Wealth, Inequality & Taxation

Thomas Piketty
Paris School of Economics

Berlin FU, June 13th 2013

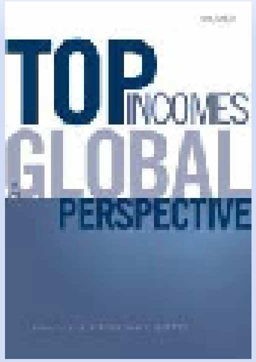
Lecture 1: Roadmap & the return of wealth

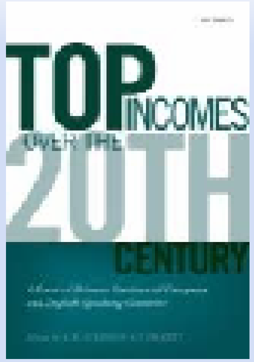
- **These lectures will focus primarily on the following issue: how do wealth-income and inheritance-income ratios evolve in the long run, and why? what are the implications for optimal capital vs labor taxation?**

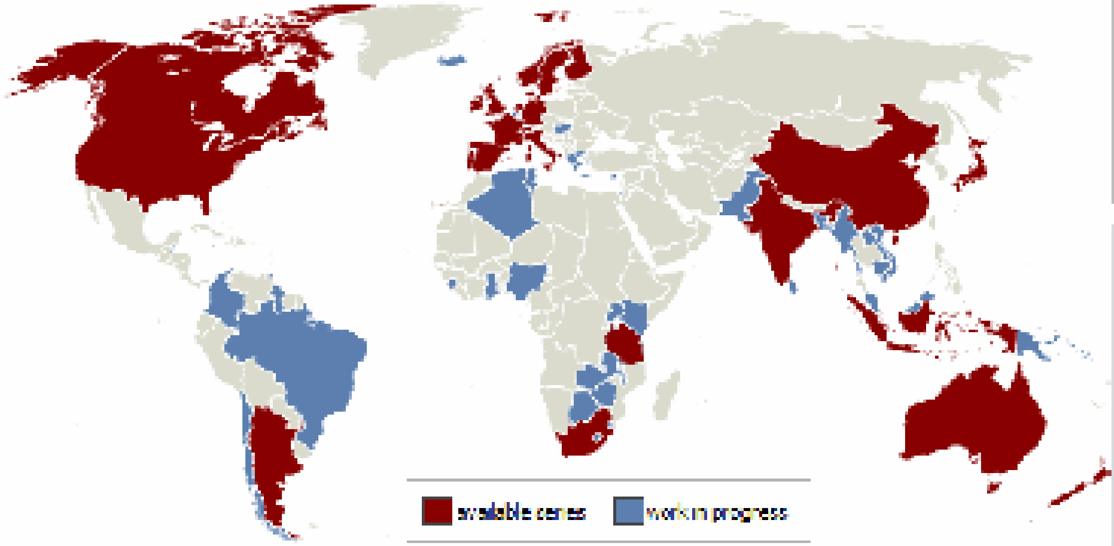
- The rise of top income shares will not be the main focus in these lectures: highly relevant for the US, but less so for Europe
- In Europe, and possibly everywhere in the very long run, the key issue the rise of wealth-income ratios and the possible return of inherited wealth

- If you want to know more about top incomes (=not the main focus of these lectures), have a look at "World Top Incomes Database" website; see however lecture 3

The World Top Incomes Database







PARIS SCHOOL OF ECONOMICS

Institute for New Economic Thinking

Center for Equitable Growth

- **Key issue adressed in these lectures: wealth & inheritance in the long run**
- **There are two ways to become rich**: either through one's own work, or through inheritance

- In Ancien Regime societies, as well as in 19^{C} and early 20^{C}, it was obvious to everybody that the inheritance channel was important
- Inheritance and successors were everywhere in the 19^{C} literature: Balzac, Jane Austen, etc.
- Inheritance flows were huge not only in novels; but also in 19^{C} tax data: major economic, social and political issue

- **Question**: **Does inheritance belong to the past?** Did modern growth kill the inheritance channel?

  E.g. due to the natural rise of human capital and meritocracy? Or due to the rise of life expectancy?

- I will answer « **NO** » to this question: I find that inherited wealth will probably play as big a role in 21^C capitalism as it did in 19^C capitalism
- Key mechanism if low growth g and r > g

Figure 1: Annual inheritance flow as a fraction of national income, France 1820-2008

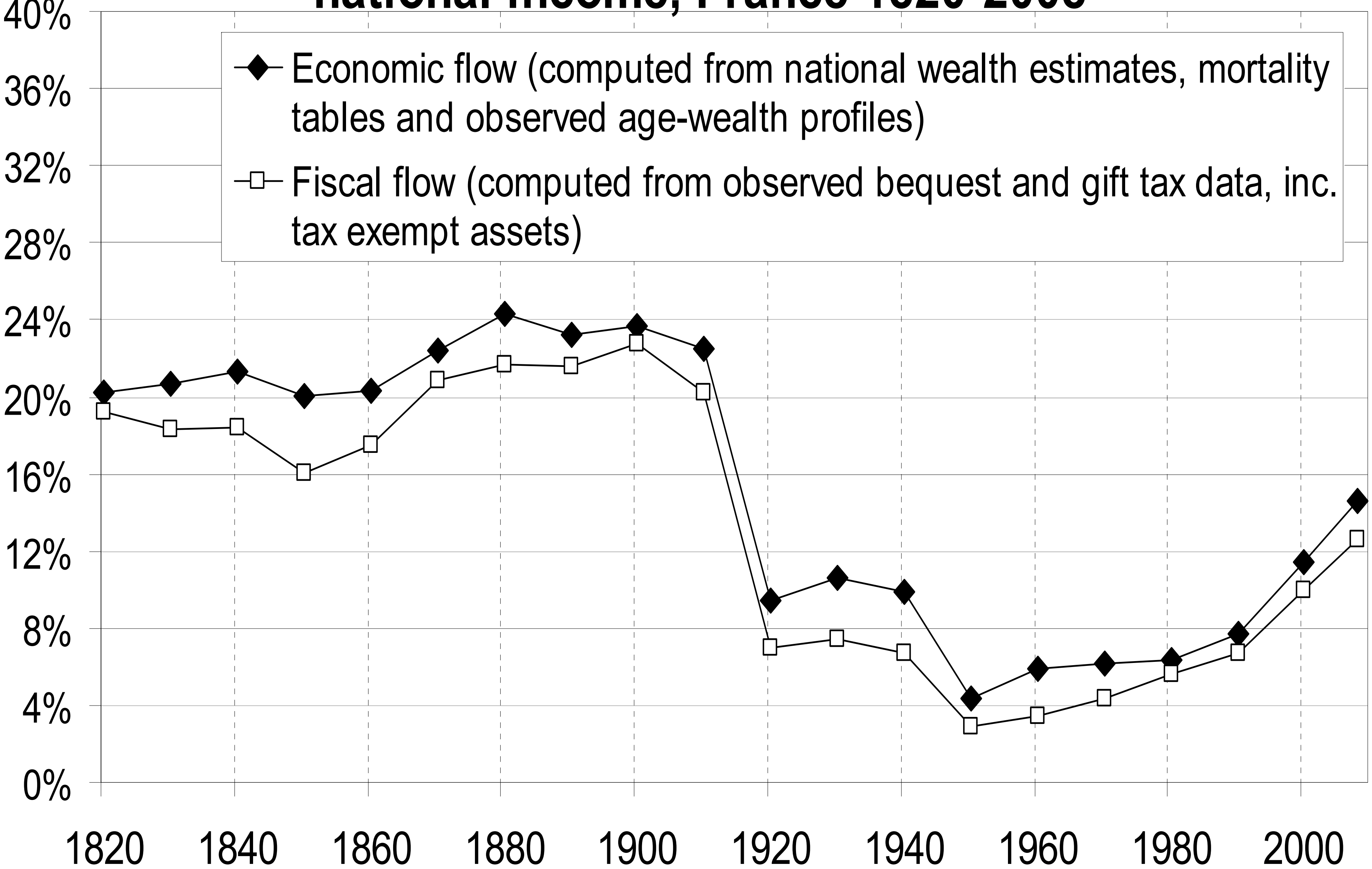
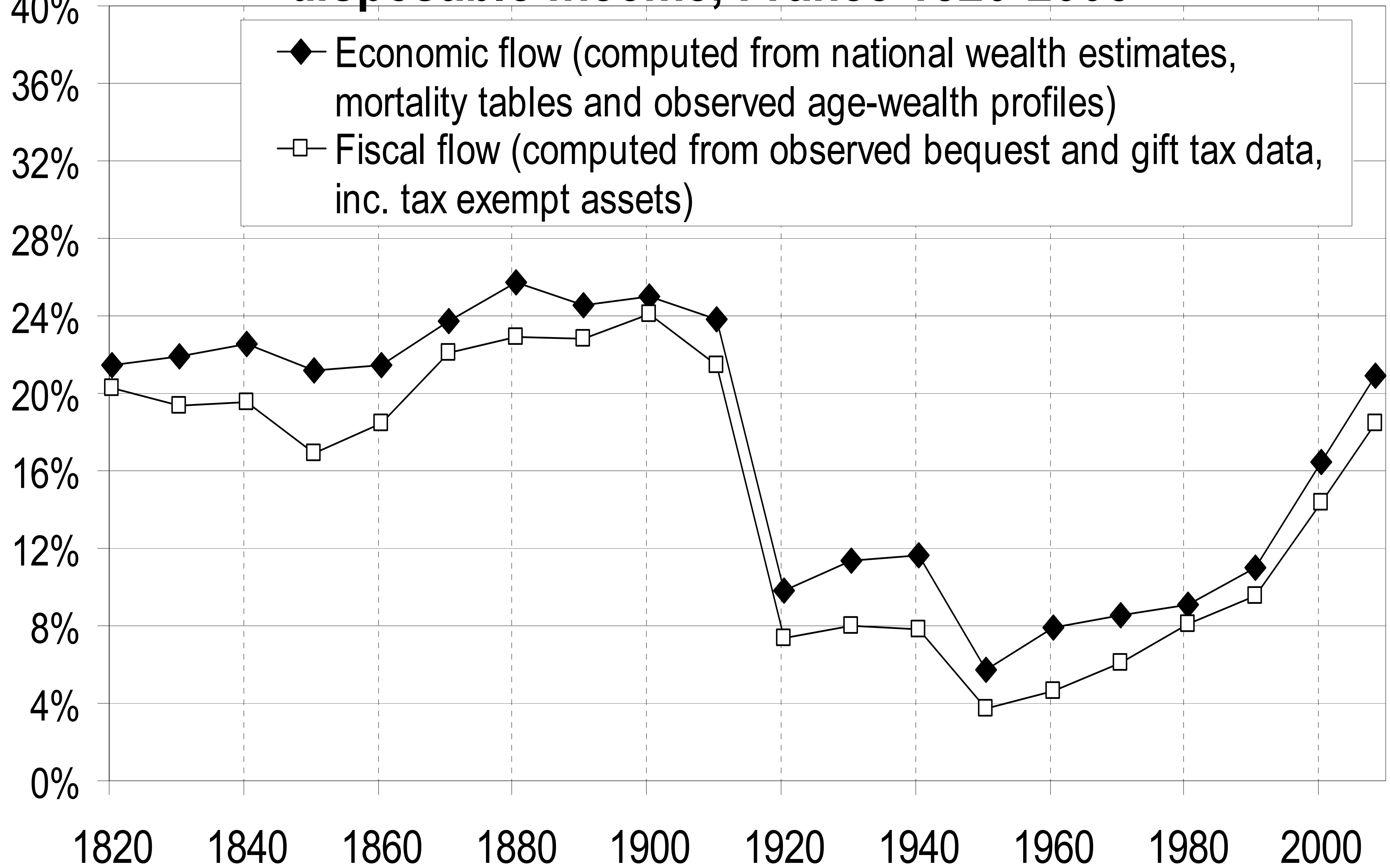


Figure 2: Annual inheritance flow as a fraction of disposable income, France 1820-2008



- An annual inheritance flow around 20%-25% of disposable income is a very large flow

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

- An annual inheritance flow around 20%-25% of disposable income means that total, cumulated inherited wealth represents the vast majority of aggregate wealth (typically above 80%-90% of aggregate wealth), and vastly dominates self-made wealth

- **Main lesson: with g low & r>g, inheritance is bound to dominate new wealth; the past eats up the future**

g = growth rate of national income and output

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

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

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

- r > g & g low might also lead to the return of extreme levels of wealth concentration (not yet: middle class bigger today)

Figure 10.1. Wealth inequality in France, 1810-2010

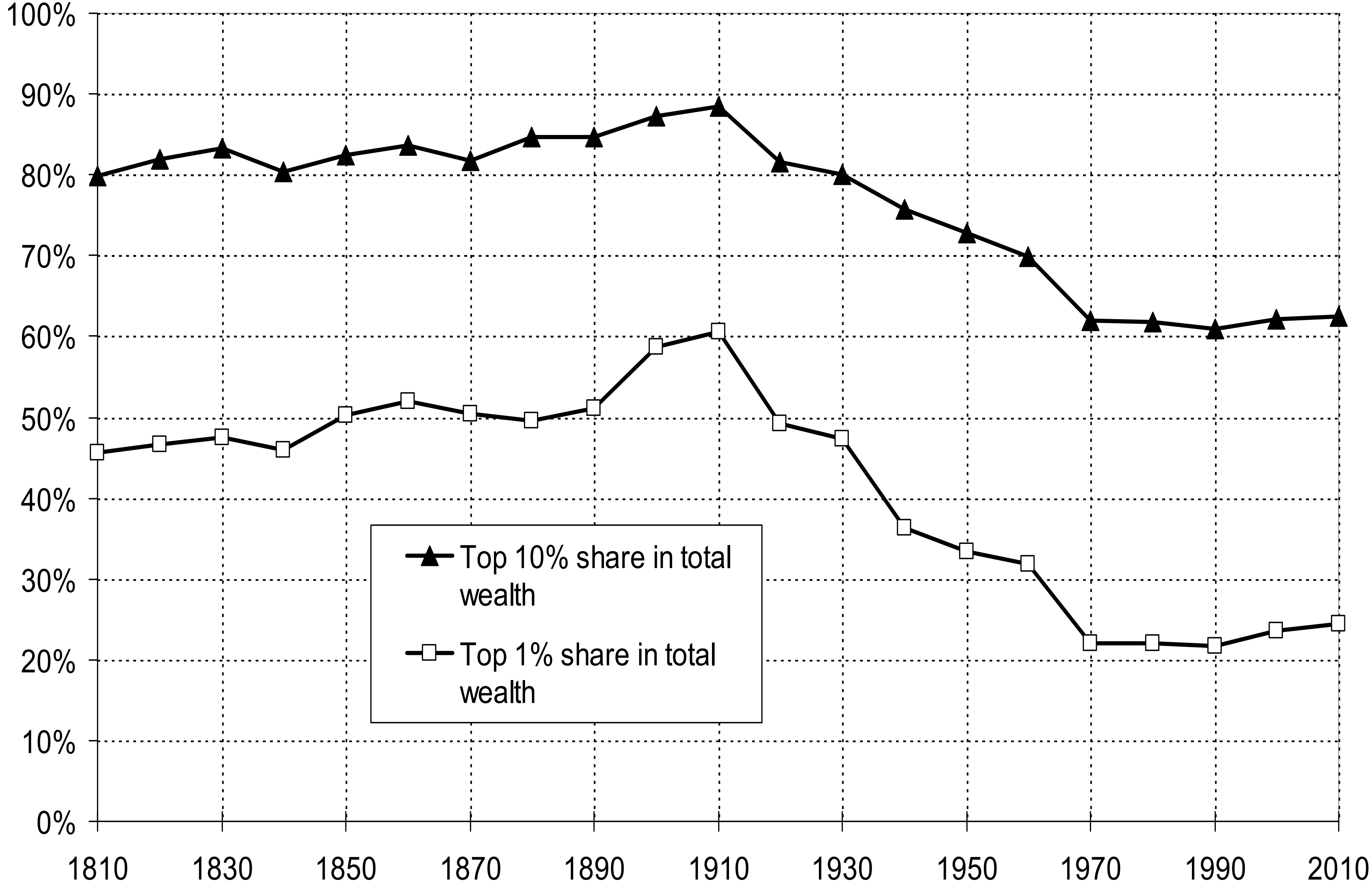


Figure 10.2. Wealth inequality: Paris vs. France, 1810-2010

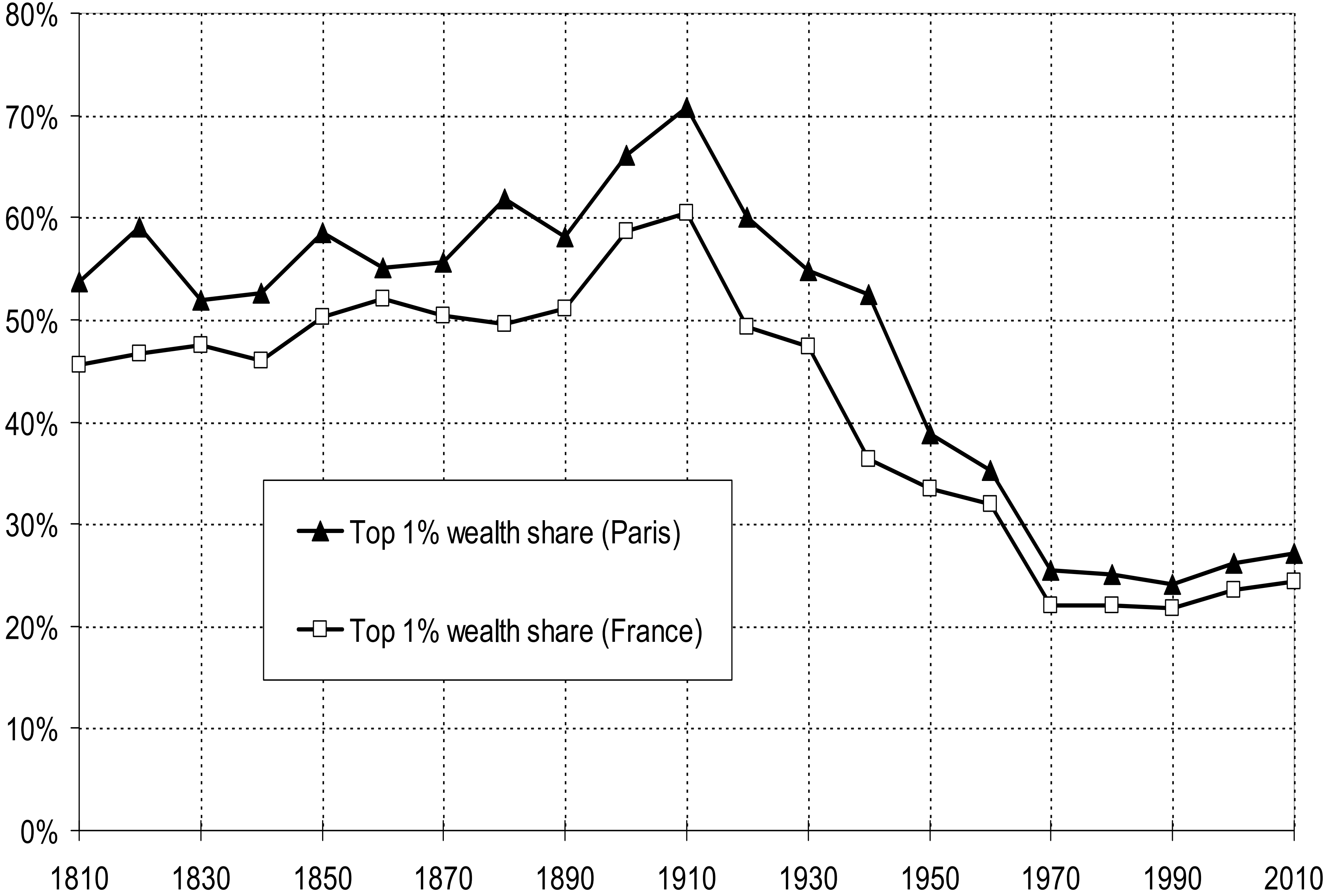


Figure 10.3. Wealth inequality in the UK, 1810-2010

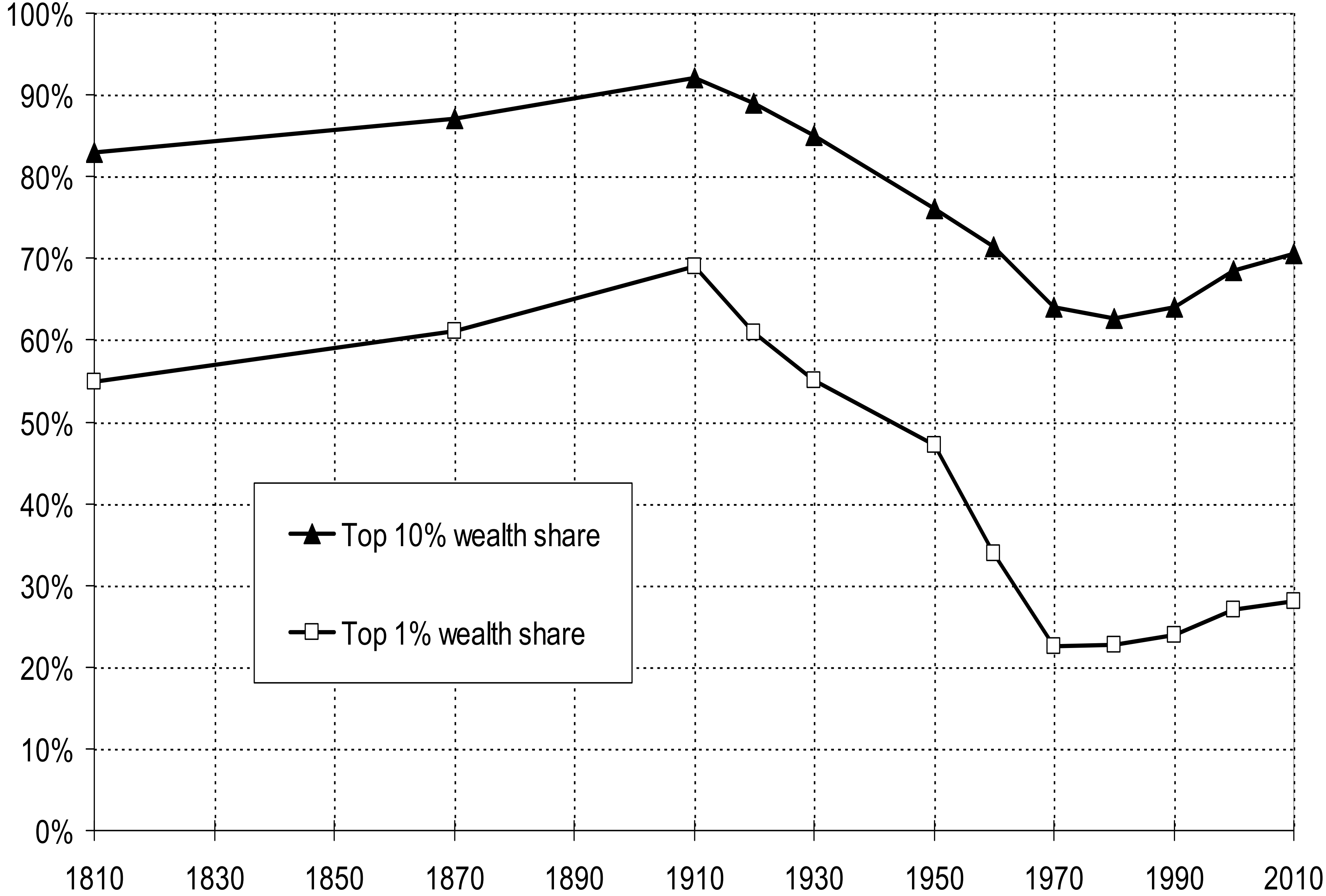


Figure 10.4. Wealth inequality in Sweden, 1810-2010 (Roine-Waldenstrom)

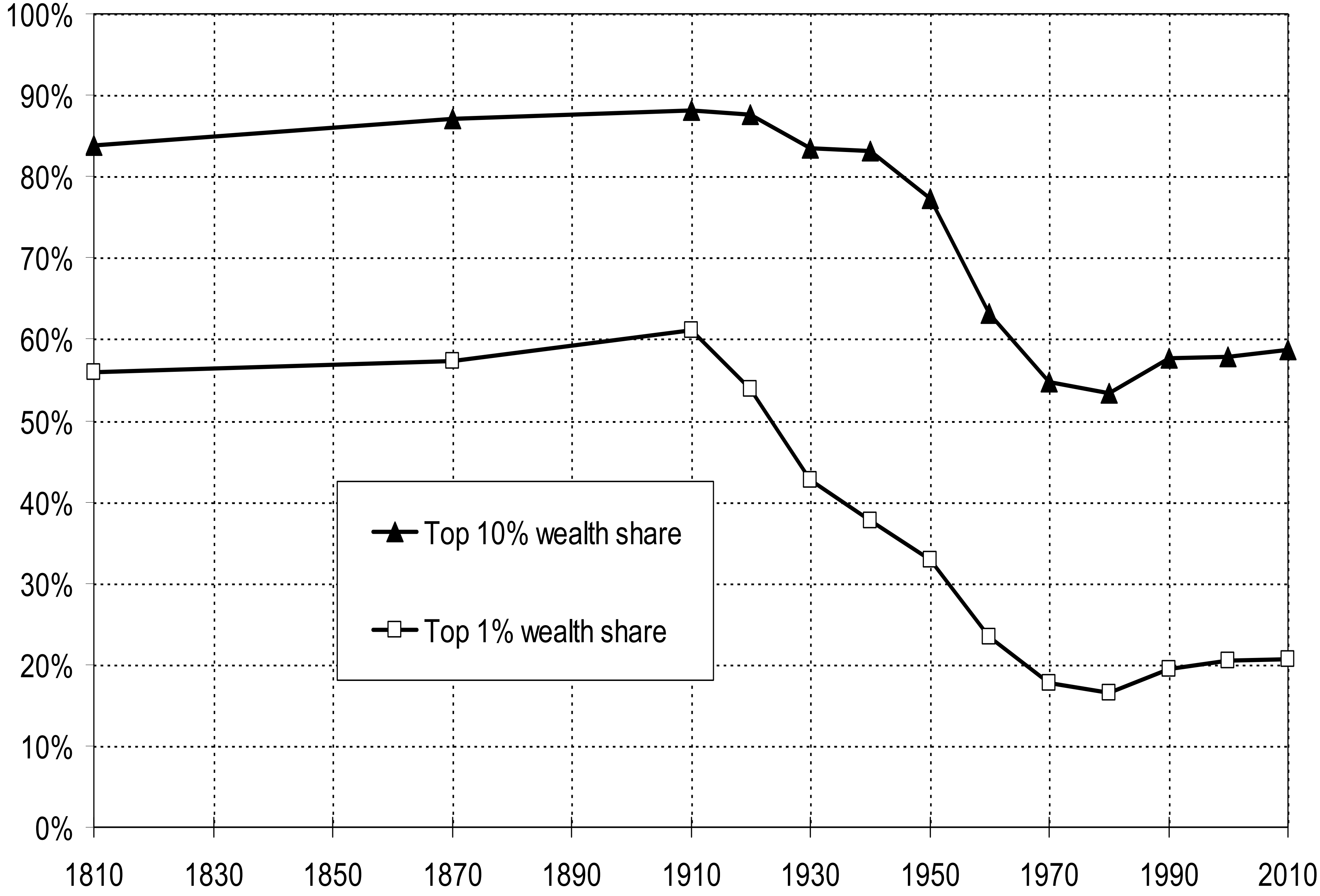
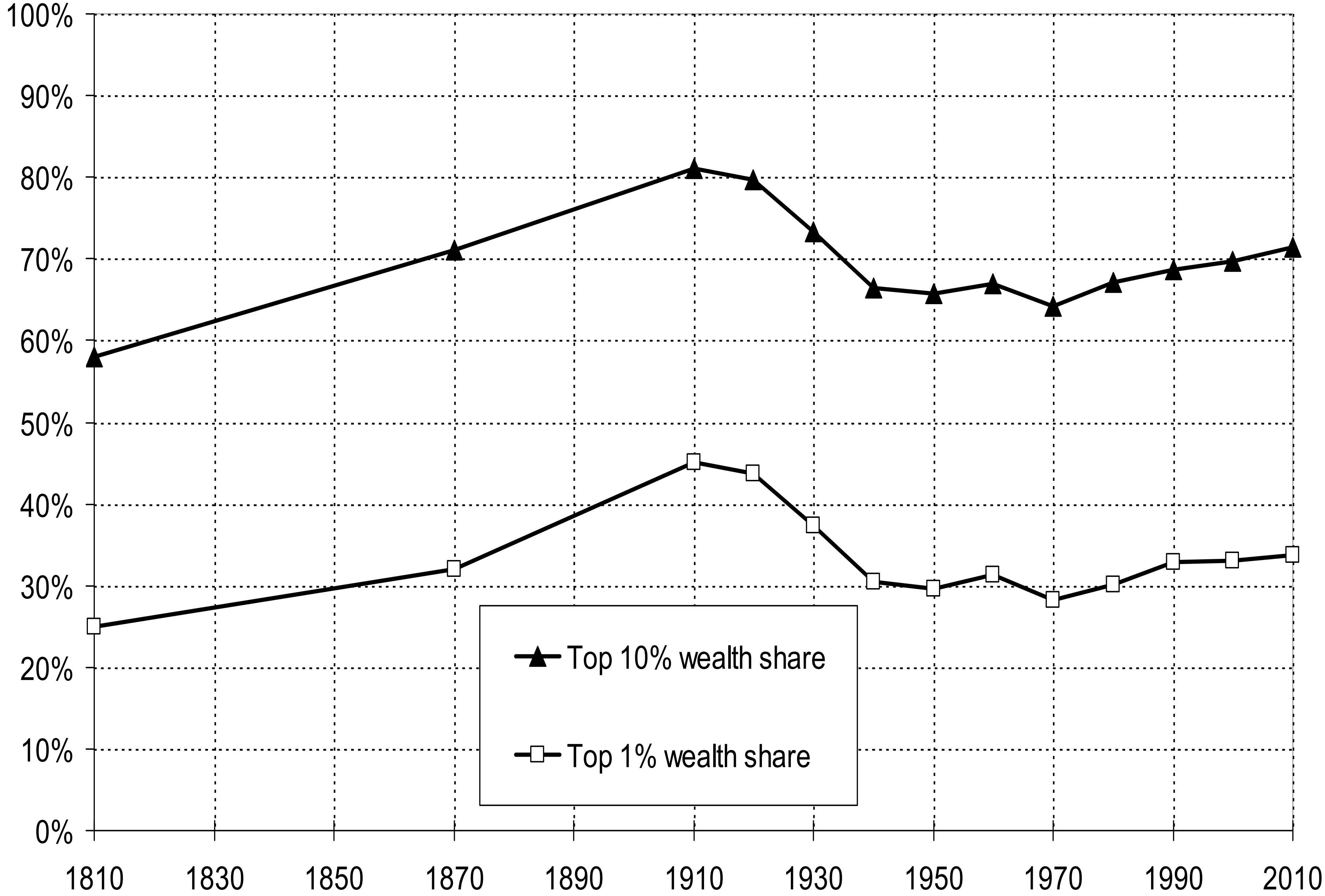


Figure 10.5. Wealth inequality in the US, 1810-2010



These lectures: three issues

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

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

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

(1) : covered in Lecture 1 (now)
(2)-(3) : covered in Lectures 2-3

Lectures based upon:

- **« On the long-run evolution of inheritance: France 1820-2050 »**, QJE 2011
- **« Capital is back: wealth-income ratios in rich countries 1700-2010 »** (with Zucman, WP 2013)
- « Inherited vs self-made wealth: theory & evidence from a rentier society » (with Postel-Vinay & Rosenthal, 2011)
- On-going work on other countries (Atkinson UK, Schinke Germany, Roine-Waldenstrom Sweden, Alvaredo US) → towards a World Wealth & Income Database
- **« A Theory of Optimal Inheritance Taxation »** (with Saez, Econometrica 2013)
- **« Optimal Taxation of Top Labor Incomes »** (with Saez & Stantcheva, AEJ:EP 2013)

(all papers are available on line at piketty.pse.ens.fr)

1. The return of wealth

- **How do aggregate wealth-income ratios evolve in the long-run, and why?**
- Impossible to address this basic question until recently: national accounts were mostly about flows, not stocks

- **We compile a new dataset to address this question:**

  - **1970-2010**: Official balance sheets for US, Japan, Germany, France, UK, Italy, Canada, Australia
  - **1870-**: Historical estimates for US, Germany, France, UK
  - **1700-**: Historical estimates for France, UK

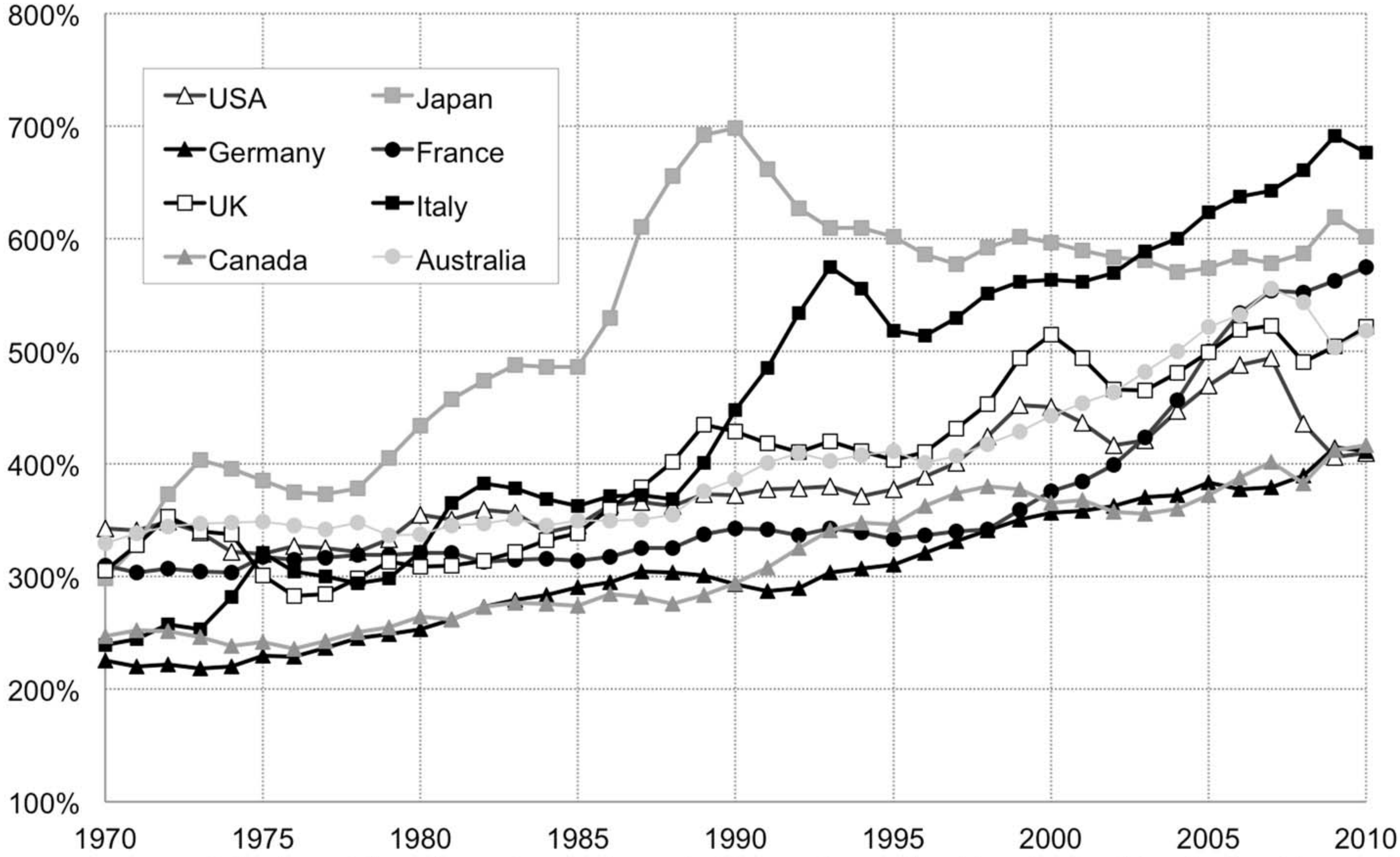
The Return of Wealth: W & Y Concepts

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

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

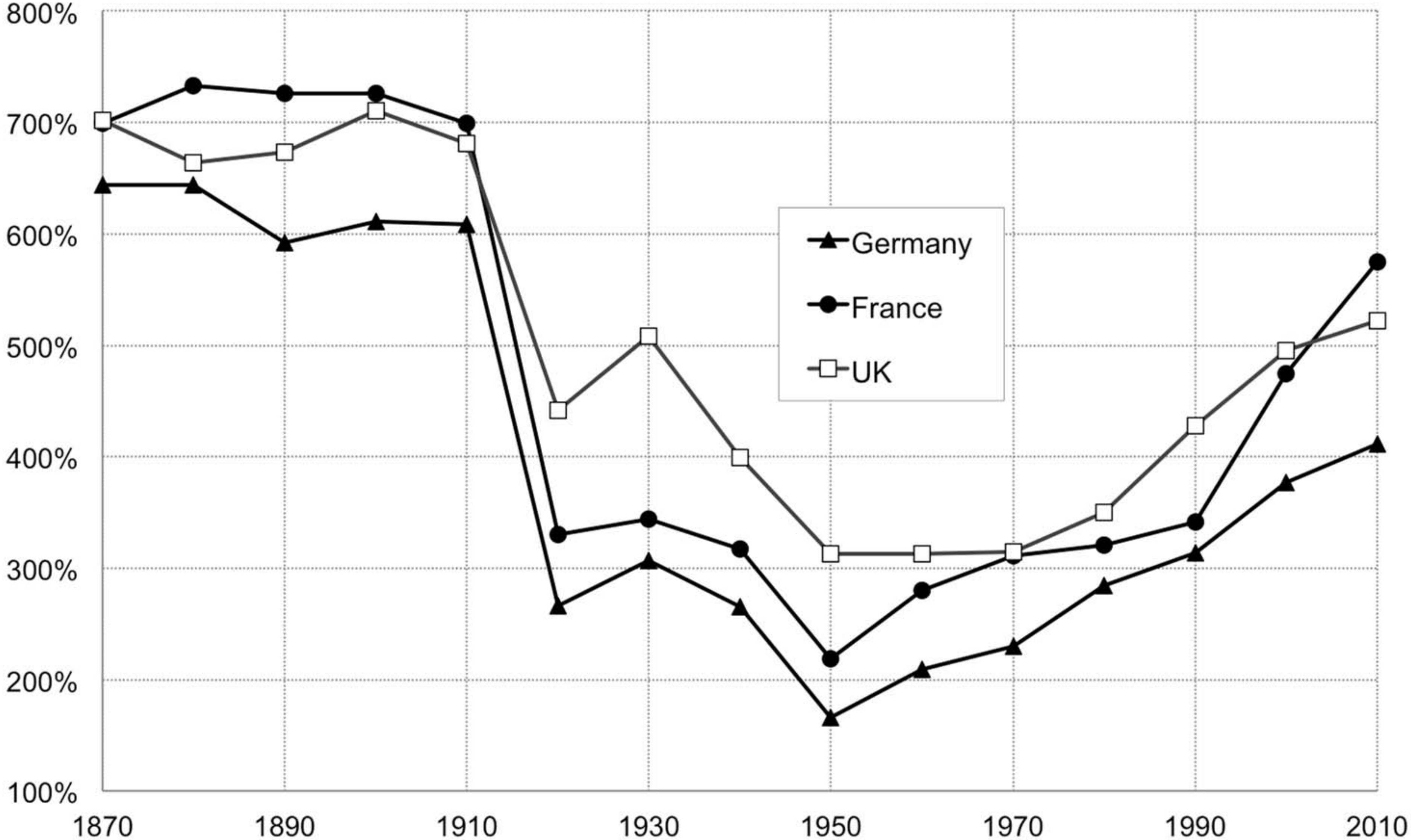
$\beta = W/Y$ = private wealth-national income ratio
$\beta_n = W_n/Y$ = national wealth-national income ratio

We Find a Gradual Rise of Private Wealth-National Income Ratios over 1970-2010



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

European Wealth-Income Ratios Appear to be Returning to Their High 18c-19c Values…



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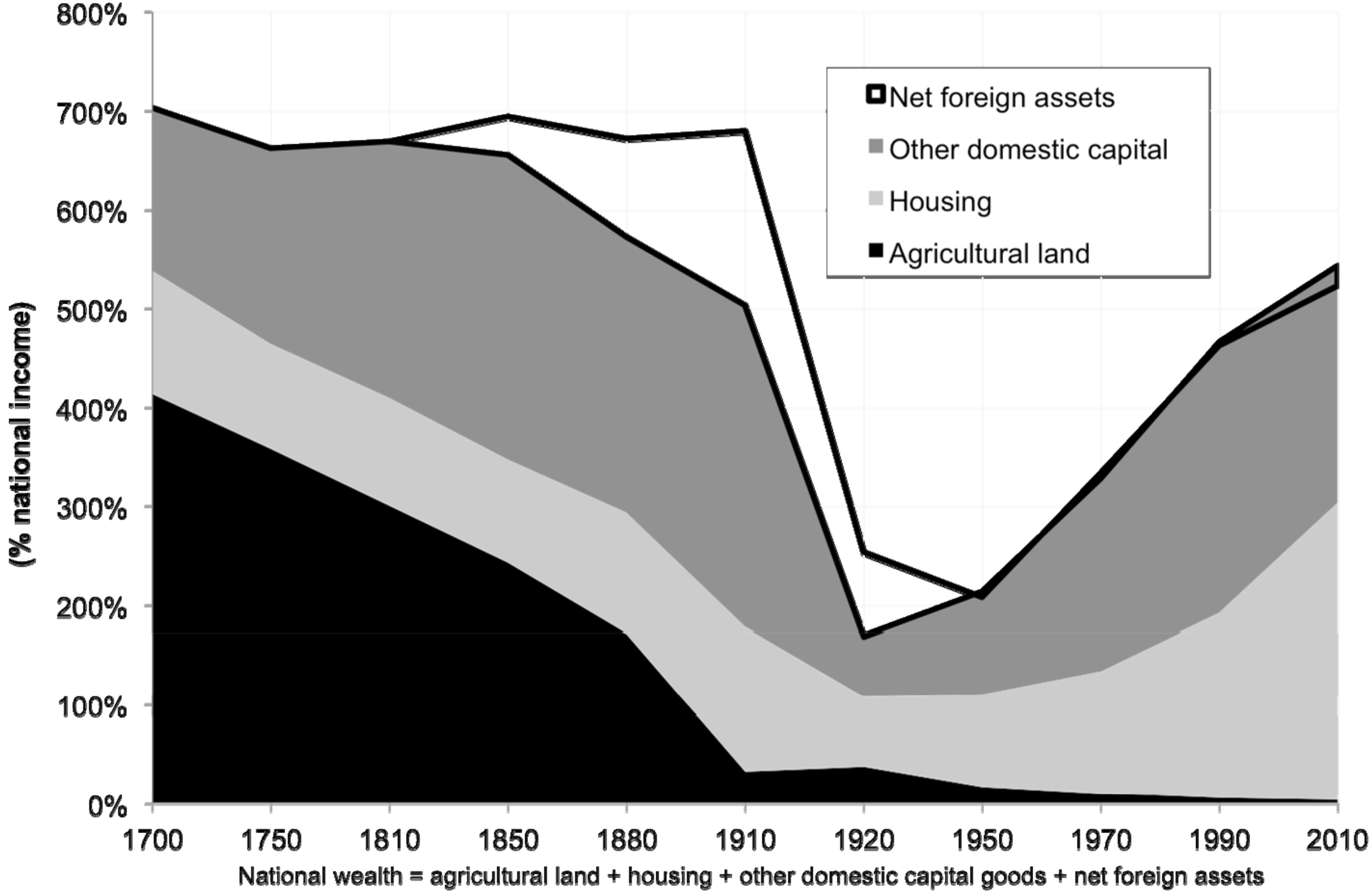
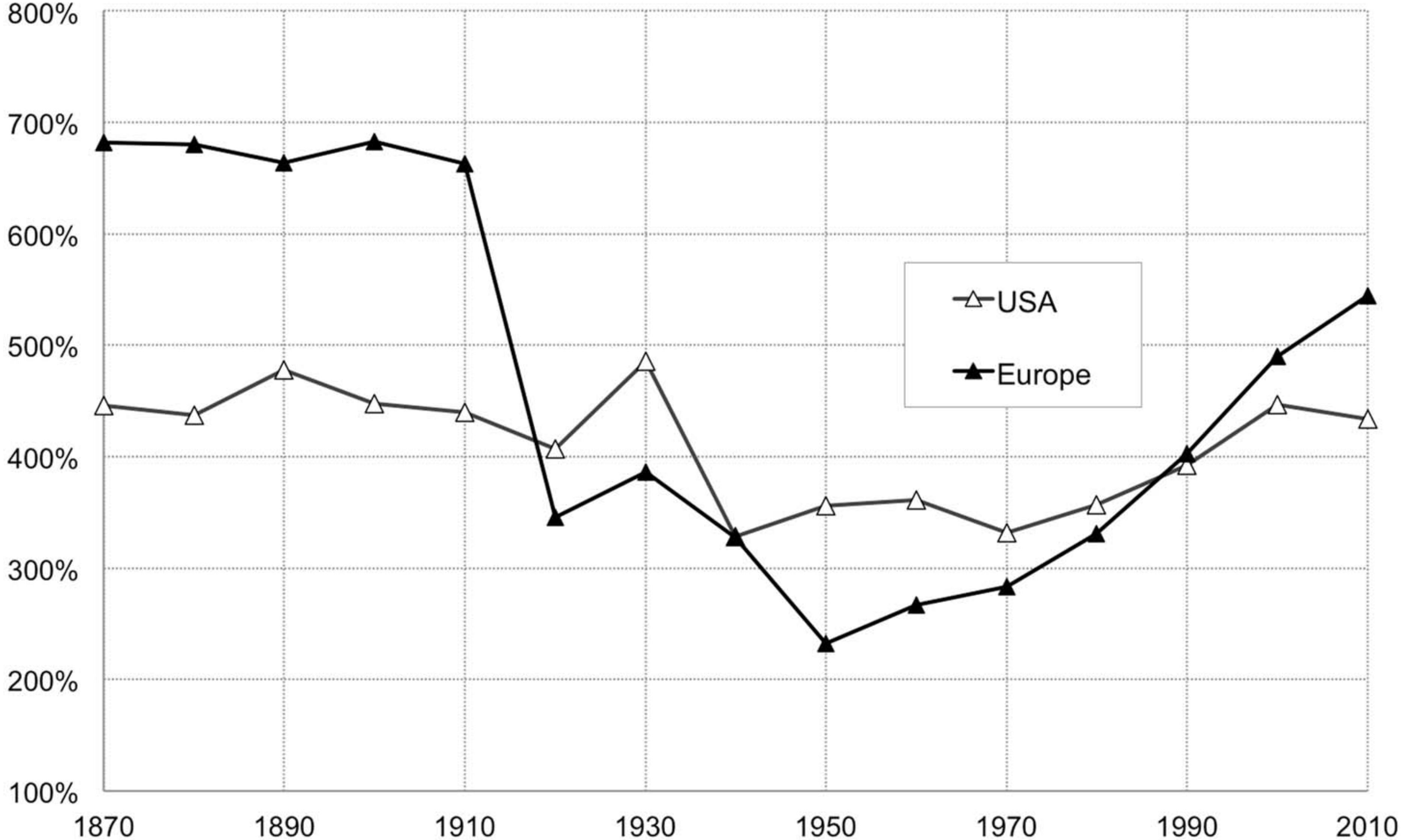
…Despite Considerable Changes in the Nature of Wealth: UK, 1700-2010

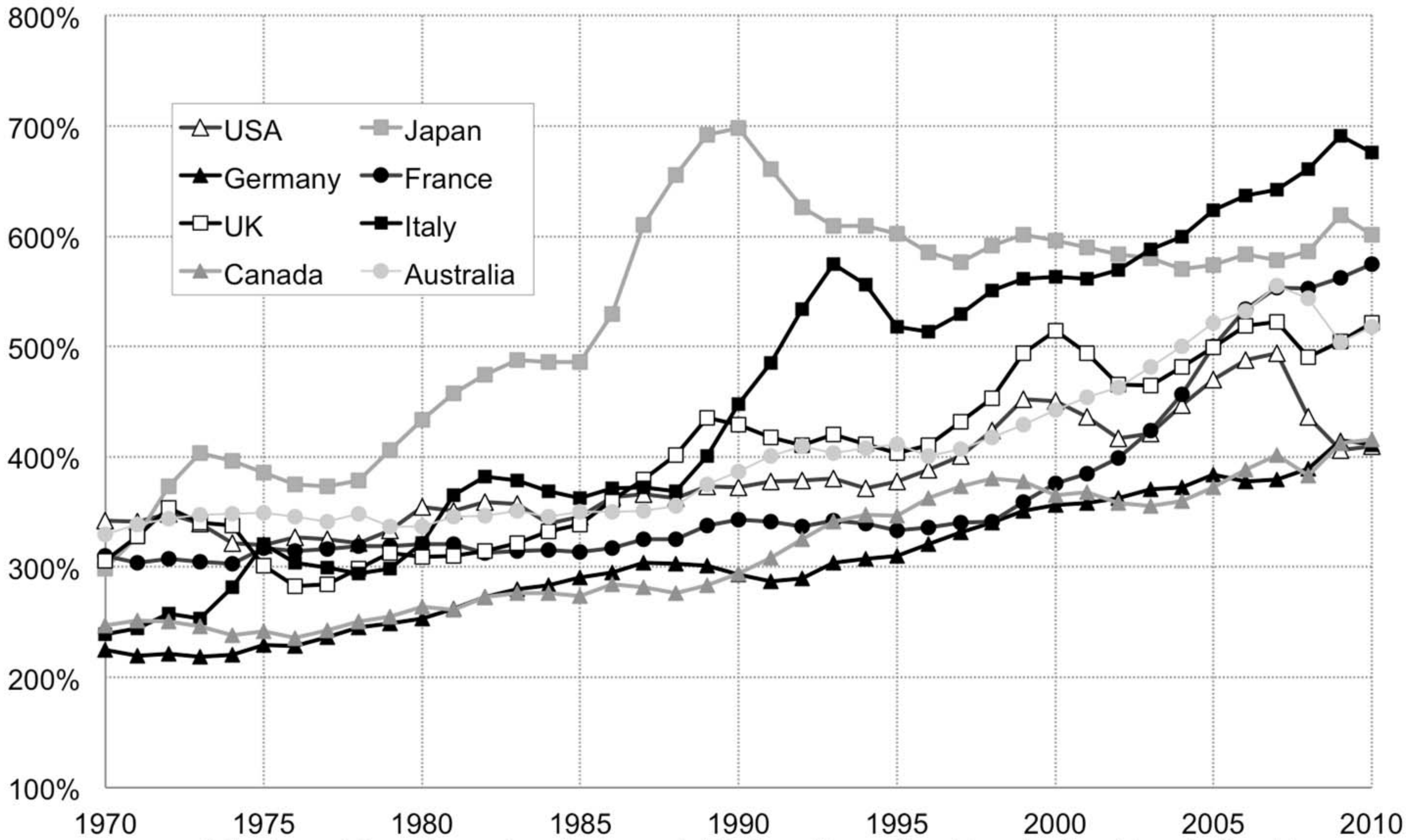


In the US, the Wealth-Income Ratio Also Followed a U-Shaped Evolution, But Less Marked



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

What We Are Trying to Understand: The Rise in Private Wealth-National Income Ratios, 1970-2010



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

How Can We Explain the 1970-2010 Evolution?

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

1. **A real economic effect**: slowdown of productivity and pop growth:

   – Harrod-Domar-Solow: wealth-income ratio $\boldsymbol{\beta = s/g}$
   – If saving rate s = 10% and growth rate g = 3%, then $\beta \approx 300\%$
   – But if s = 10% and g = 1.5%, then $\beta \approx 600\%$

⇩

Countries with low *g* are bound to have high β.
Strong effect in Europe, ultimately everywhere.

How Can We Explain Return to 19c Levels?

In very long run, limited role of asset price divergence

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

⇩

One sector model accounts reasonably well for long run dynamics & level differences Europe vs. US

Accounting for Wealth Accumulation: One Good Model

In any one-good model:

- At each date t: $W_{t+1} = W_t + s_t Y_t$
  $\rightarrow \quad \beta_{t+1} = \beta_t \, (1+g_{wst})/(1+g_t)$

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

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

  - Example: if s = 10% and g = 2%, then β = 500%

***β = s/g is* a pure accounting formula**, i.e. it is valid wherever the saving rate s comes from:

BU: Bequest-in-utility-function model

Max $U(c,b)=c^{1-s}\, b^{s}$ (or Δb^{s})

c = lifetime consumption, b = end-of-life wealth (bequest)

s = bequest taste = saving rate → ***β = s/g***

DM: Dynastic model: Max $\Sigma\, U(c_t)/(1+\delta)^t$

→ $r = \delta + \rho g$, $s = \alpha g/r$, ***β = α/r = s/g (β ↑ as g ↓)***

($U(c)=c^{1-\rho}/(1-\rho)$, $F(K,L)=K^{\alpha}L^{1-\alpha}$)

OLG model: low growth implies higher life-cycle savings

→ **in all three models, *β = s/g rises as g declines***

Accounting for Wealth Accumulation: Two Goods Model

Two goods: one capital good, one consumption good

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

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

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

Growth Rates and Private Saving Rates in Rich Countries, 1970-2010

	Real growth rate of national income	Population growth rate	Real growth rate of per capita national income	**Net private saving rate** (personal + corporate) (% 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%**

Lesson 1a: Capital is Back

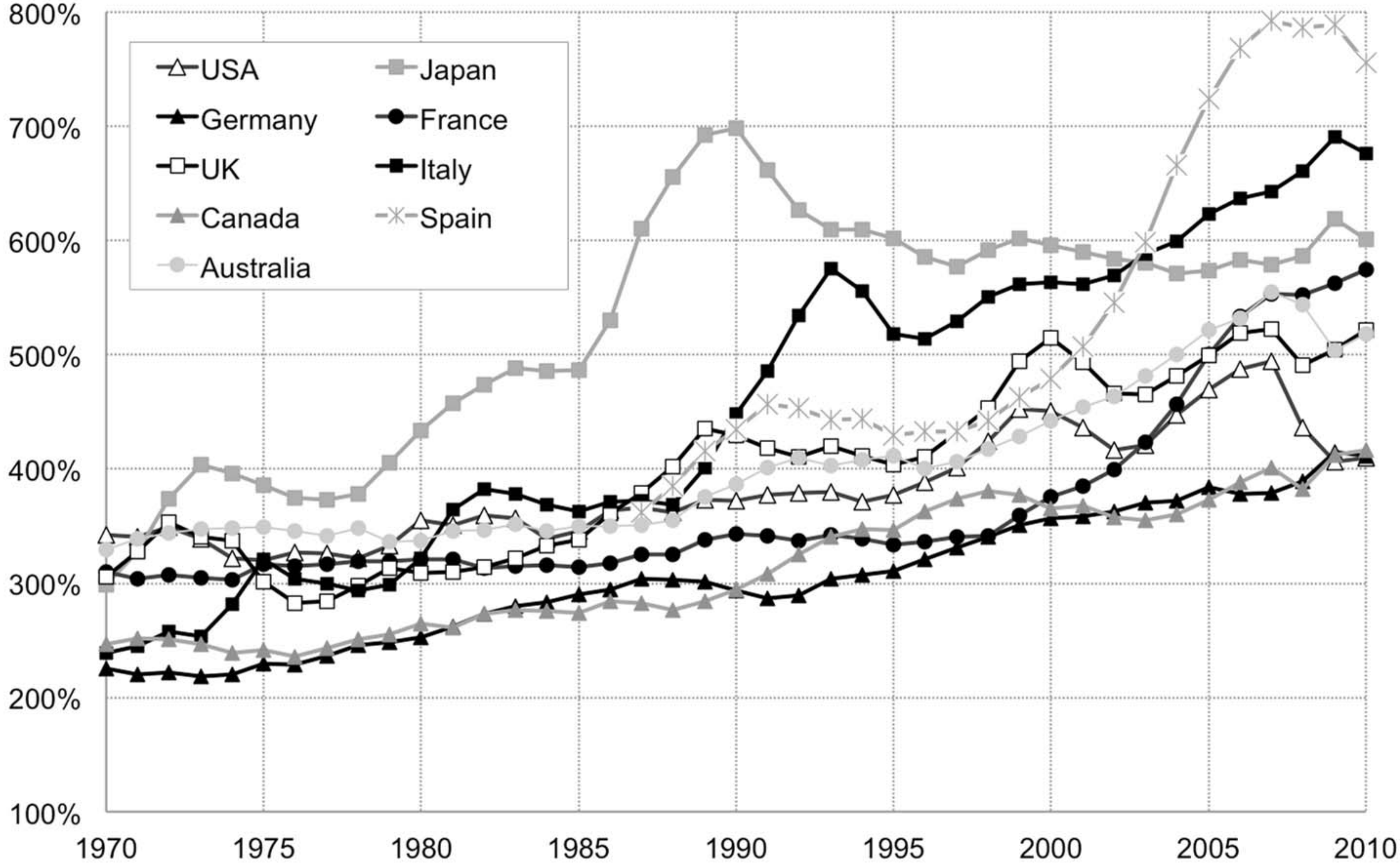
- **Low β in mid-20c were an anomaly**
  - Anti-capital policies depressed asset prices
  - Unlikely to happen again with free markets
  - Who owns wealth will become again very important

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

⇓

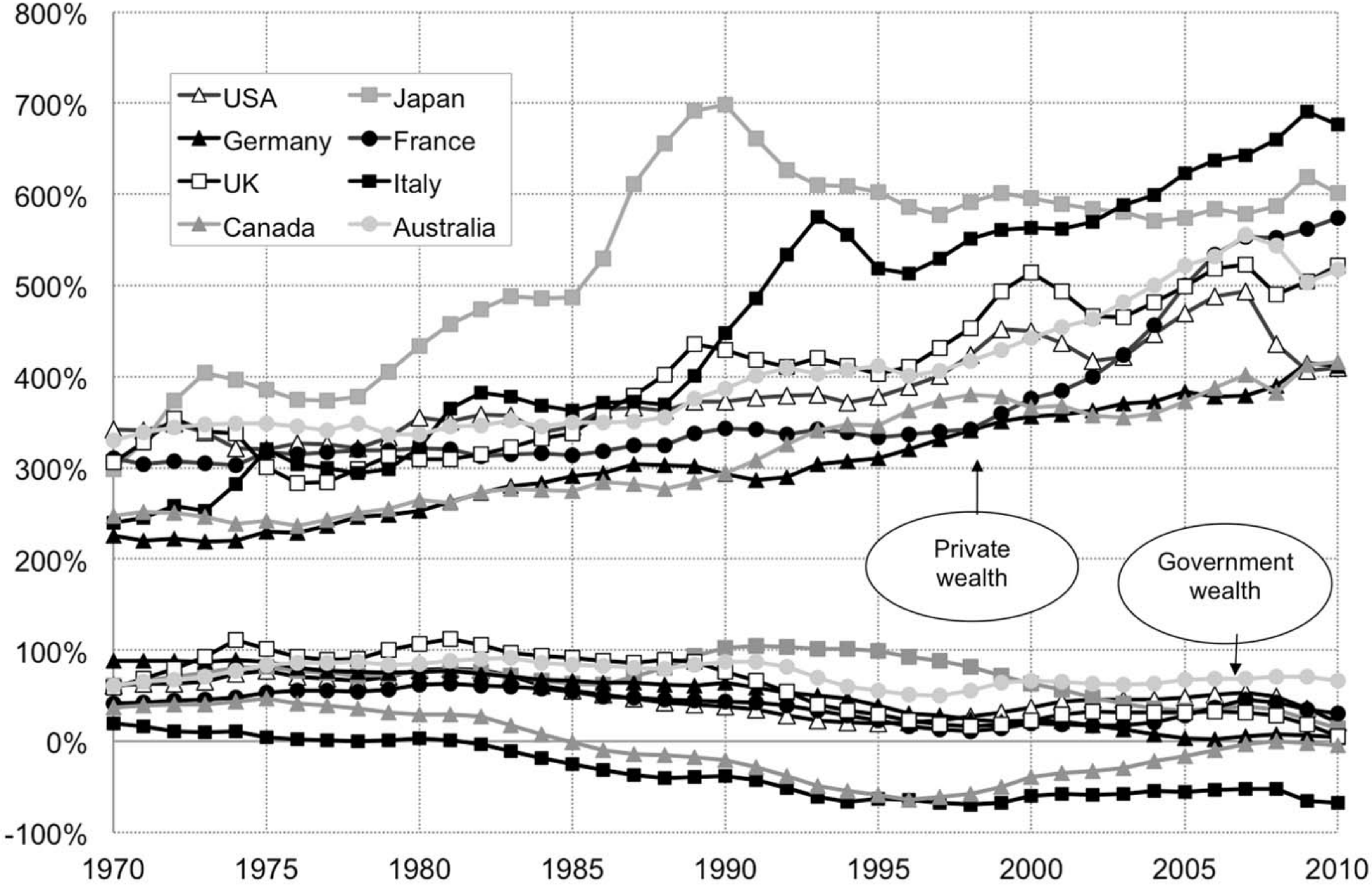
High β raise new issues about capital regulation & taxation

Private Wealth-National Income Ratios, 1970-2010, including Spain



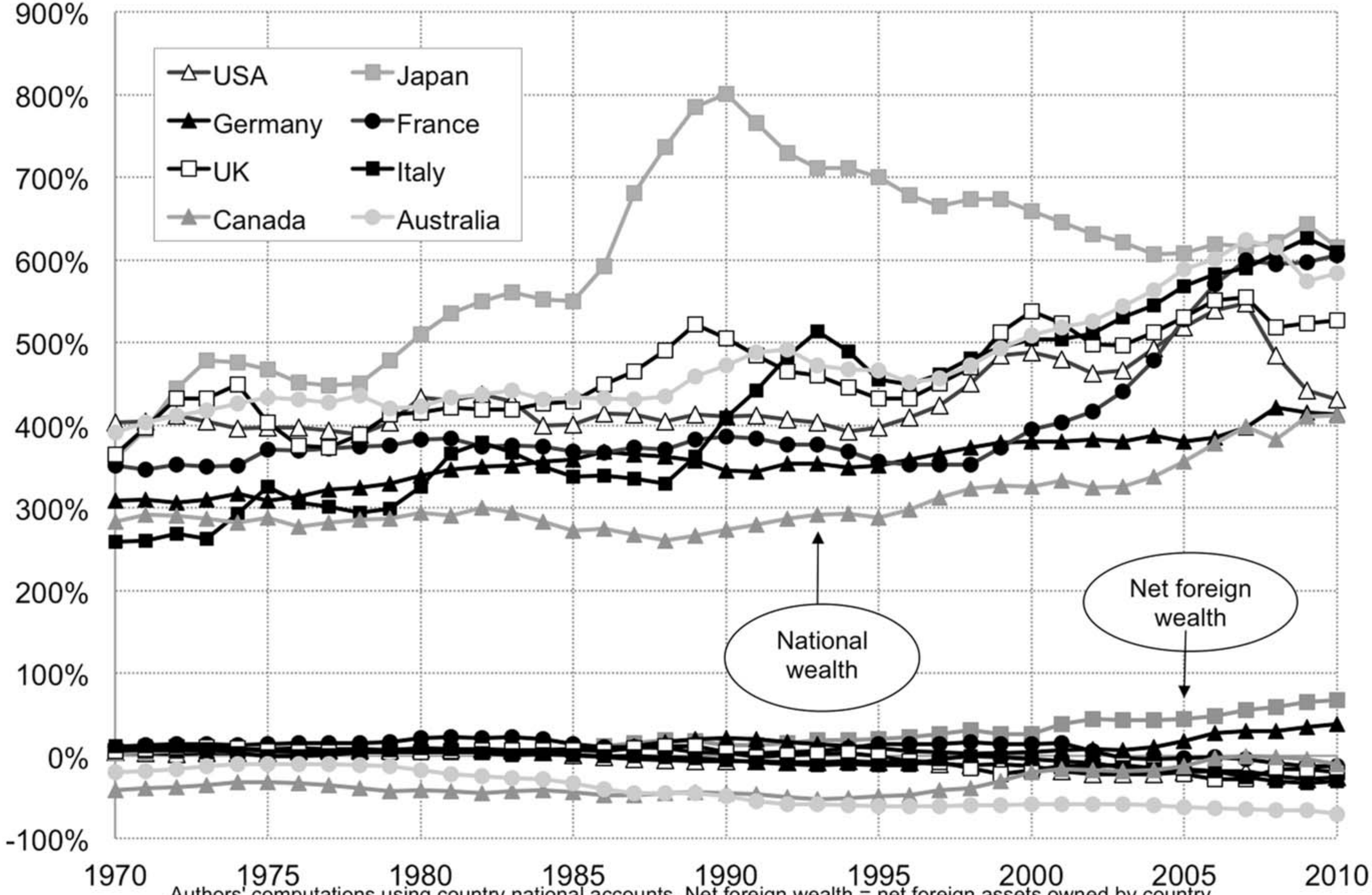
Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)

From Private to National Wealth: Small and Declining Government Net Wealth, 1970-2010



Authors' computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)

National vs. Foreign Wealth, 1970-2010 (% National Income)

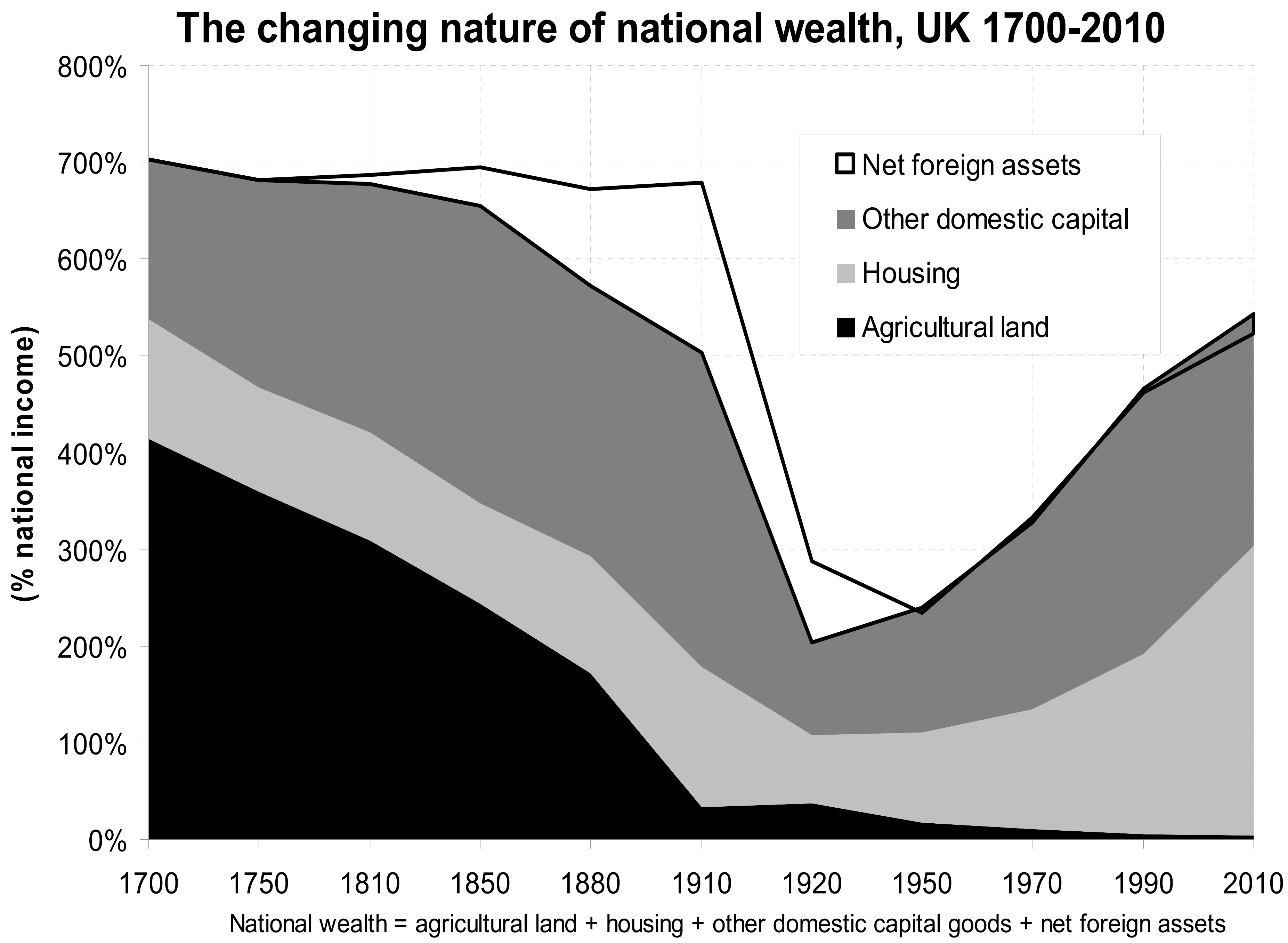


Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors)

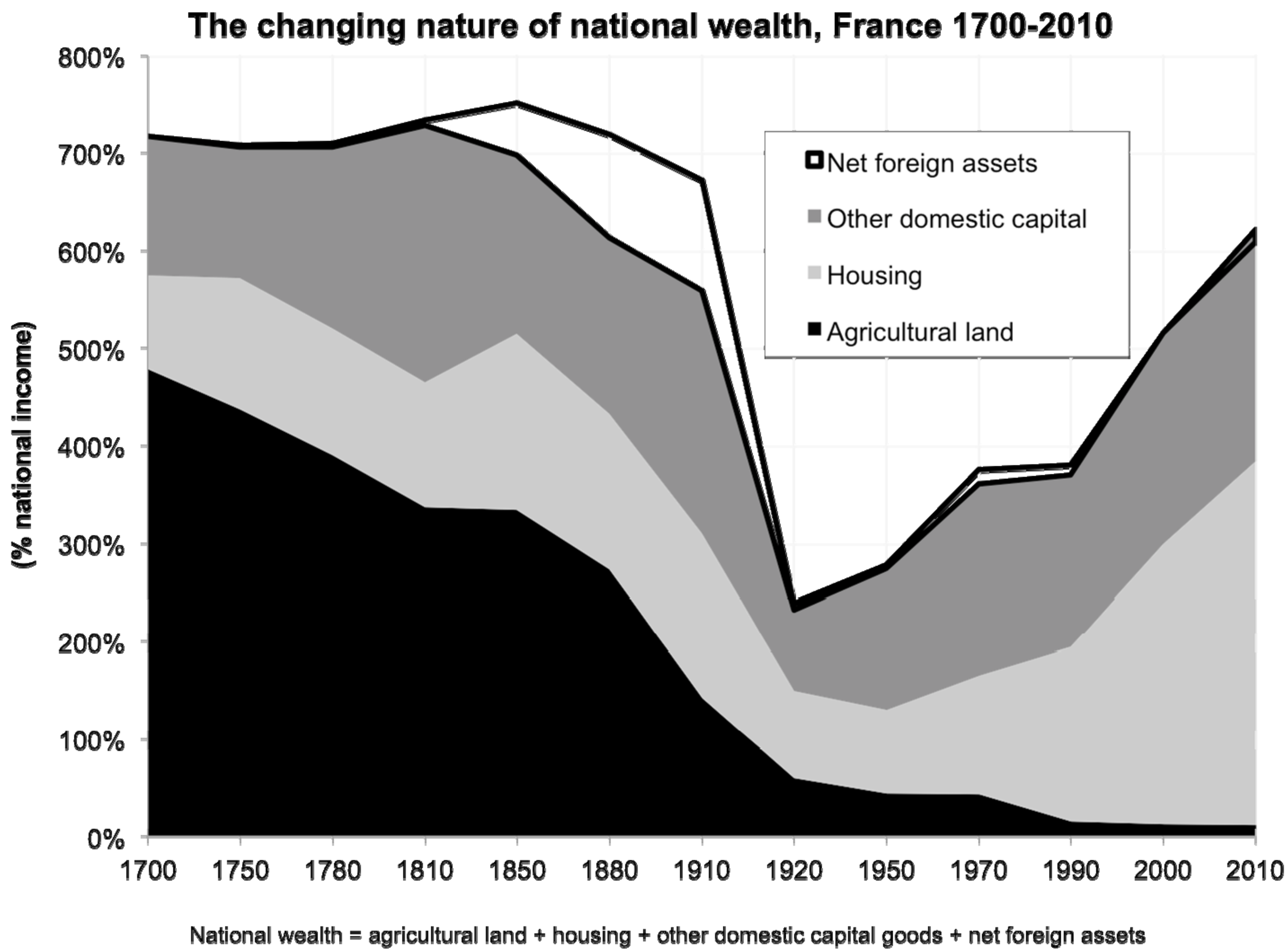
Lesson 1b: The Changing Nature of Wealth and Technology

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

- **In 18th century: $\sigma < 1$**
  - In 18c, K = mostly land
  - In land-scarce Old World, $\alpha \approx 30\%$
  - In land-rich New World, $\alpha \approx 15\%$
  - → Consistent with $\sigma < 1$: when low substitutability, α large when K relatively scarce



The changing nature of national wealth, UK 1700-2010
800%
700%
600%
500%
400%
300%
200%
100%
0%
(% national income)
Net foreign assets
Other domestic capital
Housing
Agricultural land
1700
1750
1810
1850
1880
1910
1920
1950
1970
1990
2010
National wealth = agricultural land + housing + other domestic capital goods + net foreign assets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(% national income)
1700
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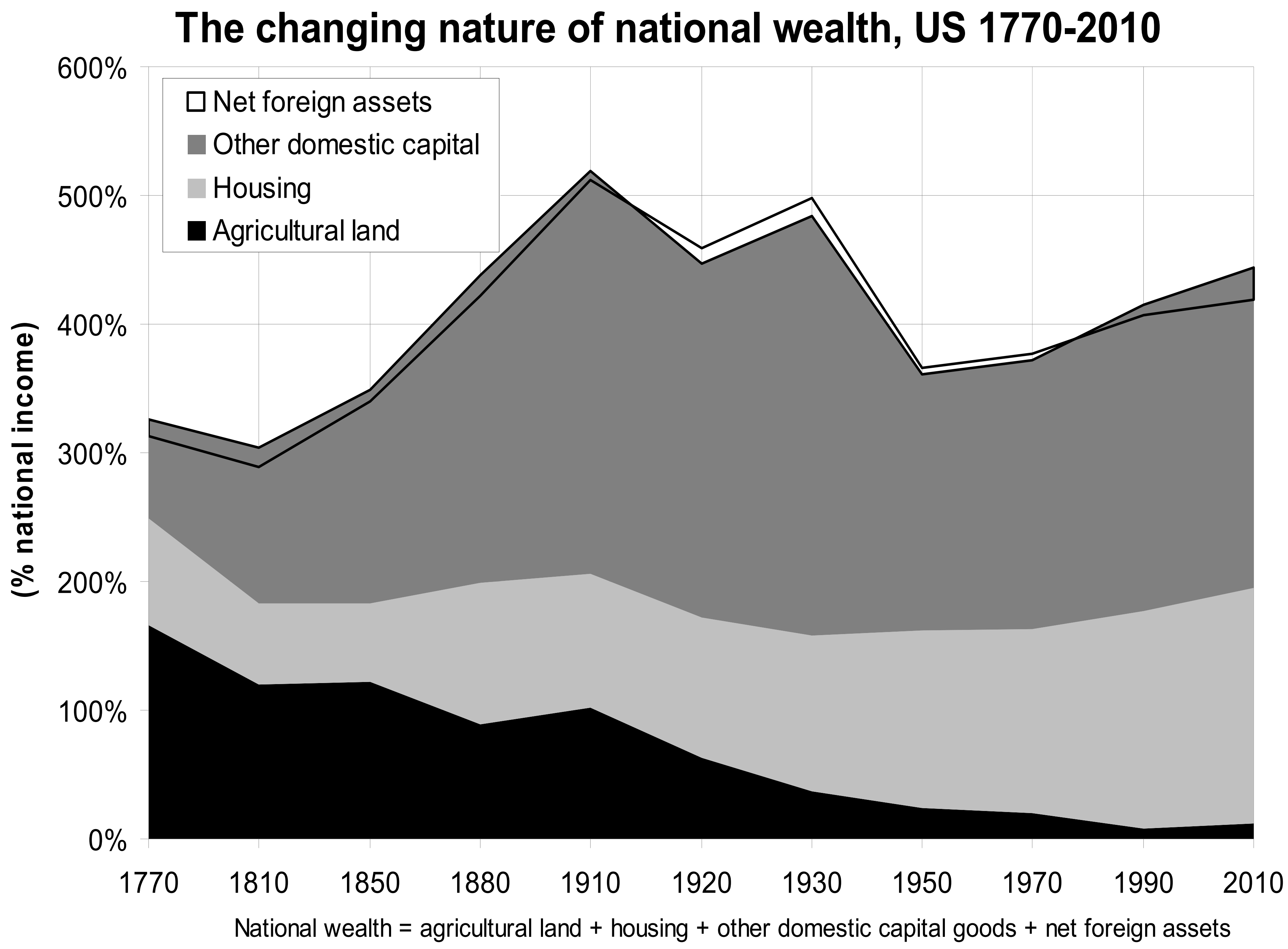
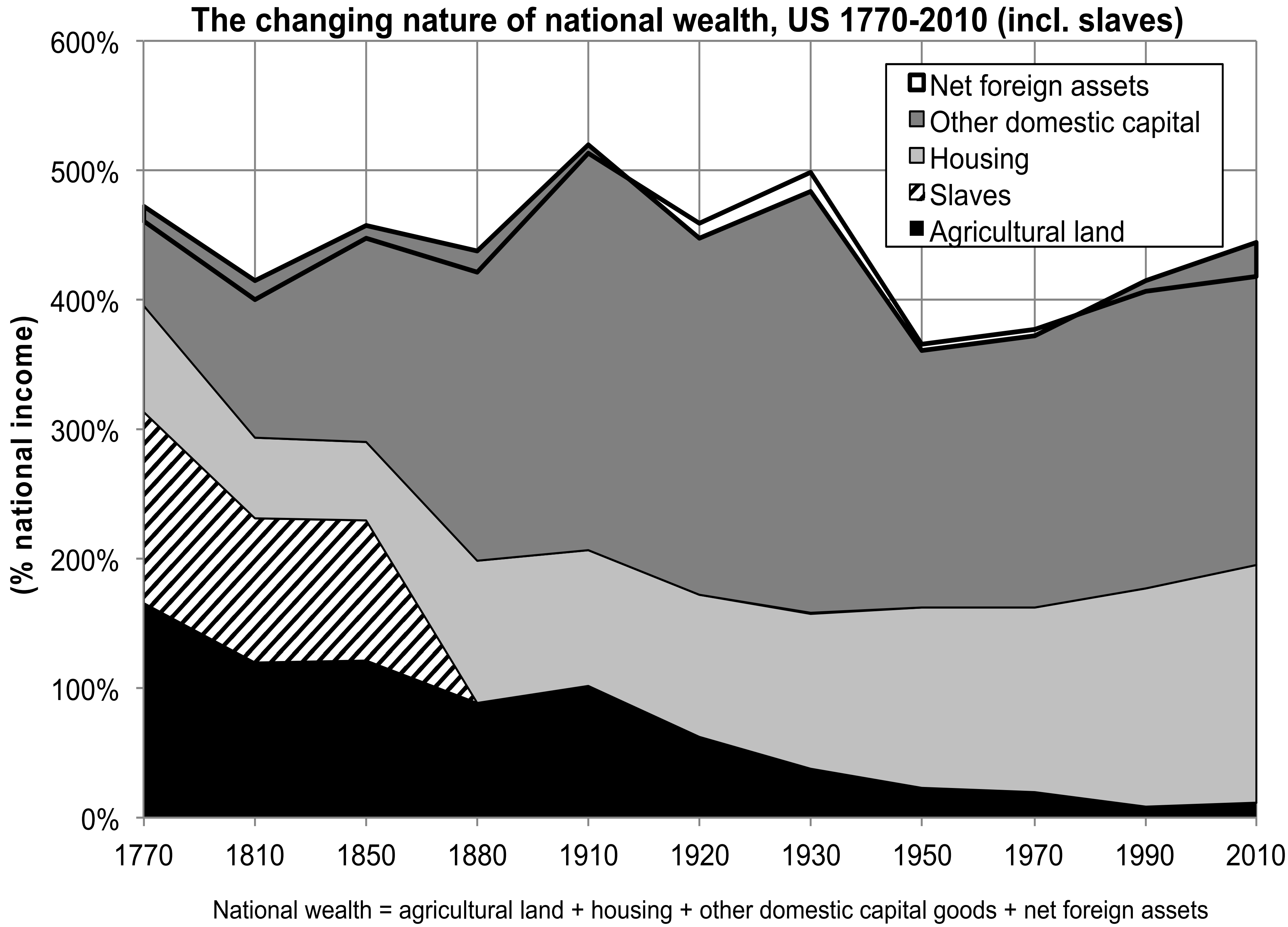
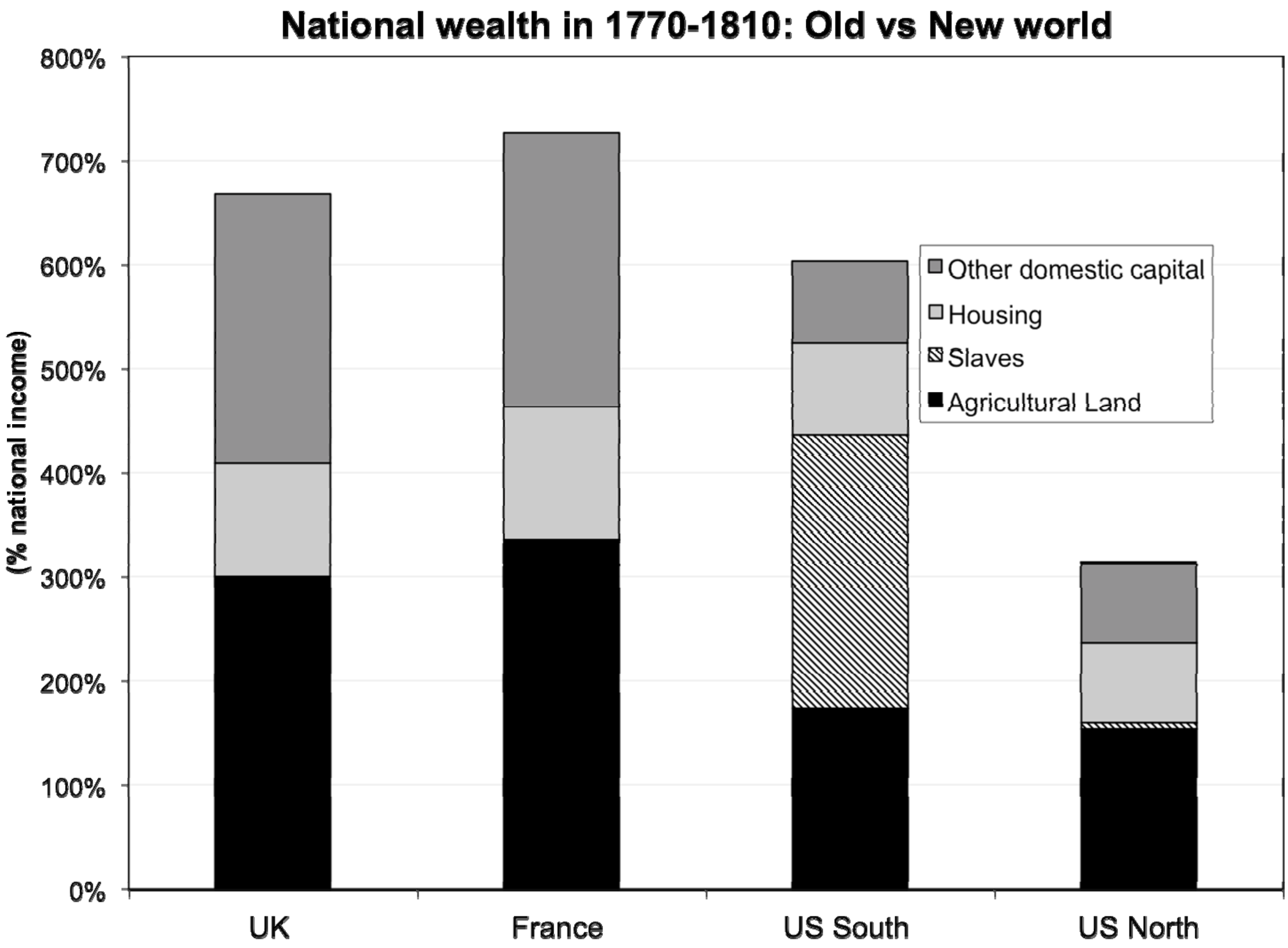
1850
1880
1910
1920
1950
1970
1990
2000
2010
Net foreign assets
Other domestic capital
Housing
Agricultural land
National wealth = agricultural land + housing + other domestic capital goods + net foreign assets



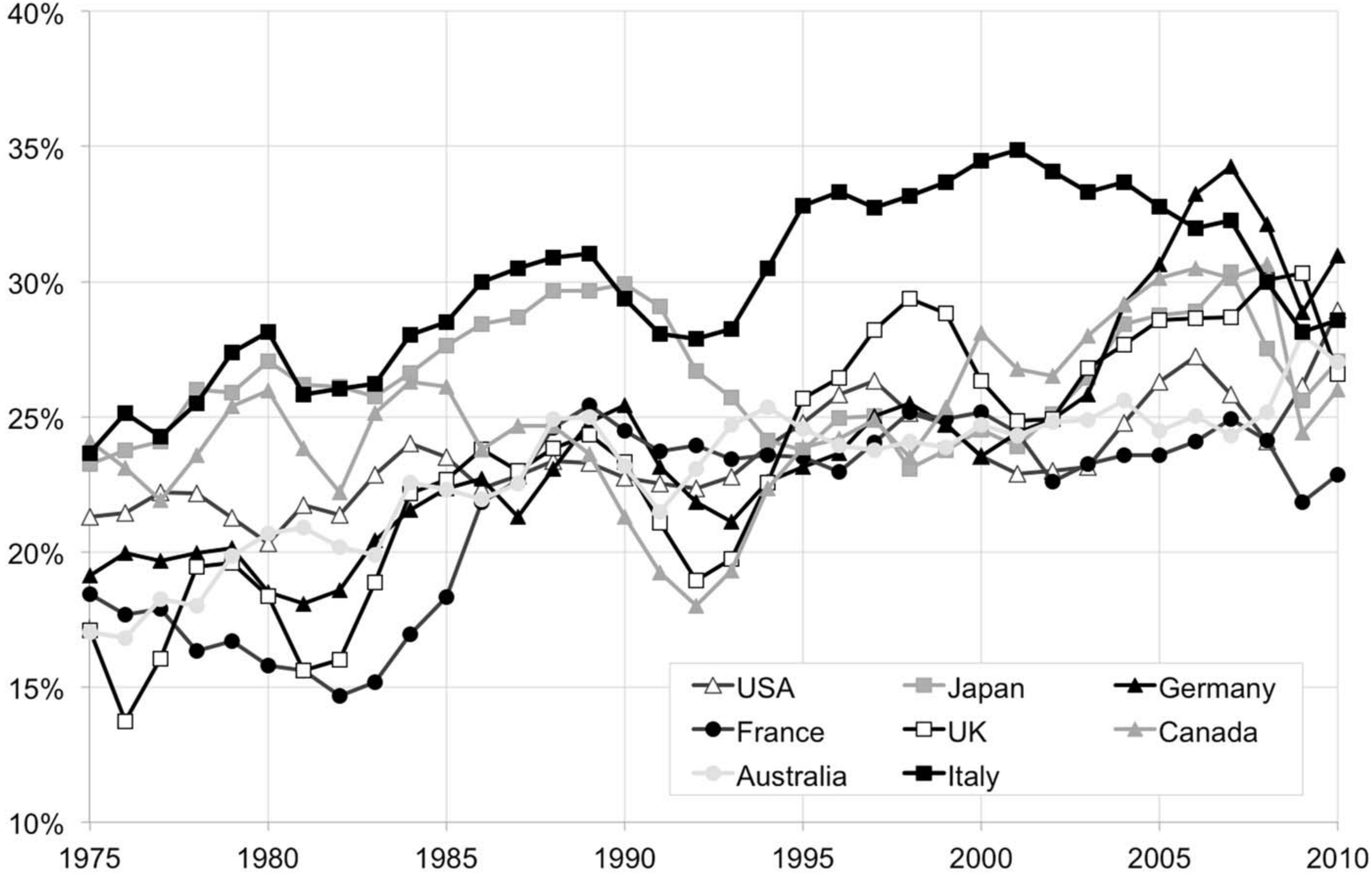
The changing nature of national wealth, US 1770-2010
Net foreign assets
Other domestic capital
Housing
Agricultural land
600%
500%
400%
300%
200%
100%
0%
(% national income)
1770
1810
1850
1880
1910
1920
1930
1950
1970
1990
2010
National wealth = agricultural land + housing + other domestic capital goods + net foreign assets



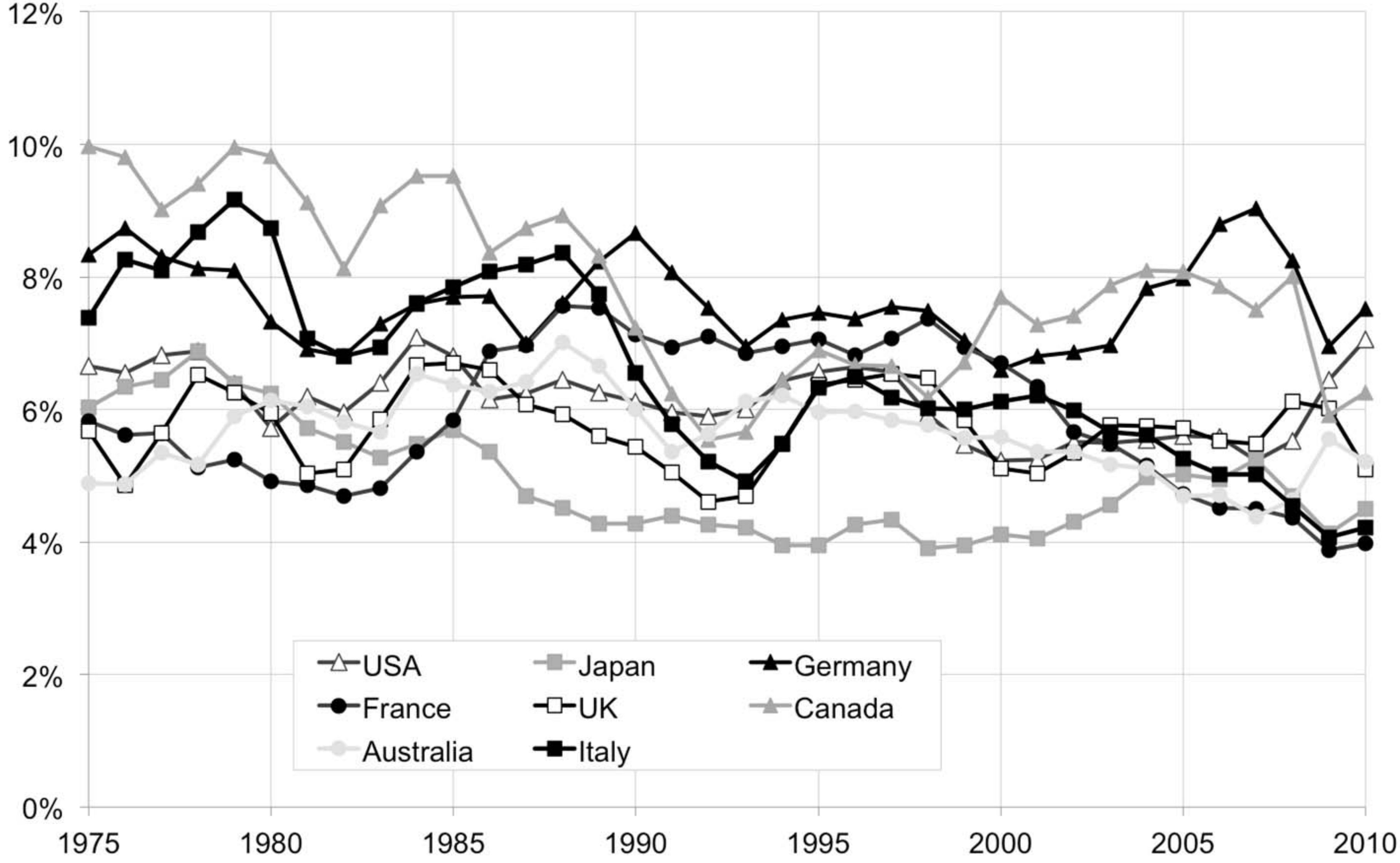
The changing nature of national wealth, US 1770-2010 (incl. slaves)
600%
500%
400%
300%
200%
100%
0%
(% national income)
1770
1810
1850
1880
1910
1920
1930
1950
1970
1990
2010
Net foreign assets
Other domestic capital
Housing
Slaves
Agricultural land
National wealth = agricultural land + housing + other domestic capital goods + net foreign assets


National wealth in 1770-1810: Old vs New world
800%
700%
600%
500%
400%
300%
200%
100%
0%
(% national income)
Other domestic capital
Housing
Slaves
Agricultural Land
UK
France
US South
US North

Rising β Come With Rising Capital Shares α…



… And Slightly Declining Average Returns to Wealth → $\sigma > 1$ and Finite



End of Lecture 1: what have we learned?

- A world with low g can naturally leads to the return of high non-human wealth: **capital is back because low growth is back**

→ A world with g=1-1.5% (=long-run world technological frontier?) is not very different from a world with g=0% (Marx-Ricardo)

- The rise of human capital is largely an illusion; non-human capital share can be larger in the future than what it was in the past; robot economy possible

- Next question: will the return of wealth take the form of egalitarian lifecycle wealth, or highly concentrated inherited wealth?

Wealth, Inequality & Taxation

Thomas Piketty
Paris School of Economics

Berlin FU, June 13th 2013

Lecture 2: The return of inherited wealth

Roadmap

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

(2) The return of inherited wealth
(=what we will cover in Lecture 2)

(3) The optimal taxation of wealth & inheritance
(we will start this part in case we have time; otherwise this will be covered in Lecture 3)

1. The Return of Wealth: W & Y Concepts

- **Wealth**
  - Private wealth W = assets - liabilities of households
  - Corporations valued at market prices through equities
  - Government wealth W_g
  - National wealth $W_n = W + W_g$
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- **Income**
  - Domestic output $Y_d = F(K,L)$ (net of depreciation)
  - National income Y = domestic output $Y_d + r\ NFA$
  - Capital share $\alpha = r\beta$ (r = average rate of return)

$\beta = W/Y$ = private wealth-national income ratio

$\beta_n = W_n/Y$ = national wealth-national income ratio

Accounting for Wealth Accumulation: One Good Model

In any one-good model:

- At each date t: $W_{t+1} = W_t + s_t Y_t$
  $\rightarrow \quad \beta_{t+1} = \beta_t \, (1+g_{wst})/(1+g_t)$

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

  - Example: if s = 10% and g = 2%, then β = 500%

Accounting for Wealth Accumulation: Two Goods Model

Two goods: one capital good, one consumption good

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

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

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

Our Empirical Strategy

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

- We observe $\beta_t, \ldots, \beta_{t+n}$

  $s_t, \ldots, s_{t+n}$

  $g_t, \ldots, g_{t+n}$

and we decompose the wealth accumulation equation between years t and $t + n$ into:

- Volume effect (saving) vs.
- Price effect (capital gain or loss)

Data Sources and Method, 1970-2010

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

- **Extensive decompositions & sensitivity analysis:**
  - Private vs. national wealth
  - Domestic capital vs. foreign wealth
  - Private (personal + corporate) vs. personal saving
  - Multiplicative vs. additive decompositions
  - R&D

1970-2010: A Low Growth and Asset Price Recovery Story

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

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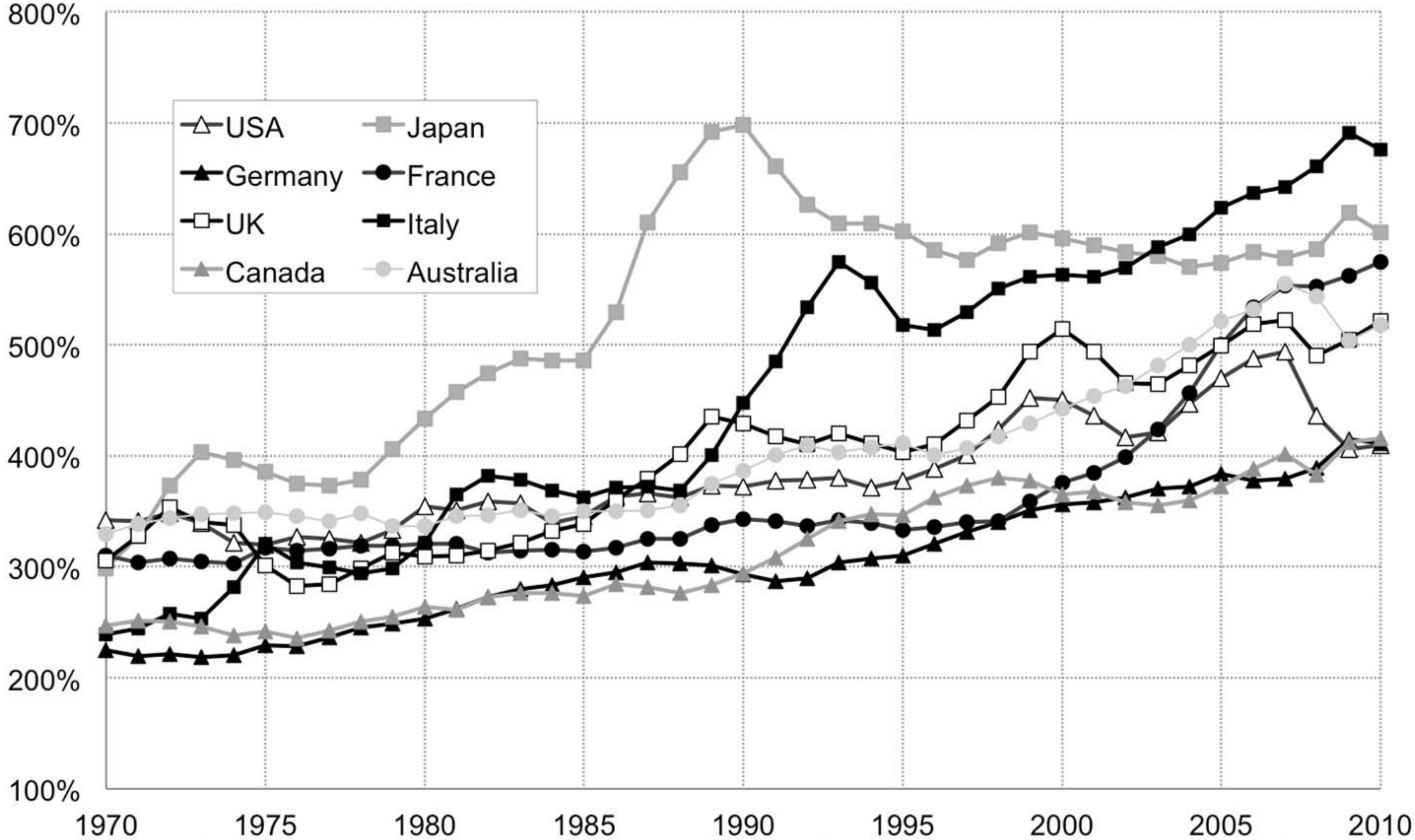
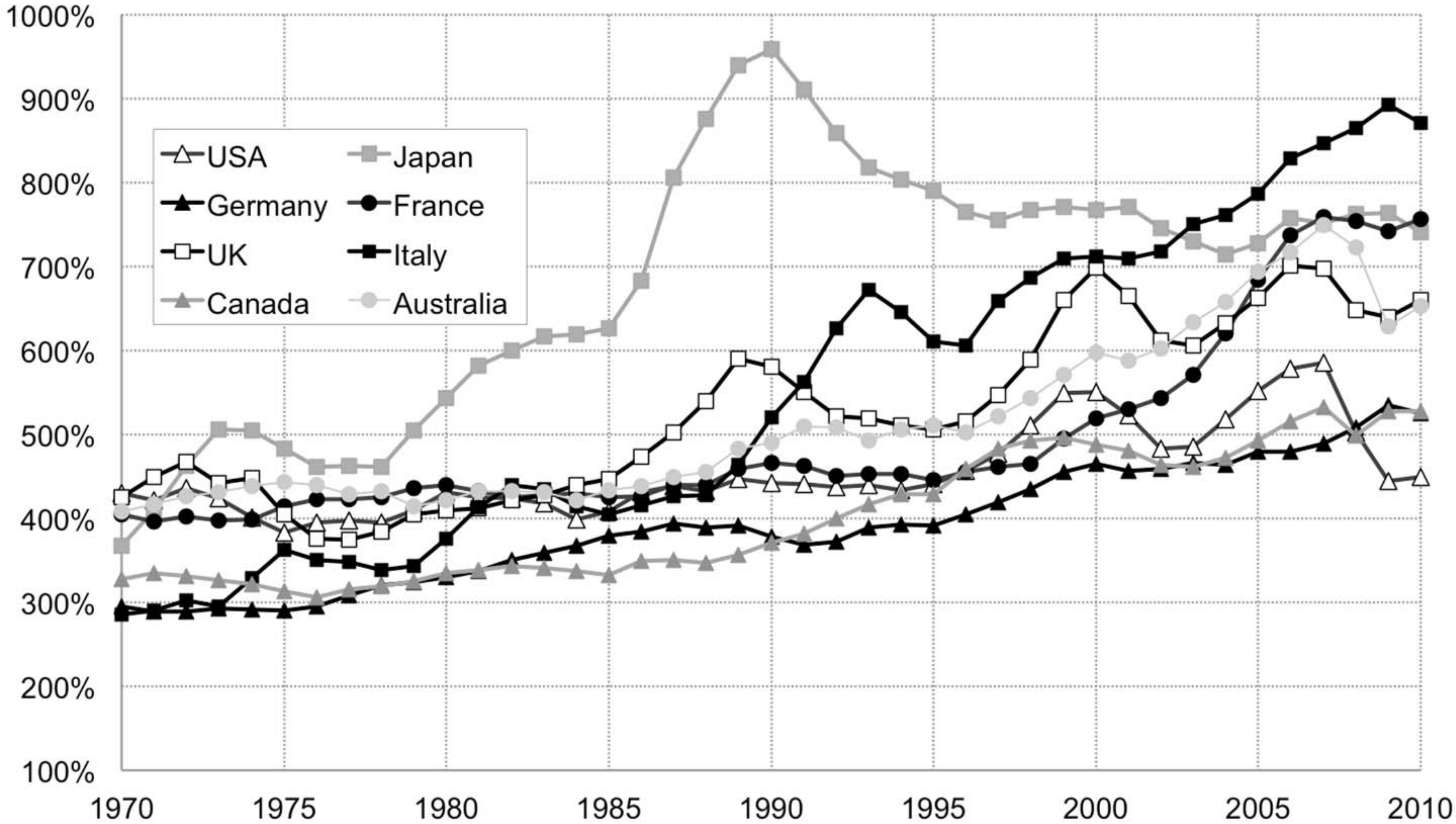
The rise in β is more than a bubble

What We Are Trying to Understand: The Rise in Private Wealth-National Income Ratios, 1970-2010



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

NB: The Rise Would be Even More Spectacular Should We Divide Wealth by Disposable Income



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

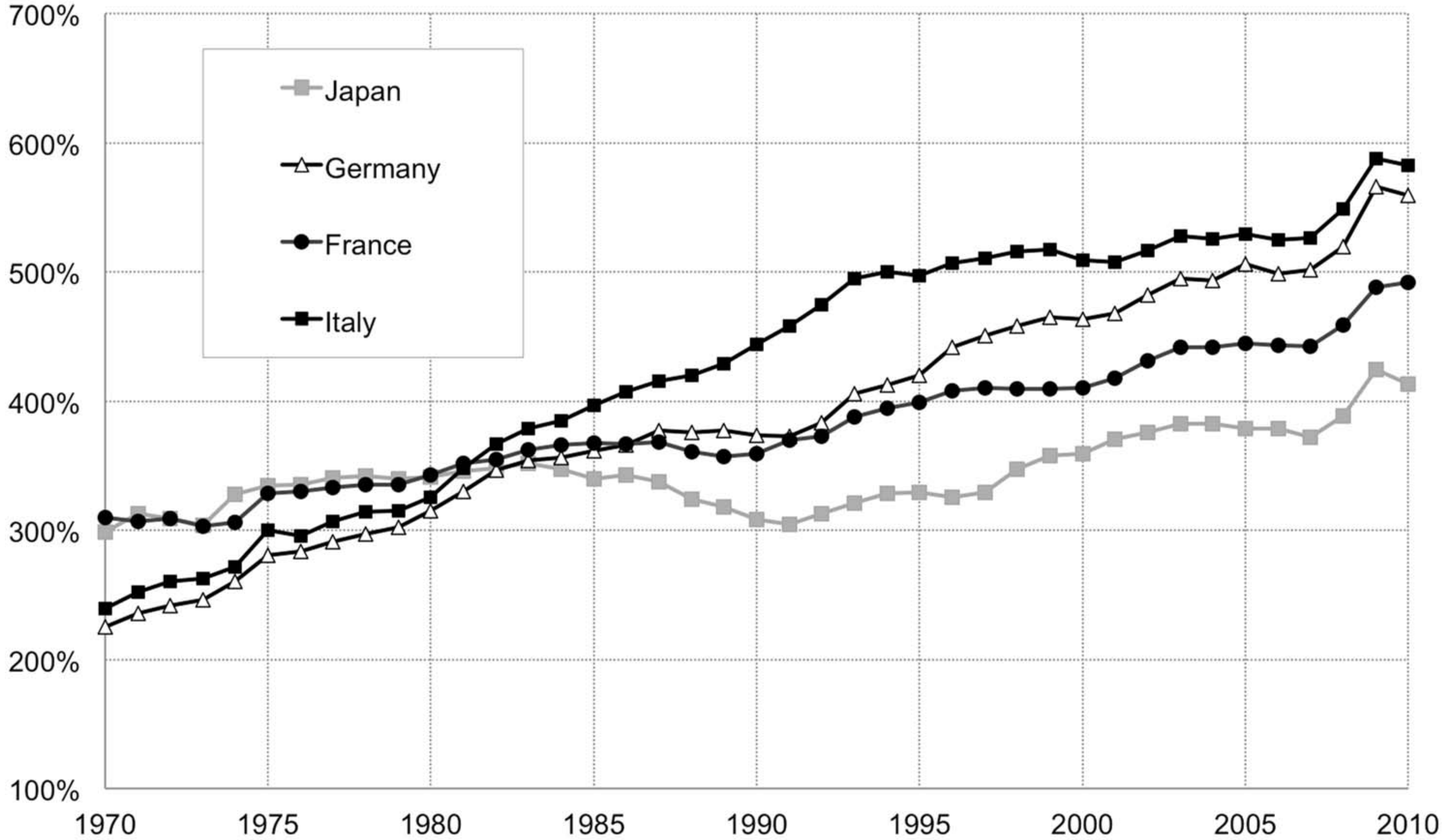
Growth Rates and Private Saving Rates in Rich Countries, 1970-2010

	Real growth rate of national income	Population growth rate	Real growth rate of per capita national income	**Net private saving rate** (personal + corporate) (% 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%**

A Pattern of Small, Positive Capital Gains on Private Wealth…

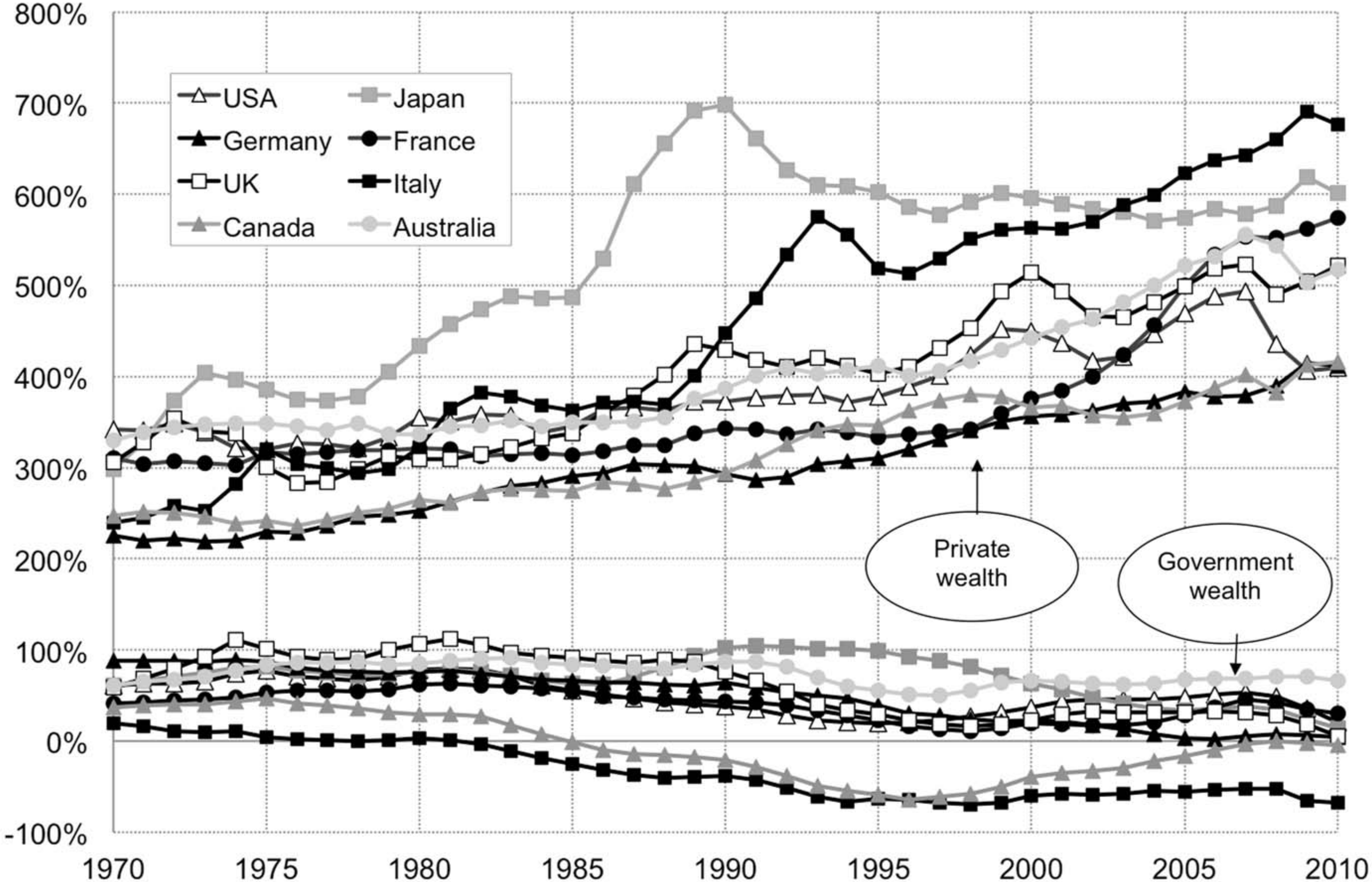
	Private wealth-national income ratios		Decomposition of 1970-2010 wealth growth rate		
	β (1970)	β (2010)	Real growth rate of private wealth g_w	Savings-induced wealth growth rate $g_{ws} = s/\beta$	Capital-gains-induced wealth growth rate q
U.S.	342%	410%	3.3%	2.9% ***88%***	0.4% ***12%***
Japan	299%	601%	4.3%	3.4% ***78%***	0.9% ***22%***
Germany	225%	412%	3.5%	4.3% ***121%***	-0.8% ***-21%***
France	310%	575%	3.8%	3.4% ***90%***	0.4% ***10%***
U.K.	306%	522%	3.6%	1.9% ***55%***	1.6% ***45%***
Italy	239%	676%	4.6%	4.2% ***92%***	0.4% ***8%***
Canada	247%	416%	4.2%	4.3% ***103%***	-0.1% ***-3%***
Australia	330%	518%	4.4%	3.4% ***79%***	0.9% ***21%***

… But Private Wealth / National Income Ratios Would Have Increased Without K Gains in Low Growth Countries



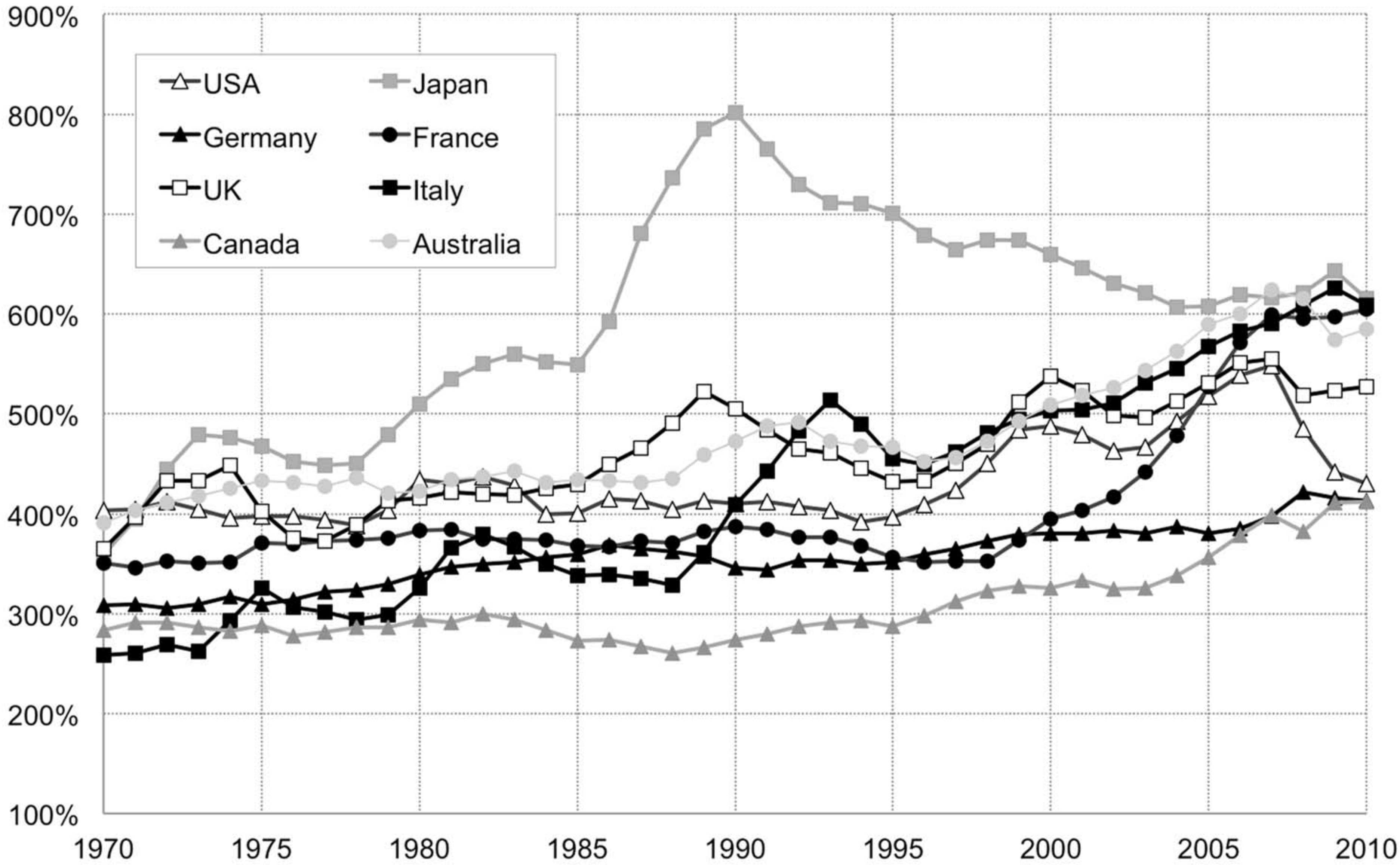
Simulated private wealth / national income ratios in the absence of valuation changes, based on 1970 wealth-income ratios, 1970-2010 private saving flows (including other volume changes) and real income growth rates

From Private to National Wealth: Small and Declining Government Net Wealth, 1970-2010



Authors' computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)

Decline in Gov Wealth Means National Wealth Has Been Rising a Bit Less than Private Wealth



Authors' computations using country national accounts. National wealth = private wealth + government wealth

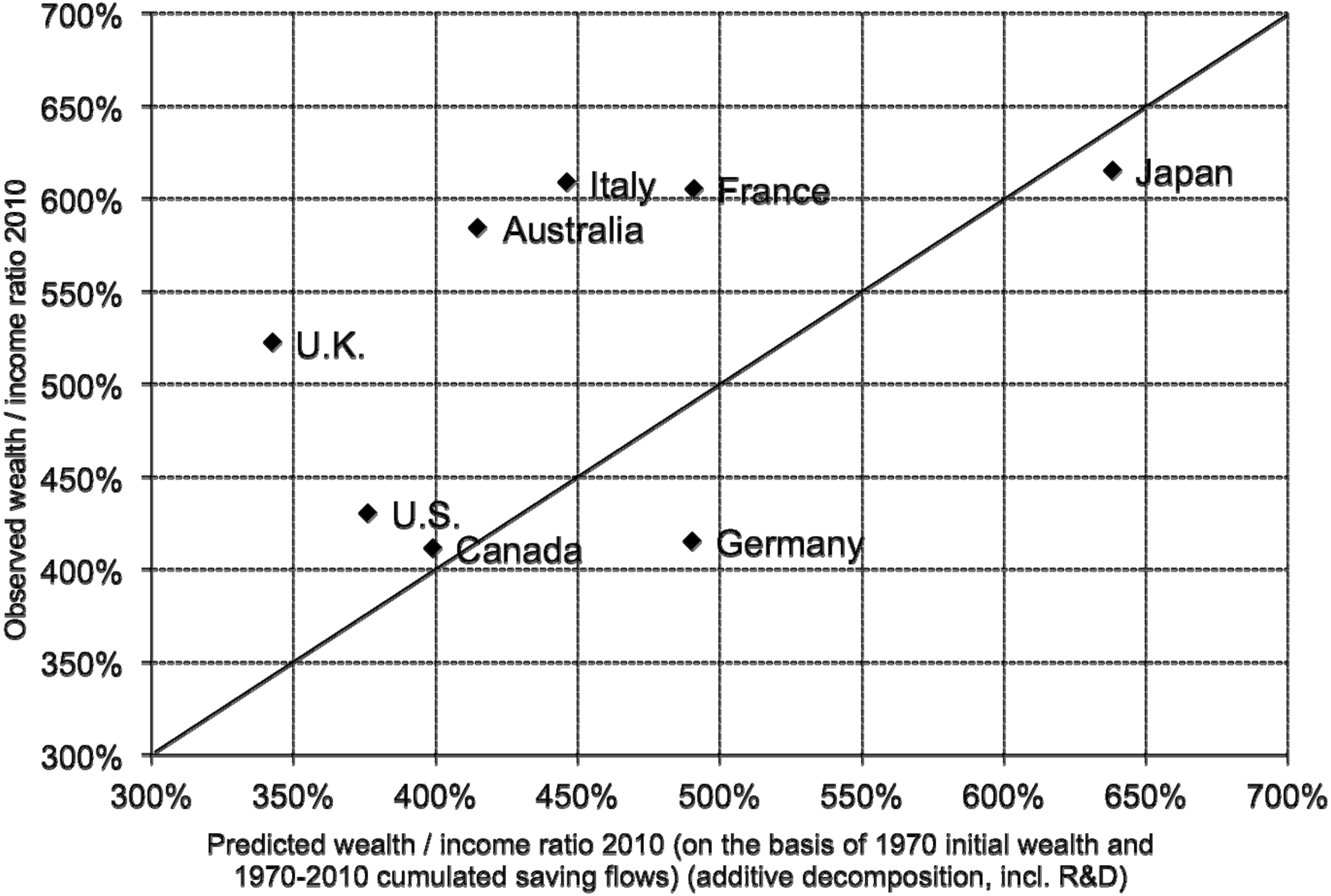
National Saving 1970-2010: Private vs Government

Average saving rates 1970-2010 (% national income)	Net national saving (private + government)	incl. private saving	incl. government saving
U.S.	5.2%	7.7%	-2.4%
Japan	14.6%	14.6%	0.0%
Germany	10.2%	12.2%	-2.1%
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%	9.9%	-0.9%

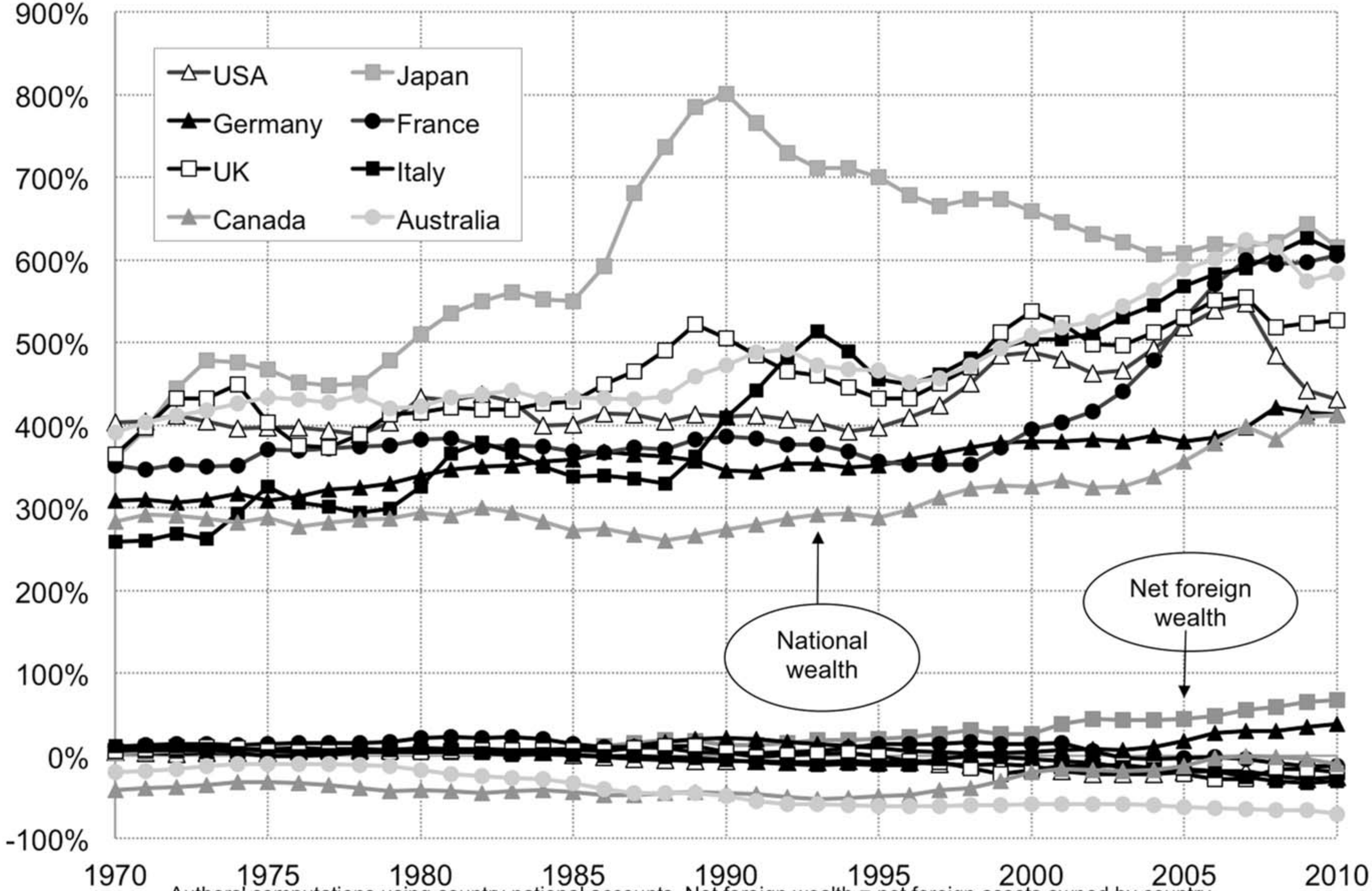
Robust Pattern of Positive Capital Gains on National Wealth

	National wealth-national income ratios		Decomposition of 1970-2010 wealth growth rate		
			Real growth rate of national wealth	Savings-induced wealth growth rate	Capital-gains-induced wealth growth rate
	β (1970)	β (2010)	g_w	$g_{ws} = s/β$	q
U.S.	404%	431%	3.0%	2.1% ***72%***	0.8% ***28%***
Japan	359%	616%	3.9%	3.1% ***78%***	0.8% ***22%***
Germany	313%	416%	2.7%	3.1% ***114%***	-0.4% ***-14%***
France	351%	605%	3.6%	2.7% ***75%***	0.9% ***25%***
U.K.	346%	523%	3.3%	1.5% ***45%***	1.8% ***55%***
Italy	259%	609%	4.1%	2.6% ***63%***	1.5% ***37%***
Canada	284%	412%	3.8%	3.4% ***89%***	0.4% ***11%***
Australia	391%	584%	4.2%	2.5% ***61%***	1.6% ***39%***

Pattern of Positive Capital Gains on National Wealth Largely Robust to Inclusion of R&D



National vs. Foreign Wealth, 1970-2010
(% National Income)



Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors)

The Role of Foreign Wealth Accumulation in Rising β

	National wealth / national income ratio (1970)		National wealth / national income ratio (2010)		Rise in national wealth / national income ratio (1970-2010)	
	incl. Domestic capital	incl. Foreign wealth	incl. Domestic capital	incl. Foreign wealth	incl. Domestic capital	incl. Foreign wealth
U.S.	**404%**		**431%**		**27%**	
	399%	4%	456%	-25%	57%	-30%
Japan	**359%**		**616%**		**256%**	
	356%	3%	548%	67%	192%	64%
Germany	**313%**		**416%**		**102%**	
	305%	8%	377%	39%	71%	31%
France	**351%**		**605%**		**254%**	
	340%	11%	618%	-13%	278%	-24%
U.K.	**365%**		**527%**		**163%**	
	359%	6%	548%	-20%	189%	-26%
Italy	**259%**		**609%**		**350%**	
	247%	12%	640%	-31%	392%	-42%
Canada	**284%**		**412%**		**128%**	
	325%	-41%	422%	-10%	97%	31%
Australia	**391%**		**584%**		**194%**	
	410%	-20%	655%	-70%	244%	-50%

Housing Has Played an Important Role in Many But Not All Countries

	Domestic capital / national income ratio (1970)			Domestic capital / national income ratio (2010)			Rise in domestic capital / national income ratio (1970-2010)		
	Total	incl. Housing	incl. Other domestic capital	Total	incl. Housing	incl. Other domestic capital	Total	incl. Housing	incl. Other domestic capital
U.S.	**399%**	142%	257%	**456%**	182%	274%	**57%**	41%	17%
Japan	**356%**	131%	225%	**548%**	220%	328%	**192%**	89%	103%
Germany	**305%**	129%	177%	**377%**	241%	136%	**71%**	112%	-41%
France	**340%**	104%	236%	**618%**	371%	247%	**278%**	267%	11%
U.K.	**359%**	98%	261%	**548%**	300%	248%	**189%**	202%	-13%
Italy	**247%**	107%	141%	**640%**	386%	254%	**392%**	279%	113%
Canada	**325%**	108%	217%	**422%**	208%	213%	**97%**	101%	-4%
Australia	**410%**	172%	239%	**655%**	364%	291%	**244%**	193%	52%

2. The return of inherited wealth

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

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

- Modigliani life-cycle theory: people save for their old days and die with zero wealth, so that inheritance flows are small

- However the Modigliani story happens to be partly wrong (except in the 1950s-60s, when there's not much left to inherit…): pension wealth is a limited part of wealth (<5% in France… but 20% in the UK)
- Bequest flow-national income ratio **B/Y = μ m W/Y**

(with m = mortality rate, μ = relative wealth of decedents)

(see « On the long run evolution of inheritance.. », QJE'11)

- B/Y has almost returned to 1910 level, both because of W/Y and of μ
- Dynastic model: μ = (D-A)/H, m=1/(D-A), so that μ m = 1/H

and B/Y = β/H

(A = adulthood = 20, H = parenthood = 30, D =death = 60-80)

- General saving model: with g low & r>g, B/Y → β/H

→ with β=600% & H=generation length=30 years, then B/Y≈20%, i.e. annual inheritance flow ≈ 20% national income

Figure 10: Steady-state cross-sectional age-wealth profile in the dynastic model with demographic noise

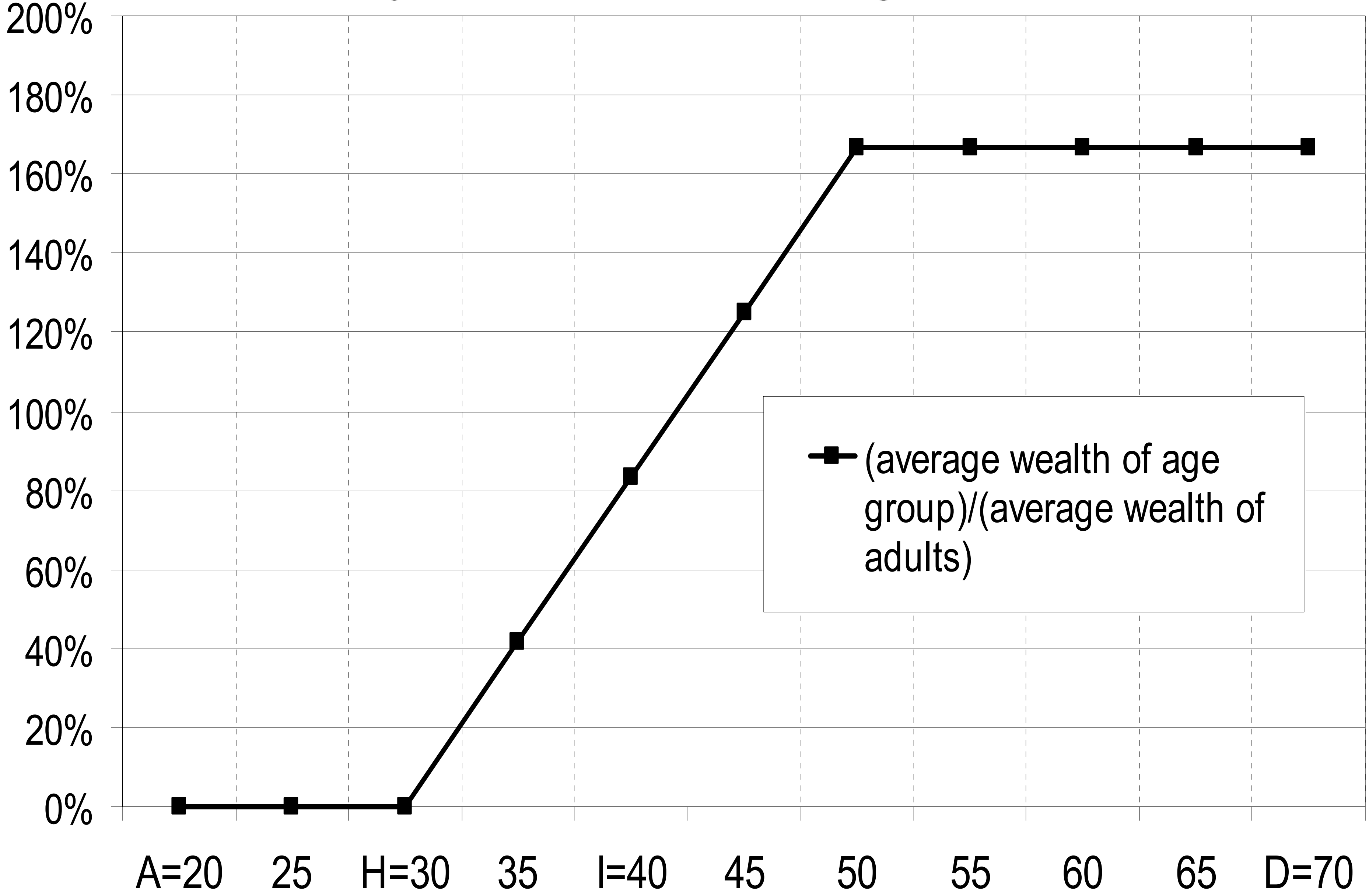


Figure 8: The ratio between average wealth of decedents and average wealth of the living in France 1820-2008

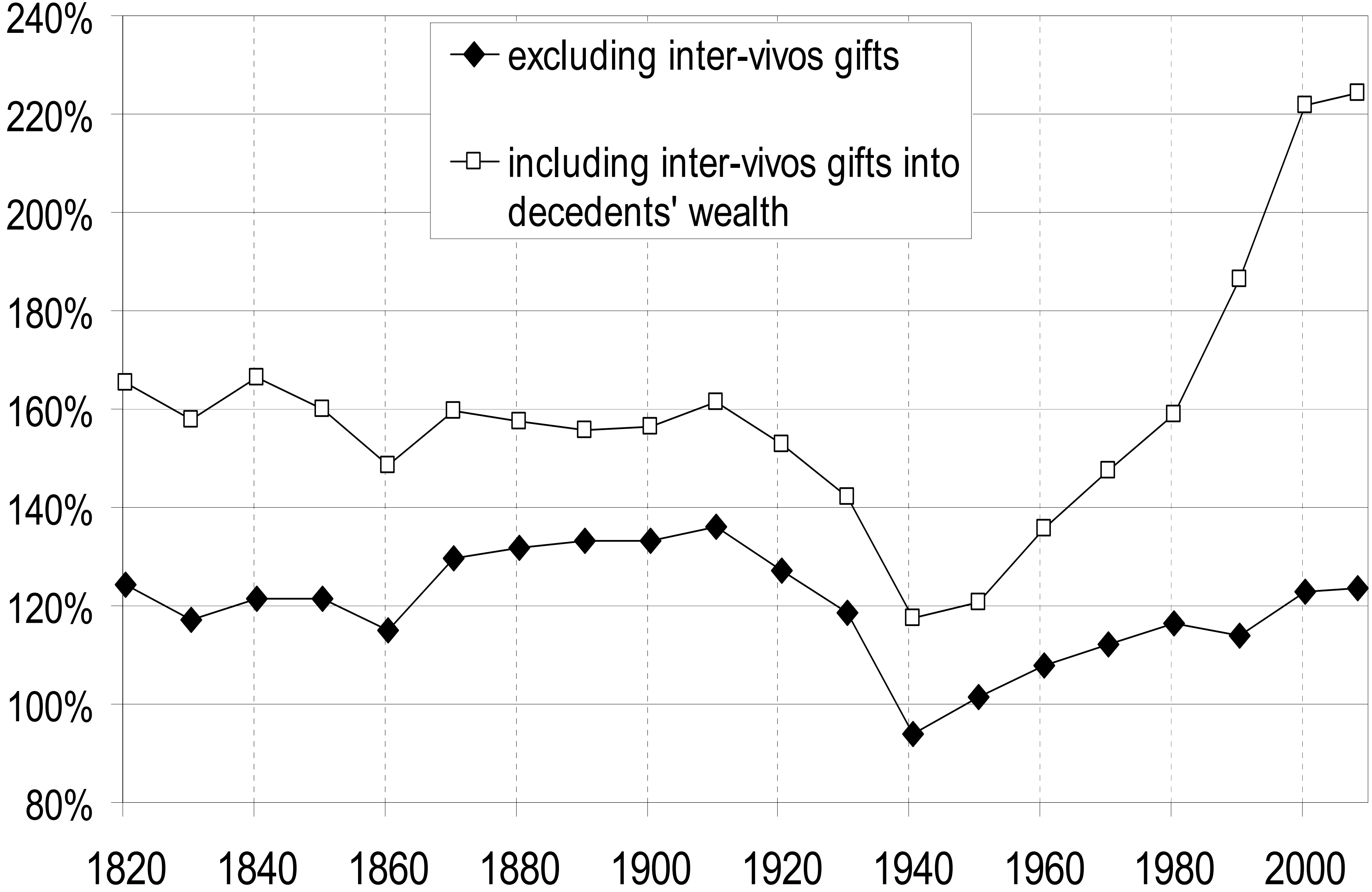


Figure 9: Observed vs simulated inheritance flow B/Y, France 1820-2100

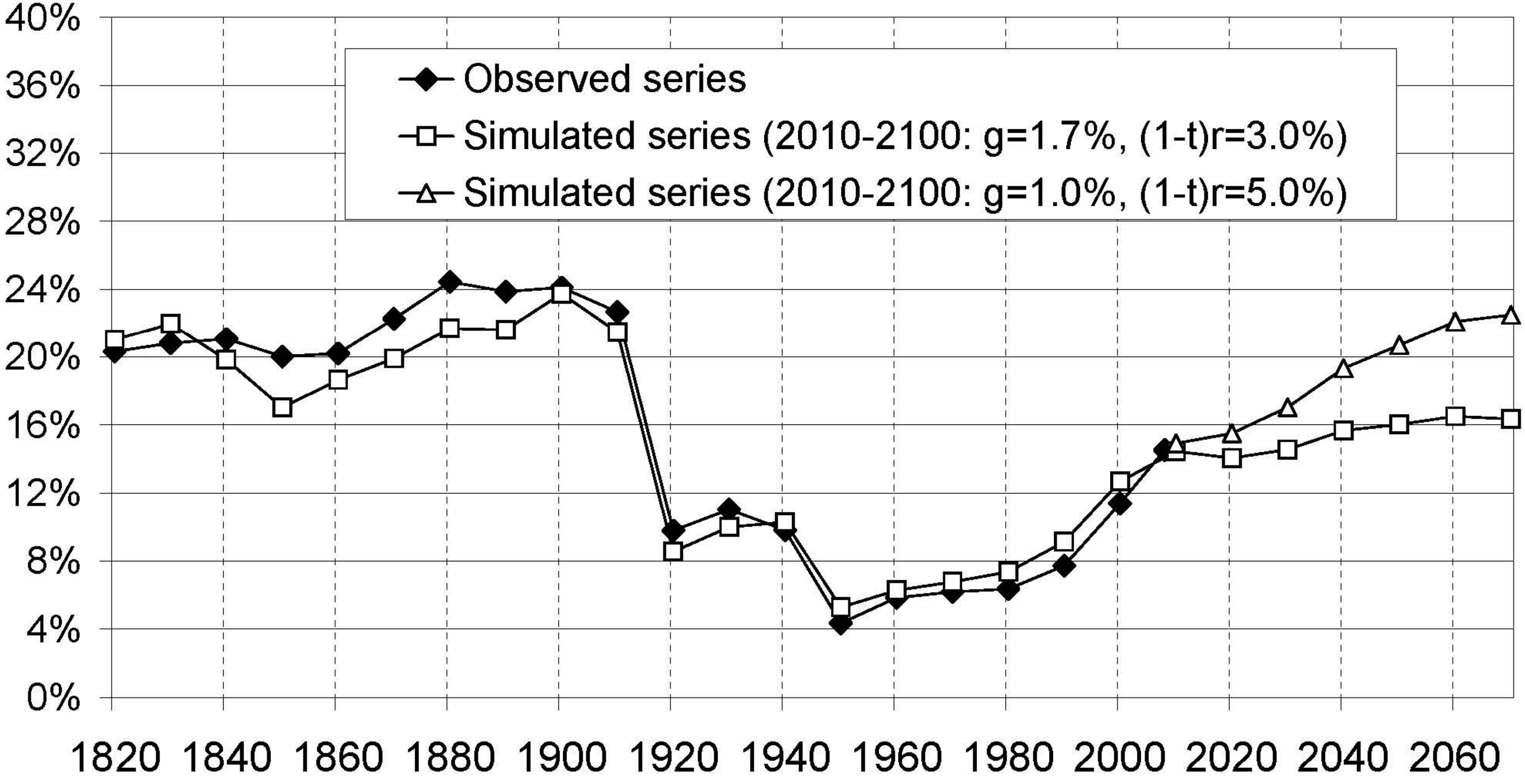
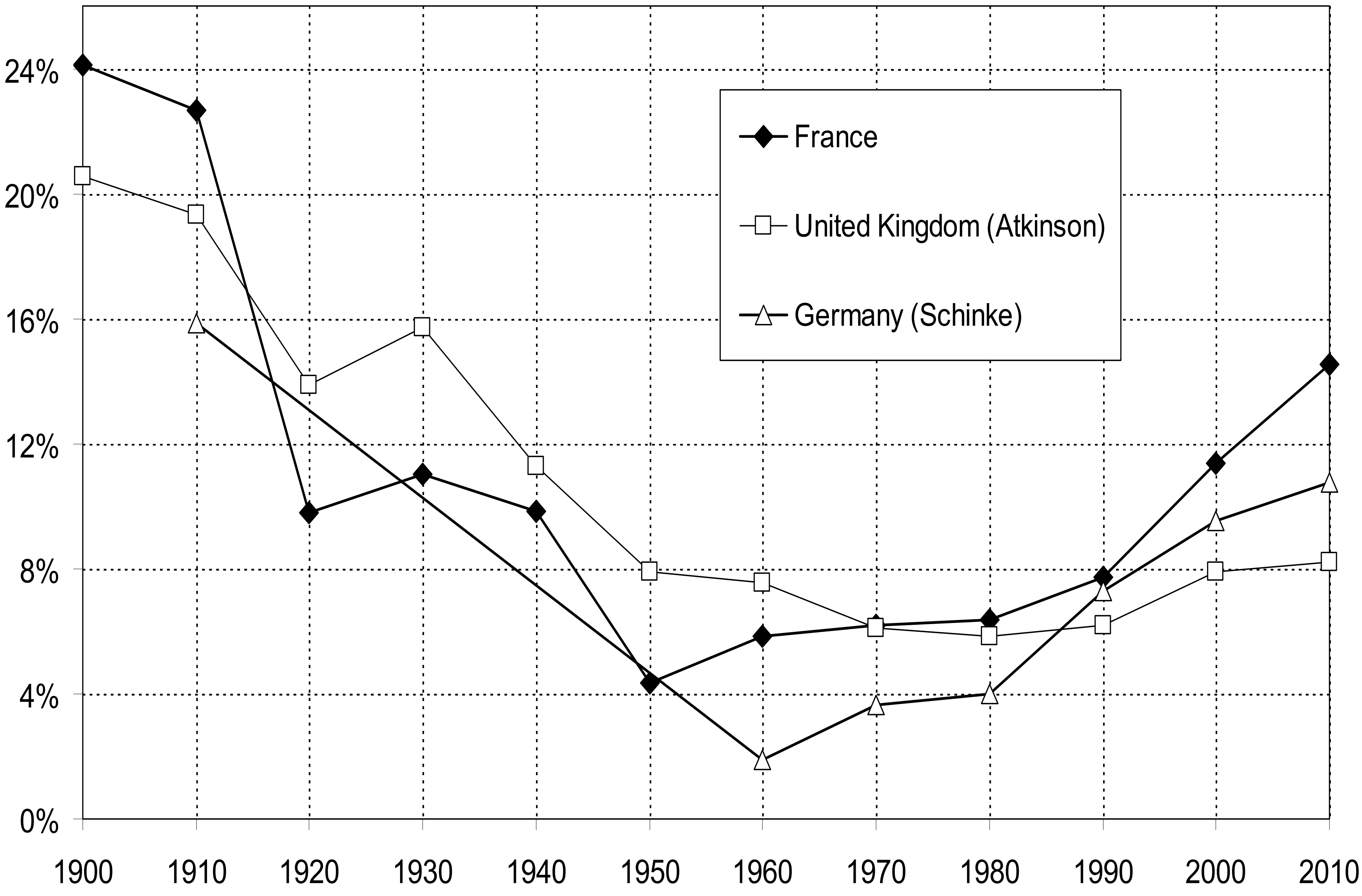


Figure 11.12. The inheritance flow in Europe 1900-2010



The share of inherited wealth in total wealth

- Modigliani AER 1986, JEP 1988: inheritance = 20% of total U.S. wealth
- Kotlikoff-Summers JPE 1981, JEP 1988: inheritance = 80% of total U.S. wealth
- Three problems with this controversy: - Bad data

- **We do not live in a stationary world: life-cycle wealth was much more important in the 1950s-1970s than it is today**
- We do not live in a representative-agent world → new definition of inherited share: **partially capitalized inheritance**

  (inheritance capitalized in the limit of today's inheritor wealth)

→ **our findings show that the share of inherited wealth has changed a lot over time, but that it is generally much closer to Kotlikoff-Summers (80%) than Modigliani (20%)**

Figure S11.3. The share of inherited wealth in aggregate wealth, France 1850-2100 (2010-2100: g=1,7%, r=3,0%)

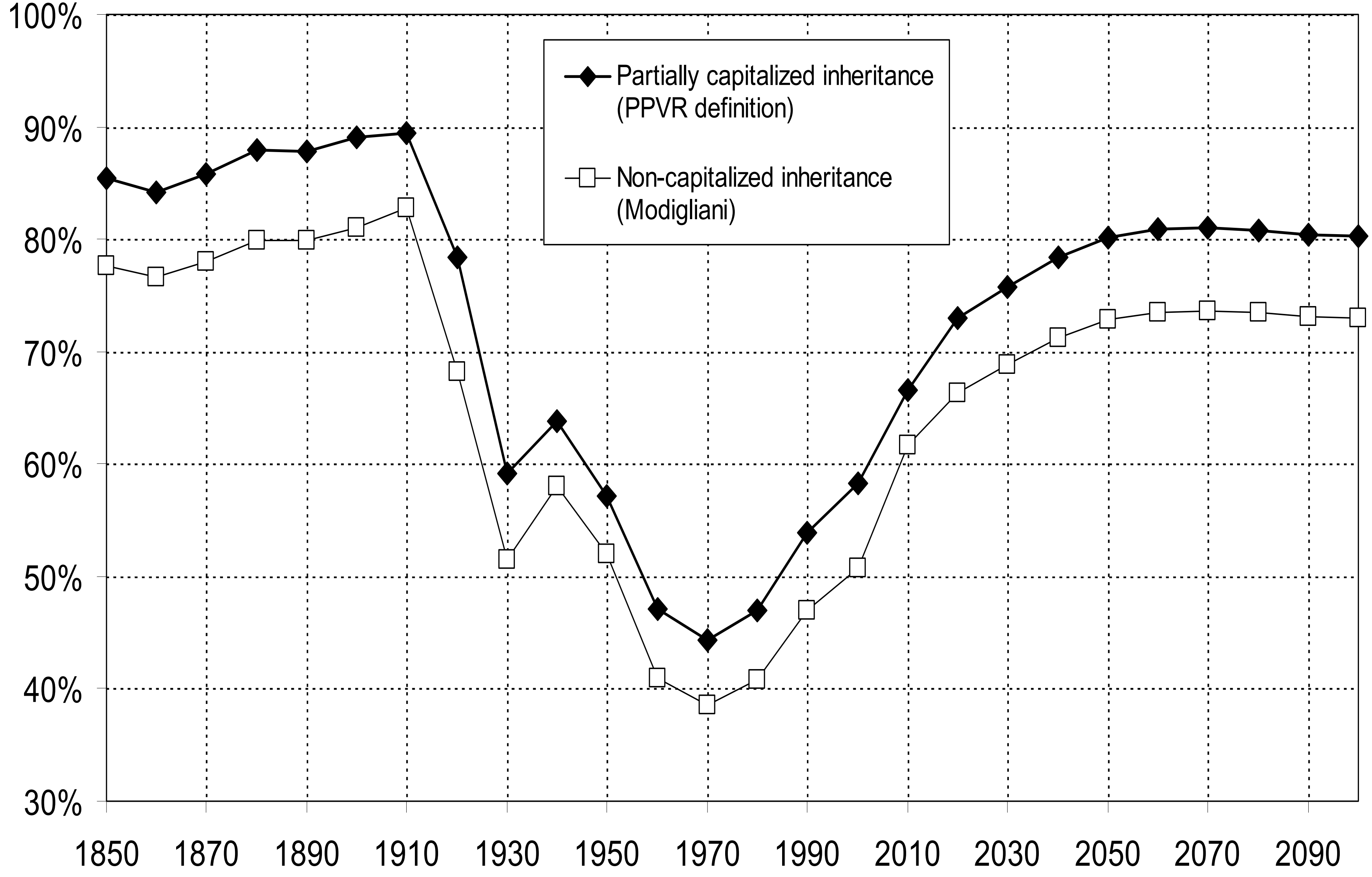
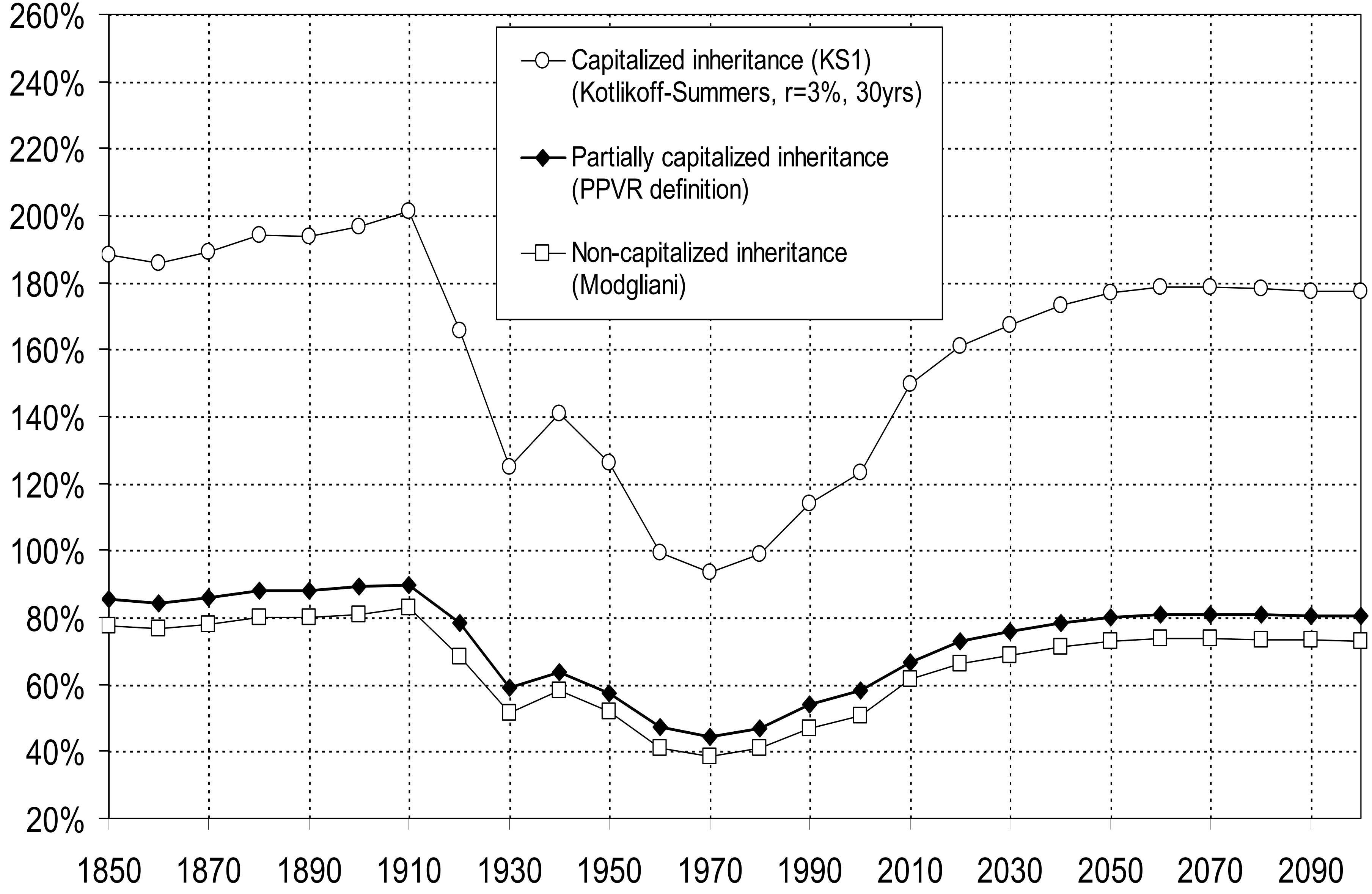


Figure S11.4. The share of inherited wealth in aggregate wealth, France 1850-2100 (2010-2100: g=1,7%, r=3,0%)



Back to distributional analysis: macro ratios determine who is the dominant social class

- 19^C: top successors dominate top labor earners

→ rentier society (Balzac, Jane Austen, etc.)

- For cohorts born in1910s-1950s, inheritance did not matter too much → labor-based, meritocratic society
- But for cohorts born in the 1970s-1980s & after, inheritance matters a lot

→ 21^c class structure will be intermediate between 19^c rentier society than to 20^c meritocratic society – and possibly closer to the former (more unequal in some dimens., less in others)

- The rise of human capital & meritocracy was an illusion .. especially with a labor-based tax system

Table 3: Intra-cohort distributions of labor income and inheritance, France, 1910 vs 2010

Shares in aggregate labor income or inherited wealth	Labor income 1910-2010	Inherited wealth 1910	Inherited wealth 2010
Top 10% "Upper Class"	**30%**	**90%**	**60%**
incl. Top 1% "Very Rich"	*6%*	*50%*	*25%*
incl. Other 9% "Rich"	*24%*	*40%*	*35%*
Middle 40% "Middle Class"	**40%**	**5%**	**35%**
Bottom 50% "Poor"	**30%**	**5%**	**5%**

Figure 15: Cohort fraction inheriting more than bottom 50% lifetime labor resources (cohorts born in 1820-2020)

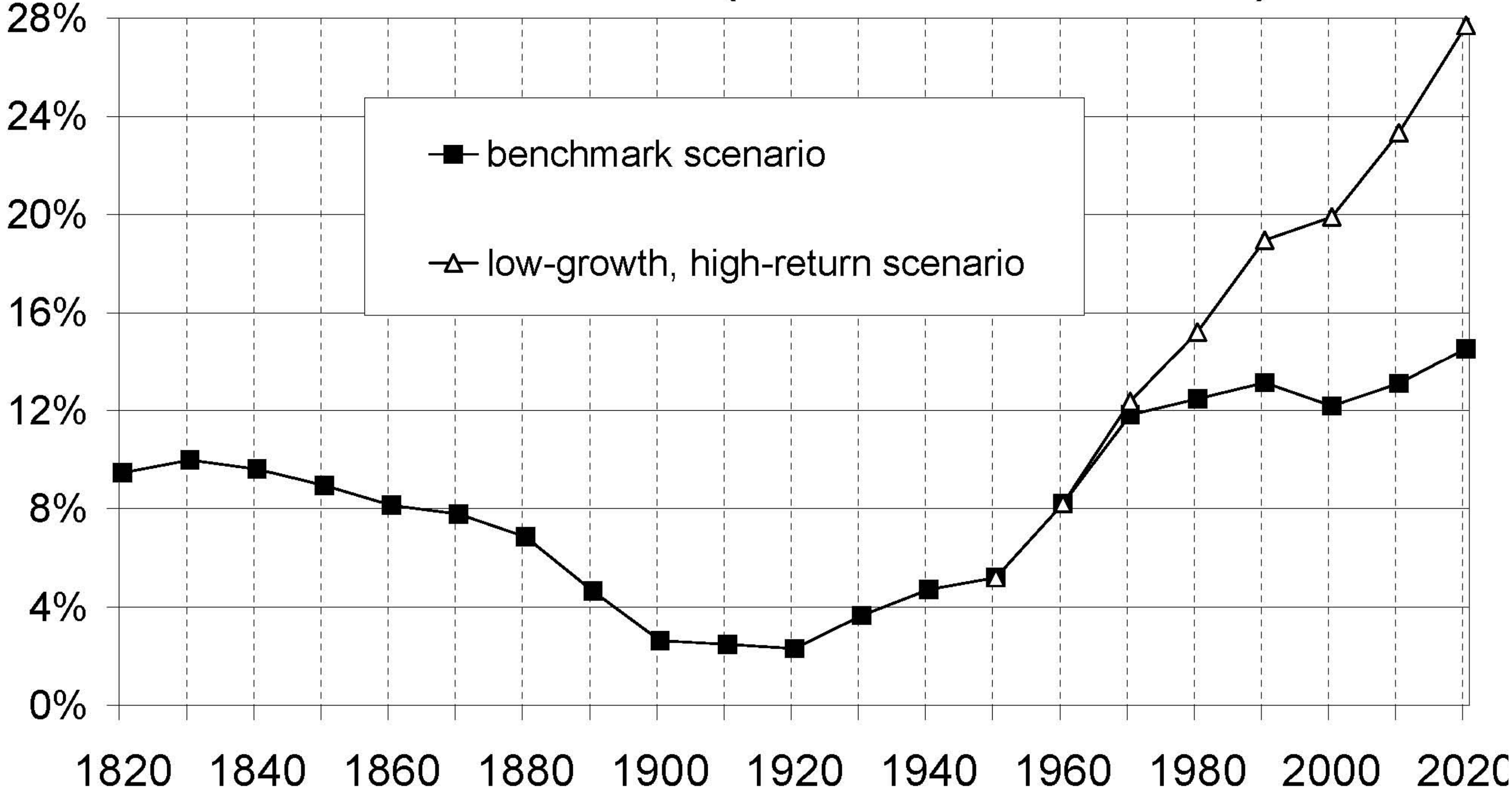
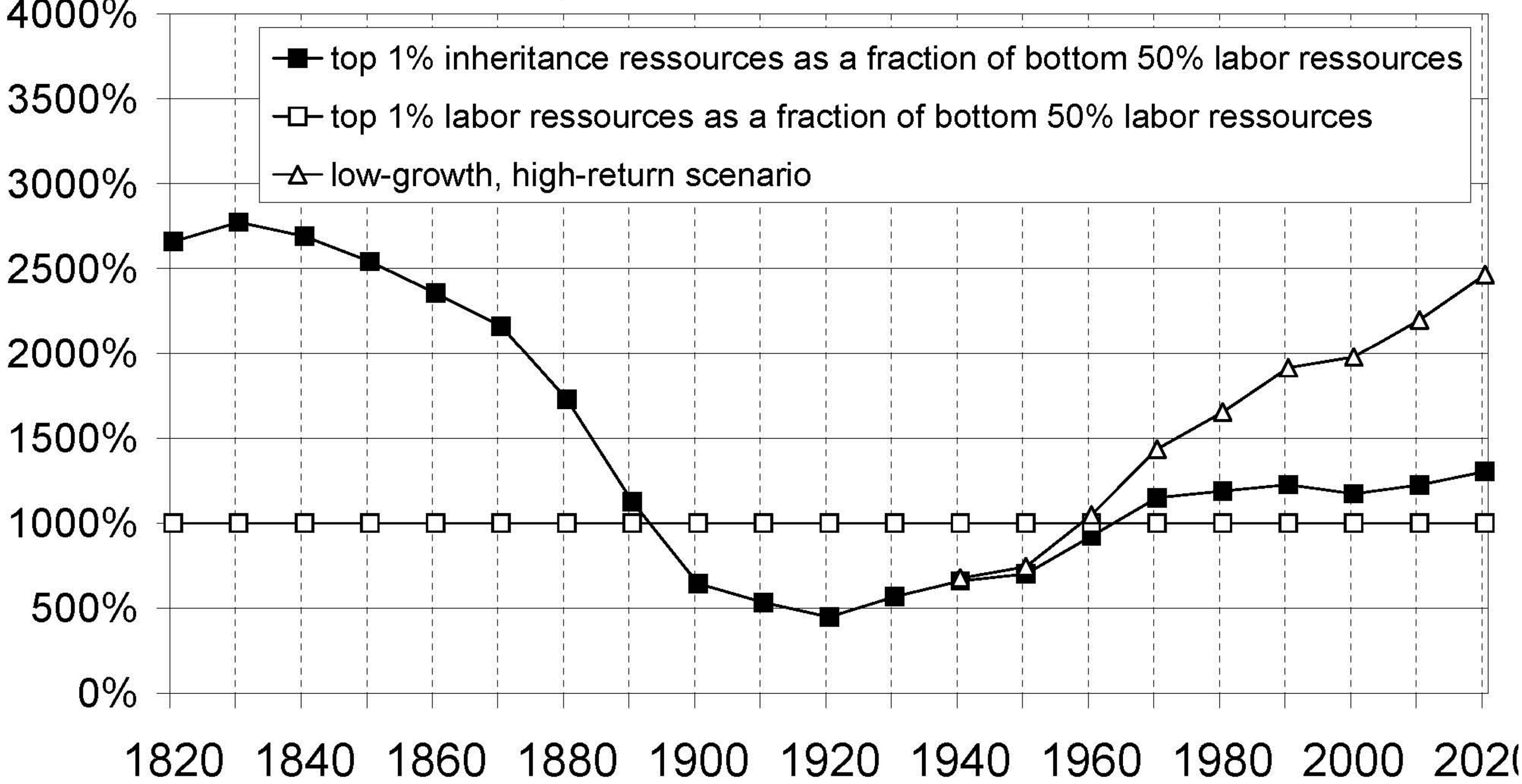


Figure 14: Top 1% successors vs top 1% labor income earners (cohorts born in 1820-2020)



End of Lecture 2: the consequences of r > g

- r > g implies that wealth coming from the past is capitalized faster than growth

  → return of high inherited wealth

- r > g also implies higher concentration of wealth: in any dynamic model with stochastic random shocks (taste, productivity, return,.), the steady-state (inverted) Pareto coefficient is an increasing function of r – g
- Intuition: the higher r – g, the more strongly wealth shocks get amplified over time

  → if r - g very large in 21c (low growth, high global return to wealth, zero k tax), wealth inequality back to 19c levels?

  (Forbes billionnaires grow at 7-8%/year: r > g)

Figure 10.10. World rate of return vs growth rate, 0-2200

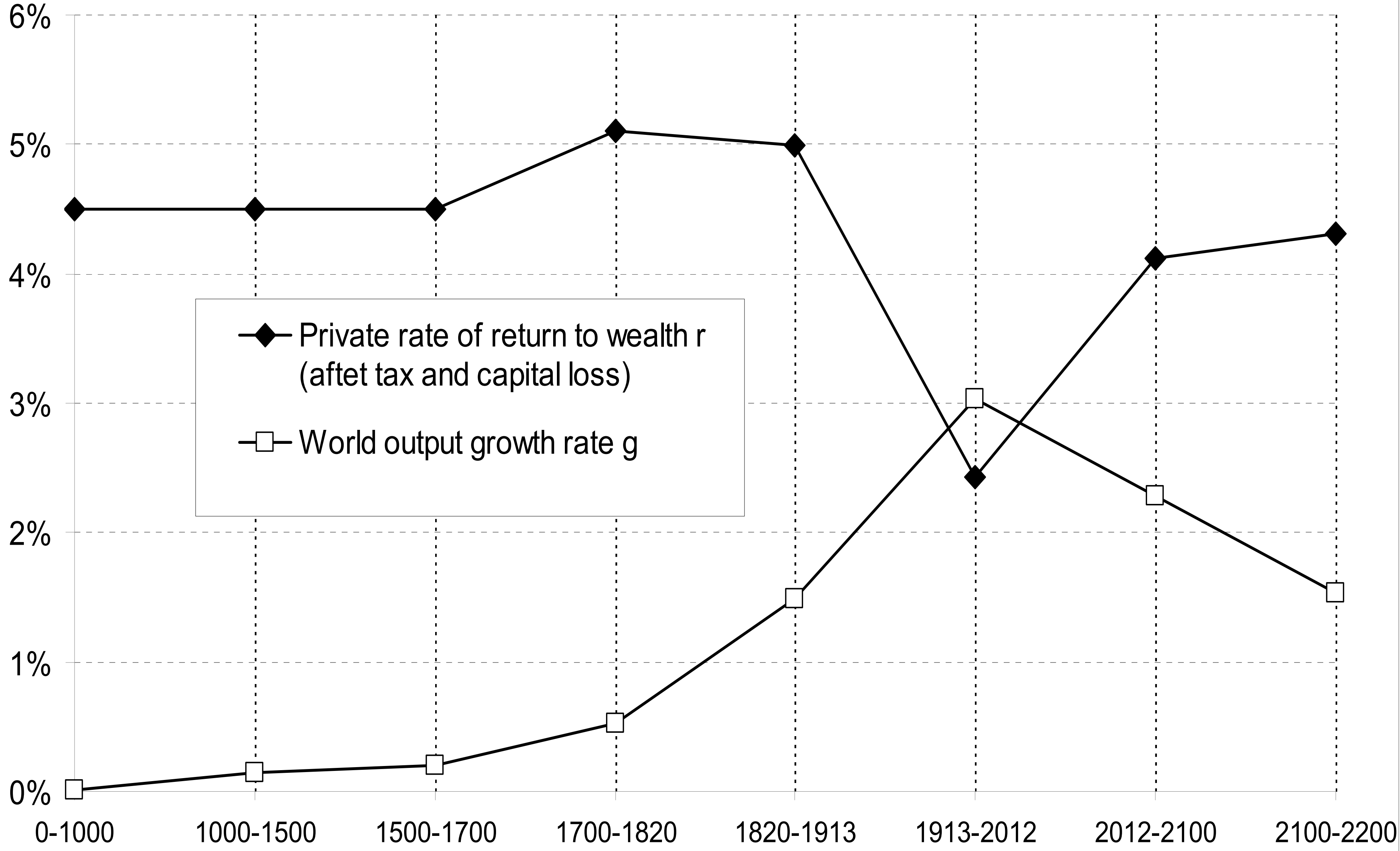


Figure 10.1. Wealth inequality in France, 1810-2010

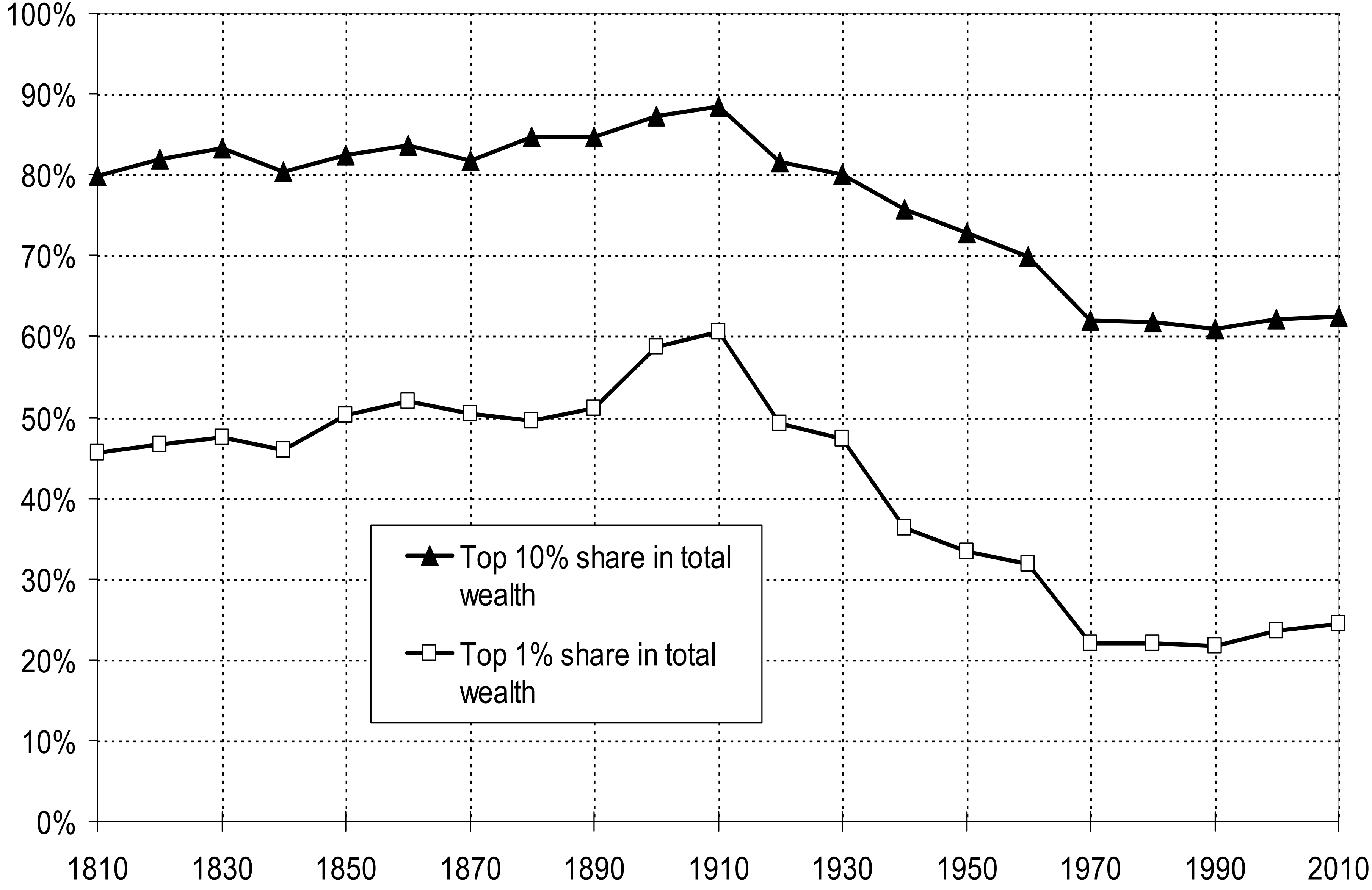


Figure 10.2. Wealth inequality: Paris vs. France, 1810-2010

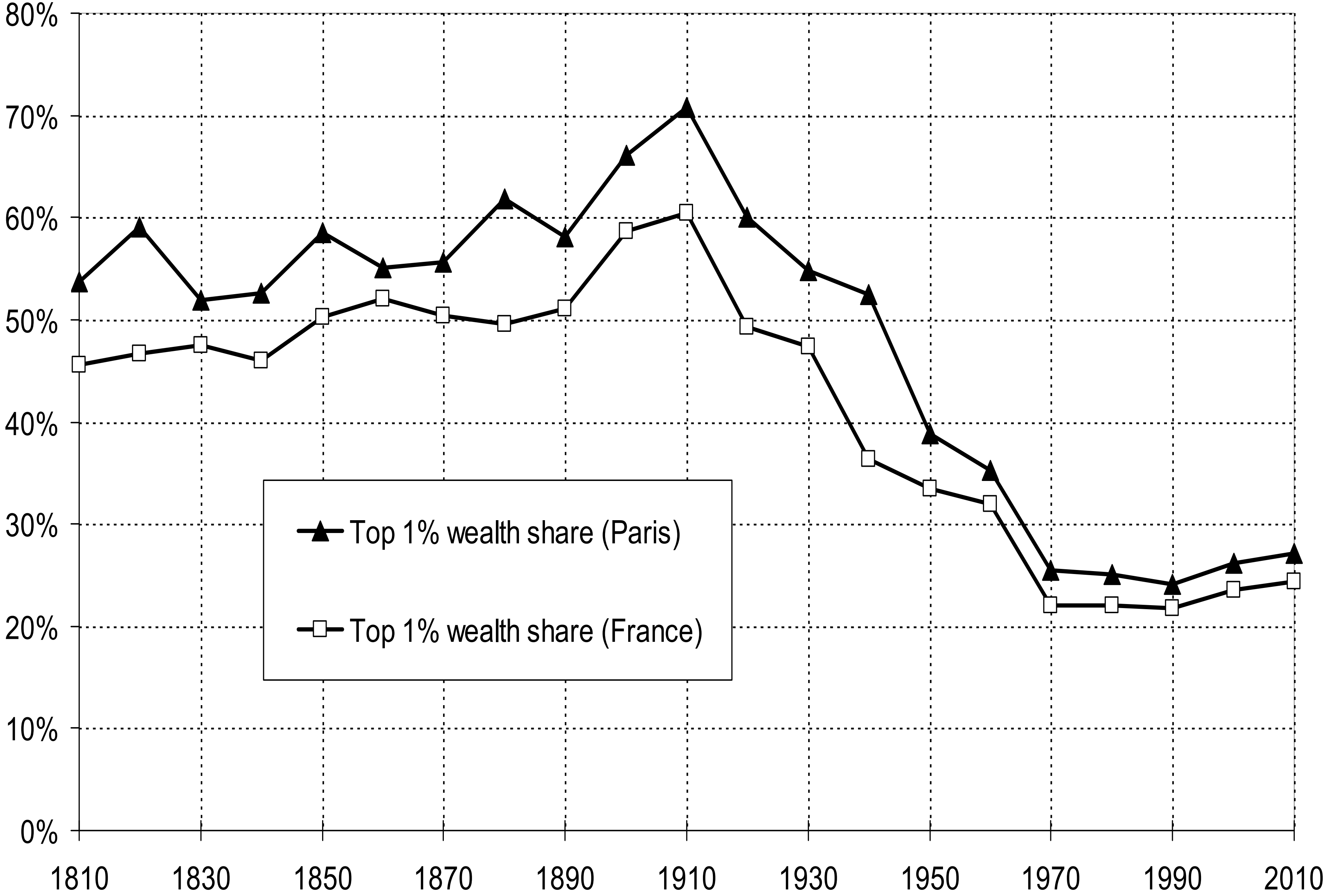


Figure 10.3. Wealth inequality in the UK, 1810-2010

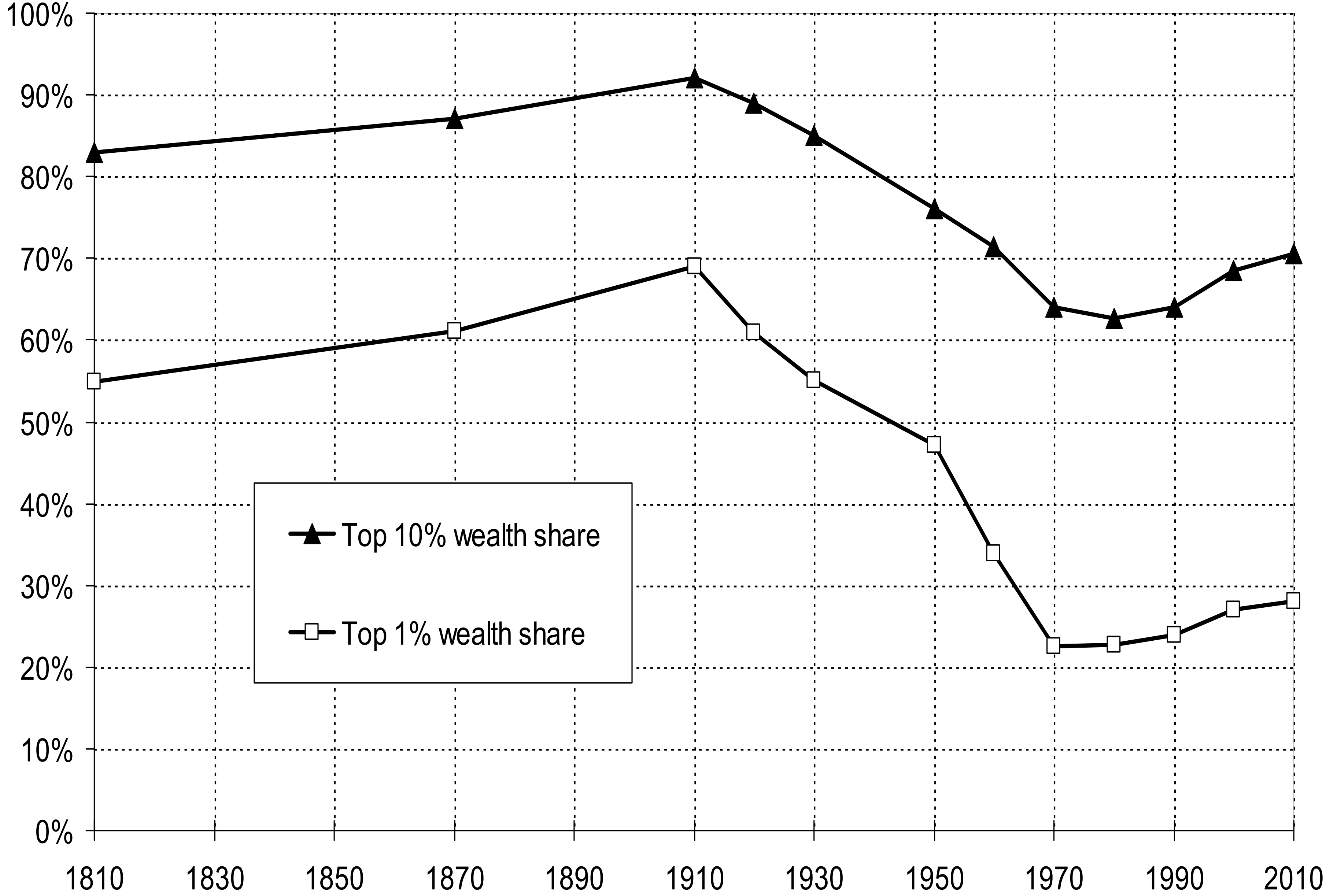


Figure 10.4. Wealth inequality in Sweden, 1810-2010 (Roine-Waldenstrom)

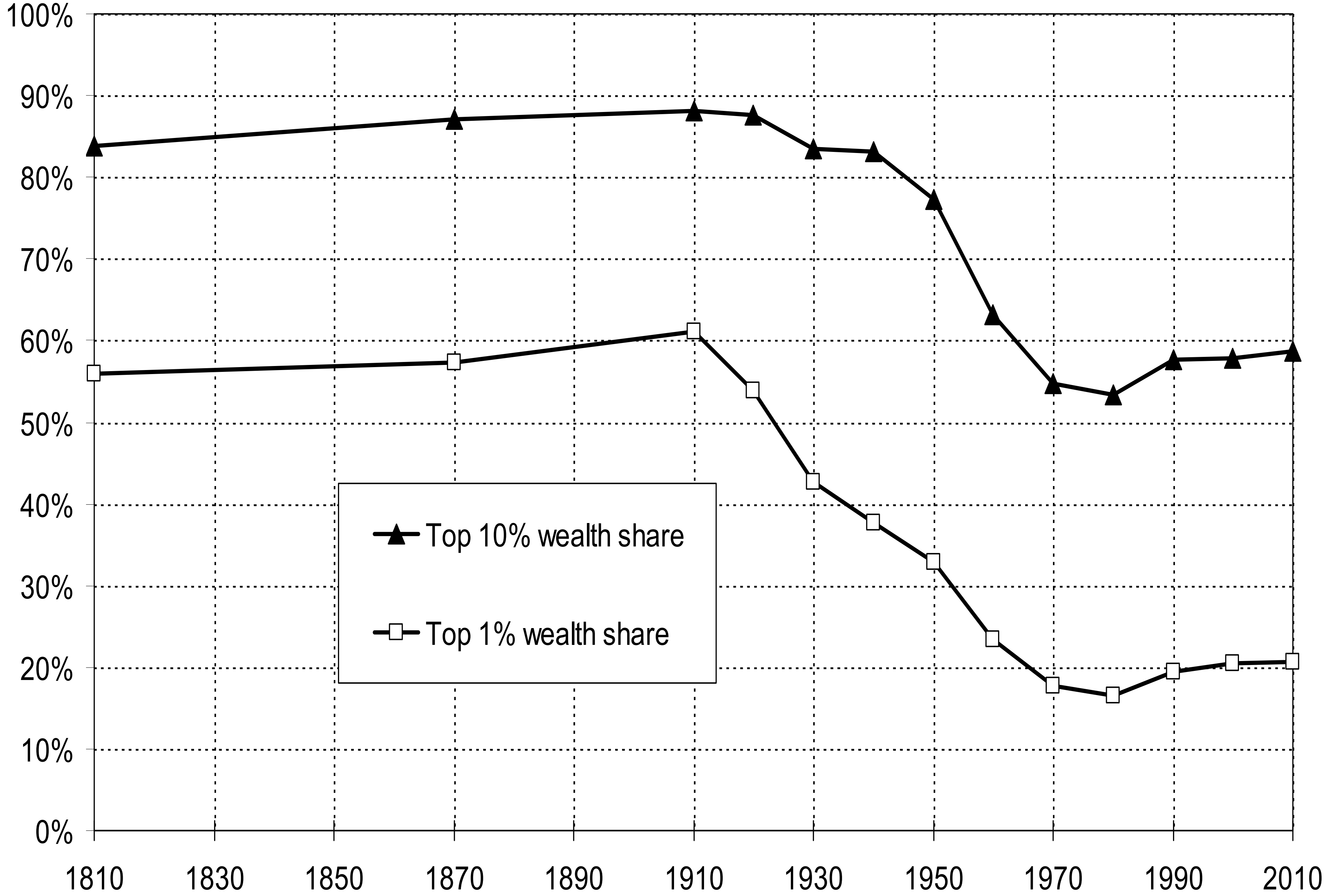
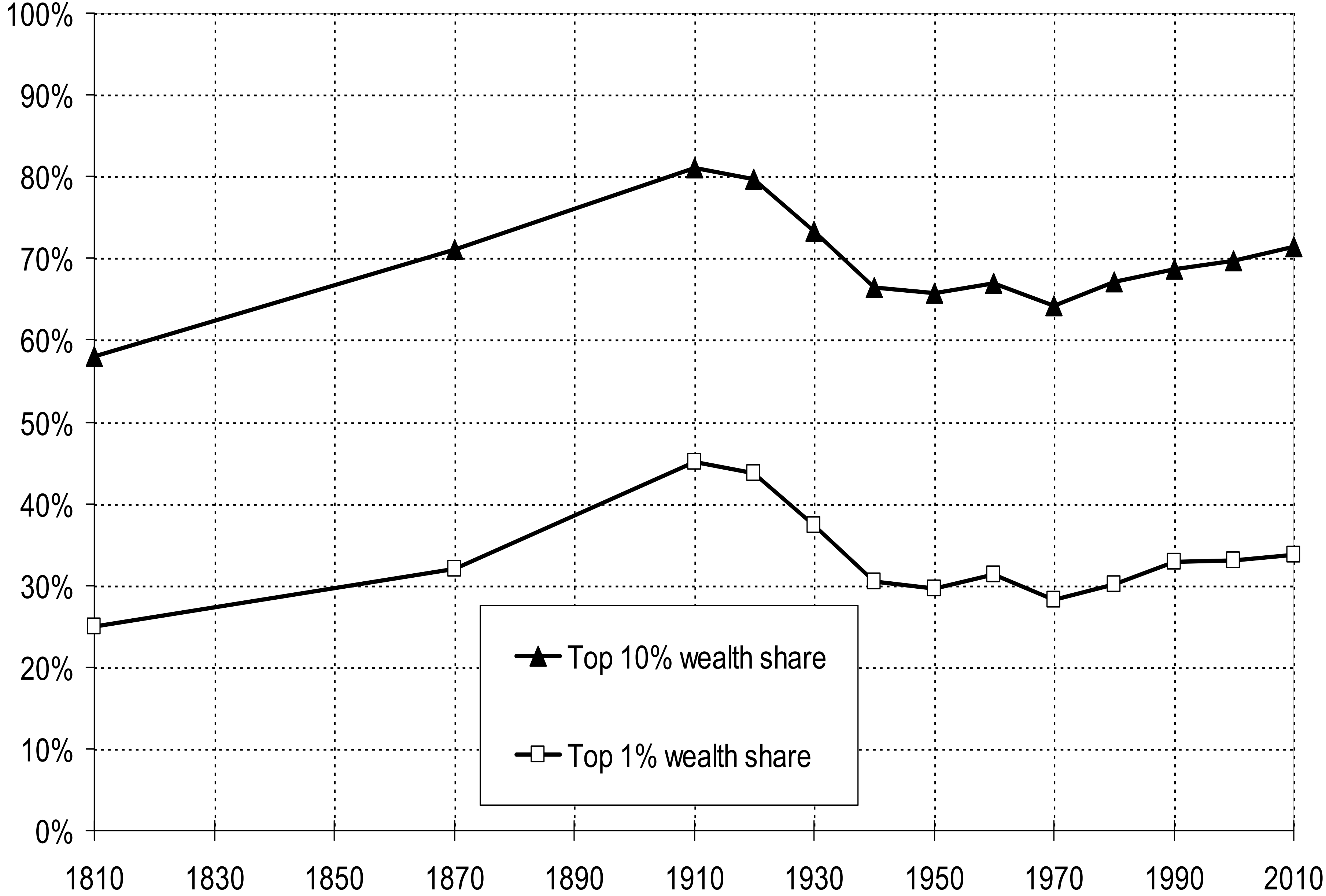


Figure 10.5. Wealth inequality in the US, 1810-2010



Wealth, Inequality & Taxation

Thomas Piketty
Paris School of Economics

Berlin FU, June 14th 2013

Lecture 3: Implications for optimal taxation

The optimal taxation of wealth & inheritance

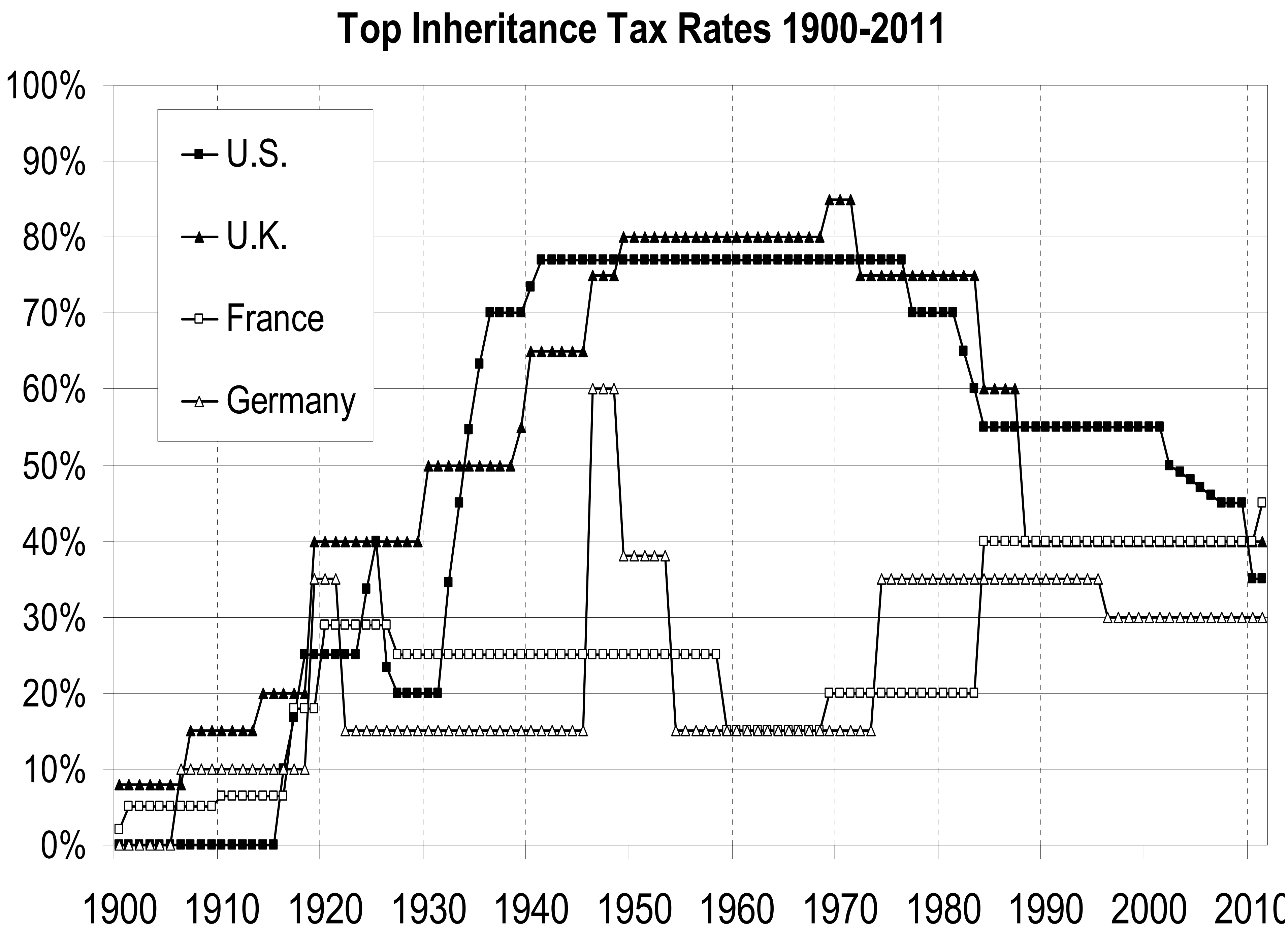
- Summary of main results from Piketty-Saez, « A Theory of Optimal Inheritance Taxation », Econometrica 2013
- **Result 1:Optimal Inheritance Tax Formula** (macro version, NBER WP'12)
- Simple formula for optimal bequest tax rate expressed in terms of estimable macro parameters:

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

with: b_y = macro bequest flow, e_B = elasticity, s_{b0} =bequest taste
→ τ_B increases with b_y and decreases with e_B and s_{b0}

- For realistic parameters: τ_B=50-60% (or more..or less...)

→ **our theory can account for the variety of observed top bequest tax rates (30%-80%)**



Top Inheritance Tax Rates 1900-2011
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
U.S.
U.K.
France
Germany

- **Result 2: Optimal Capital Tax Mix** (NBER WP'12)

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

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

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

(& why high top inheritance and top capital income tax rates often come together, e.g. US-UK 1930s-1980s)

Optimal inheritance tax formulas

- Agent i in cohort t (1 cohort =1 period =H years, H≈30)
- Receives bequest $b_{ti}=z_i b_t$ at beginning of period t
- Works during period t
- Receives labor income $y_{Lti}=\theta_i y_{Lt}$ at end of period t
- Consumes c_{ti} & leaves bequest b_{t+1i} so as to maximize:

$$\mathbf{Max}\ V_i(c_{ti}, b_{t+1i}, \underline{b}_{t+1i})$$
$$\text{s.c. } c_{ti} + b_{t+1i} \leq (1-\tau_B) b_{ti} e^{rH} + (1-\tau_L) y_{Lti}$$

With: b_{t+1i} = end-of-life wealth (wealth loving)

$\underline{b}_{t+1i}=(1-\tau_B) b_{t+1i} e^{rH}$ = net-of-tax capitalized bequest left (bequest loving)

τ_B=bequest tax rate, τ_L=labor income tax rate

$V_i()$ homogeneous of degree one (to allow for growth)

- **Special case: Cobb-Douglas preferences**:

$V_i(c_{ti},b_{t+1i},\underline{b}_{t+1i}) = c_{ti}^{1-s_i}\, b_{t+1i}^{s_{wi}}\, \underline{b}_{t+1i}^{s_{bi}}$ (with $s_i = s_{wi}+s_{bi}$)

$\rightarrow \quad b_{t+1i} = s_i\,[(1-\tau_B)z_i b_t e^{rH} + (1-\tau_L)\theta_i y_{Lt}] = s_i\,\underline{y}_{ti}$

- **General preferences: $V_i()$ homogenous of degree one:**

Max $V_i() \rightarrow$ FOC $V_{ci} = V_{wi} + (1-\tau_B)e^{rH} V_{bi}$

All choices are linear in total life-time income $\underline{y}_{ti}$

$\rightarrow \quad b_{t+1i} = s_i\,\underline{y}_{ti}$

Define $s_{bi} = s_i\,(1-\tau_B)e^{rH}\,V_{bi}/V_{ci}$

Same as Cobb-Douglas but s_i and s_{bi} now depend on $1-\tau_B$

(income and substitution effects no longer offset each other)

- We allow for any distribution and any ergodic random process for taste shocks s_i and productivity shocks θ_i

$\rightarrow$ **endogenous dynamics of the joint distribution $\Psi_t(z,\theta)$ of normalized inheritance z and productivity θ**

- **Macro side**: open economy with exogenous return r, domestic output $Y_t=K_t^{\alpha}L_t^{1-\alpha}$, with $L_t=L_0e^{gHt}$ and g=exogenous productivity growth rate

(inelastic labor supply $l_{ti}=1$, fixed population size = 1)

- **Period by period government budget constraint**:

$$\tau_L Y_{Lt} + \tau_B B_t e^{rH} = \tau Y_t$$

I.e. $$\boldsymbol{\tau_L(1-\alpha) + \tau_B b_{yt} = \tau}$$

With τ = exogenous tax revenue requirement (e.g. τ=30%)

$b_{yt} = e^{rH}B_t/Y_t$ = capitalized inheritance-output ratio

- **Government objective:**

We take τ≥0 as given and solve for the optimal tax mix τ_L,τ_B maximizing steady-state SWF = $\int \omega_{z\theta}V_{z\theta}\ d\Psi(z,\theta)$

with Ψ(z,θ) = steady-state distribution of z and θ

$\omega_{z\theta}$ = social welfare weights

Equivalence between τ_B and τ_K

- In basic model, tax τ_B on inheritance is equivalent to tax τ_K on annual return r to capital as:

  $\underline{b}_{ti} = (1-\tau_B) b_{ti} e^{rH} = b_{ti} e^{(1-\tau_K)rH}$, i.e. $\tau_K = -\log(1-\tau_B)/rH$

- E.g. with r=5% and H=30, τ_B=25% ↔ τ_K=19%, τ_B=50% ↔ τ_K=46%, τ_B=75% ↔ τ_K=92%

- This equivalence no longer holds with

(a) tax enforcement constraints, or **(b)** life-cycle savings, or **(c)** uninsurable risk in $r=r_{ti}$

→ Optimal mix τ_B,τ_K then becomes an interesting question

- **Special case**: taste and productivity shocks s_i and θ_i are i.e. across and within periods (no memory)

$\rightarrow s = E(s_i \mid \theta_i, z_i) \rightarrow$ simple aggregate transition equation:

$$b_{t+1i} = s_i\,[(1-\tau_B) z_i b_t e^{rH} + (1-\tau_L)\theta_i y_{Lt}]$$

$$\rightarrow b_{t+1} = s\,[(1-\tau_B) b_t e^{rH} + (1-\tau_L) y_{Lt}]$$

Steady-state convergence: $b_{t+1} = b_t e^{gH}$

$$\rightarrow \qquad b_{yt} \rightarrow b_y = \frac{s(1-\tau-\alpha)e^{(r-g)H}}{1-se^{(r-g)H}}$$

- b_y increases with r-g (capitalization effect, Piketty QJE'11)
- If r-g=3%,τ=10%,H=30,α=30%,s=10% $\rightarrow$ b_y=20%
- If r-g=1%,τ=30%,H=30,α=30%,s=10% $\rightarrow$ b_y=6%

- **General case:** under adequate ergodicity assumptions for random processes s_i and θ_i :

Proposition 1 (unique steady-state): for given τ_B,τ_L, then as $t \to +\infty$, $b_{yt} \to b_y$ and $\Psi_t(z,\theta) \to \Psi(z,\theta)$

- Define: $$e_B = \frac{db_y}{d(1-\tau_B)} \frac{1-\tau_B}{b_y}$$

- e_B = elasticity of steady-state bequest flow with respect to net-of-bequest-tax rate $1-\tau_B$
- With $V_i()$ = Cobb-Douglas and i.i.d. shocks, $e_B = 0$
- For general preferences and shocks, $e_B>0$ (or <0)

$\to$ we take e_B as a free parameter

- Meritocratic rawlsian optimum, i.e. social optimum from the viewpoint of zero bequest receivers (z=0):

Proposition 2 (zero-receivers tax optimum)

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

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

- τ_B increases with b_y and decreases with e_B and s_{b0}
- If bequest taste $s_{b0}=0$, then $\tau_B = 1/(1+e_B)$

→ standard revenue-maximizing formula

- If $e_B \to +\infty$, then $\tau_B \to 0$: back to Chamley-Judd
- If $e_B=0$, then $\tau_B<1$ as long as $s_{b0}>0$
- I.e. zero receivers do not want to tax bequests at 100%, because they themselves want to leave bequests

→ **trade-off between taxing rich successors from my cohort vs taxing my own children**

Example 1: τ=30%, α=30%, s_{bo}=10%, e_B=0

- If b_y=20%, then τ_B=73% & τ_L=22%
- If b_y=15%, then τ_B=67% & τ_L=29%
- If b_y=10%, then τ_B=55% & τ_L=35%
- If b_y=5%, then τ_B=18% & τ_L=42%

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

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

With high b_y (low g), it's the opposite: it's worth taxing bequests, so as to reduce labor taxation and allow zero receivers to leave a bequest

Example 2: τ=30%, α=30%, s_{bo}=10%, b_y=15%

- If e_B=0, then τ_B=67% & τ_L=29%
- If e_B=0.2, then τ_B=56% & τ_L=31%
- If e_B=0.5, then τ_B=46% & τ_L=33%
- If e_B=1, then τ_B=35% & τ_L=35%

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

Kopczuk-Slemrod 2001: e_B=0.2 (US)

(French experiments with zero-children savers: e_B=0.1-0.2)

- **Optimal Inheritance Tax Formula (micro version, EMA'13)**
- The formula can be rewritten so as to be based solely upon estimable distributional parameters and upon r vs g :
- $\boldsymbol{\tau_B = (1 - Gb^*/Ry_L^*)/(1+e_B)}$

With: **b* =** average bequest left by zero-bequest receivers as a fraction of average bequest left

$\boldsymbol{y_L^*}$ **=** average labor income earned by zero-bequest receivers as a fraction of average labor income

G = generational growth rate, **R =** generational rate of return

- If e_B=0 & G=R, then $\boldsymbol{\tau_B = 1 - b^*/y_L^*}$ **(pure distribution effect)**

→ if b*=0.5 and y_L*=1, τ_B = 0.5 : if zero receivers have same labor income as rest of the pop and expect to leave 50% of average bequest, then it is optimal from their viewpoint to tax bequests at 50% rate

- If e_B=0 & b*=y_L*=1, then $\boldsymbol{\tau_B = 1 - G/R}$ **(fiscal Golden rule)**

→ if R →+∞, τ_B →1: zero receivers want to tax bequest at 100%, even if they plan to leave as much bequest as rest of the pop

Figure 1: Optimal linear inheritance tax rates, by percentile of bequest received (calibration of optimal tax formulas using 2010 micro data)

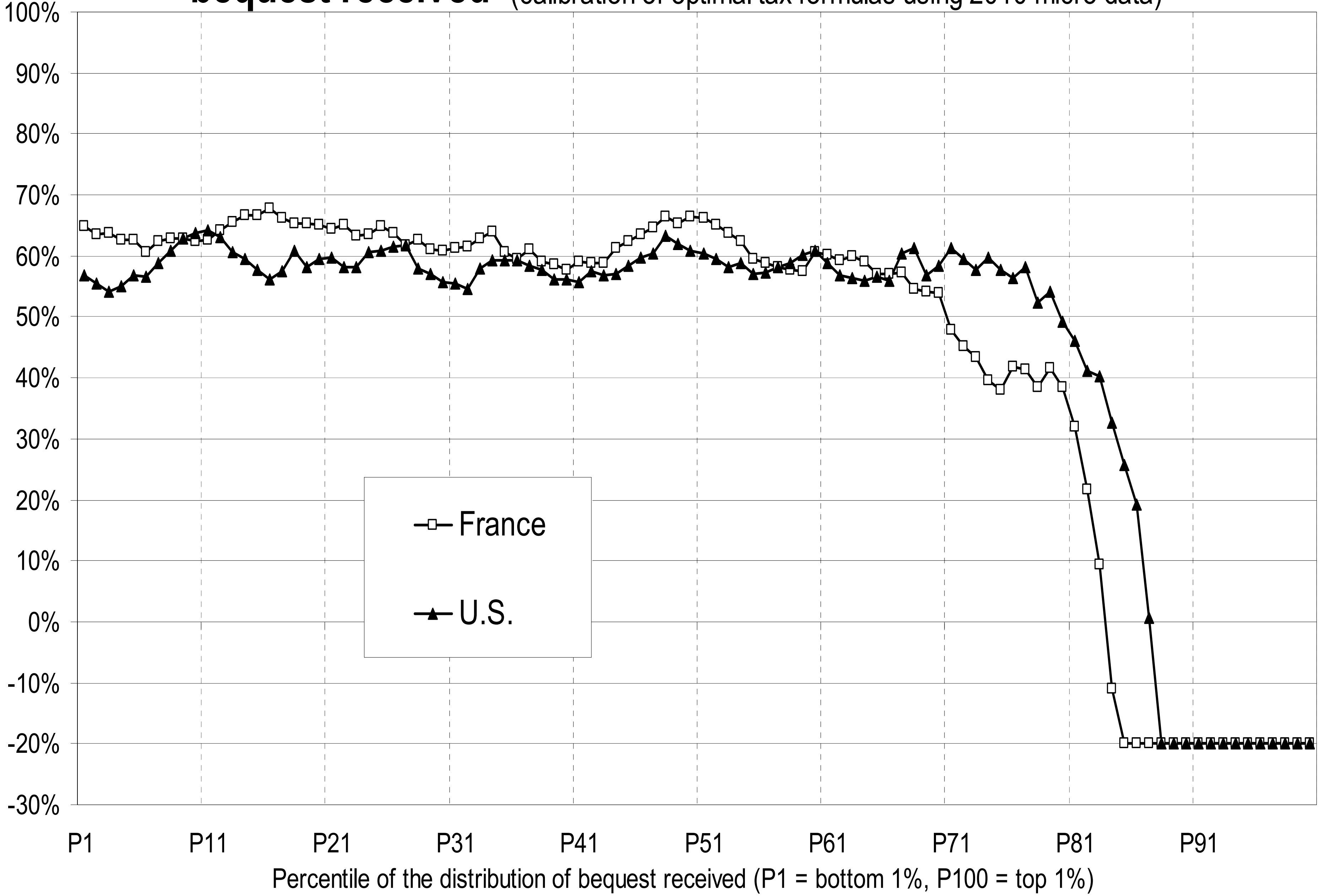
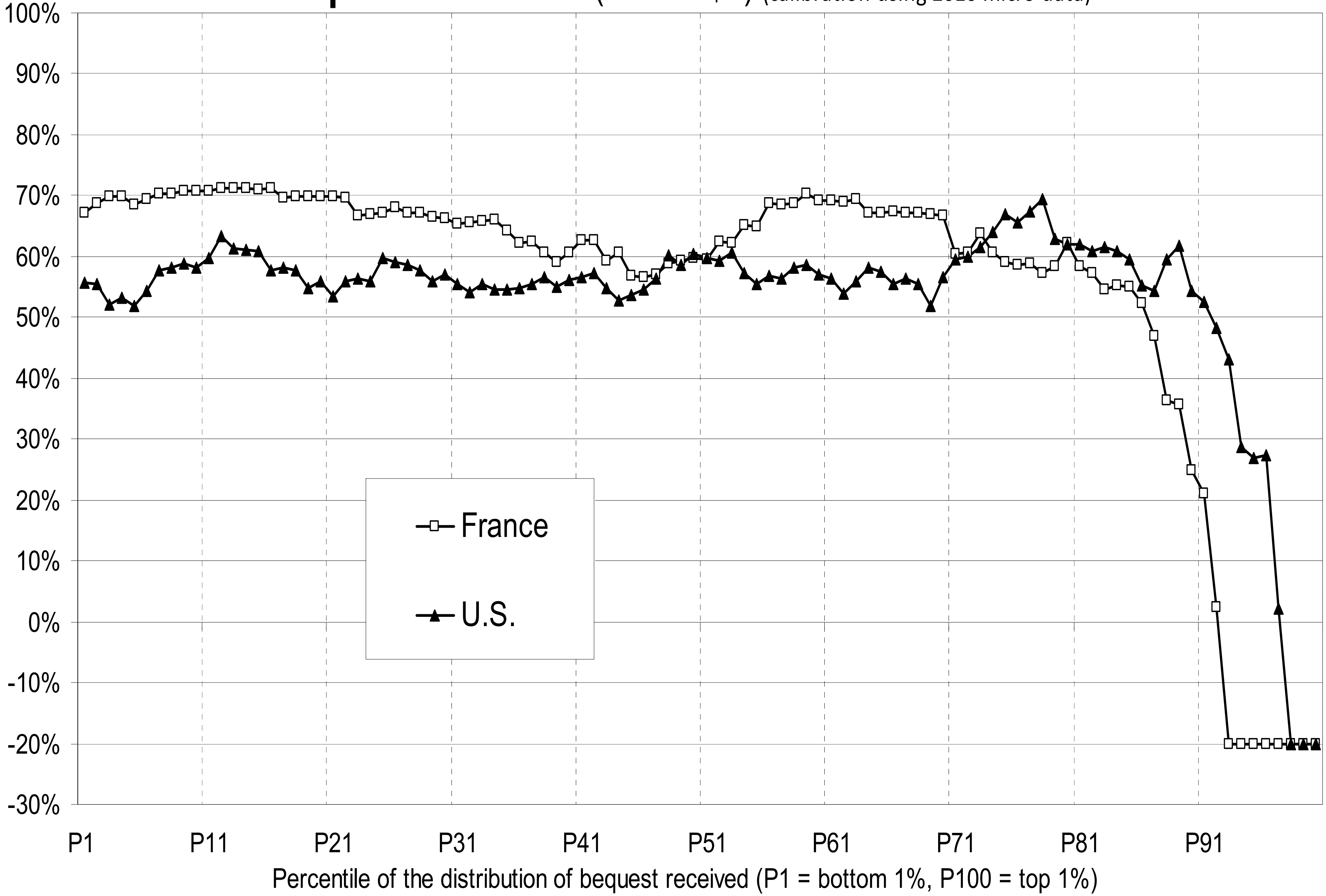


Figure 2: Optimal top inheritance tax rates, by percentile of bequest received (1m€ or $+) (calibration using 2010 micro data)



The optimal taxation of top labor incomes

- **World top incomes database**: 25 countries, annual series over most of 20^{C}, largest historical data set
- **Two main findings**:

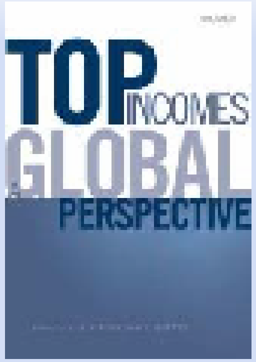
- **The fall of rentiers**: inequality ↓ during first half of 20^{C} = top capital incomes hit by 1914-1945 capital shocks; did not fully recover so far (long lasting shock + progressive taxation)

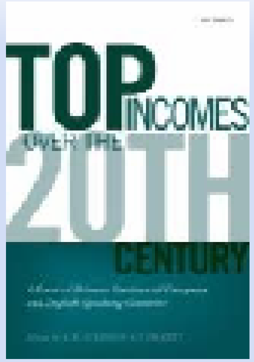
→ without war-induced economic & political shock, there would have been no long run decline of inequality; nothing to do with a Kuznets-type spontaneous process

- **The rise of working rich**: inequality ↑ since 1970s; mostly due to top labor incomes, which rose to unprecedented levels; top wealth & capital incomes also recovering, though less fast; top shares ↓ ’08-09, but ↑ ’10; **Great Recession is unlikely to reverse the long run trend**

→ **what happened?**

The World Top Incomes Database





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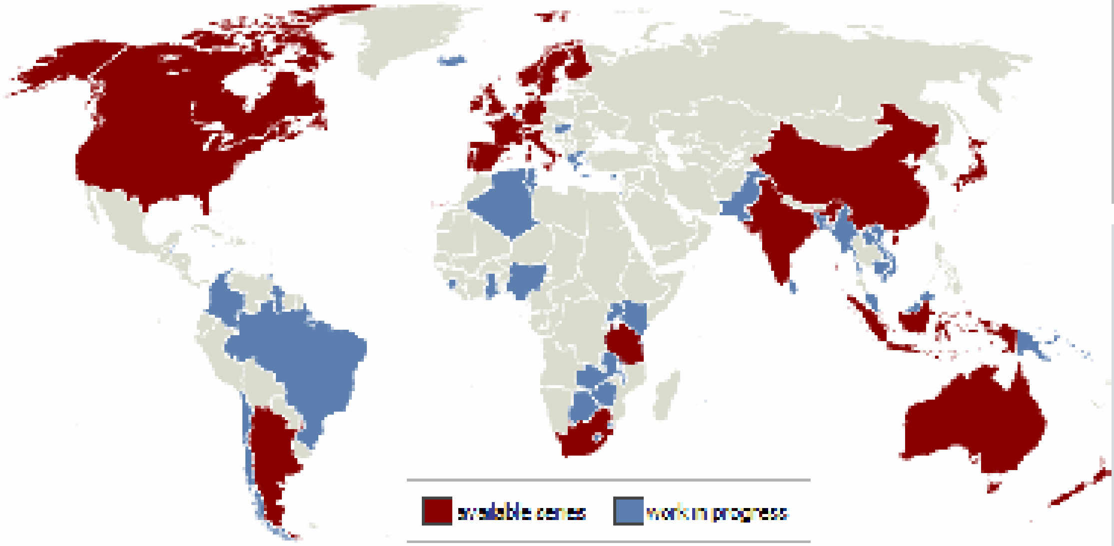


Institute for New Economic Thinking

Center for Equitable Growth

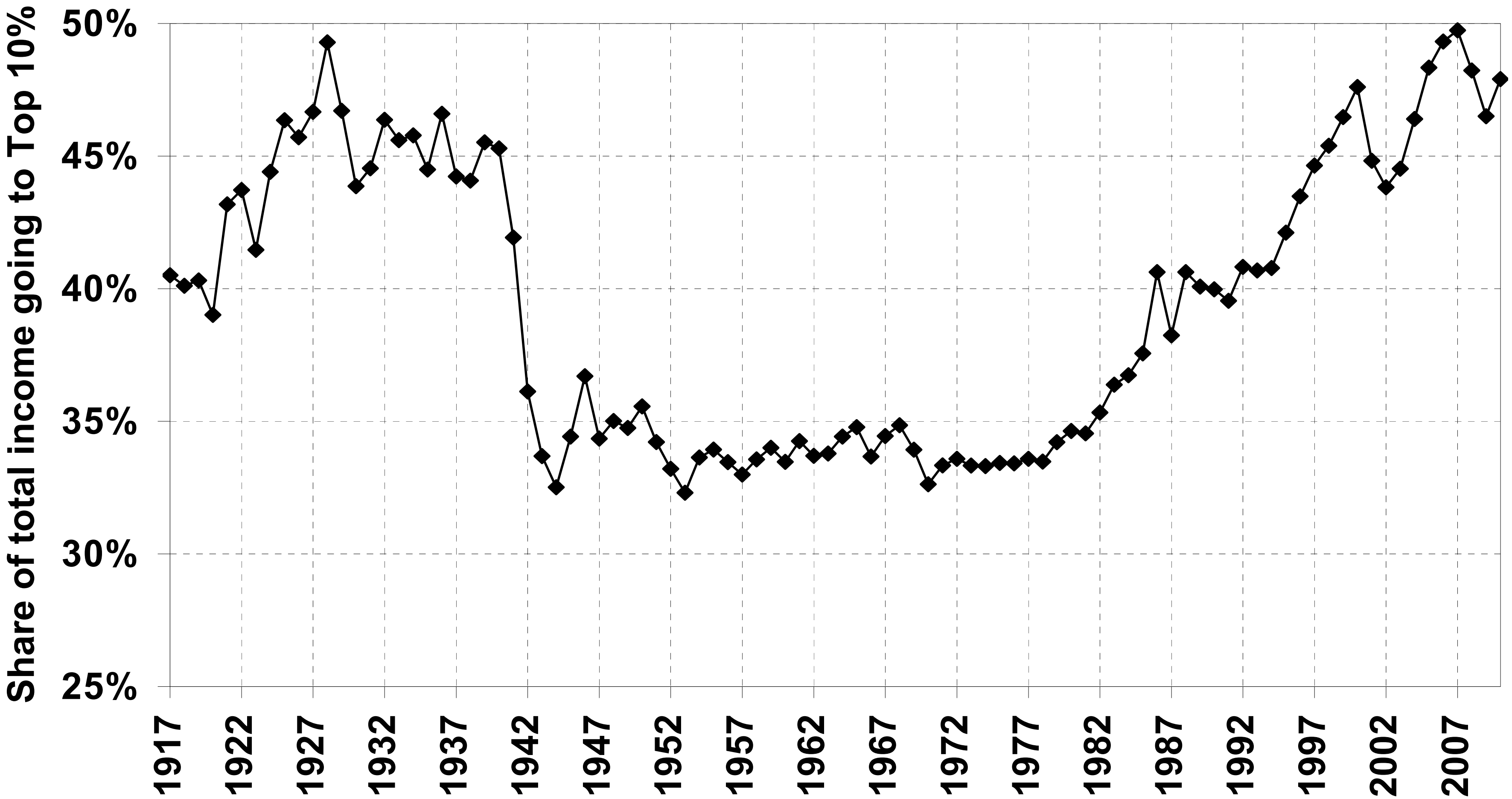
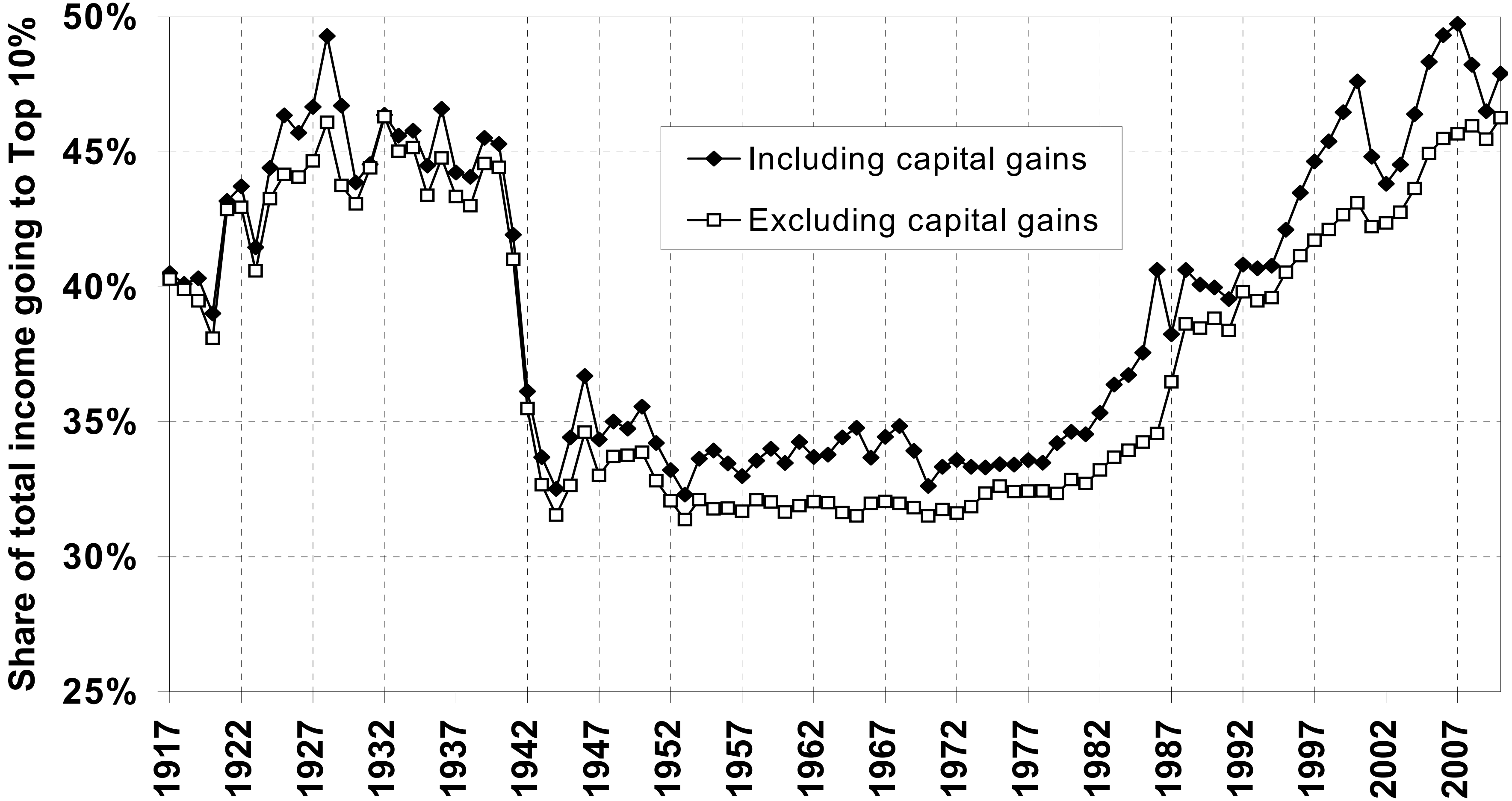


FIGURE 1

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

Source: Piketty and Saez (2003), series updated to 2010.
Income is defined as market income including realized capital gains (excludes government transfers).



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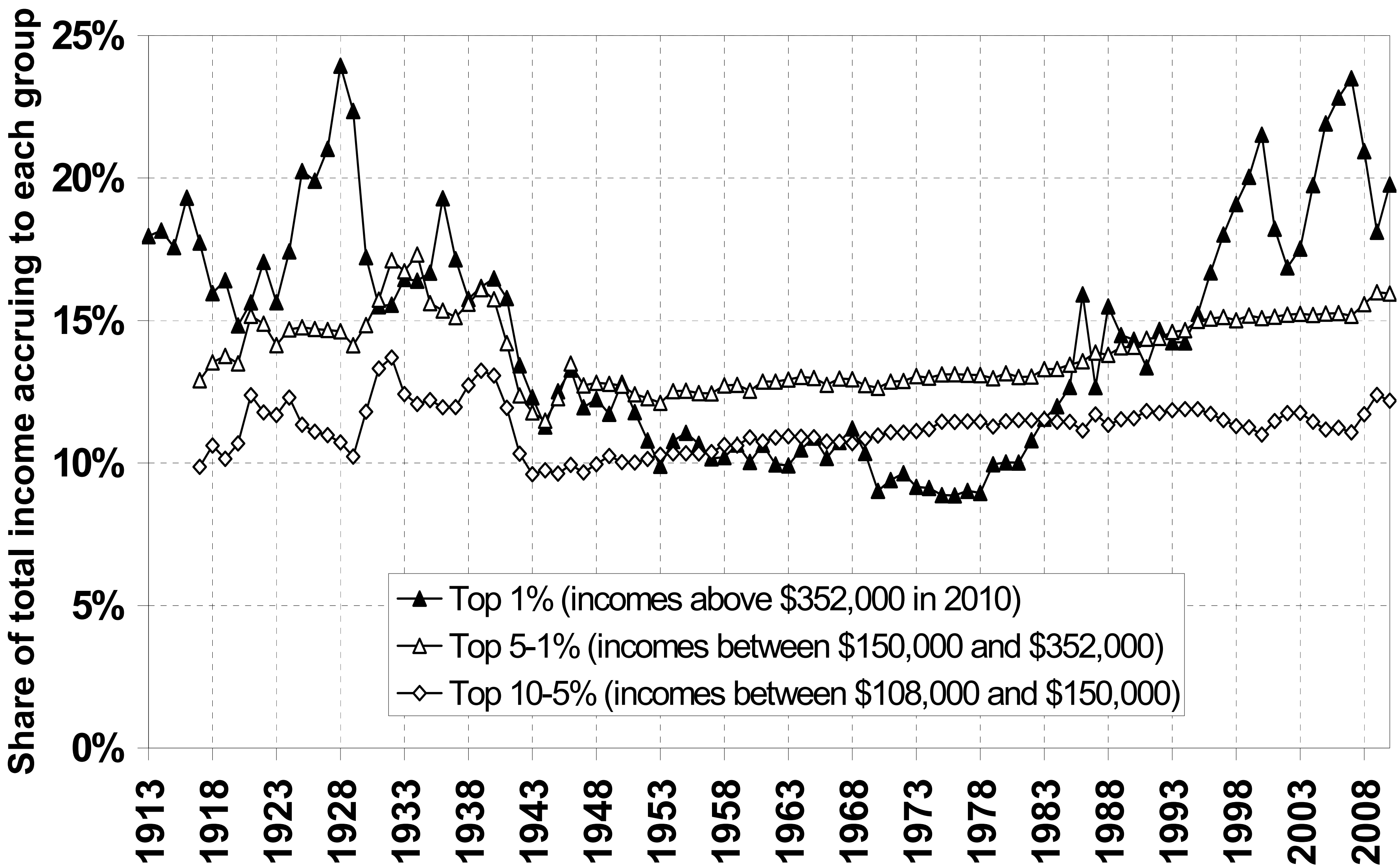
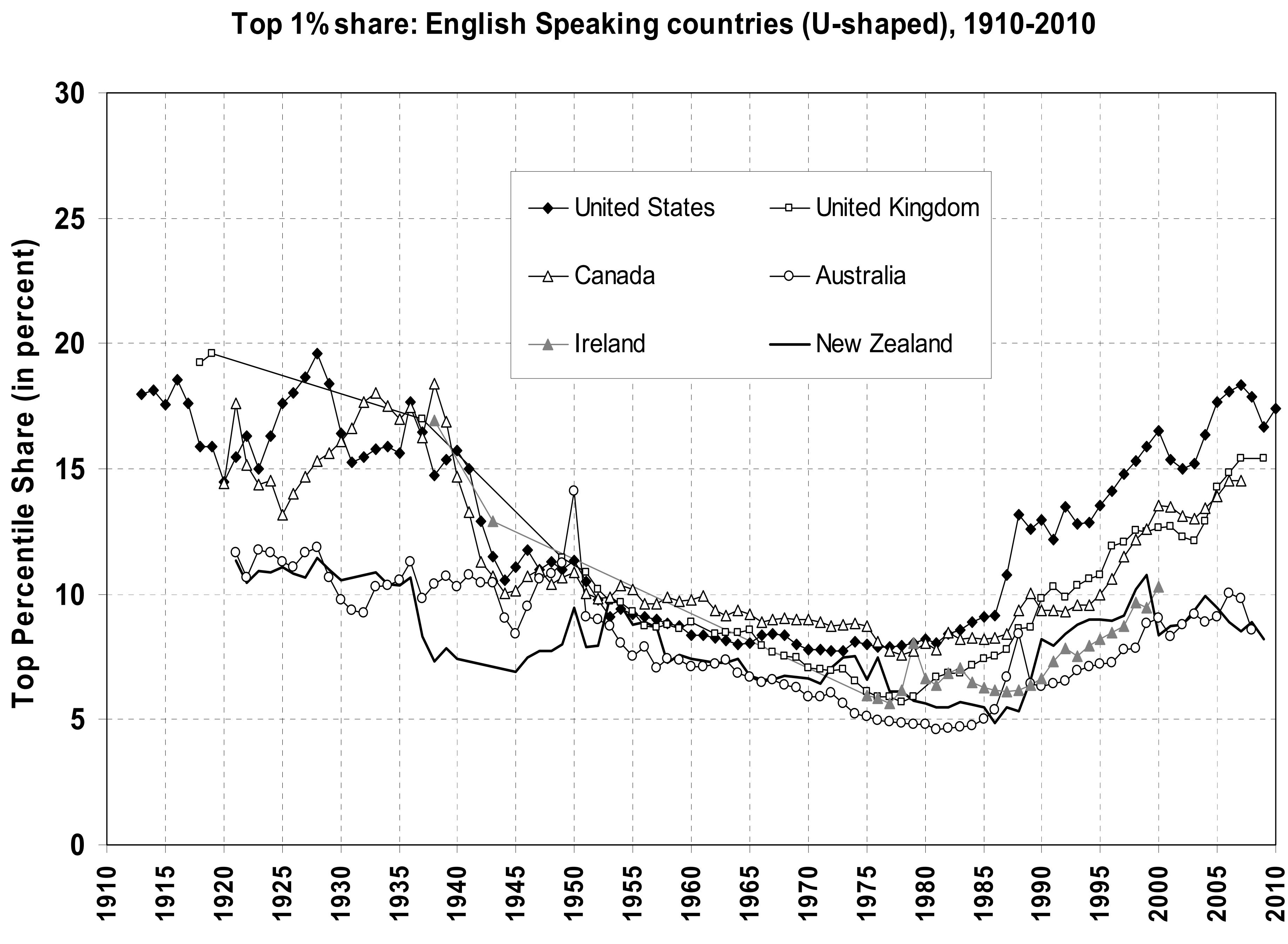
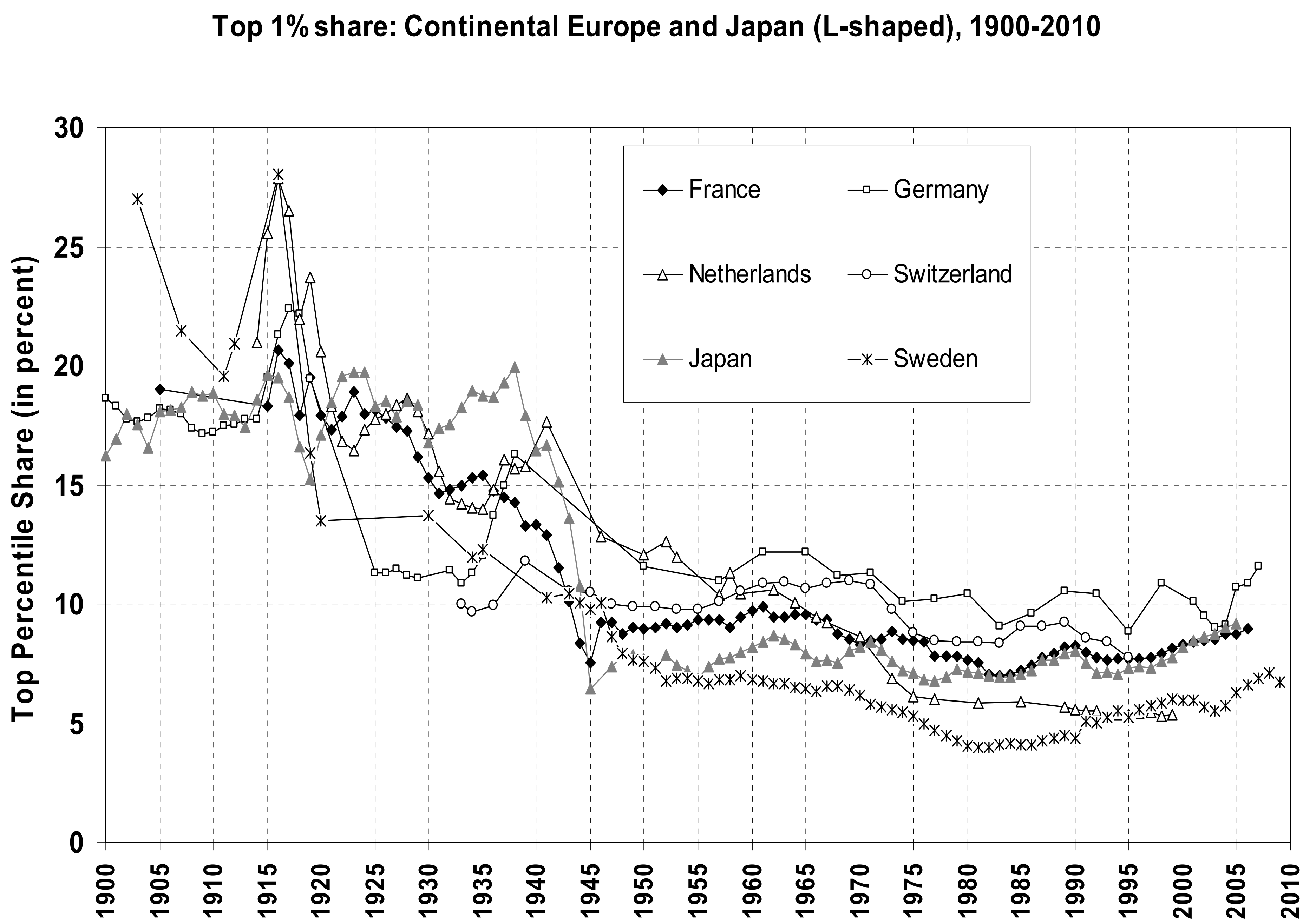


FIGURE 2

Decomposing the Top Decile US Income Share into 3 Groups, 1913-2010



Top 1% share: English Speaking countries (U-shaped), 1910-2010
Top Percentile Share (in percent)
30
25
20
15
10
5
0
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
United States
United Kingdom
Canada
Australia
Ireland
New Zealand


Top 1% share: Continental Europe and Japan (L-shaped), 1900-2010
Top Percentile Share (in percent)
France
Germany
Netherlands
Switzerland
Japan
Sweden
0
5
10
15
20
25
30
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010

How much should we use progressive taxation to reverse the trend?

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

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

→ very naïve view of the top end labor market

& very ideological: we have zero evidence on the marginal product of top executives; it may well be that prices are distorted upwards (more natural for price setters to bias their own price upwards rather than downwards)

- A more realistic view: grabbing hand model = marginal products are unobservable; top executives have an obvious incentive to convince shareholders & subordinates that they are worth a lot; no market convergence because constantly changing corporate & job structure (& costs of experimentation → **competition not enough to converge to full information**)

→ when pay setters set their own pay, there's no limit to rent extraction... **unless confiscatory tax rates at the very top**

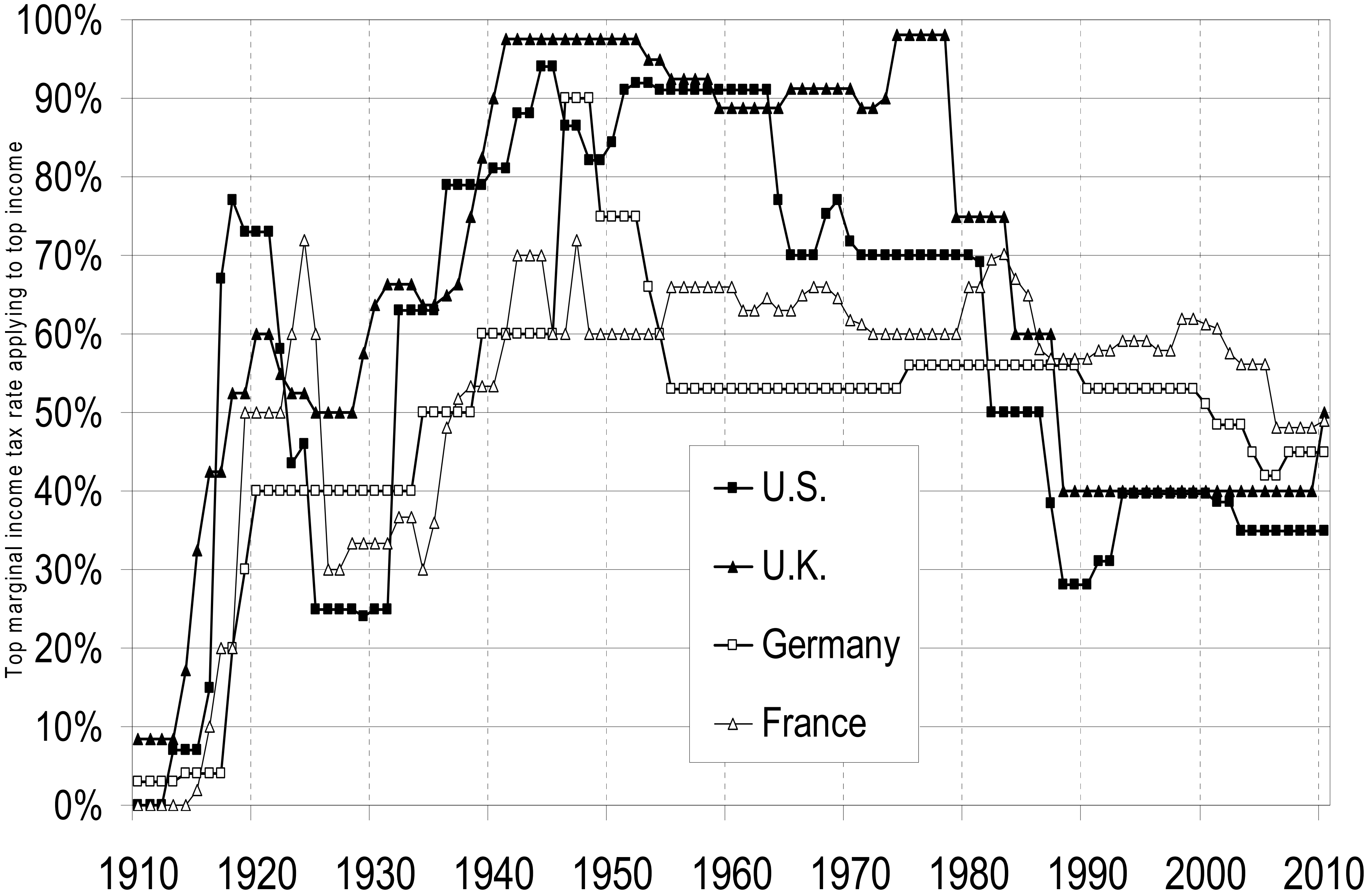
(memo: US top tax rate (1m$+) 1932-1980 = 82%)

(no more fringe benefits than today)

→ see Piketty-Saez-Stantcheva, « Optimal Taxation of Top Labor Incomes », AEJ-EP 2013

(macro & micro evidence on rising CEO pay for luck)

Top Income Tax Rates 1910-2010



Source: World Top Incomes Database, 2012.

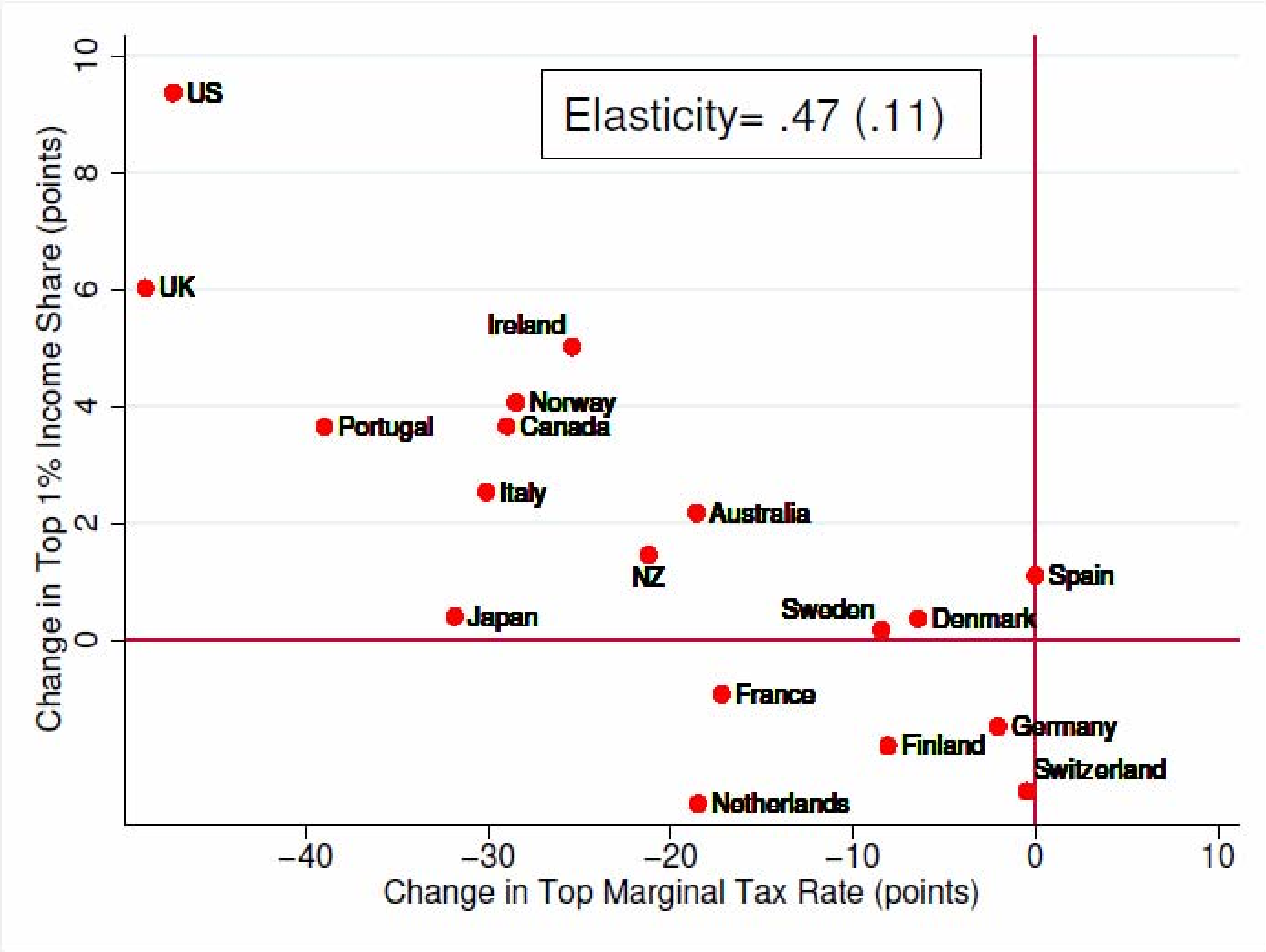
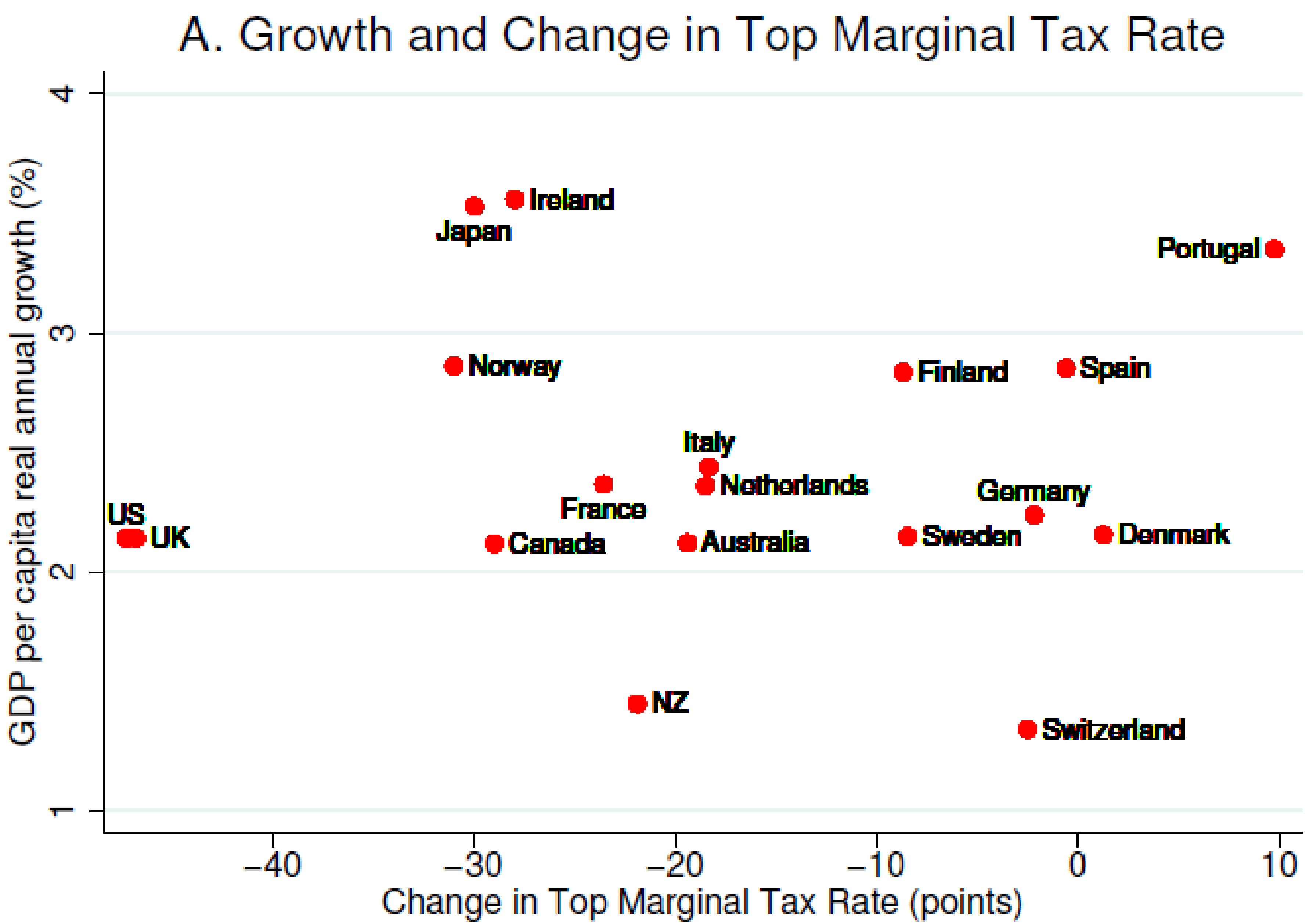


Figure 3: Changes in Top Income Shares and Top Marginal Tax Rates


A. Growth and Change in Top Marginal Tax Rate
GDP per capita real annual growth (%)
Change in Top Marginal Tax Rate (points)
4
3
2
1
−40
−30
−20
−10
0
10
Ireland
Japan
Portugal
Norway
Finland
Spain
Italy
Netherlands
Germany
US
UK
France
Canada
Australia
Sweden
Denmark
NZ
Switzerland

Optimal Taxation of Top Labor Incomes

- **Standard optimal top tax rate formula: $\tau = 1/(1+ae)$**

With: e = elasticity of labor supply, a = Pareto coefficient

- $\tau \downarrow$ as elasticity e $\uparrow$: don't tax elastic tax base
- $\tau \uparrow$ as inequality $\uparrow$, i.e. as Pareto coefficient a $\downarrow$

(US: a≈3 in 1970s → ≈1.5 in 2010s; b=a/(a-1)≈1.5 → ≈3)

(memo: $b = E(y|y>y_0)/y_0$ = measures fatness of the top)

- **Augmented formula: $\tau = (1+tae_2+ae_3)/(1+ae)$**

With $e = e_1 + e_2 + e_3$ = labor supply elasticity + income shifting elasticity + bargaining elasticity (rent extraction)

- **Key point: $\tau \uparrow$ as elasticity $e_3 \uparrow$**

Table 4: How Much Should We Tax Top Incomes ? A Tale of Three Elasticities

Total elasticity $e = e_1 + e_2 + e_3 =$	0.5

Scenario 1: Standard supply side tax effects		Scenario 2: Tax avoidance effects (a) current narrow tax base	Scenario 2: Tax avoidance effects (b) after base broadening	Scenario 3: Compensation bargaining effects	
$e_1 =$	0.5	$e_1 = 0.2$	$e_1 = 0.2$	$e_1 =$	0.2
$e_2 =$	0.0	$e_2 = 0.3$	$e_2 = 0.1$	$e_2 =$	0.0
$e_3 =$	0.0	$e_3 = 0.0$	$e_3 = 0.0$	$e_3 =$	0.3

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

Pareto coeffient a =	1.5
Alternative tax rate t =	20%

Scenario 1		Scenario 2 (a) e_2=0.3	Scenario 2 (b) e_2=0.1	Scenario 3	
$\tau^* =$	57%	τ^* = 62 %	τ^* = 71 %	$\tau^* =$	83%

End of Lecture 3: what have we learned?

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

- From a r-vs-g viewpoint, 21^{c} maybe not too different from 19^{c} – but still better than Ancien Regime… except that nobody tried to depict AR as meritocratic…

- Better integration between empirical & theoretical research in public economics is badly needed