (stakeholder capitalism? more on this later)
- Except that NFA has been rising a lot in 1990s-2000s

Figure 4.1. Capital in Germany, 1870-2010



National capital is worth 6,5 years of national income in Germany in 1910 (incl. about 0,5 year invested abroad). Sources and series: see piketty.pse.ens.fr/capital21c.

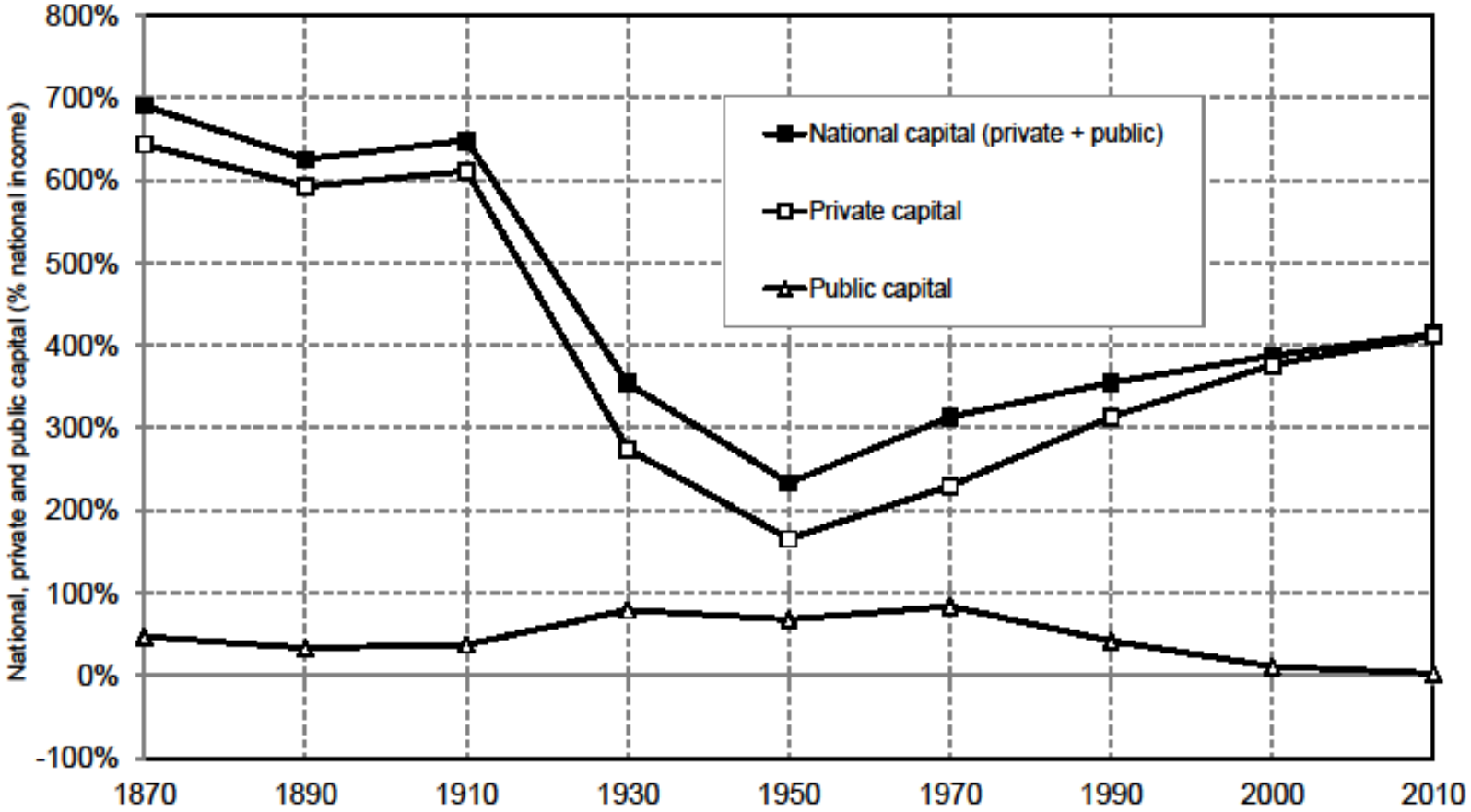
Figure 4.2. Public wealth in Germany, 1870-2010



Public debt is worth almost 1 year of national income in Germany in 2010 (as much as assets)

Sources and series: see piketty.pse.ens.fr/capital21c.

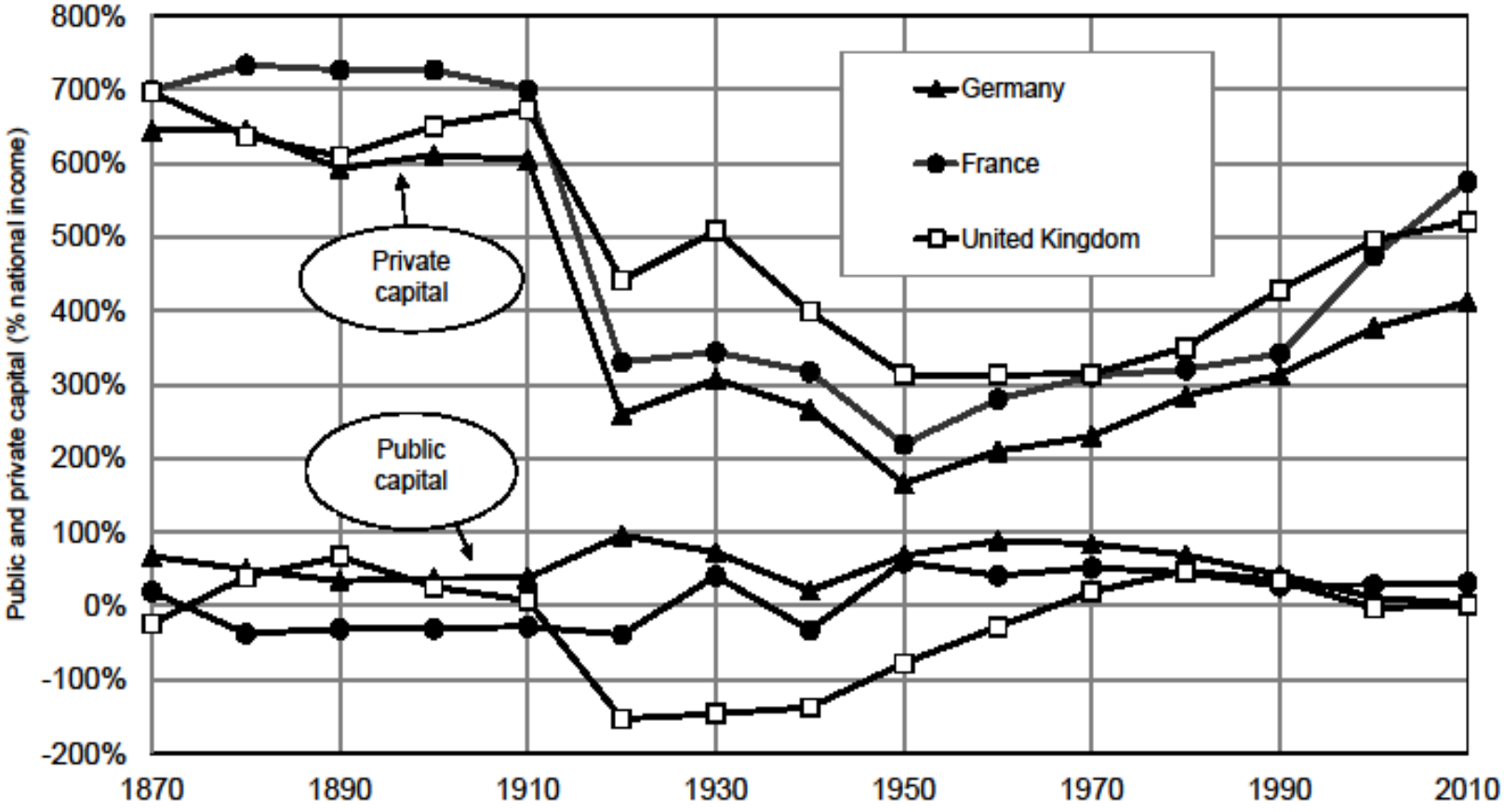
Figure 4.3. Private and public capital in Germany, 1870-2010



In 1970, public capital is worth almost 1 year of national income, versus slightly more than 2 for private capital.

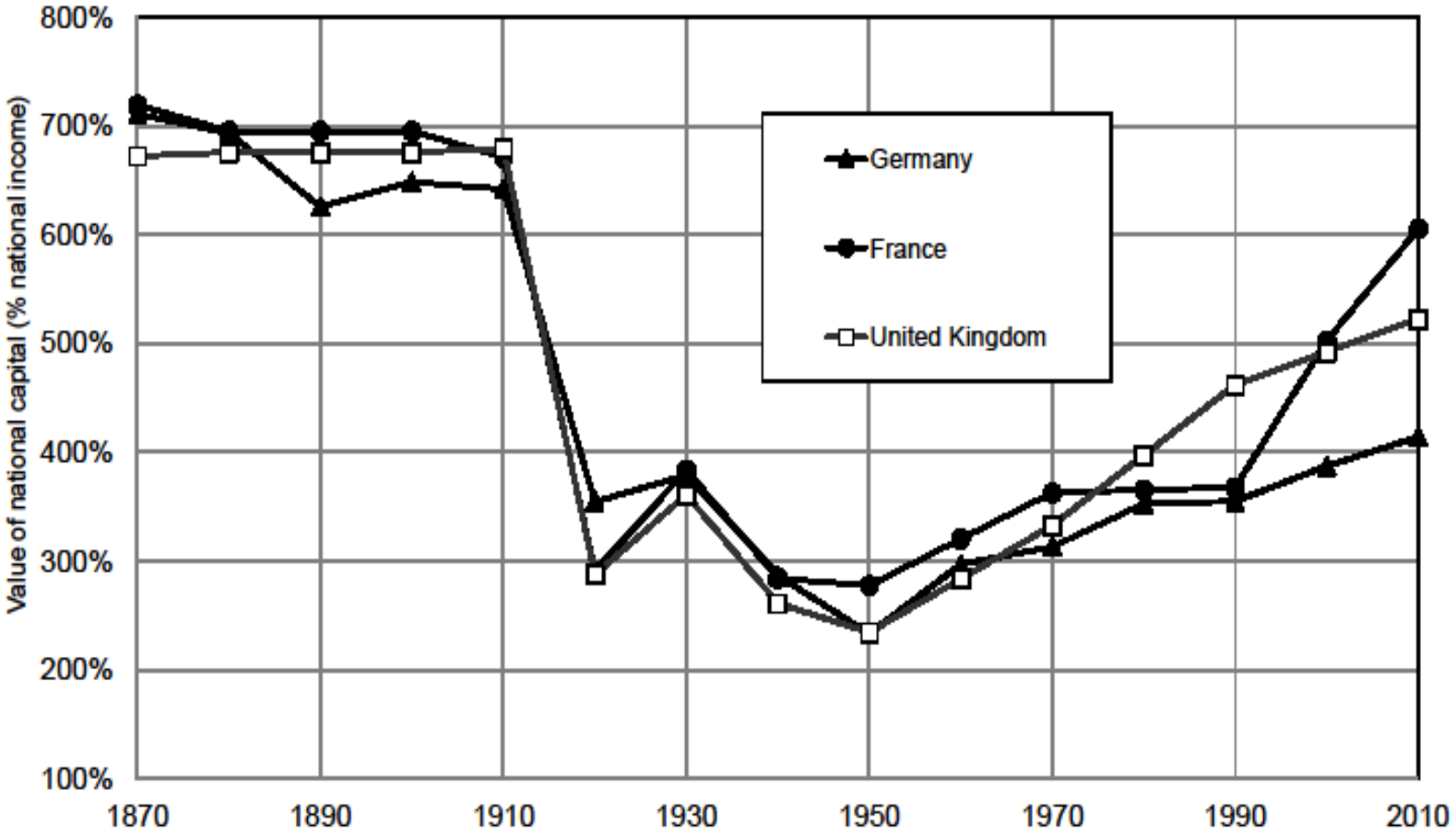
Sources and series: see piketty.pse.ens.fr/capital21c

Figure 4.4. Private and public capital in Europe, 1870-2010



The fluctuations of national capital in Europe in the long run are mostly due to the fluctuations of private capital.
Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 4.5. National capital in Europe, 1870-2010

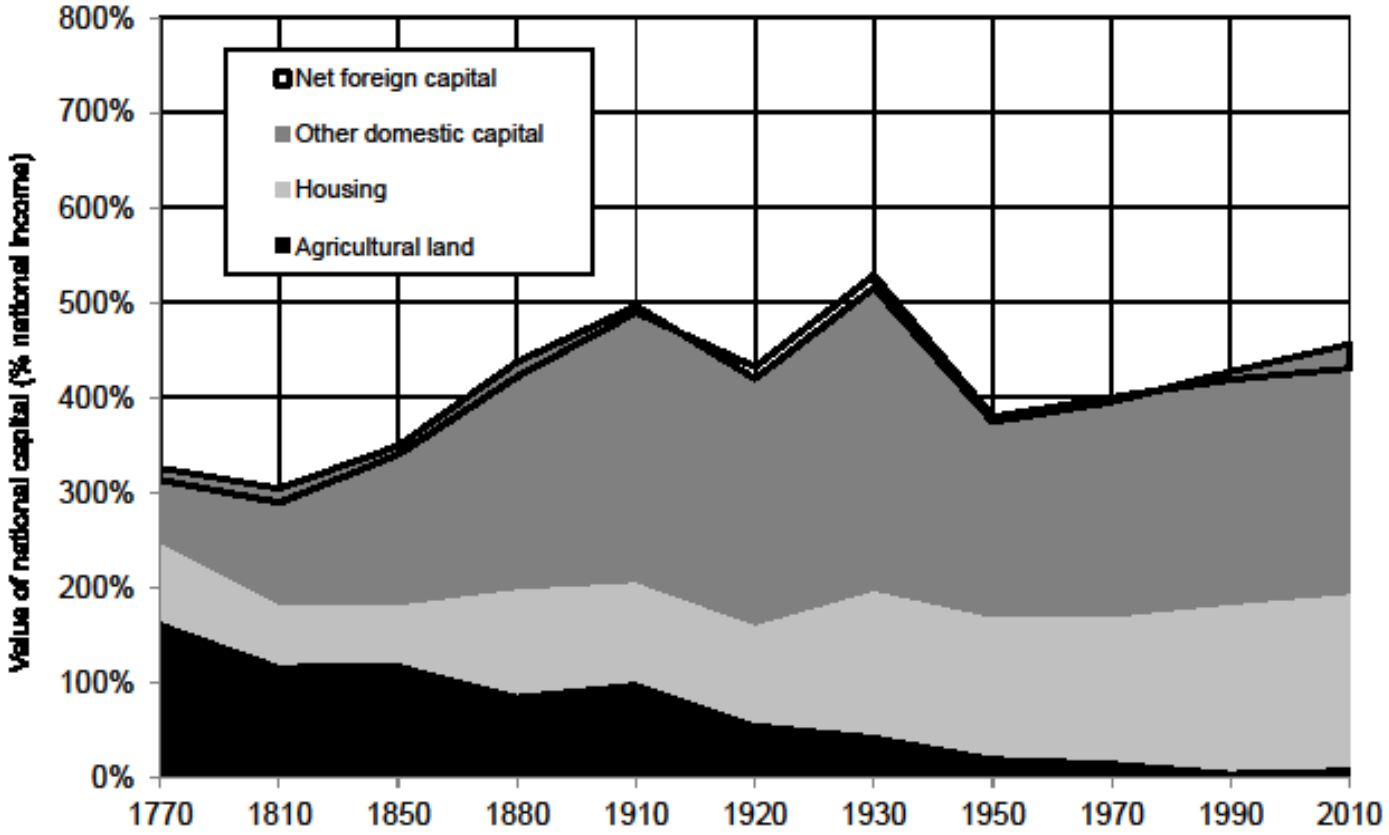


National capital (sum of public and private capital) is worth between 2 and 3 years of national income in Europe in 1950. Sources and series: see piketty.pse.ens.fr/capital21c

Capital in America: the role of slavery

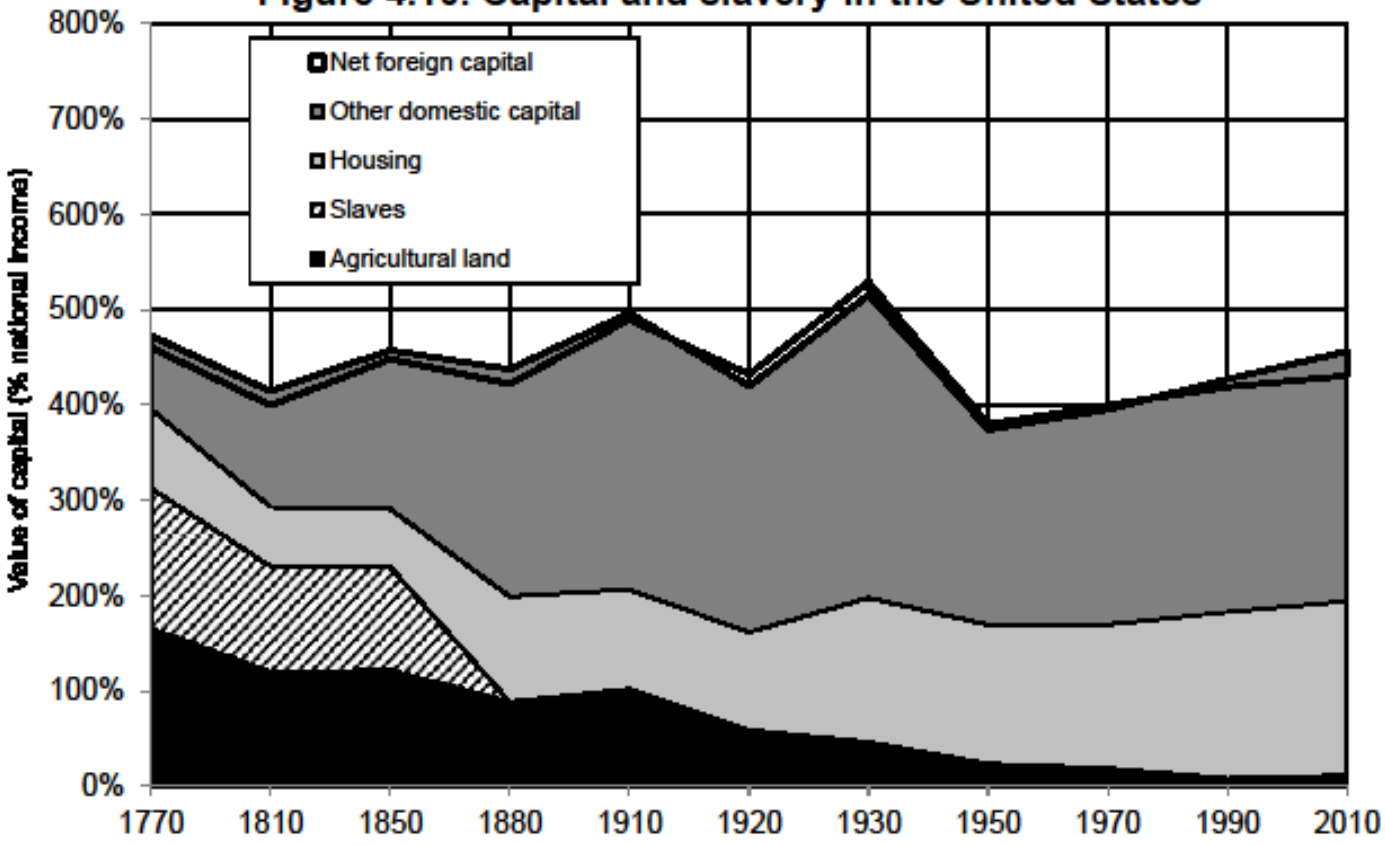
- Very different historical pattern than in Europe
- Rising β_n during 19c, almost stable in 20c
- Level of β_n generally smaller than in Europe, particularly in 19c
- Two factors: less time to accumulate capital; lower land price (more land in volume, but less land in value)
- NFA always close to 0 in US; but <0 in Canada
- Southern US before 1865: critical importance of slave capital in private wealth >> see lecture 5 (most extreme illustration of capital as power)

Figure 4.6. Capital in the United States, 1770-2010



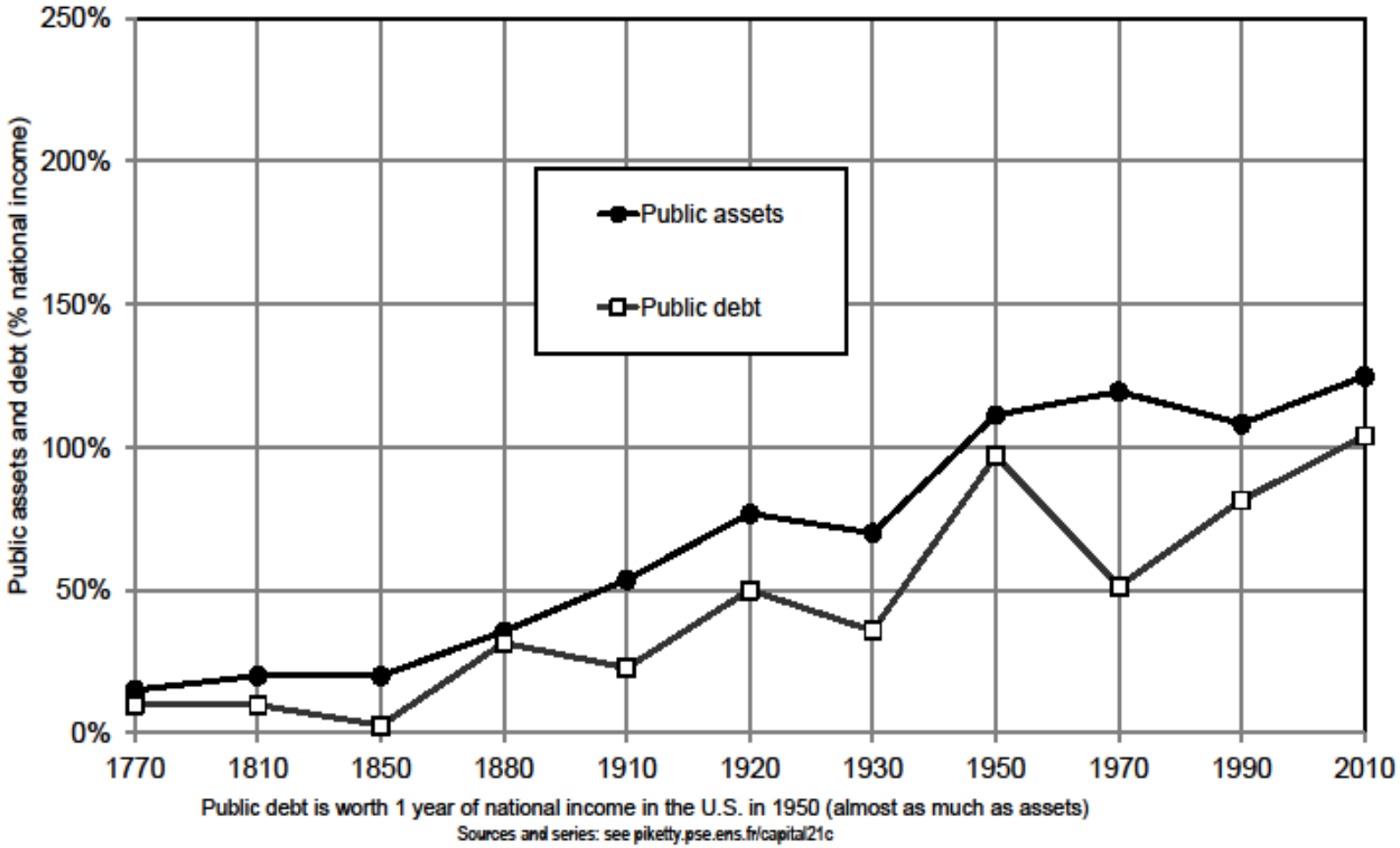
National capital is worth 3 years of national income in the United States in 1770 (incl. 1,5 years in agricultural land). Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 4.10. Capital and slavery in the United States



The market value of slaves was about 1,5 years of U.S. national income around 1770 (as mush as land).
Sources and series: see piketty.pse.ens.fr/capital21c.

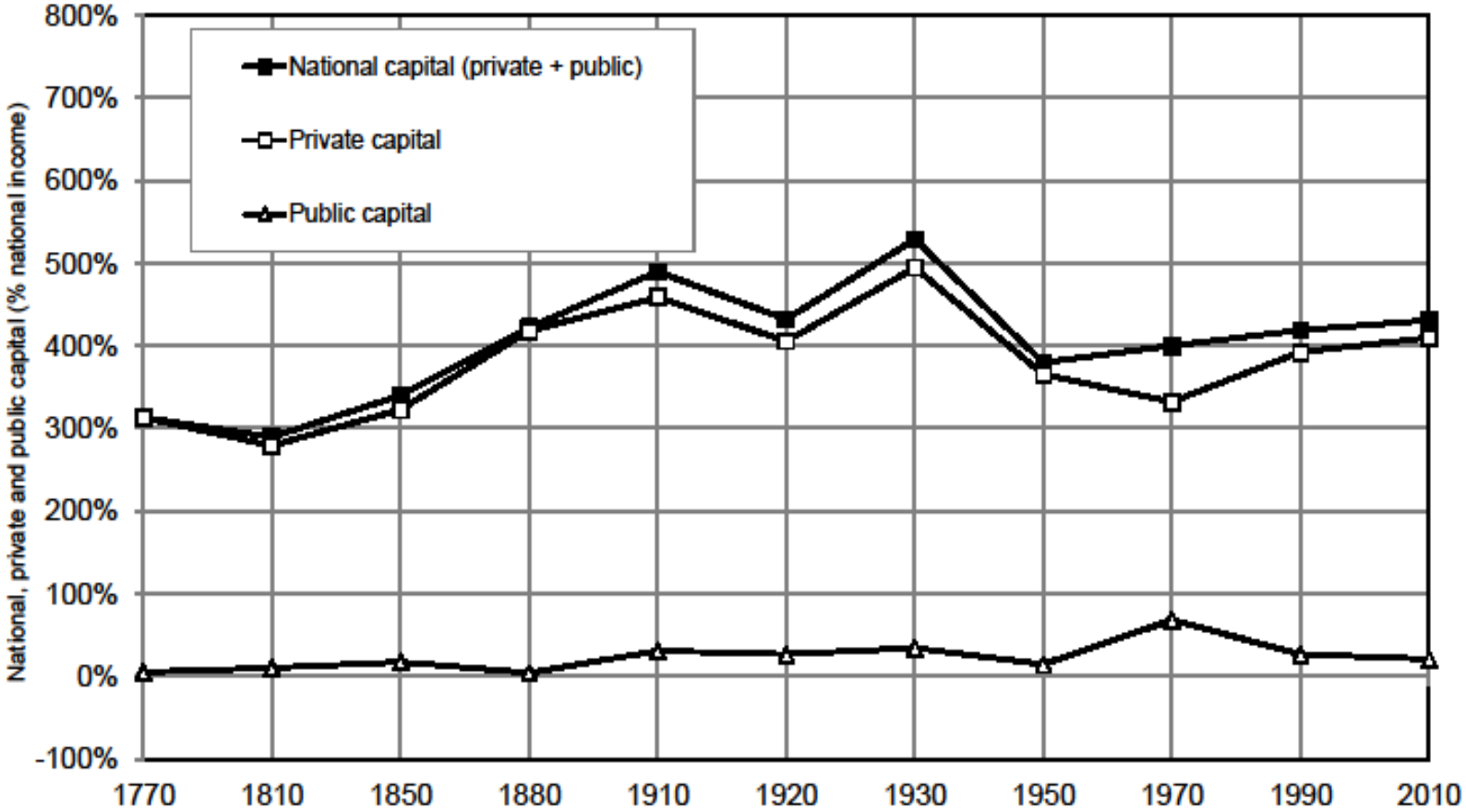
Figure 4.7. Public wealth in the United States, 1770-2010



Public debt is worth 1 year of national income in the U.S. in 1950 (almost as much as assets)

Sources and series: see piketty.pse.ens.fr/capital21c

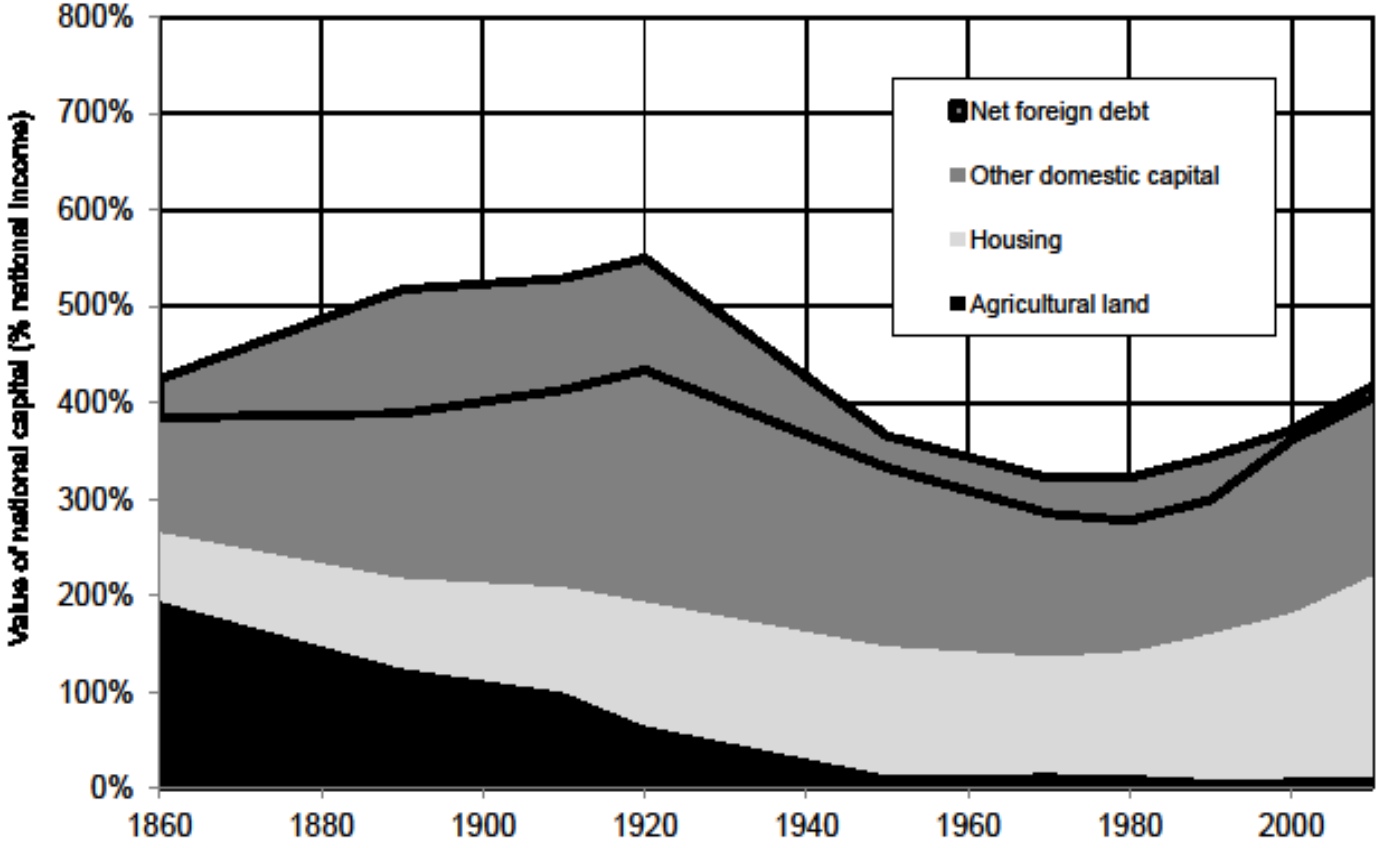
Figure 4.8. Private and public capital in the U.S., 1770-2010



In 2010, public capital is worth 20% of national income, vs. over 400% for private capital.

Sources and series: see piketty.pse.ens.fr/capital21c

Figure 4.9. Capital in Canada, 1860-2010

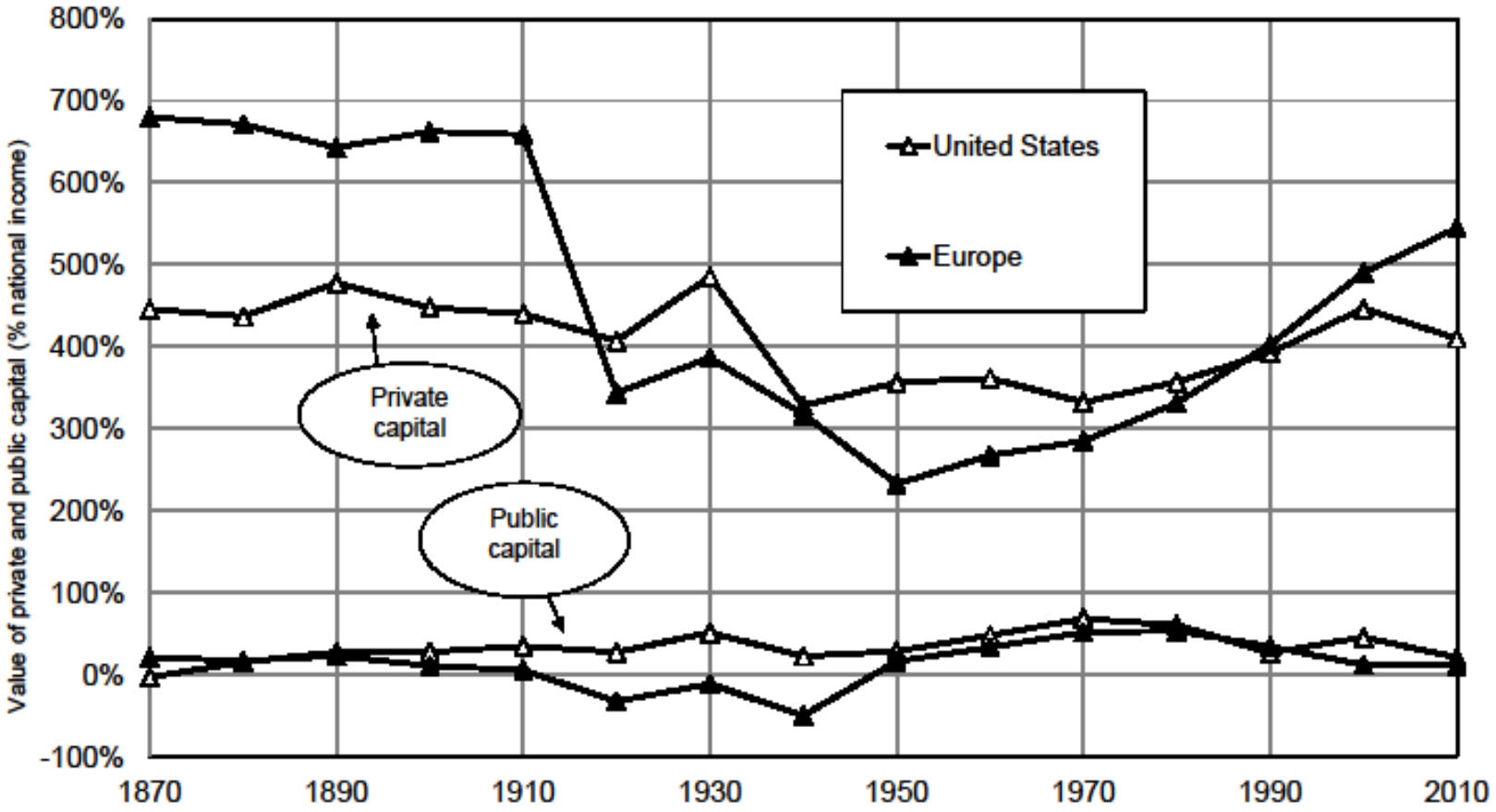


In Canada, a substantial part of domestic capital has always been helf by the rest of the world, so that national capital has always been less than domsetic capital. Sources and series: see piketty.pse.ens.fr/capital21c

Summing up: what have we learned?

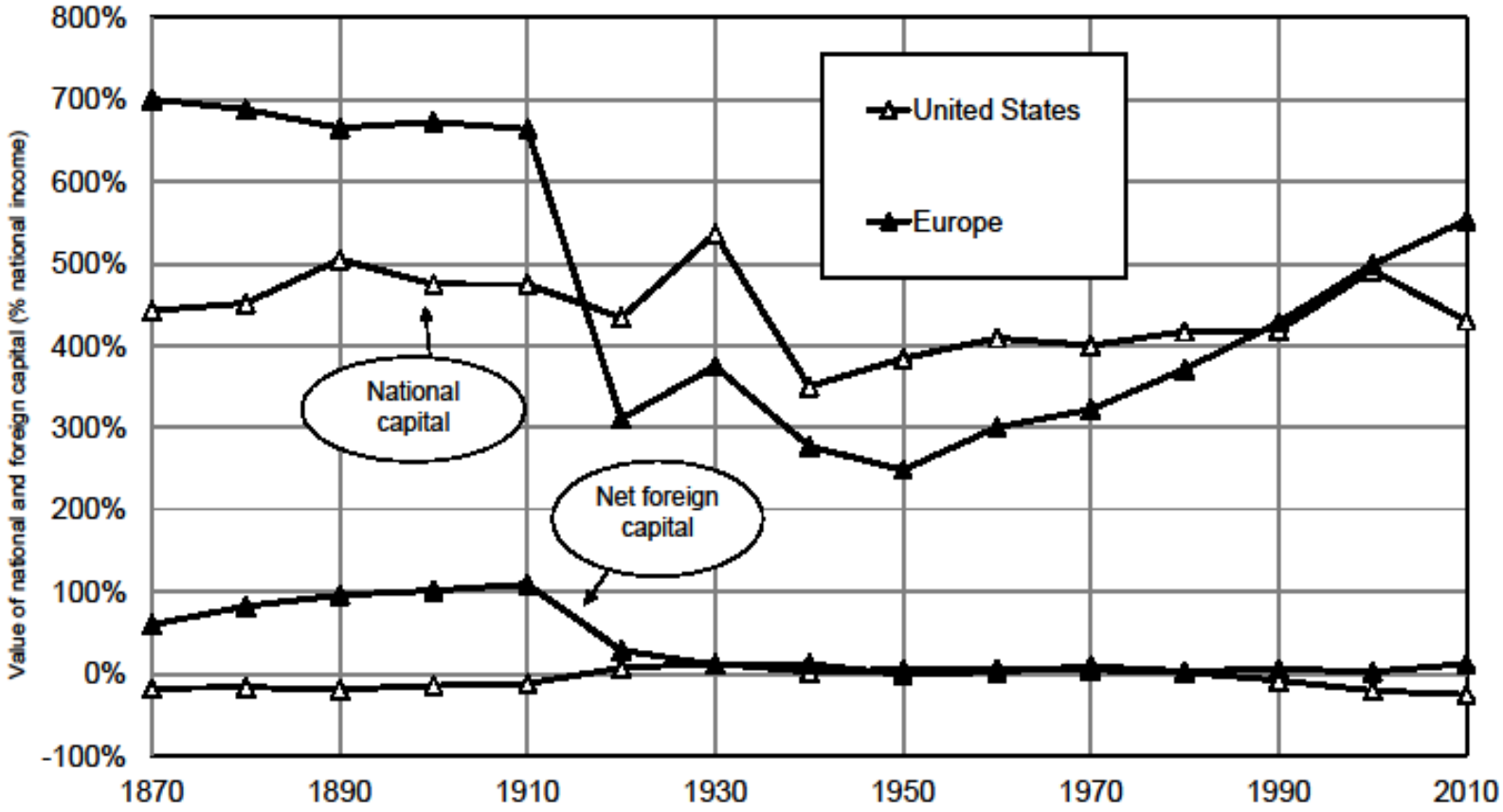
- National wealth-income ratios $\beta_n = W_n/Y$ followed a large U-shaped curve in Europe: 600-700% in 18c-19c until 1910, down to 200-300% around 1950, back to 500-600% in 2010
- U-shaped curve much less marked in the US
- Most of the long run changes in β_n are due to changes in the private wealth-income ratios $\beta = W/Y$
- But changes in public wealth-income ratios $\beta_g = W_g/Y$ (>0 or <0) also played an important role (e.g. amplified the β decline between 1910 and 1950)
- Changes in net foreign assets NFA (>0 or <0) also played an important role (e.g. account for a large part of the β decline between 1910 and 1950)

Figure 5.1. Private and public capital: Europe and America, 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 U.S.). Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 5.2. National capital in Europe and America, 1870-2010

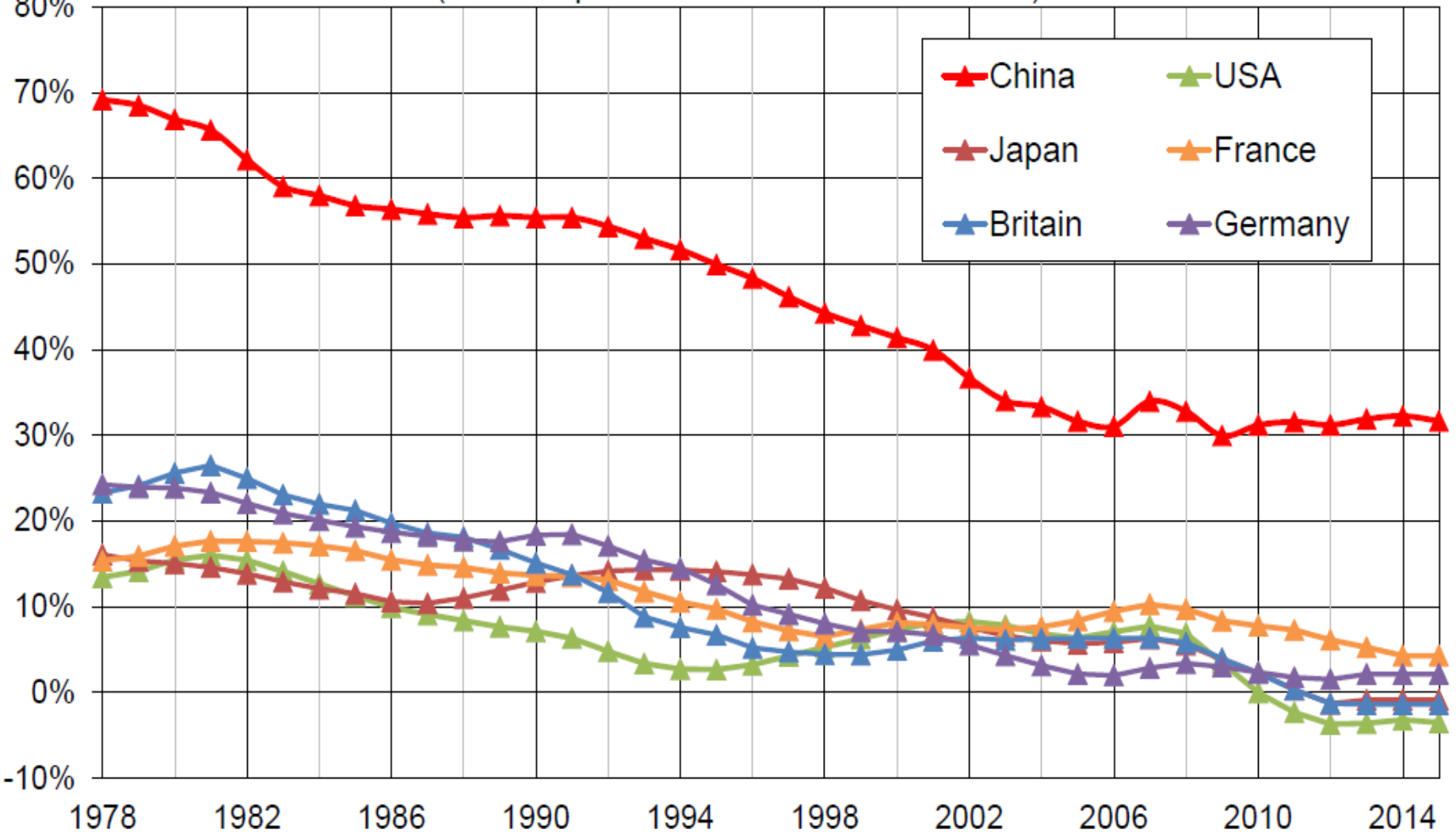


National capital (public and private) is worth 6,5 years of national income in Europe in 1910, vs. 4,5 years in America.
Sources and series: see piketty.pse.ens.fr/capital21c.

The changing share of public ownership

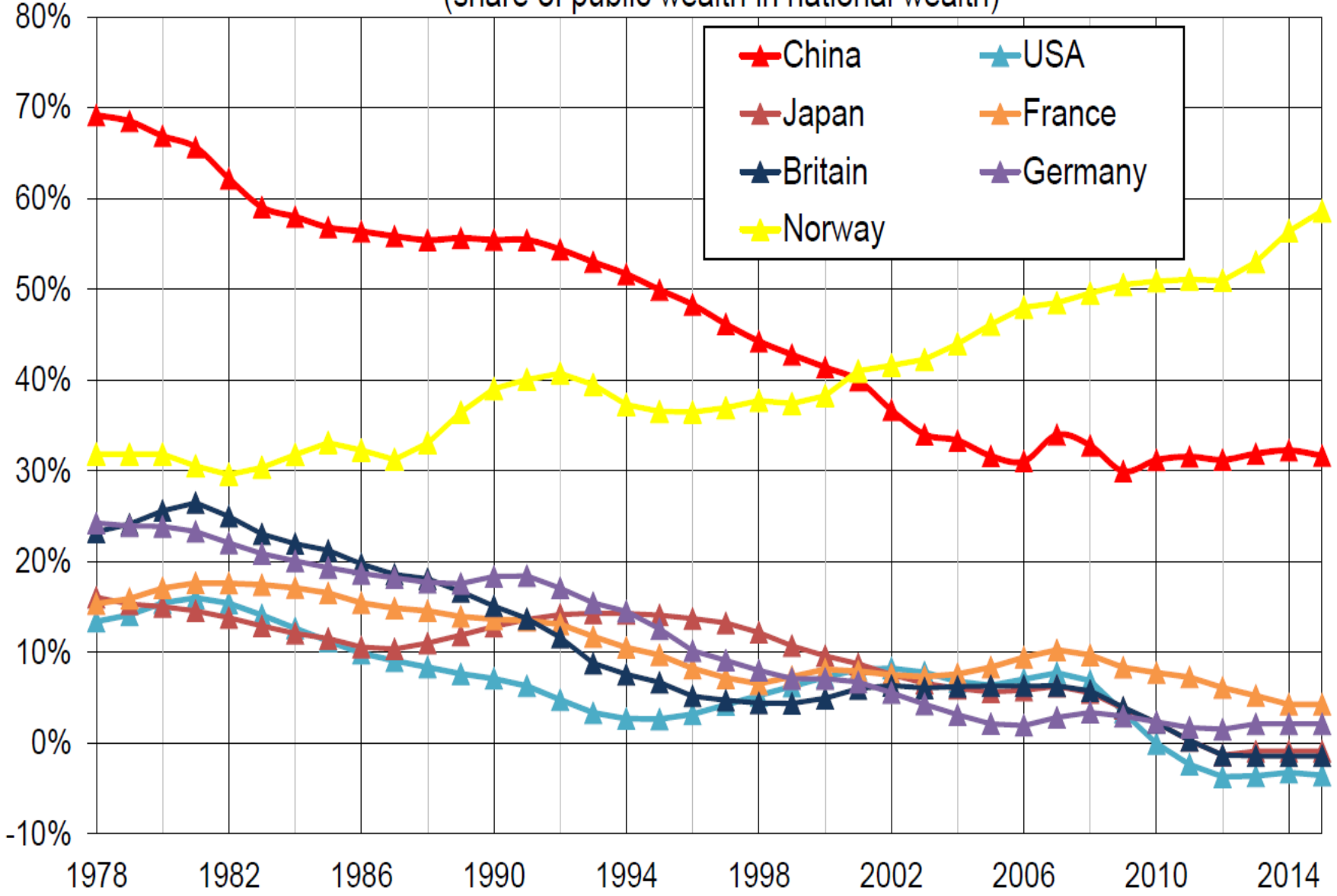
- During the 1950-1980 period, the share of net public wealth in net national wealth was as large as 25-30% in many Western countries = mixed property regime
- By 2015, the share of net public wealth is negative not only in Italy but also in US, UK and Japan (and only slightly positive in France and Germany)
- In China, public share seems stabilize around 30%
- See Alvaredo et al 2017 Global Inequality Dynamics: New Findings from WID.world ;Piketty-Yang-Zucman Capital Accumulation, Private Property and Rising Inequality in China, 1978-2015 ; Novokmet-Piketty-Zucman 2017 From Soviets to Oligarchs: Inequality and Property in Russia 1905-2016
- Changing ideology on efficiency of private vs public property
- Rising public debt: more difficulties to agree about fair tax burden with growth slowdown and globalization? And/or structural myopa in absence of strong rules or ideology?

Figure 2b. The decline of public property
(share of public wealth in national wealth)



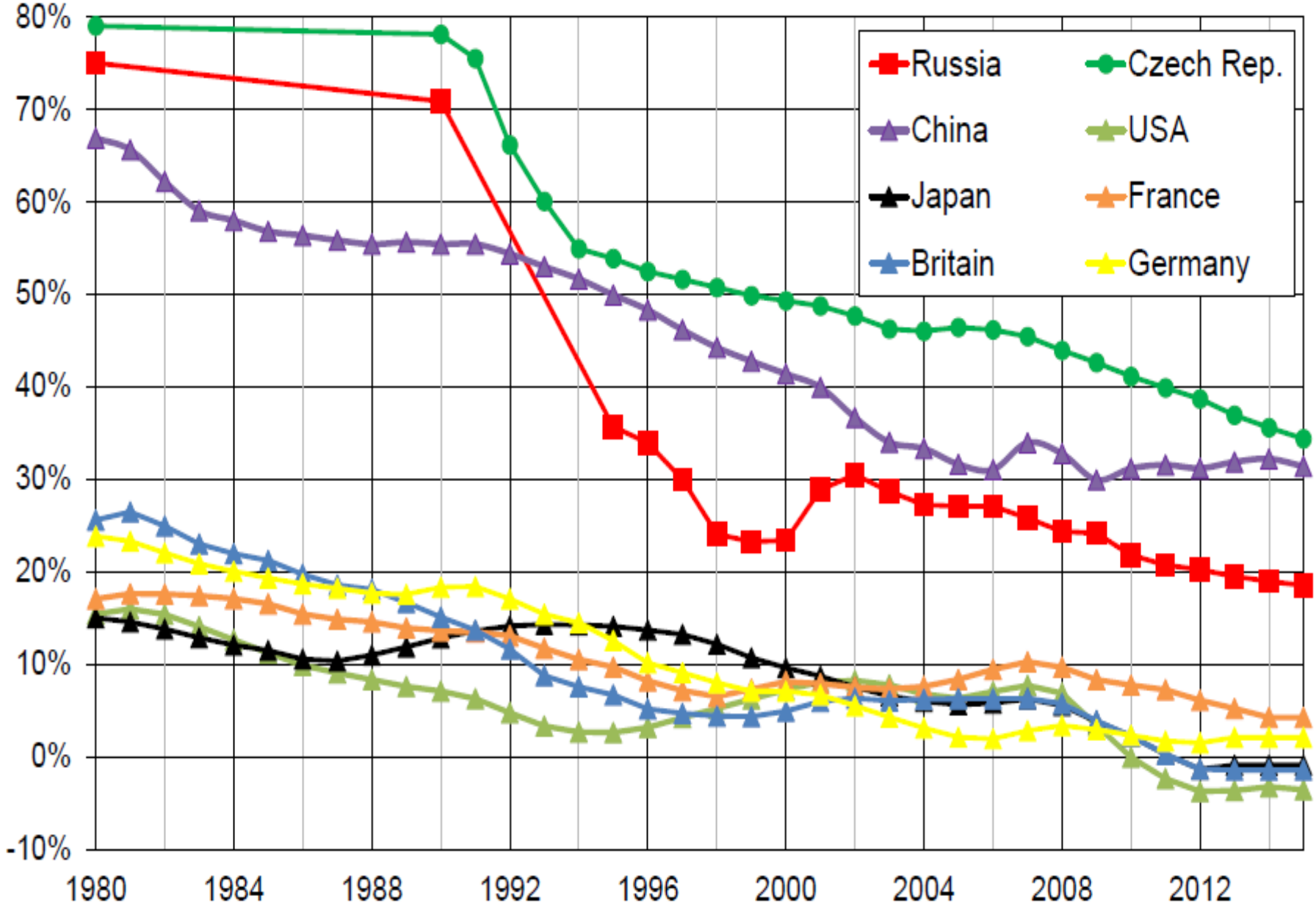
Share of net public wealth (public assets minus public debt) in net national wealth (private + public).
China: Piketty, Yang and Zucman (2016). Other countries: Piketty and Zucman (2014) and WID.world updates.

Figure 2c. The decline of public property vs. the rise of sovereign funds
(share of public wealth in national wealth)



Share of net public wealth (public assets minus public debt) in net national wealth (private + public).
China: Piketty, Yang and Zucman (2016). Other countries: Piketty and Zucman (2014) and WID.world updates.

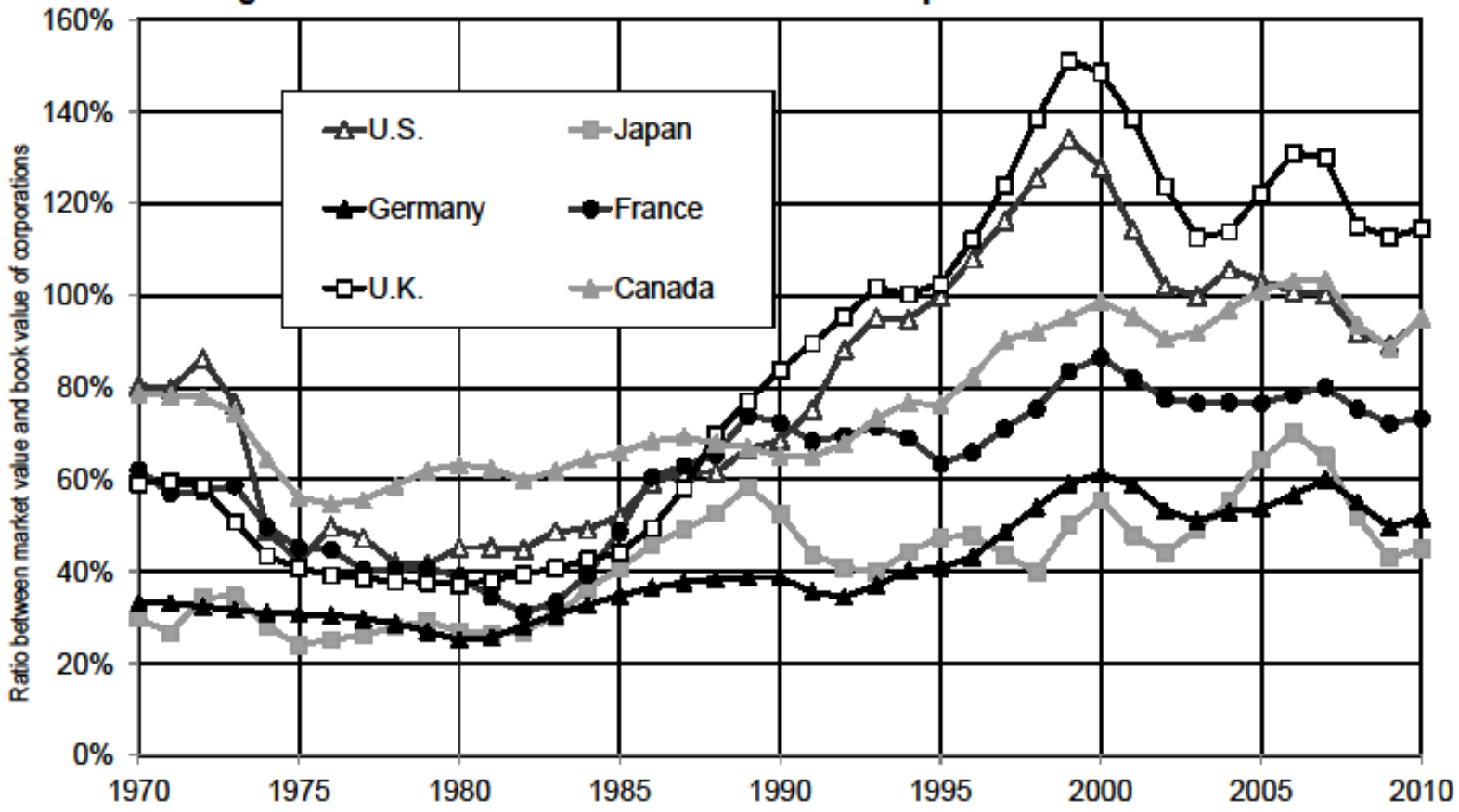
Figure 7c. The decline of public property: Russia vs other countries
(share of net public wealth in net national wealth)



Market vs book value of corporations: capital and power

- So far we used a market-value definition of national wealth W_n : corporations valued at stock market prices
- Book value of corporations = assets – debt
- Tobin's Q ratio = (market value)/(book value) (>1 or <1)
- Residual corporate wealth W_c = book value – market value
- Book-value national wealth $W_b = W_n + W_c$
- In principe, $Q \approx 1$ (otherwise, investment should adjust), so that $W_c \approx 0$ and $W_b \approx W_n$
- But Q can be systematically >1 if immaterial investment not well accounted in book assets
- But Q can be systemativally <1 if shareholders have imperfect control of the firm (**stakeholder model**): this can explain why Q lower in Germany than in US-UK, and the general rise of Q since 1970s-80s

Figure 5.6. Market value and book value of corporations



Tobin's Q (i.e. the ratio between market vaue and book value of corporations) has risen in rich countries since the 1970s-1980s. Sources and series: see piketty.pse.ens.fr/capital21c.

- Differences in legal systems, particularly in labor law & company law (stakeholder rights: “codetermination” = power sharing btw shareholders and workers) can explain different levels of Tobin’s Q
- See McGaughey, « Do Corporations Increase Inequality? », WP 2015 on corporate law and inequality; see also « The Codetermination Bargains: The History of German Corporate and Labour Law », WP 2015 and Schuster, « European Company Law », LSE slides 2015 on codetermination in Germany, Sweden and other European countries : **more codetermination → lower Tobin’s Q, but this can be good for the long-run investment of workers**
- Germany: employee representatives make 50% of supervisory board members (but shareholders have decisive vote and pick management board: German two-board system)
- Sweden: 3 employees (≈30%) in single board of directors
- France since 2013: 1-2 employees (≈10-20%) in board of directors
- UK-US: 0 employee in board; shareholders have 100% of seats
- One could also grant voting rights to workers in general shareholder meetings (McGaughey): **economic democracy yet to be invented**

Property regimes in history: from feudal to social

- Feudal property involves various forms of « political » power over workers, e.g. judicial power, forced labor, etc.
- French revolution: attempt to separate pure private property rights (legitimate) from political power (state monopoly). End of perpetual land rents. But in practice not easy to draw the line.
- **Blaufard, *The Great Demarcation: the French Revolution and the Invention of Modern Property*, OUP 2014**. 1789: « abolition of feudal privileges », but presumption that land rights are legitimate and need to be compensated. 1793: presumption that non-rent rights (e.g. selling rights) are feudal. 1815: compensation of aristocrats. In the end, church property was redistributed much more than aristocratic property.
- Polanyi 1944: sacralisation of private property during 19c led to 1914-1945 shocks; after 1945, invention of new forms of social property: codetermination, mixed property, etc.
- 21c : social property still alive, but gradual return of a legal regime more favourable to private property rights
- More on property regimes in Advanced Economic History course

Intellectual property & immaterial capital

- One key shortcoming of existing balance sheets: intellectual property and immaterial k (patents, copyrights, research, ideas, culture,..) are taken into account only when they are privately owned, so that a rise in wealth-income ratio might just reflect rising privatization of intellectual property & immat. k
- Major policy issues today: How long should patents and copyrights last? Is it possible to have private property rights on basic research articles that were publicly financed? Is it possible to grant exclusivity rights for digitalization of works that are in public domain (library collections, art works, etc.)? To what extent did weak IP laws in China and India facilitate world convergence? What would happened if all knowledge was privately owned through strong IP laws?
- See e.g. Kapczynski 2015, « Intellectual Property & Inequality »; « The Access to Knowledge Mobilization and the New Politics of Intellectual Property", YLJ 2008; Zone books 2010; "The Cost of Price: Why and How to Get Beyond Intellectual Property", UCLALR 2012; see also Boyle 2003 « The Second Enclosure Movement and the Construction of the Public Domain »
- See also Koh et al, « Labor Share Decline and the Capitalization of Intellectual Property Products », WP 2015

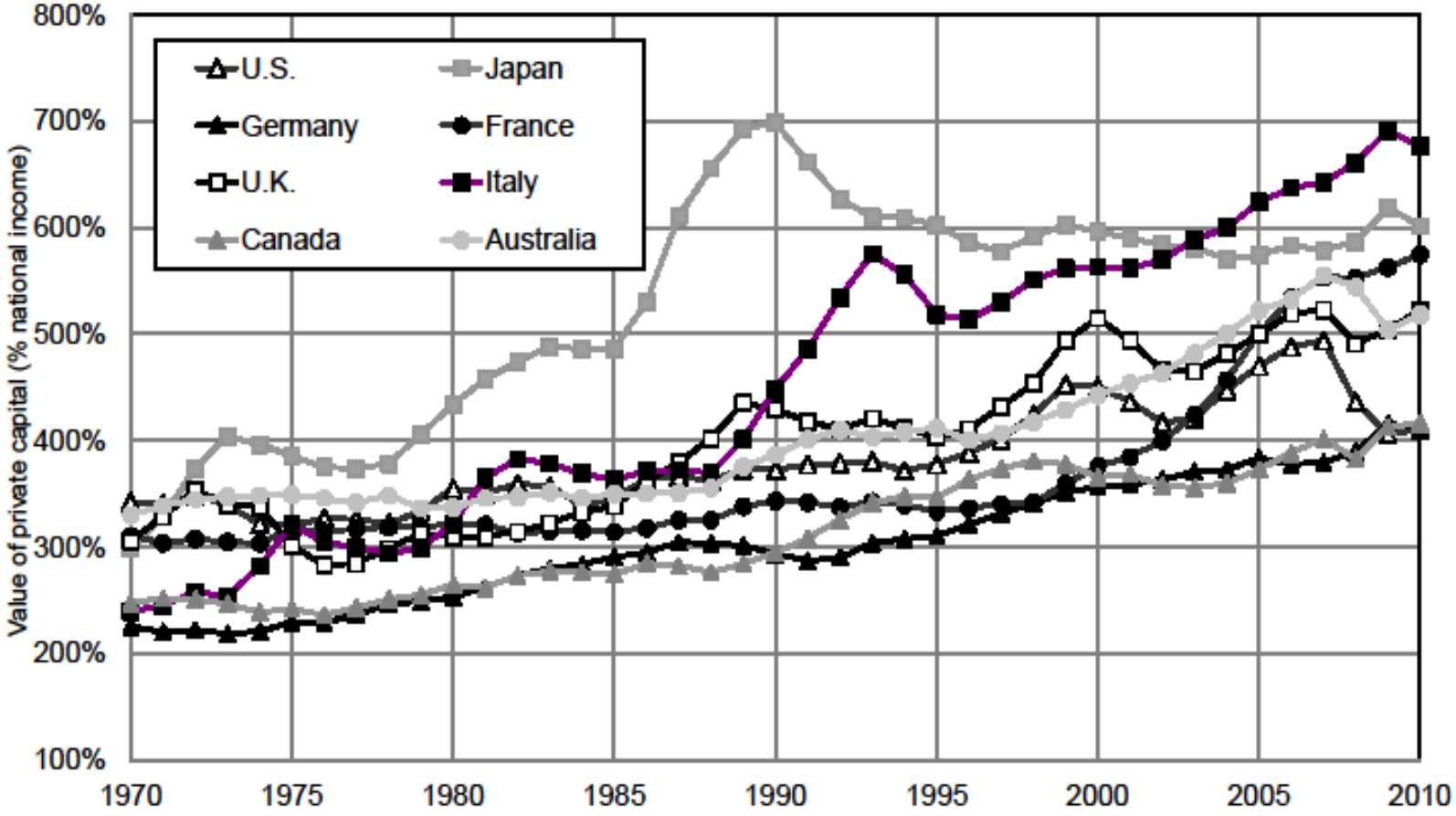
Natural capital and land prices

- Other key shortcoming of existing balance sheets: natural ressources (energy, forest, etc.) are usually taken into account only when they are discovered and exploited; climate, air quality, etc. are never taken into account
- Can depletion of natural capital (not to mention climate and other environmental damage be larger than the rise of private capital?
- Natural capital depletion ≈ 3%-4% of Y at the world level, and 6%-8% Y in low income countries
- This can largely undo the effect of positive net saving
- See Barbier 2014a, 2014b, « Account of Depreciation of Natural Capital »
- See also World Bank Wealth Accounting database
- On common property (« commons ») and natural ressources management, see work by E. Olstrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, CUP 1990; *Property in Land and Other Ressources*, Lincoln Institute 2012
- In the long run, changes in relative price of land and other natural assets can be very important

The rise of wealth-income ratios in rich countries : volume or price effects ?

- Over 1970-2010 period, the analysis can be extented to top 8 developed economies: US, Japan, Germany, France, UK, Italy, Canada, Australia (see Piketty-Zucman QJE 2014)
- Around 1970, β≈200-350% in all rich countries
- Around 2010, β≈400-700% in all rich countries
- Asset price bubbles (real estate and/or stock market) are important in the short-run and medium-run
- But the long-run evolution over 1970-2010 is more than a bubble: it happens in every rich country, and can be partly explained by growth slowdown and the Harrod-Domar-Solow formula β=s/g (higher wealth-income ratio β if higher saving rate s and lower growth rate g)
- **It can also be explained by a structural price effect: rising land price, or rising power of owners, or rising domain of property?**

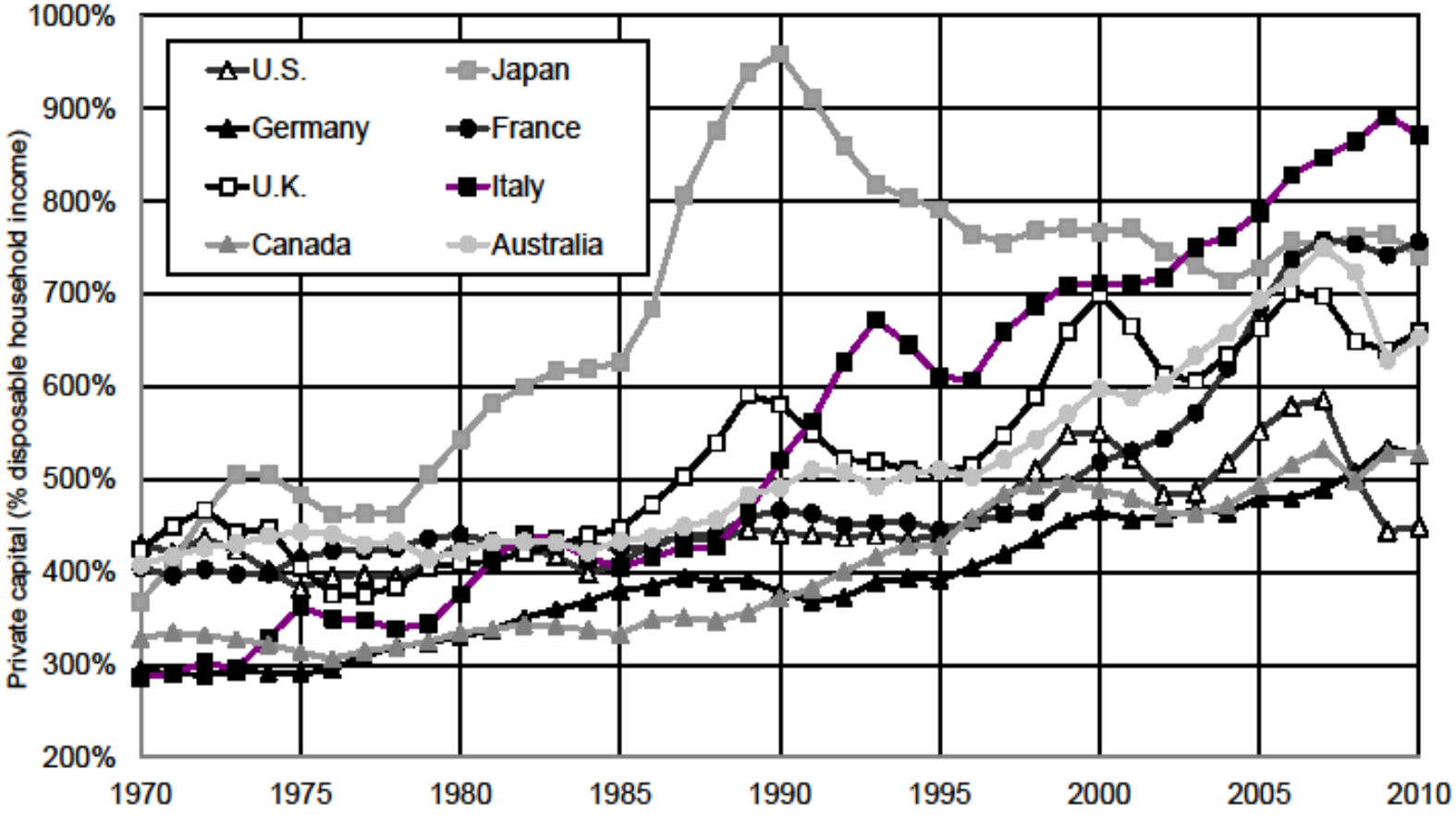
Figure 5.3. Private capital in rich countries, 1970-2010



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.

- The rise of β would be even larger is we were to divide private wealth W by disposable household income Y_h rather than by national income Y
- Y_h used to be ≈90% of Y until early 20c (=very low taxes and govt spendings); it is now ≈70-80% of Y (=rise of in-kind transfers in education and healh)
- $\beta_h = W/Y_h$ is now as large as 800-900% in some countries (Italy, Japan, France…)
- But in order to make either cross-country or time-series comparisons, it is better to use national income Y as a denominator (=more comprehensive and comparable income concept)

Figure 5.4. Private capital measured in years of disposable income

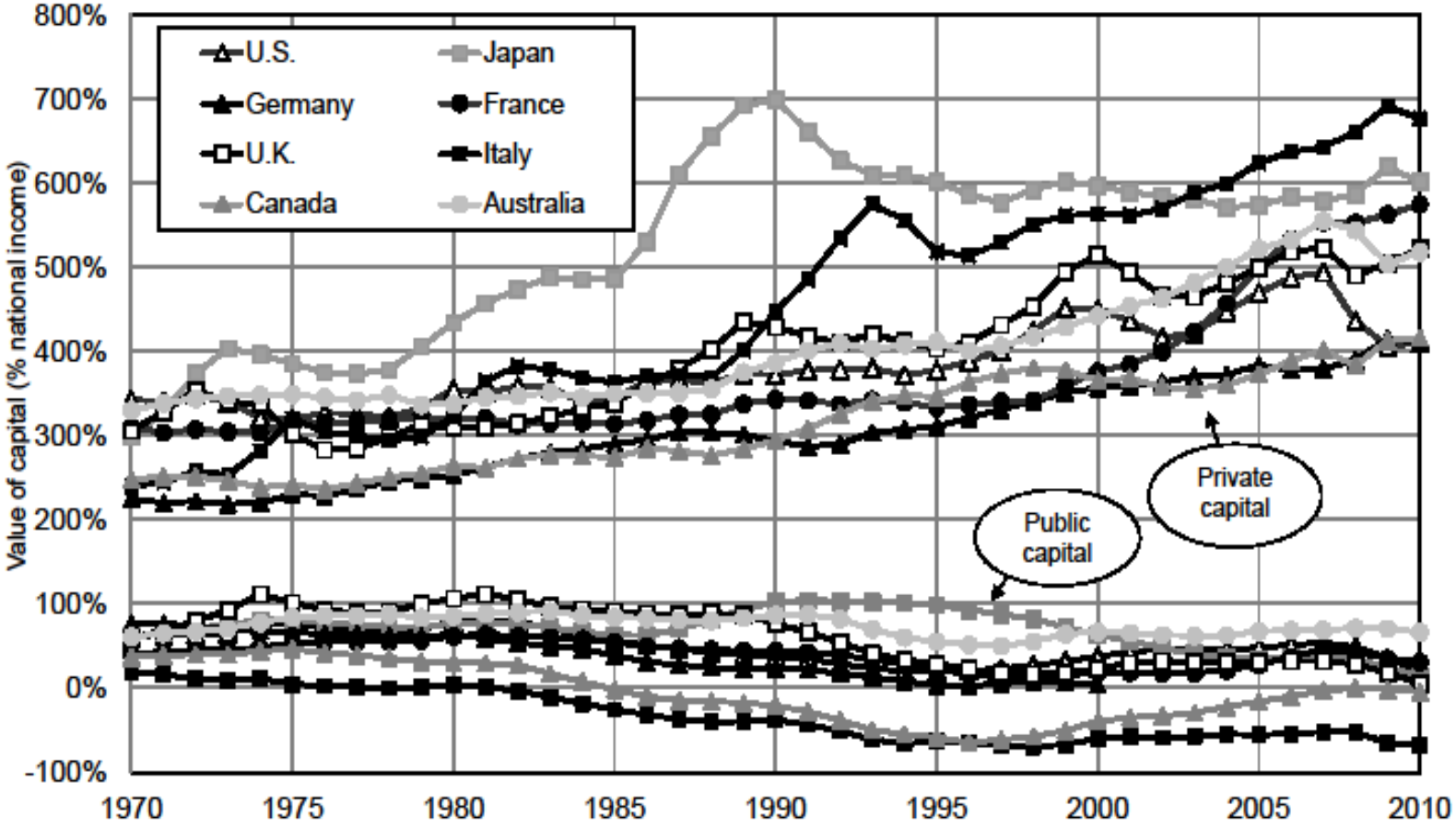


Expressed in years of household disposable income (about 70-80% of national income), the capital/income ratio appears to be larger than when it is expressed in years of national income.

Sources and series : see piketty.pse.ens.fr/capital21c.

- 1970-2010: rise of private wealth-income ratio β, decline in public wealth-inccome ratio β_g
- But the rise in β was much bigger than the decline in β_g, so that national wealth-income ratio $\beta_n=\beta+\beta_g$ rose substantially
- Exemple: Italy. β rose from 240% to 680%, β_g declined from 20% to -70%, so that β_n rose from 260% to 610%. I.e. at most 1/4 of total increase in β can be attributed to a transfer from public to private wealth (privatisation and public debt).

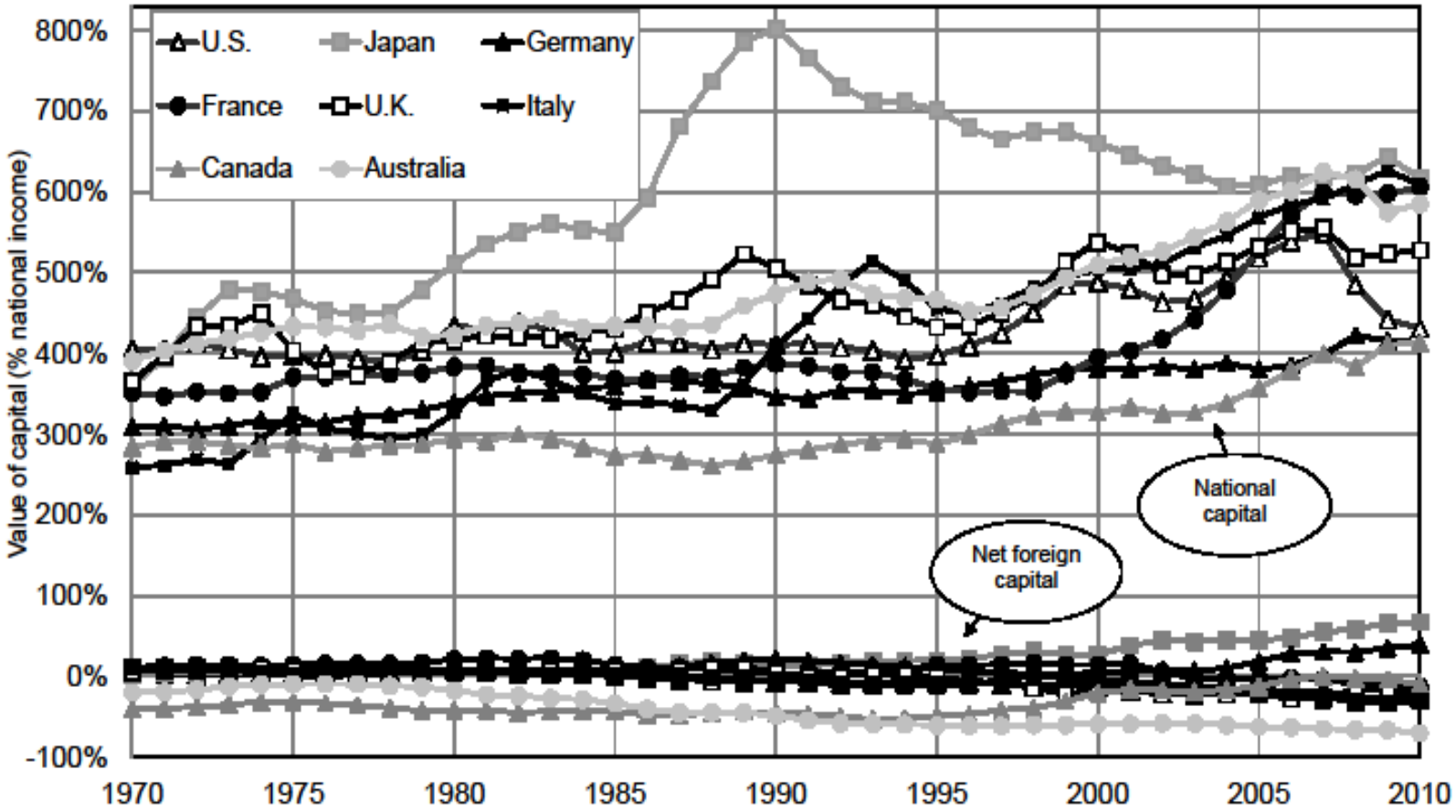
Figure 5.5. Private and public capital in rich countries, 1970-2010



In Italy, private capital rose from 240% to 680% of national income between 1970 and 2010, while public capital droptped from 20% to -70%. Sources and series: see piketty.pse.ens.fr/capital21c.

- In most countries, NFA ≈ 0, so rise in national wealth-income ratio ≈ rise in domestic capital-output ratio; in Japan and Germany, a non-trivial part of the rise in β_n was invested abroad (≈ 1/4)

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.

- **Partial explanation for rise in wealth-income ratio in the very long run: growth slowdown and $\beta = s/g$**
  (Harrod-Domar-Solow steady-state formula)
- **One-good capital accumulation model**: $\mathbf{W_{t+1} = W_t + s_t Y_t}$
  → dividing both sides by Y_{t+1}, we get: $\beta_{t+1} = \beta_t (1+g_{wt})/(1+g_t)$

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

$1+g_t = Y_{t+1}/Y_t$ = total income growth rate (productivity+population)

- If saving rate $s_t \rightarrow s$ and growth rate $g_t \rightarrow g$, then:

$$\mathbf{\beta_t \rightarrow \beta = s/g}$$

- E.g. if s=10% & g=2%, then β = 500%: this is the only wealth-income ratio such that with s=10%, wealth rises at 2% per year, i.e. at the same pace as income
- If s=10% and growth declines from g=3% to g=1,5%, then the steady-state wealth-income ratio goes from about 300% to 600%

→ **the large variations in growth rates and saving rates (g and s are determined by different factors and generally do not move together) explain the large variations in β over time and across countries**

(see Piketty-Zucman QJE 2014 & Course notes on wealth models)

Table 5.1. Growth rates and saving rates in rich coutries, 1970-2010

	Growth rate of national income	Growth rate of population	Growth rate of per capita national income	**Private saving** (net of depreciation) (% national income)
U.S.	**2,8%**	1,0%	1,8%	**7,7%**
Japan	**2,5%**	0,5%	2,0%	**14,6%**
Germany	**2,0%**	0,2%	1,8%	**12,2%**
France	**2,2%**	0,5%	1,7%	**11,1%**
U.K.	**2,2%**	0,3%	1,9%	**7,3%**
Italy	**1,9%**	0,3%	1,6%	**15,0%**
Canada	**2,8%**	1,1%	1,7%	**12,1%**
Australia	**3,2%**	1,4%	1,7%	**9,9%**

Saving rates and demographic growth vary a lot within rich countries; growth rates of per capita national income vary much less.

Sources: see piketty.pse.ens.fr/capital21c

Table 5.2. Private saving in rich countries, 1970-2010

	Private saving (net of depreciation) (% national income)	incl. Household net saving	incl. Corporate net saving (net retained earnings)
U.S.	7,7%	4,6% ***60%***	3,1% ***40%***
Japan	14,6%	6,8% ***47%***	7,8% ***53%***
Germany	12,2%	9,4% ***77%***	2,8% ***23%***
France	11,1%	9,0% ***81%***	2,1% ***19%***
U.K.	7,4%	2,8% ***38%***	4,6% ***62%***
Italy	15,0%	14,6% ***97%***	0,4% ***3%***
Canada	12,1%	7,2% ***60%***	4,9% ***40%***
Australia	9,9%	5,9% ***60%***	3,9% ***40%***

A large part (variable across countries) of private saving comes from corporate retained earnings (undistributed profits).

Sources: see piketty.pse.ens.fr/capital21c

Table 5.3. Gross and net saving in rich countries, 1970-2010

	Gross private savings (% national income)	Minus: Capital depreciation	Equal: Net private saving
U.S.	18,8%	11,1%	**7,7%**
Japan	33,4%	18,9%	**14,6%**
Germany	28,5%	16,2%	**12,2%**
France	22,0%	10,9%	**11,1%**
U.K.	19,7%	12,3%	**7,3%**
Italy	30,1%	15,1%	**15,0%**
Canada	24,5%	12,4%	**12,1%**
Australia	25,1%	15,2%	**9,9%**

A large part of gross saving (generally about half) corresponds to capital depreciation; i.e. it is used solely to repair or replace used capital.

Sources: see piketty.pse.ens.fr/capital21c

Table 5.4. Private and public saving in rich countries, 1970-2010

	National saving (private + public) (net of depreciation) (% national income)	incl. Private saving	incl. Public saving
U.S.	**5,2%**	7,6%	-2,4%
Japan	**14,6%**	14,5%	0,1%
Germany	**10,2%**	12,2%	-2,0%
France	**9,2%**	11,1%	-1,9%
U.K.	**5,3%**	7,3%	-2,0%
Italy	**8,5%**	15,0%	-6,5%
Canada	**10,1%**	12,1%	-2,0%
Australia	**8,9%**	9,8%	-0,9%

A large part (variable across countries) of private saving is absorved by public deficits, so that national saving (private + public) is less than private saving.

Sources: voir piketty.pse.ens.fr/capital21c

- **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 wealth growth rate (=residual term)

→ Main finding: **relative price effects (capital gains and losses) are key in the short and medium run and at local level; volume effects (saving and investment) are probably more important in the long run and at the national or continental level**

See the detailed decomposition results for wealth accumulation into volume and relative price effects in Piketty-Zucman, QJE 2014)

Figure 7a: Observed vs. predicted national wealth / national income ratios (2010)

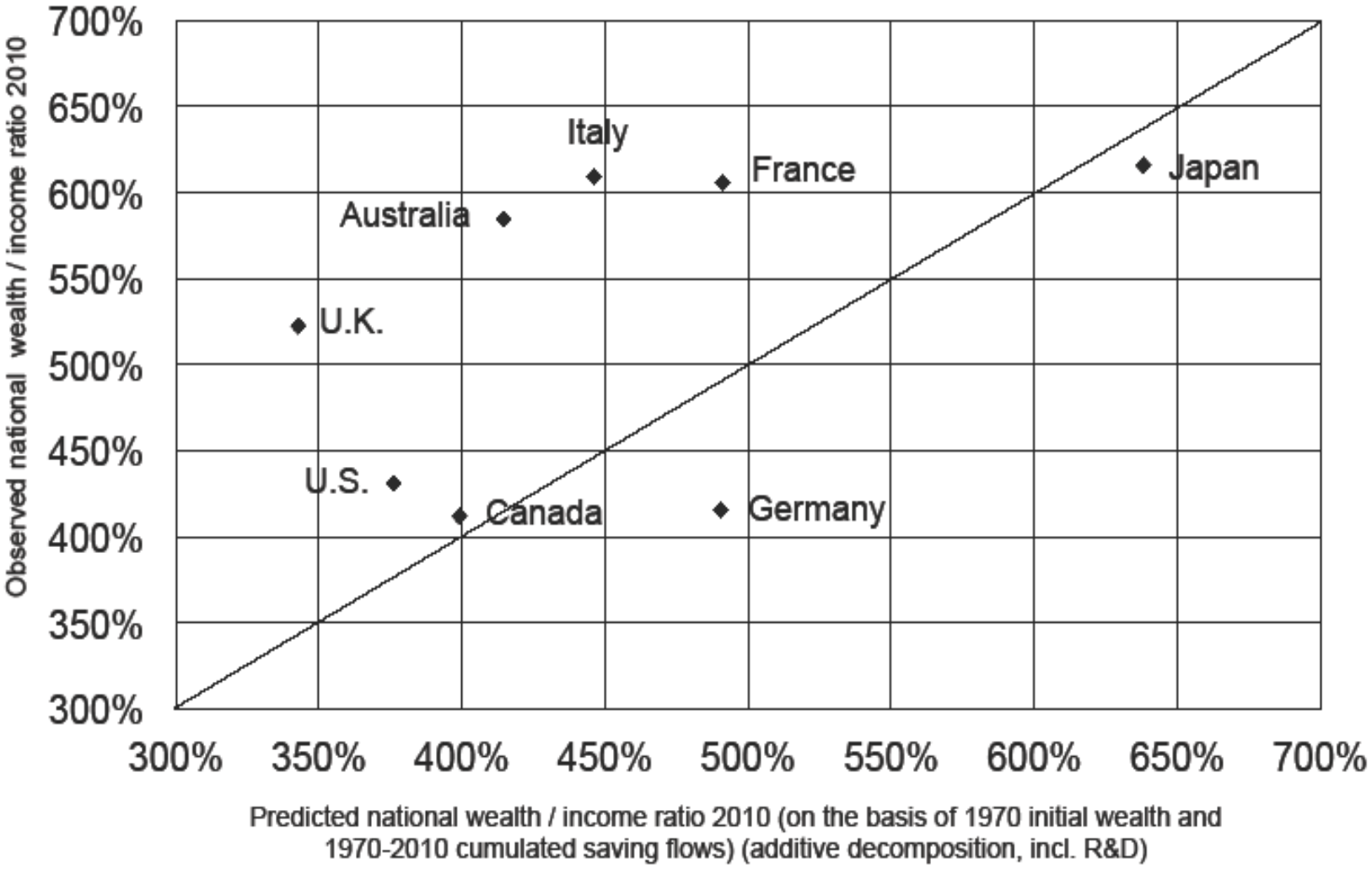


Figure 7b: Observed vs. predicted national wealth / national income ratios (2010)

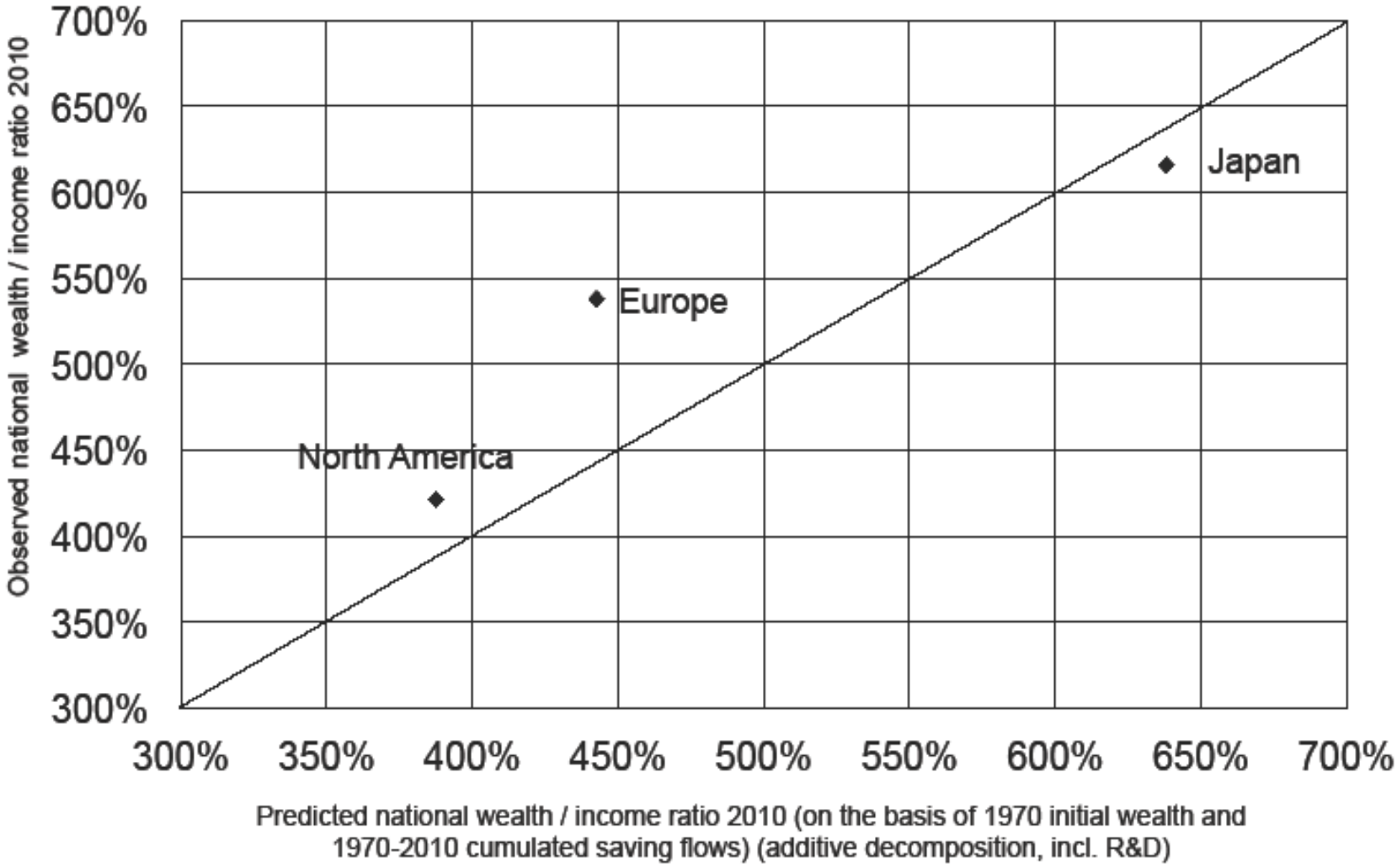


Table 10: Accumulation of national wealth in rich countries, 1910-1950

	National wealth-national income ratios		Decomposition of 1950 national wealth-national income ratio			
	β (1910)	β (1950)	Initial wealth effect	Cumulated new savings	Cumulated war destructions	Capital gains or losses
U.S.	469%	380%	132%	193%	0%	55%
Germany	637%	223%	400%	109% ***31%***	-120% ***29%***	-165% ***40%***
France	747%	261%	421%	144% ***38%***	-132% ***27%***	-172% ***35%***
U.K.	719%	208%	409%	75% ***46%***	-19% ***4%***	-256% ***50%***

Germany's national wealth-income ratio fell from 637% to 223% between 1910 and 1950. 31% of the fall can be attributed to insufficient saving, 29% to war destructions, and 40% to real capital losses.

Can land and housing prices also matter in the very long run?

- Very difficult to identify pure land prices: hard to measure all past investment and improvment to land, the local infrastructures, etc.
- There are good reasons to believe that price effects dominate in the short and medium run, but less so in the long run
- However one can also find mechanims explaining why land and housing prices might also matter in the very long run
- See e.g Gyourko et al, « Superstar cities », AEJ 2013
- See also Schularick et al 2015, « No price like home: global land prices 1870-2012 » : the speed of technical progress in transportation technology has been relatively faster in 1850-1960 than in 1960-2010 (relative to other sectors such as biotech, computer, etc.) (e.g. airplane speed unchanged in recent decades)

- This can potentially explain the rise of relative land prices in large capital cities in recent decades

- More generally, in models with n goods, different speed of technical change can explain any long-run change in relative prices

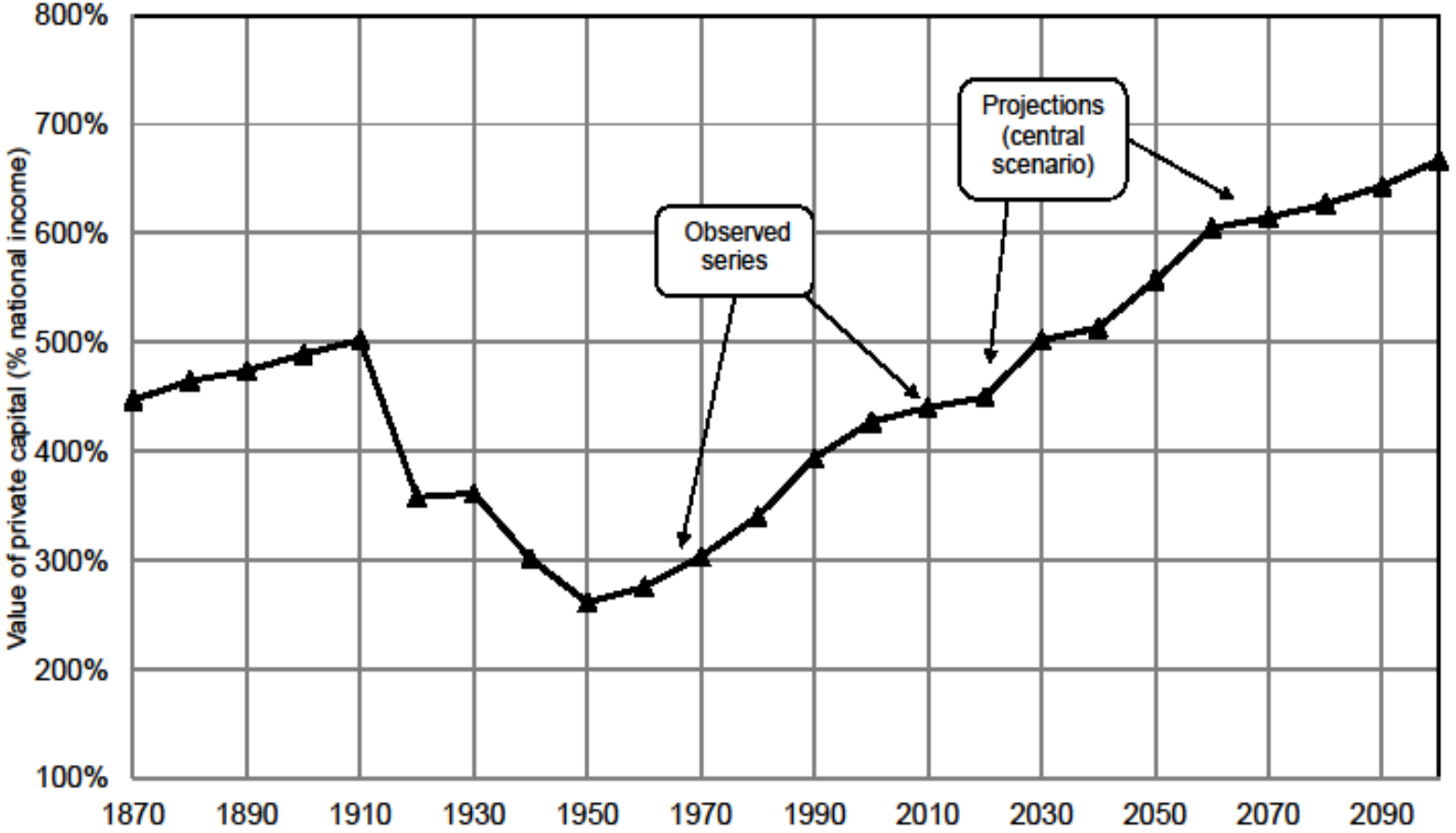
- This can also interact with the evolution of institutions and policies: rent control, etc.

- See also V. Grossmann, T. Steger, “Das House-Kapital: Along-Term Housing and Macro Model”, WP 2016

Capital in developing countries

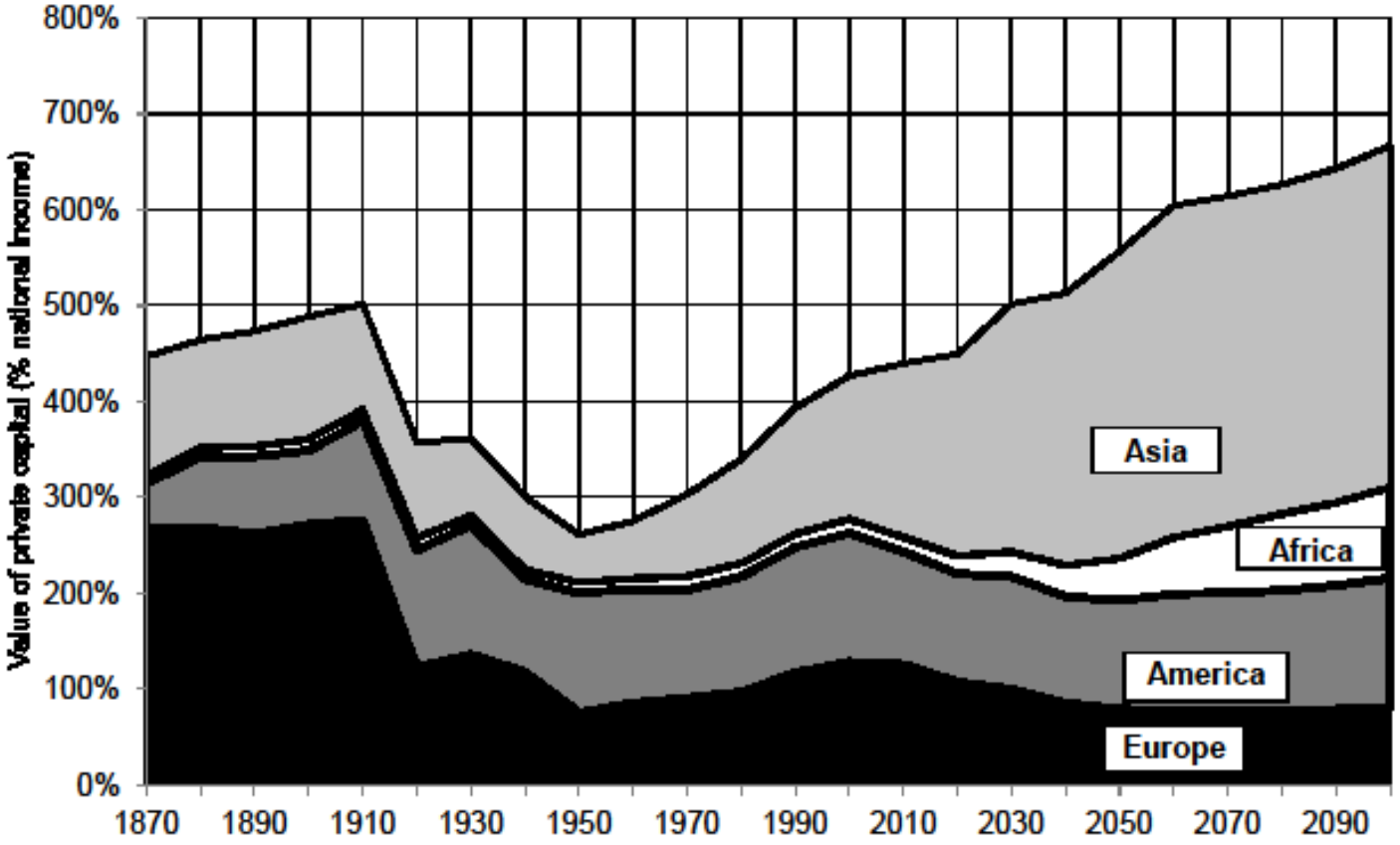
- Main lesson from historical experience of rich countries: wealth-income ratios β and β_n have no reason to be stable over time and across countries
- Unfortunately, limited balance sheet data for developing countries; key priority for future research: extending http://www.wid.world/ to more countries
- See simulations for world capital-income ratio in Capital…, chapter 5 & appendix tables
- If global growth slowdown in the future ($g \approx 1,5\%$) and saving rates remain high ($s \approx 10\text{-}12\%$), then the global β might rise towards 700% (or more… or less…)

Figure 5.8. The world capital/income ratio, 1870-2100



According to simulations (central scenario), the world capital/income ratio could be near to 700% by the end of the 21st century. Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 12.5. The distribution of world capital 1870-2100



According to the central scenatio, Asian countries should own about half of world capital by the end of the 21st century. Sources and series: see piketty.pse.ens.fr/capital21c.

Capital-income ratios β vs. capital shares α

- What are the consequences for the share α of capital income in national income? Not simple. **Capital is multidimensional: legal system, relative prices and bargaining power matter a lot. One-sector production functions with perfect competition can be useful to think about some of the logical issues, but they are never the full story.**
- Capital/income ratio β=K/Y
- Capital share $\alpha = Y_K/Y$

with Y_K = capital income (=sum of rent, dividends, interest, profits, etc.: i.e. all incomes going to the owners of capital, independently of any labor input)

- I.e. β = ratio between capital stock and income flow
- While α = share of capital income flow in total income flow
- By definition: **$\alpha = r \times \beta$**

With $r = Y_K/K$ = average real rate of return to capital

- If β=600% and r=5%, then α = 30% = typical values

- In practice, the average rate of return to capital r (typically r≈4-5%) varies a lot across assets and over individuals
- Typically, rental return on housing = 3-4% (i.e. the rental value of an appartment worth 100 000€ is generally about 3000-4000€/year) (+ capital gain or loss)
- Return on stock market (dividend + k gain) = as much as 6-7% in the long run
- Return on bank accounts or cash = as little as 1-2% (but only a small fraction of total wealth)
- Average return across all assets and individuals ≈ 4-5%

The Cobb-Douglas production function

- Cobb-Douglas production function: $\mathbf{Y = F(K,L) = K^{\alpha} L^{1-\alpha}}$
- With perfect competition, wage rate v = marginal product of labor, rate of return r = marginal product of capital:

$$r = F_K = \alpha K^{\alpha-1} L^{1-\alpha} \text{ and } v = F_L = (1-\alpha) K^{\alpha} L^{-\alpha}$$

- Therefore capital income $Y_K = r K = \alpha Y$

  & labor income $Y_L = v L = (1-\alpha) Y$ (see Cobb-Douglas AER 1928)
- I.e. capital & labor shares are entirely set by technology (say, α=30%, 1-α=70%) and do not depend on quantities K, L
- Intuition: Cobb-Douglas ↔ elasticity of substitution between K & L is exactly equal to 1
- I.e. if v/r rises by 1%, K/L=α/(1-α) v/r also rises by 1%. So the quantity response exactly offsets the change in prices: if wages ↑by 1%, then firms use 1% less labor, so that labor share in total output remains the same as before

The limits of Cobb-Douglas

- Economists like Cobb-Douglas production function, because they like simple stories, and because capital shares sometime seem to be approximately stable

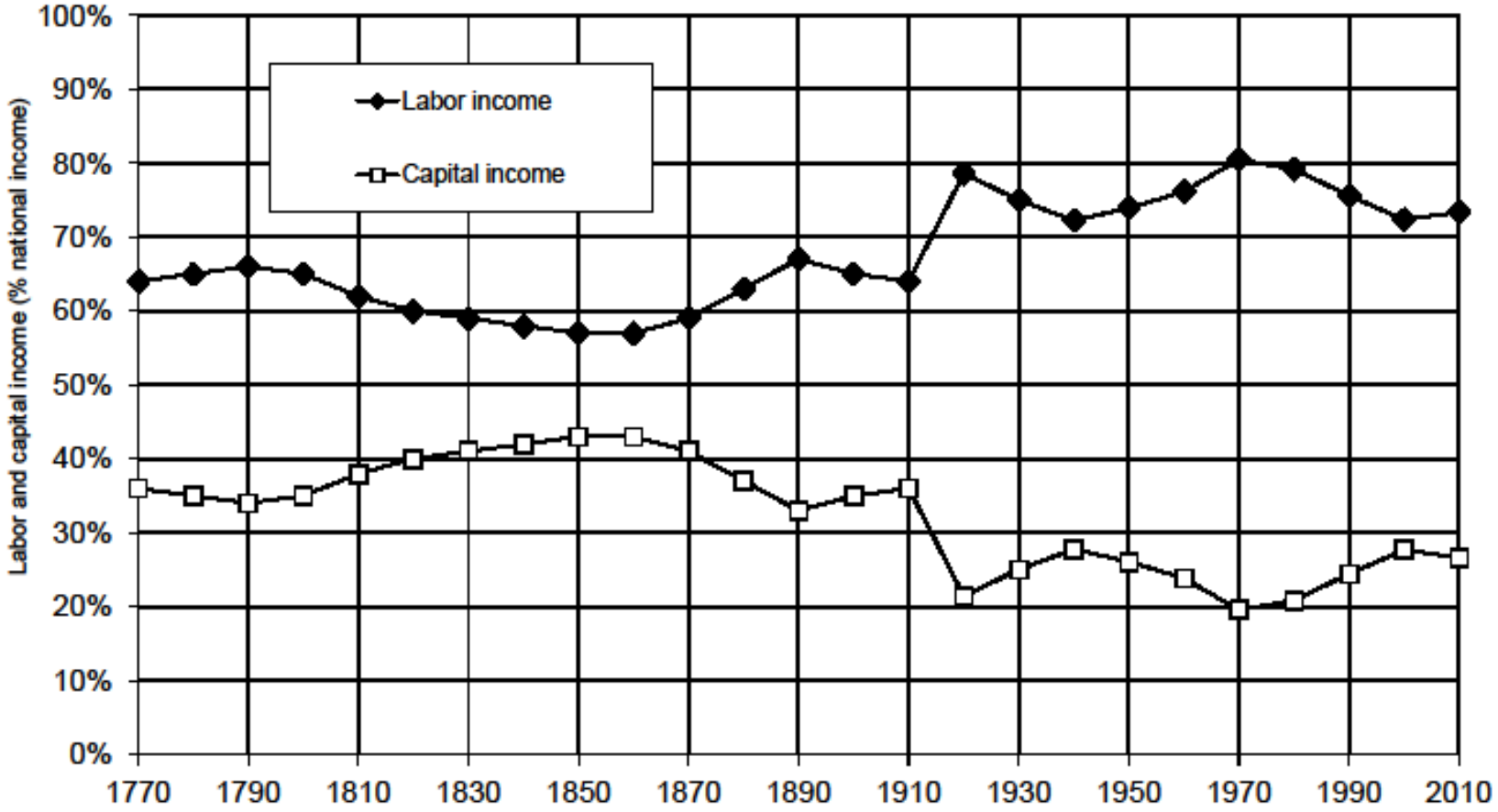
- However it is only an approximation: in practice, capital shares α vary in the 20-40% range over time and between countries (or even sometime in the 10-50% range)

- In 19c, capital shares were closer to 40%; in 20c, they were closer to 20-30%; structural rise of human capital (i.e. exponent $\alpha\downarrow$ in Cobb-Douglas production function $Y = K^{\alpha} L^{1-\alpha}$?), or purely temporary phenomenon ?

- In 19c, long wage stagnation 1800-1850 during the first phase of industrialisation UK France → large decline of labor share, large rise of profit share (→rise of socialist/communist movements during 1830s-1840s)
- See R. Allen, « Engel's Pause: Technical Change, Capital Accumulation and Inequality During the British Industrial Revolution », EEH 2009; « Engel's Pause: A Pessimist Guide to the Industrial Revolution », WP 2007
- Capital-biased technical change, large labor reserve army in the countryside, lack of labor bargaining power

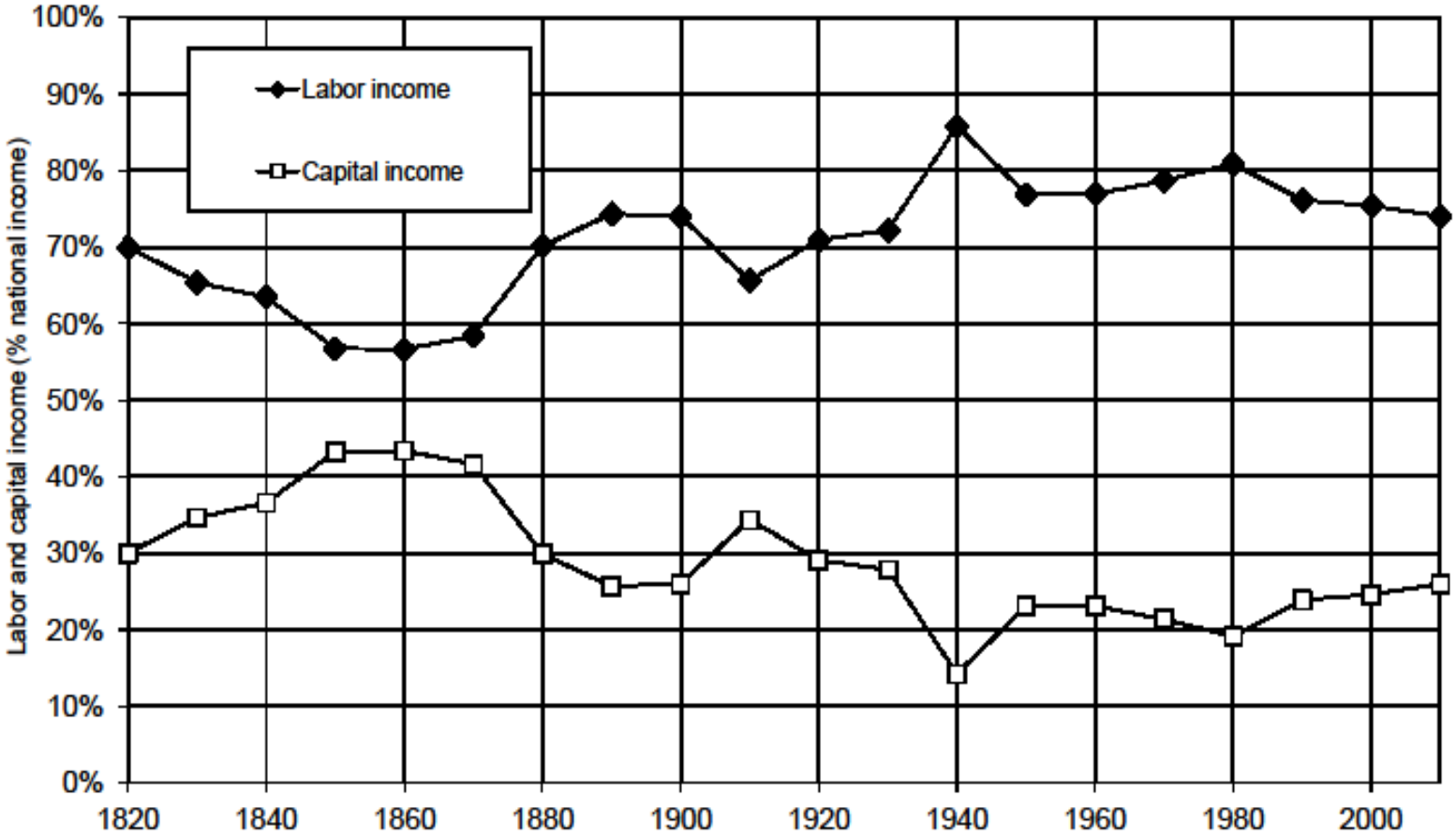
- Over 1970-2010 period, capital shares have increased from 15-25% to 25-30% in rich countries : very difficult to explain with Cobb-Douglas framework and perfect competition

Figure 6.1. The capital-labor split in the United Kingdom, 1770-2010



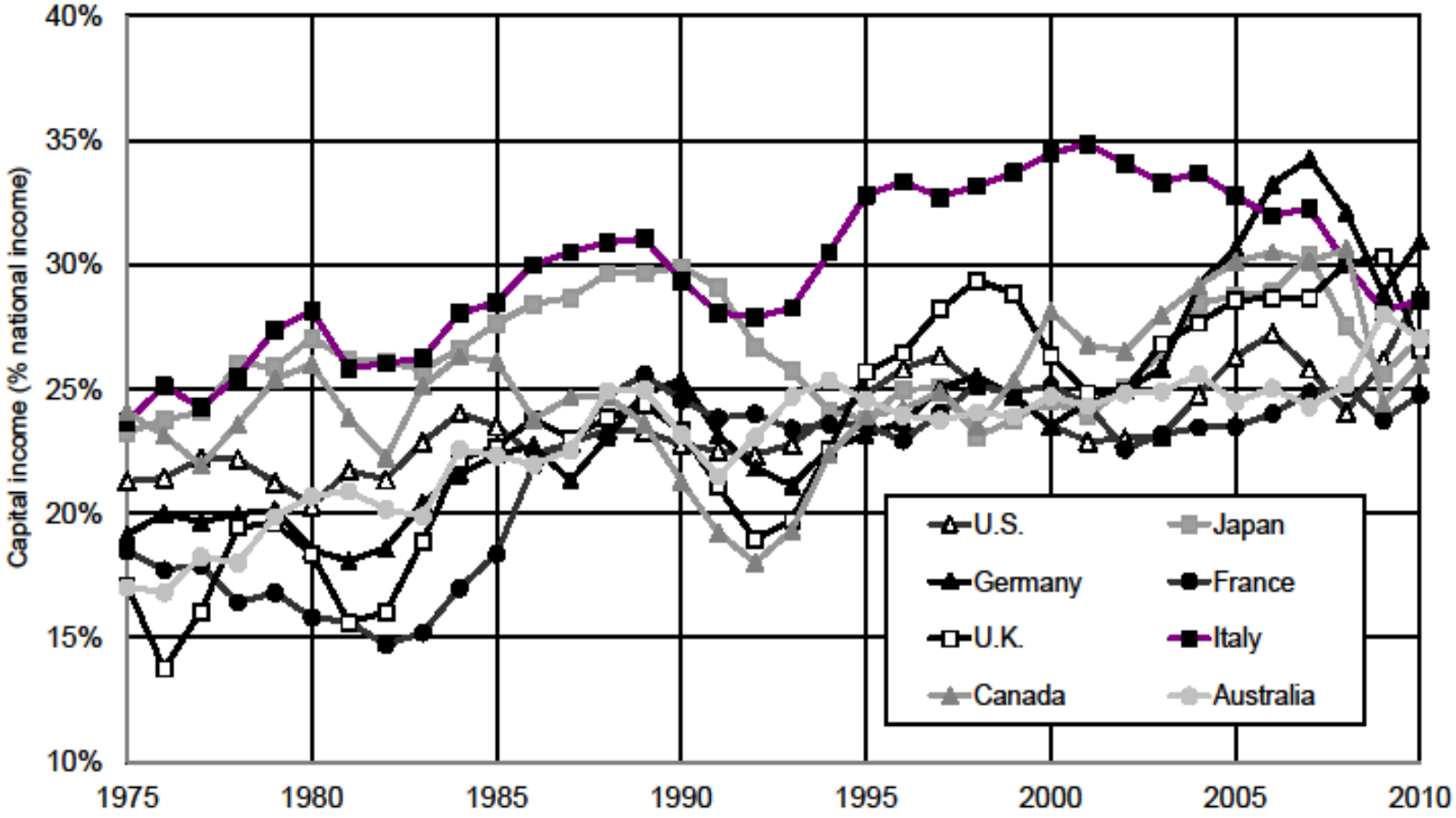
During the 19th century, capital income (rent, profits, dividends, interest,..) absorbed about 40% of national income, vs. 60% for labor income (salaried and non salaried). Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 6.2. The capital-labor split in France, 1820-2010



In the 21st century, capital income (rent, profits, dividends, interest,..) absorbs about 30% of national income, vs. 70% for labor income (salaried and non salaried). Sources and series: see piketty.pse.ens.fr/capital21c.

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

The CES production function

- CES = a simple way to think about changing capital shares
- CES : $\mathbf{Y = F(K,L) = [a\, K^{(\sigma-1)/\sigma} + b\, L^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)}}$

  with a, b = constant

  σ = constant elasticity of substitution between K and L
- σ →∞: linear production function Y = r K + v L

  (infinite substitution: machines can replace workers and vice versa, so that the returns to capital and labor do not fall at all when the quantity of capital or labor rise) (= robot economy)
- σ →0: F(K,L)=min(rK,vL) (fixed coefficients) = no substitution possibility: one needs exactly one machine per worker
- σ →1: converges toward Cobb-Douglas; but all intermediate cases are also possible: Cobb-Douglas is just one possibility among many

- Compute the first derivative $r = F_K$: the marginal product to capital is given by

$$\mathbf{r = F_K = a\, \beta^{-1/\sigma}} \quad \text{(with } \beta = K/Y\text{)}$$

I.e. r ↓ as β↑ (more capital makes capital less useful),

but the important point is that the speed at which r ↓ depends on σ

- With $r = F_K = a\,\beta^{-1/\sigma}$, the capital share α is given by:

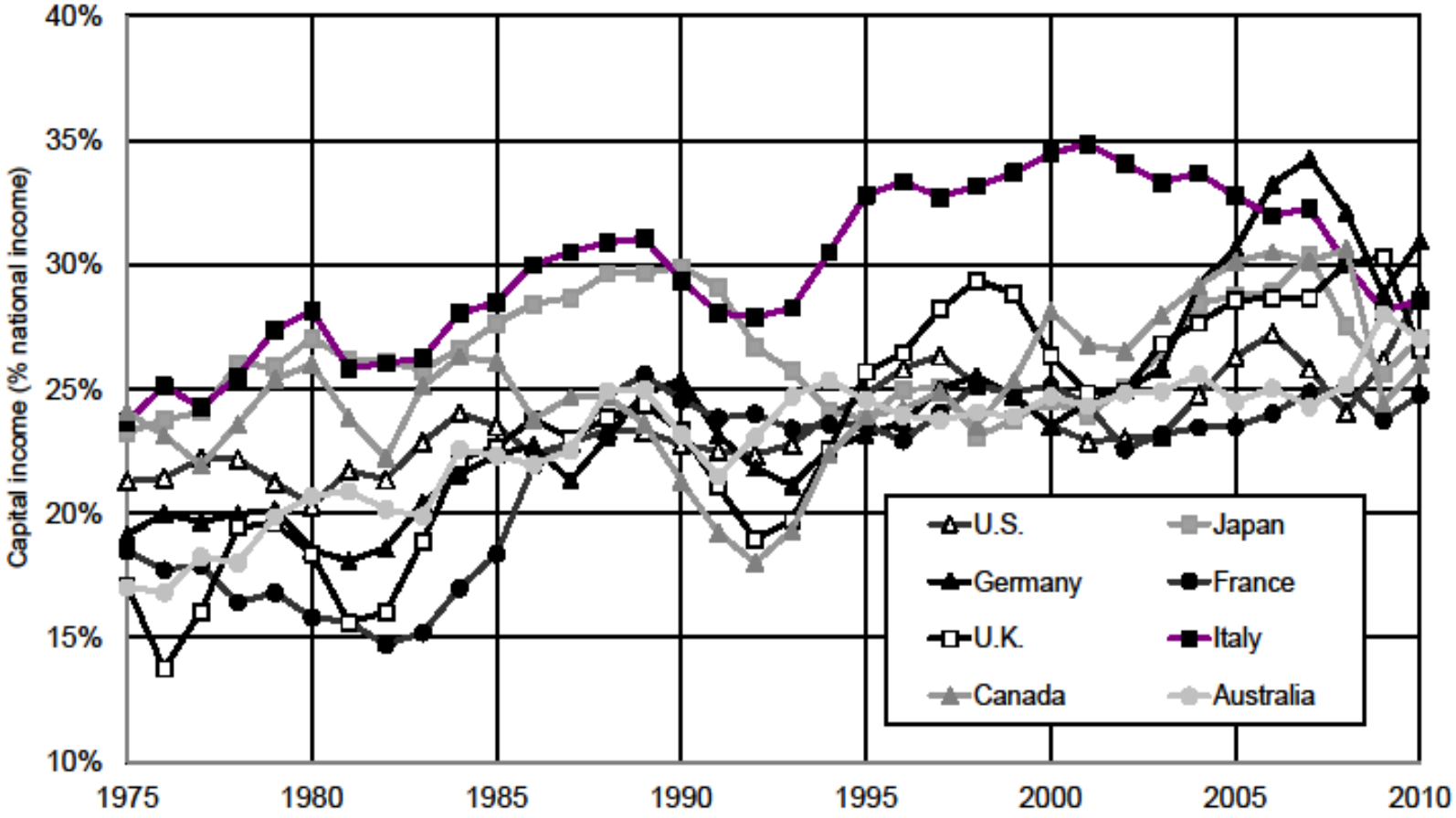
$$\boldsymbol{\alpha = r\,\beta = a\,\beta^{(\sigma-1)/\sigma}}$$

- I.e. α is an increasing function of β if and only if $\sigma>1$ (and stable iff $\sigma=1$)

- The important point is that with large changes in the volume of capital β, small departures from $\sigma=1$ are enough to explain large changes in α
- If $\sigma = 1.5$, capital share rises from $\alpha=28\%$ to $\alpha =36\%$ when β rises from $\beta=250\%$ to $\beta =500\%$

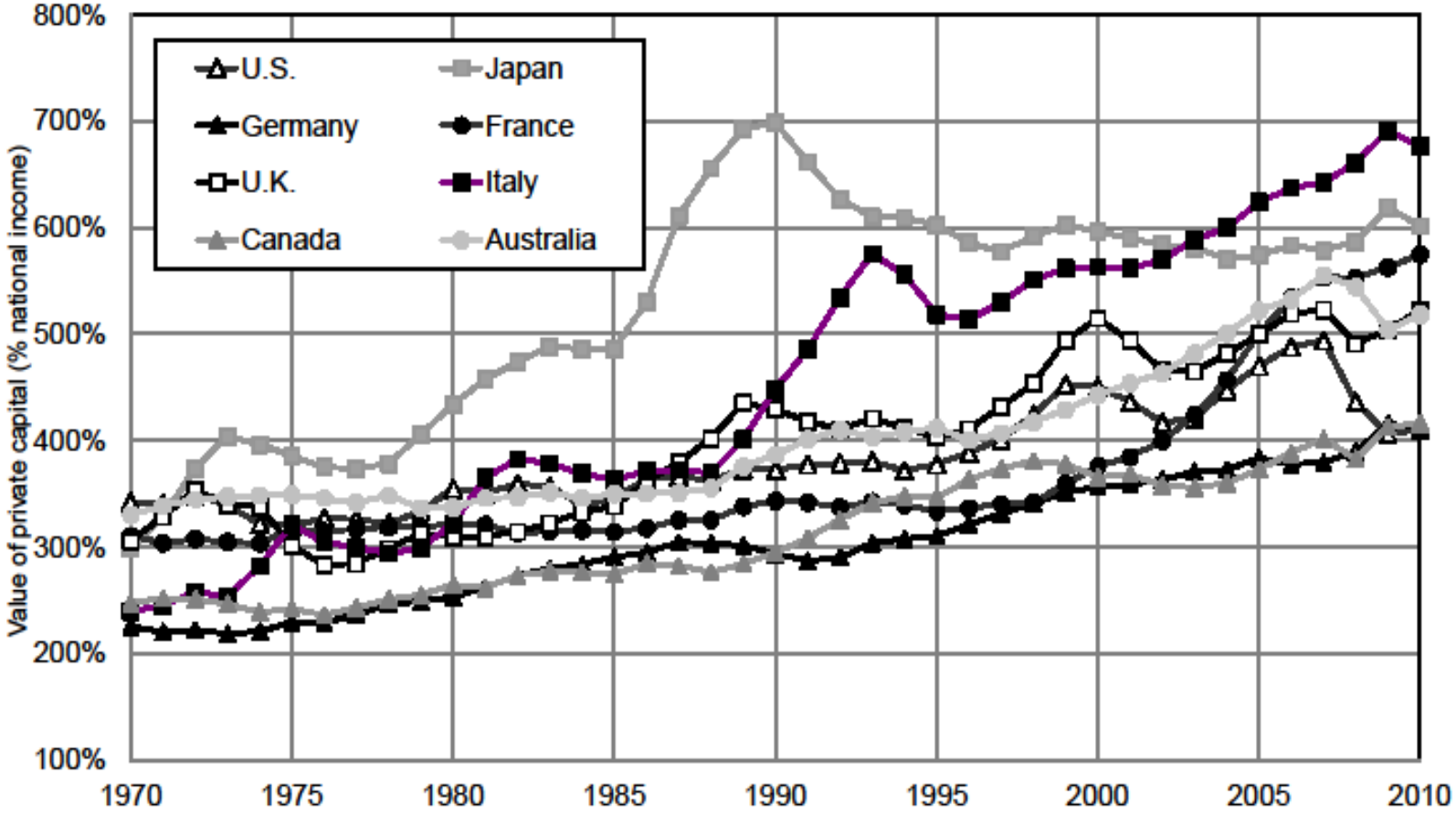
  = more or less what happened since the 1970s
- In case β reaches $\beta =800\%$, α would reach $\alpha =42\%$
- In case $\sigma =1.8$, α would be as large as $\alpha =53\%$

Figure 6.5. The capital share in rich countries, 1975-2010



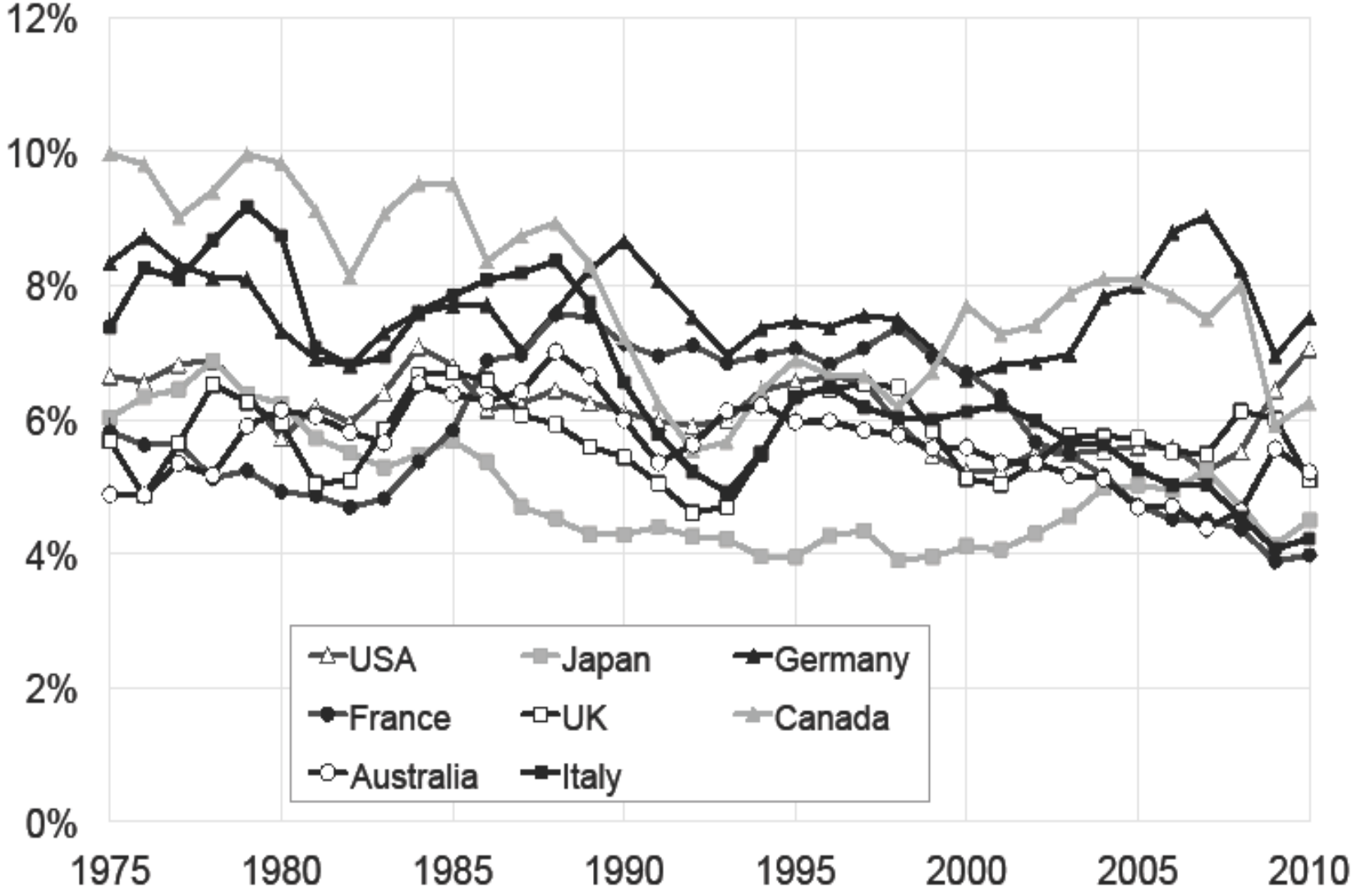
Capital income absorbs between 15% and 25% of national income in rich countries in 1970, and between 25% and 30% in 2000-2010. Sources and series: see piketty.pse.ens.fr/capital21c

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.

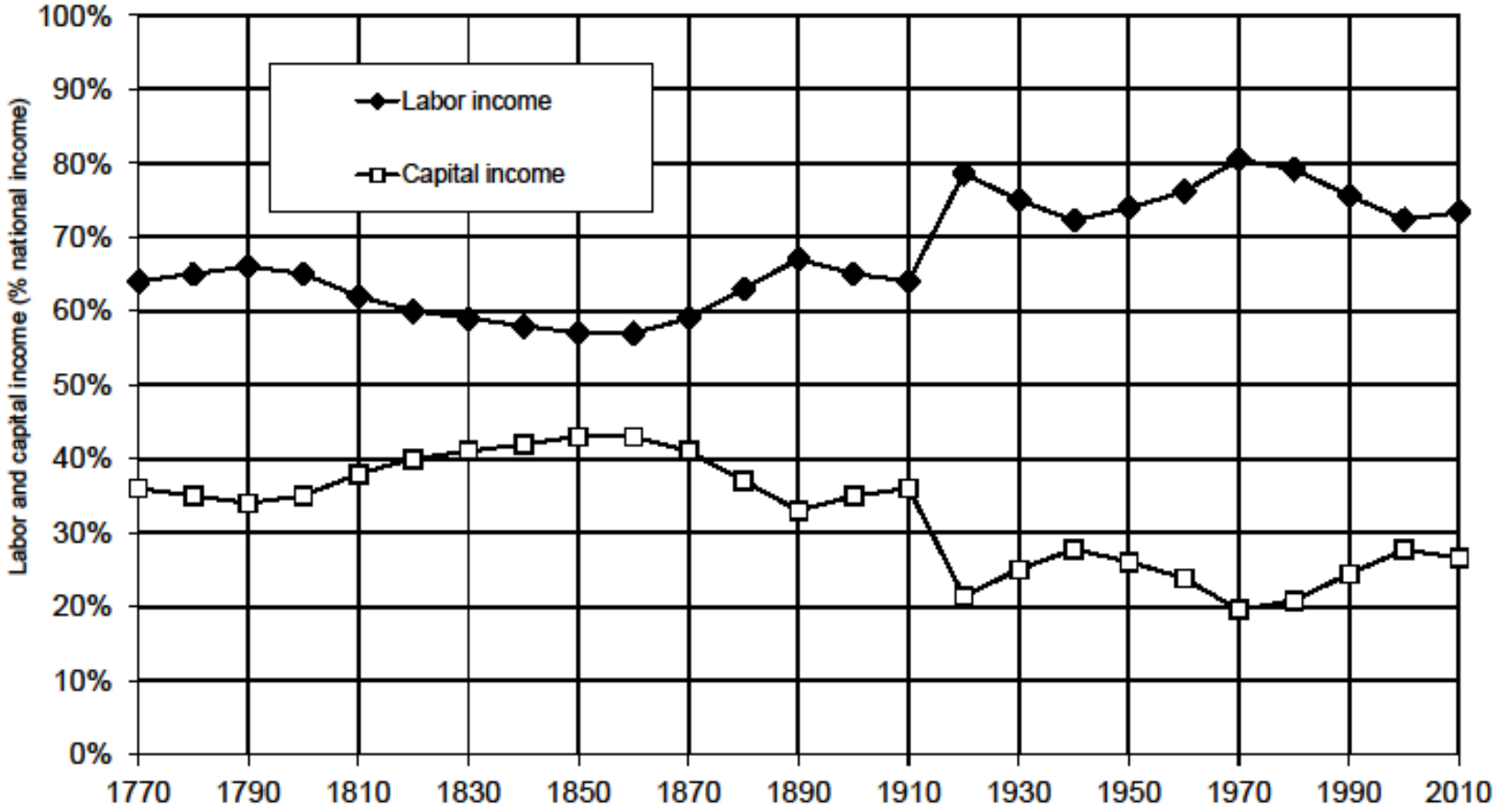
Figure 14: Average return on private wealth 1975-2010



Measurement problems with capital shares

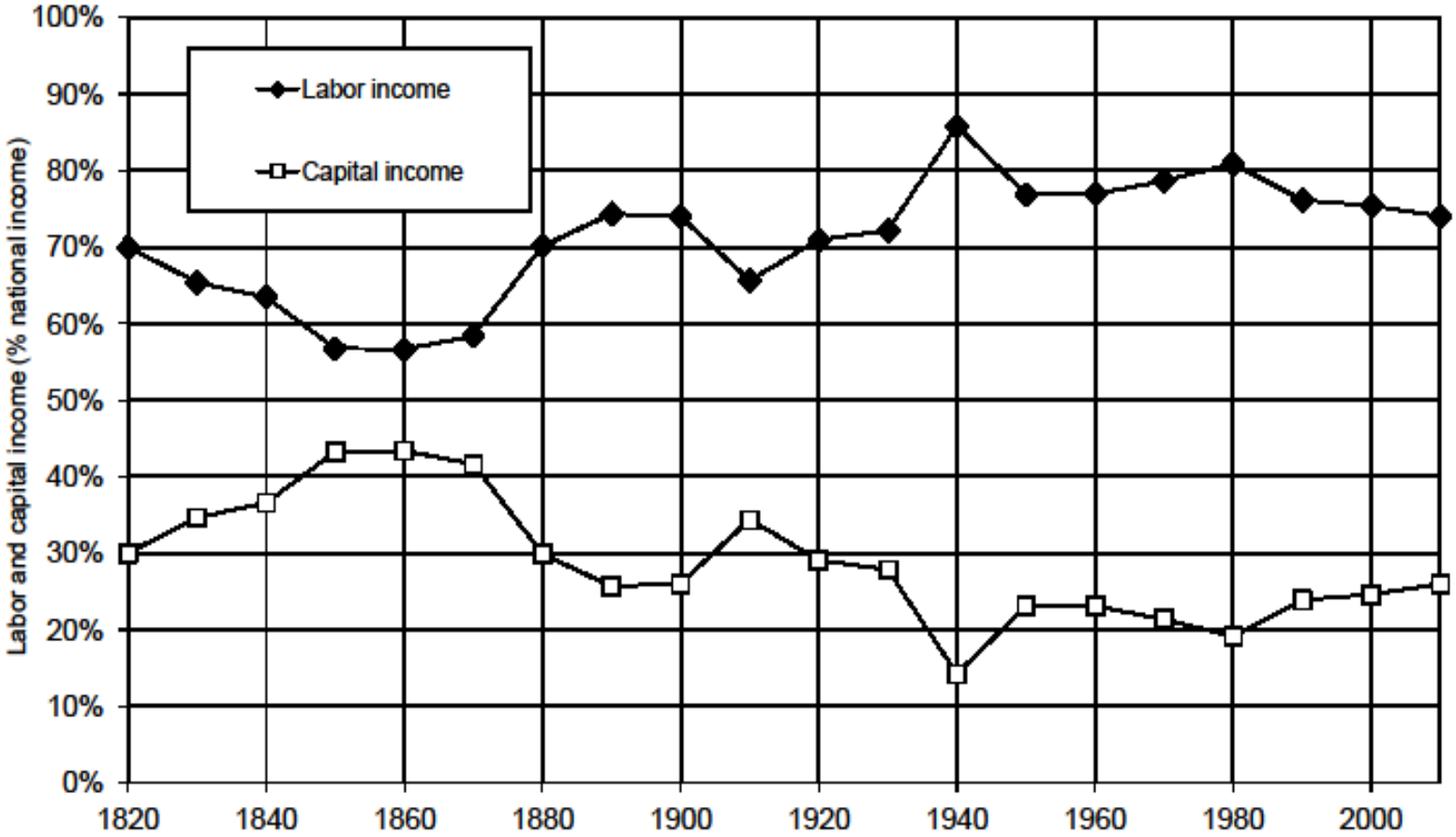
- In many ways, β is easier to measure than α
- In principle, capital income = all income flows going to capital owners (independanty of any labor input); labor income = income flows going to labor earners (independantly of any capital input)
- But in practice, the line is often hard to draw: family firms, self-semployed workers, informal financial intermediation costs (=the time spent to manage one's own portfolio)
- If one measures the capital share α from national accounts (rent+dividend+interest+profits) and compute average return r=α/β, then the implied r often looks very high for a pure return to capital ownership: it probably includes a non-negligible entrepreneurial labor component, particularly in reconstruction periods with low β and high r; the pure return might be 20-30% smaller (see estimates)
- **One should use two-sector models** $Y=qY_h+Y_b$ (housing + business; q = relative housing price); return to housing = closer to pure return to capital (**or n-sector models**)

Figure 6.1. The capital-labor split in the United Kingdom, 1770-2010



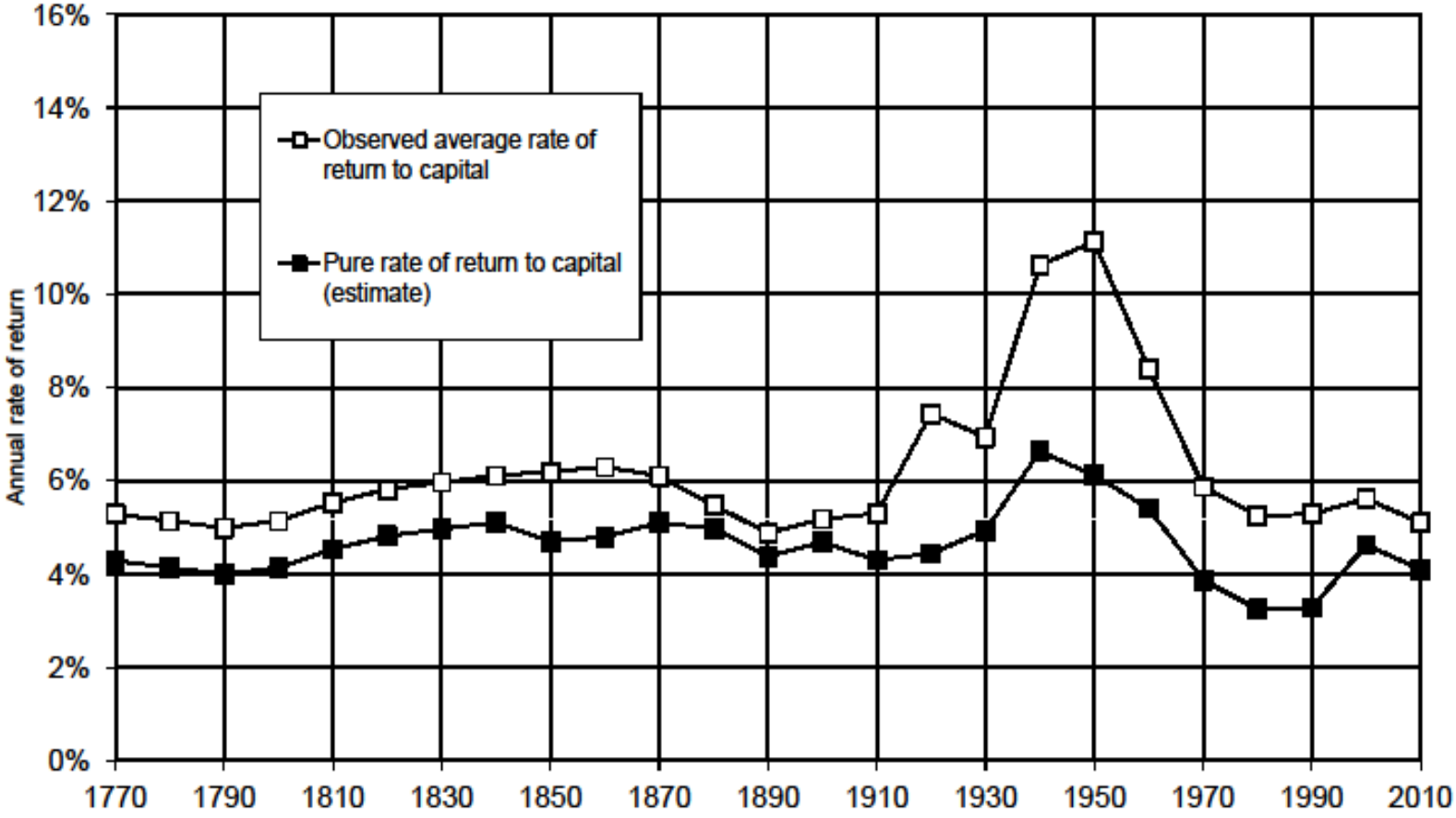
During the 19th century, capital income (rent, profits, dividends, interest,..) absorbed about 40% of national income, vs. 60% for labor income (salaried and non salaried). Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 6.2. The capital-labor split in France, 1820-2010



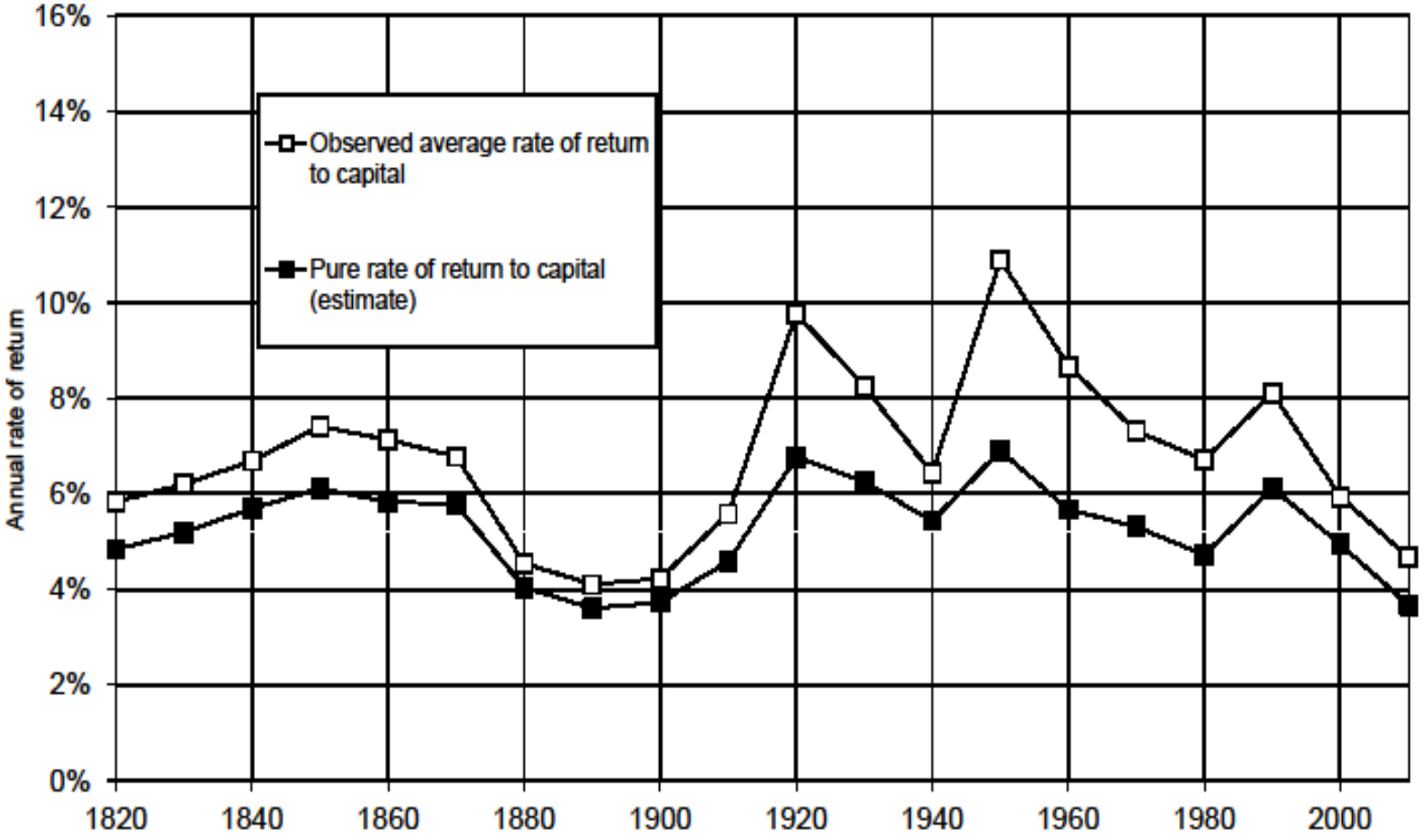
In the 21st century, capital income (rent, profits, dividends, interest,..) absorbs about 30% of national income, vs. 70% for labor income (salaried and non salaried). Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 6.3. The pure return to capital in the United Kingdom, 1770-2010



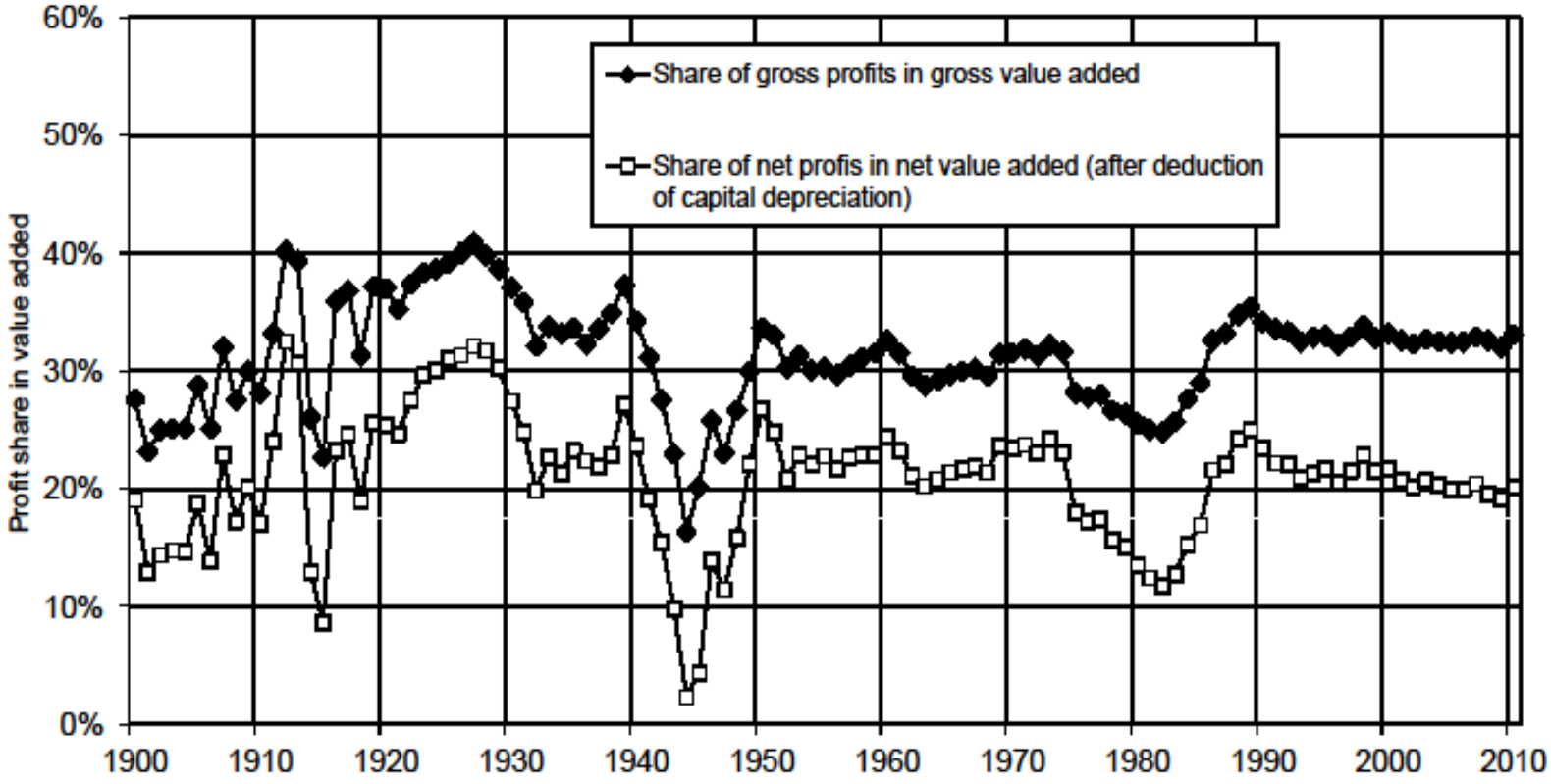
The pure rate of return to capital is roughly stable around 4%-5% in the long run.
Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 6.4. The pure rate of return to capital in France, 1820-2010



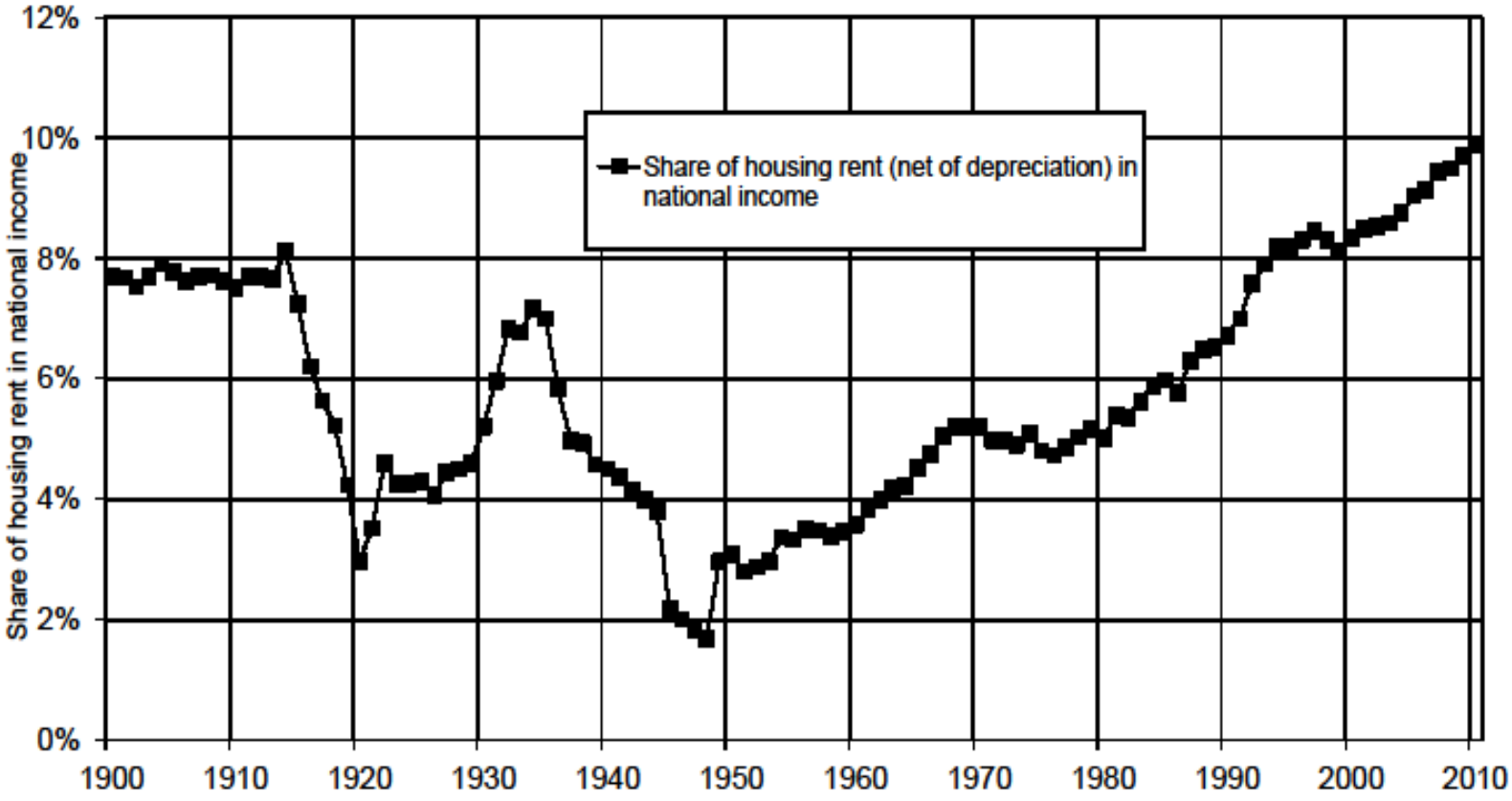
The observed average rate of return displays larger fluctuations than the pure rate of return during the 20th century.
Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 6.6. The profit share in the value added of corporations in France, 1900-2010



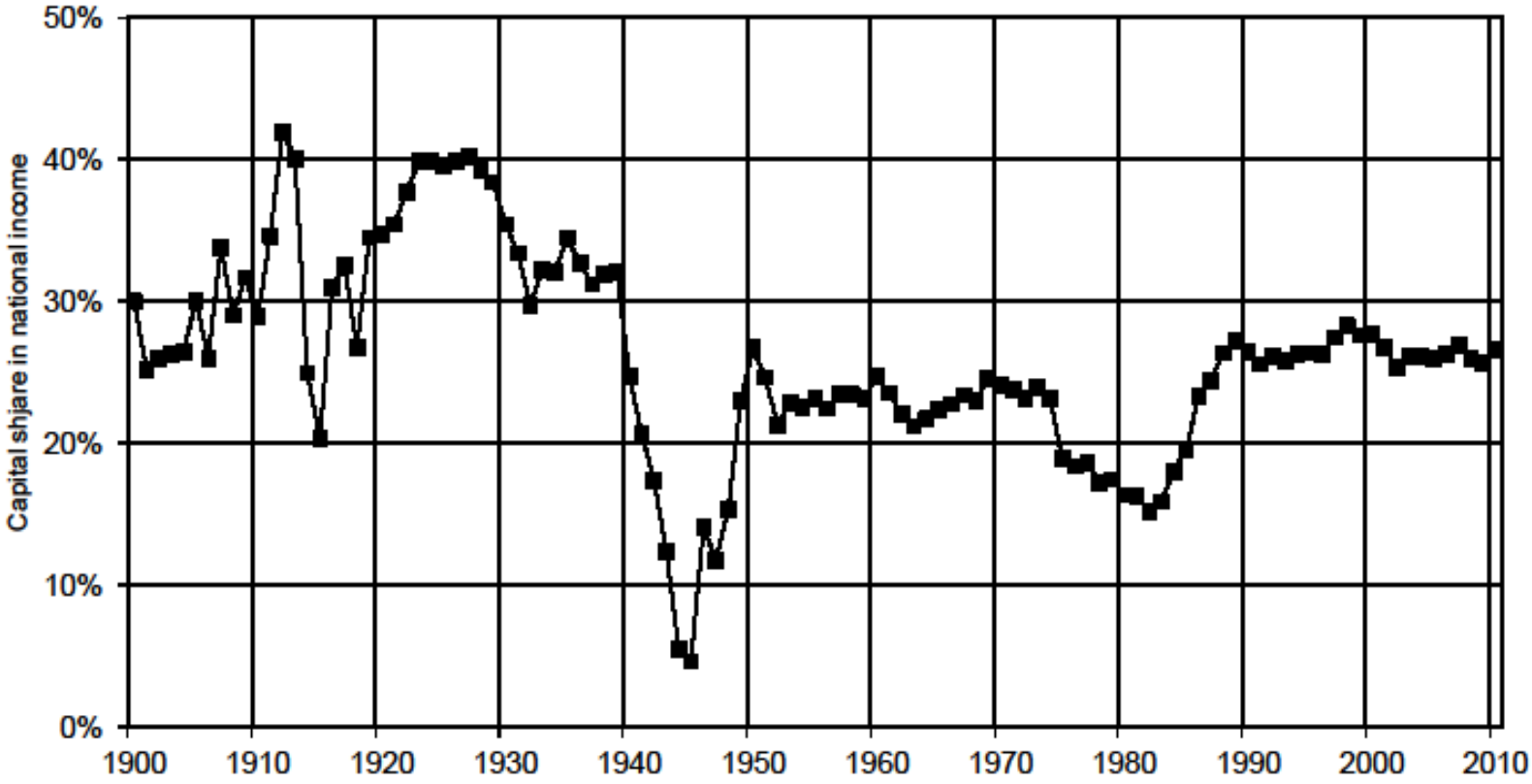
The share of gross profits in gross value added of corporations rose from 25% in 1982 to 33% in 2010; the share of net profits in net value added rose from 12% to 20%. Sources and series: see piketty.pse.ens.fr/capital21c

Figure 6.7. The share of housing rent in national income in France, 1900-2010



The share of housing rent (rental value of dwellings) rose from 2% of national income in 1948 to 10% in 2010.
Sources and series: see piketty.pse.ens.fr/capital21c.

Figure 6.8. The capital share in national income in France, 1900-2010



The share of capital income (net profits and rents) rose from 15% of national income in 1982 to 27% in 2010.
Sources and series: see piketty.pse.ens.fr/capital21c.

Recent work on capital shares

- Imperfect competition and globalization: see Karabarmounis-Neiman 2013 , « The Global Decline in the Labor Share »; see also Karabarmounis-Neiman 2014; Assous-Dutt 2013, Dutt 2015
- Multi-sector models. Atkinson-Summers: $Y=F(K_1,AL+BK_2)$
- See
- See also Berger-Wolff 2017
- Public vs private firms: see Azmat-Manning-Van Reenen 2011, « Privatization and the Decline of the Labor Share in GDP: A Cross-Country Analysis of the Network Industries »
- K shares and CEO pay : see Pursey 2013,«CEO Pay and Factor shares: Bargaining effects in US corporations 1970-2011 »

- **Capital shares in developing countries: another under-studied issue**
- Capital share α is often v. high in poor countries (40-50% instead of 20-30%), but why: low bargaining power of labor, and/or natural ressources, and/or measurement pb? Lots of missing data; see e.g. ILO Global Wage Report 2014-15