# Wealth, Inequality & Taxation

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# Wealth and inequality in the long run

- Long run distributional trends = key question asked by 19$^{C}$ economists
- Many came with apocalyptic answers
- Ricardo-Marx: a small group in society (land owners or capitalists) will capture an ever growing share of income & wealth

  → no “balanced development path” can occur
- During 20$^{C}$, a more optimistic consensus emerged: “growth is a rising tide that lifts all boats”

  (Kuznets 1953; cold war context)

- But inequality ↑ since 1970s destroyed this fragile consensus (US 1976-2007: ≈60% of total growth was absorbed by top 1%)

→ 19$^{C}$ economists raised the right questions; we need to adress these questions again; we have no strong reason to believe in balanced development path

- 2007-2011 world financial crisis also raised doubts about balanced devt path… will stock options & bonuses, or oil-rich countries, or China, or tax havens, absorb an ever growing share of world ressources in 21$^{C}$ capitalism?

# Convergence vs divergence

- **Convergence forces do exist**: diffusion of knowledge btw countries (fostered by econ & fin integration)

& wth countries (fostered by adequate educ institutions)

- **But divergence forces can be stronger**:

(1) When top earners set their own pay, there's no limit to rent extraction → top income shares can diverge

(2) The wealth accumulation process contains several divergence forces, especially with r > g → a lot depends on the net-of-tax global rate of return r on large diversified portfolios : if r=5%-6% in 2010-2050 (=what we observe in 1980-2010 for large Forbes fortunes, or Abu Dhabi sovereign fund, or Harvard endowment), then global wealth divergence is very likely

# This lecture: two issues

- **1.The rise of the working rich** (≈1h, slides 1-22)
  - Atkinson-Piketty-Saez,« Top Incomes in the Long Run of History », JEL 2011
  - New results from *World Top Incomes Database (WTID)*
  - Piketty-Saez-Stantcheva, « Optimal Taxation of Top Labor Income: A Tale of Three Elasticities », NBER WP 2011

  **(key mechanism: grabbing hand)**

- **2.The return of wealth & inheritance** (≈1h30, slides 23-76)
  - Piketty, « On the Long Run Evolution of Inheritance », QJE 2011
  - Piketty-Zucman, « Capital is Back: Wealth-Income Ratios in Rich Countries 1870-2010 », WP PSE 2012
  - First results from *World Wealth Database (preliminary)*
  - Piketty-Saez, « A Theory of Optimal Capital Taxation », NBER WP 2012

  **(key mechanism: r>g)**

  (r = rate of return to wealth, g = growth rate)

# 1. The Rise of the Working Rich

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

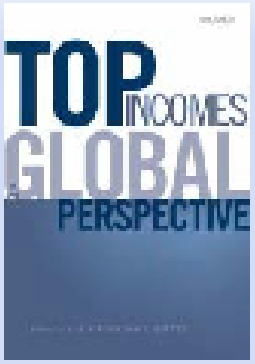
- **The fall of rentiers**: inequality ↓ during first half of 20C = top capital incomes hit by 1914-1945 capital shocks; did not fully recover so far (long lasting shock + progressive taxation)

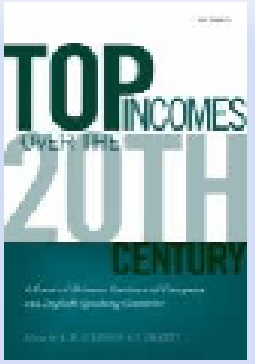
→ without war-induced economic & political shock, there would have been no long run decline of inequality; nothing to do with a Kuznets-type spontaneous process

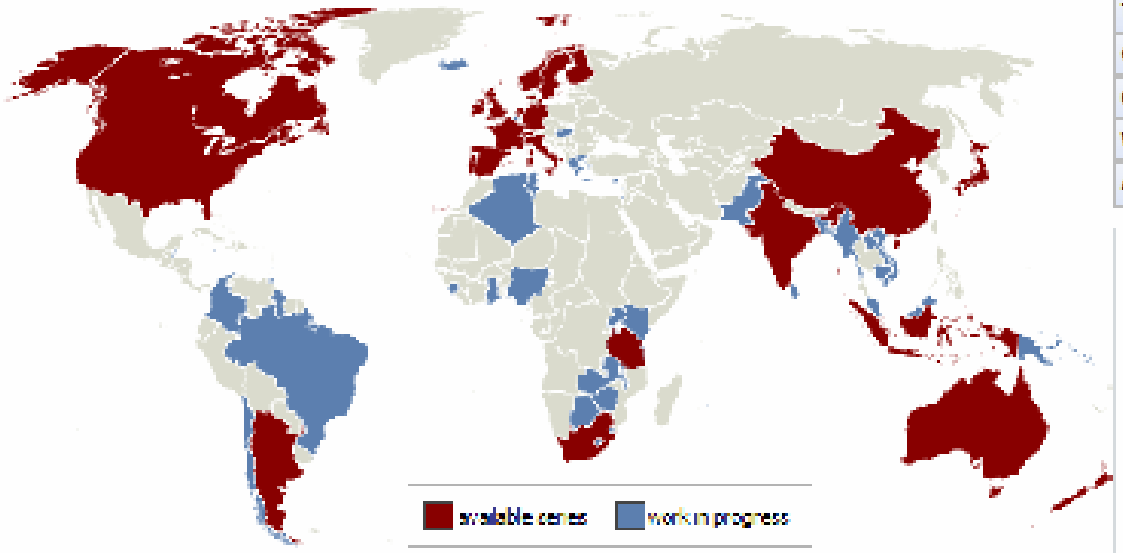
- **The rise of working rich**: inequality ↑ since 1970s; mostly due to top labor incomes, which rose to unprecedented levels; top wealth & capital incomes also recovering, though less fast

→ **what happened?**

# The World Top Incomes Database





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- Work In Progress
- Acknowledgments


Institute for New Economic Thinking

Center for Equitable Growth

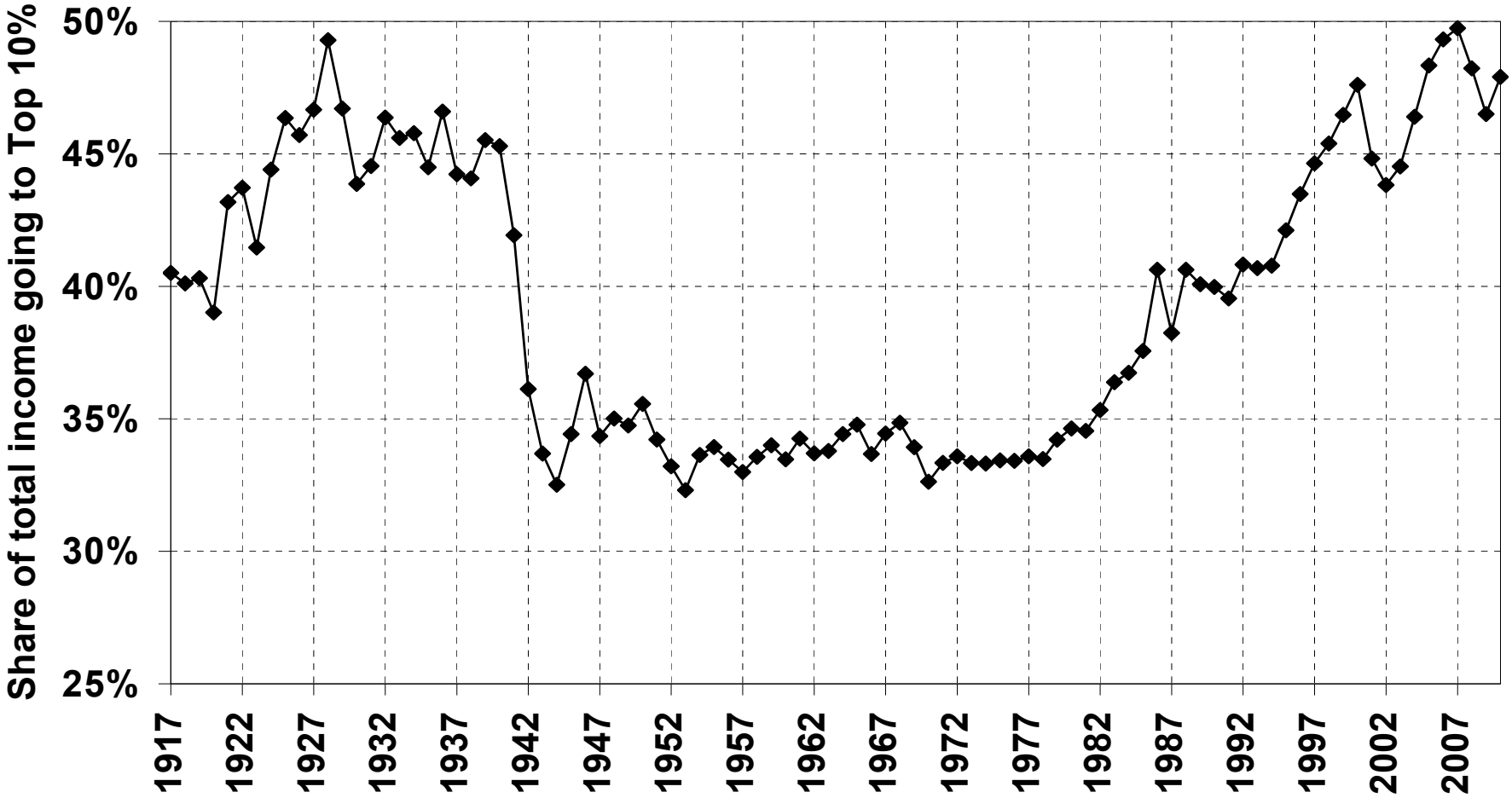
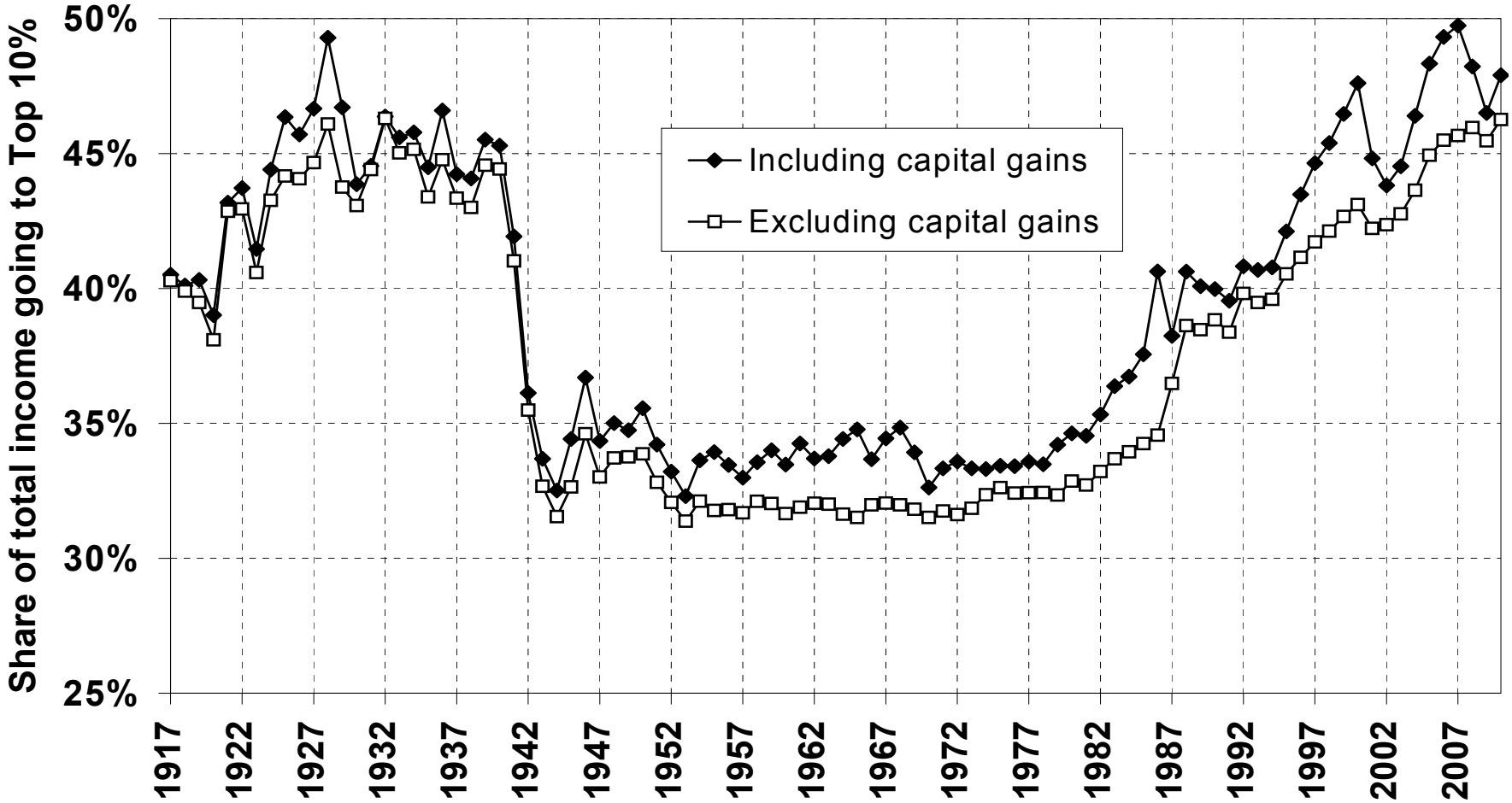



**FIGURE 1**

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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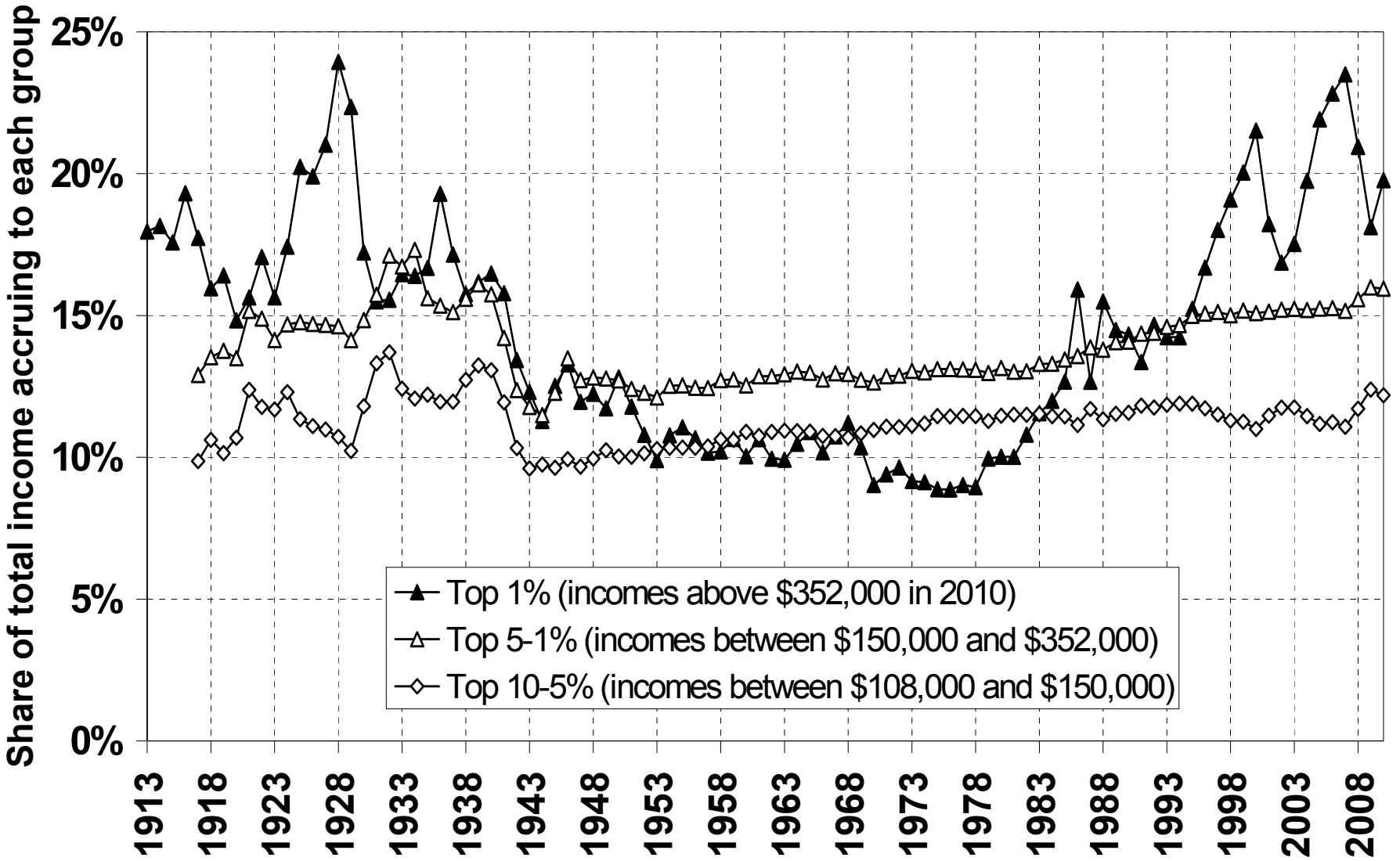
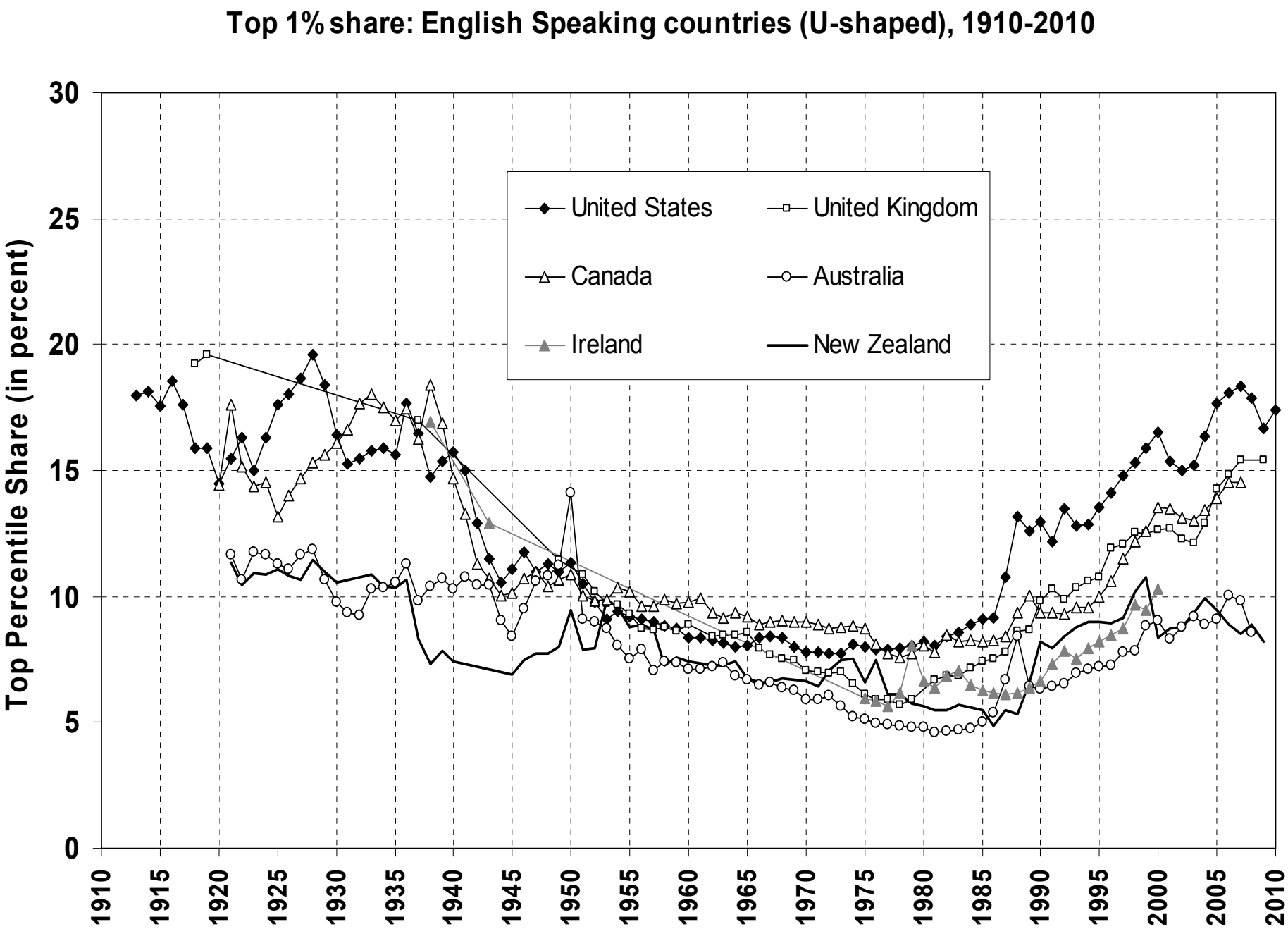
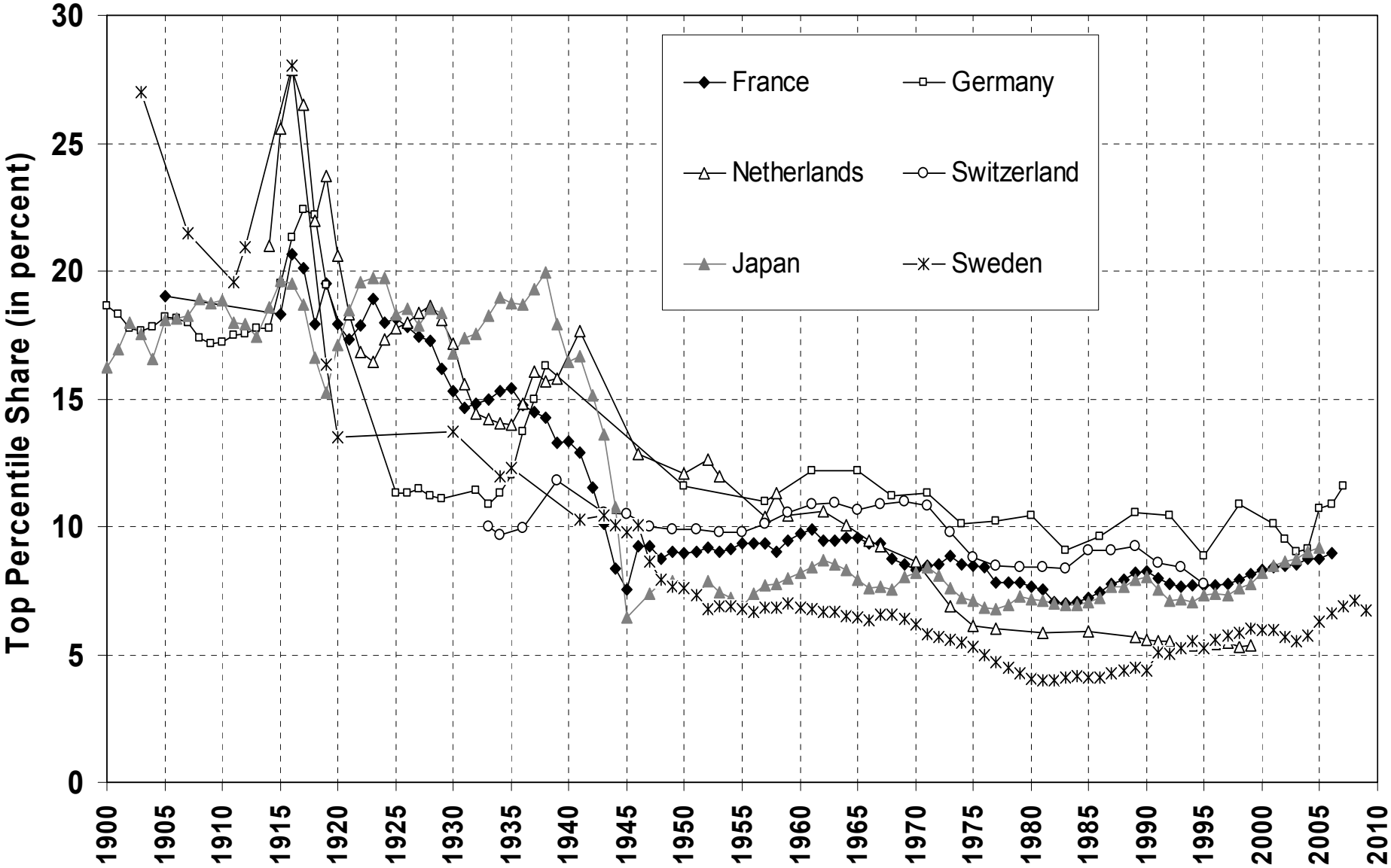


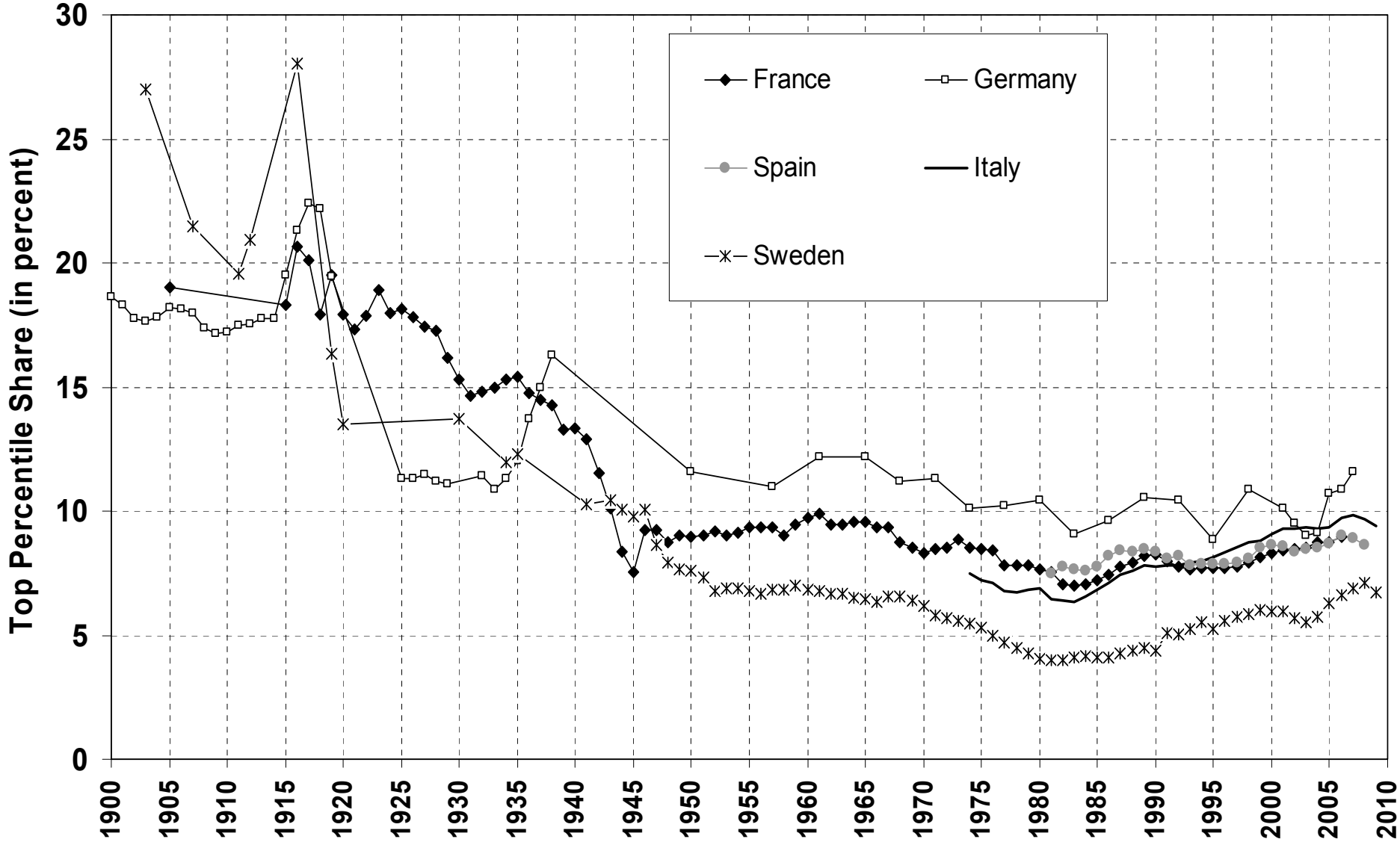

**FIGURE 2**

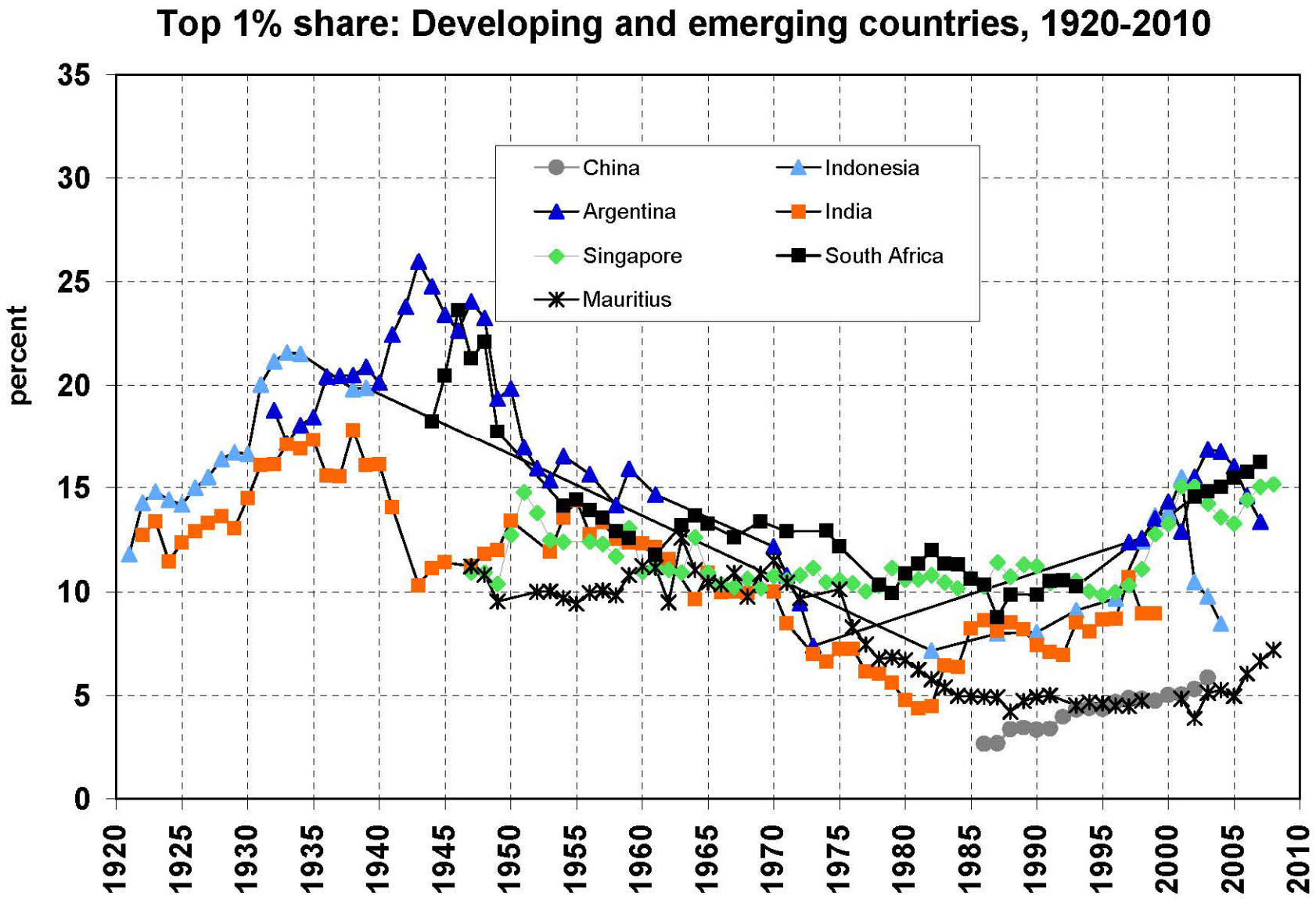
Decomposing the Top Decile US Income Share into 3 Groups, 1913-2010


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

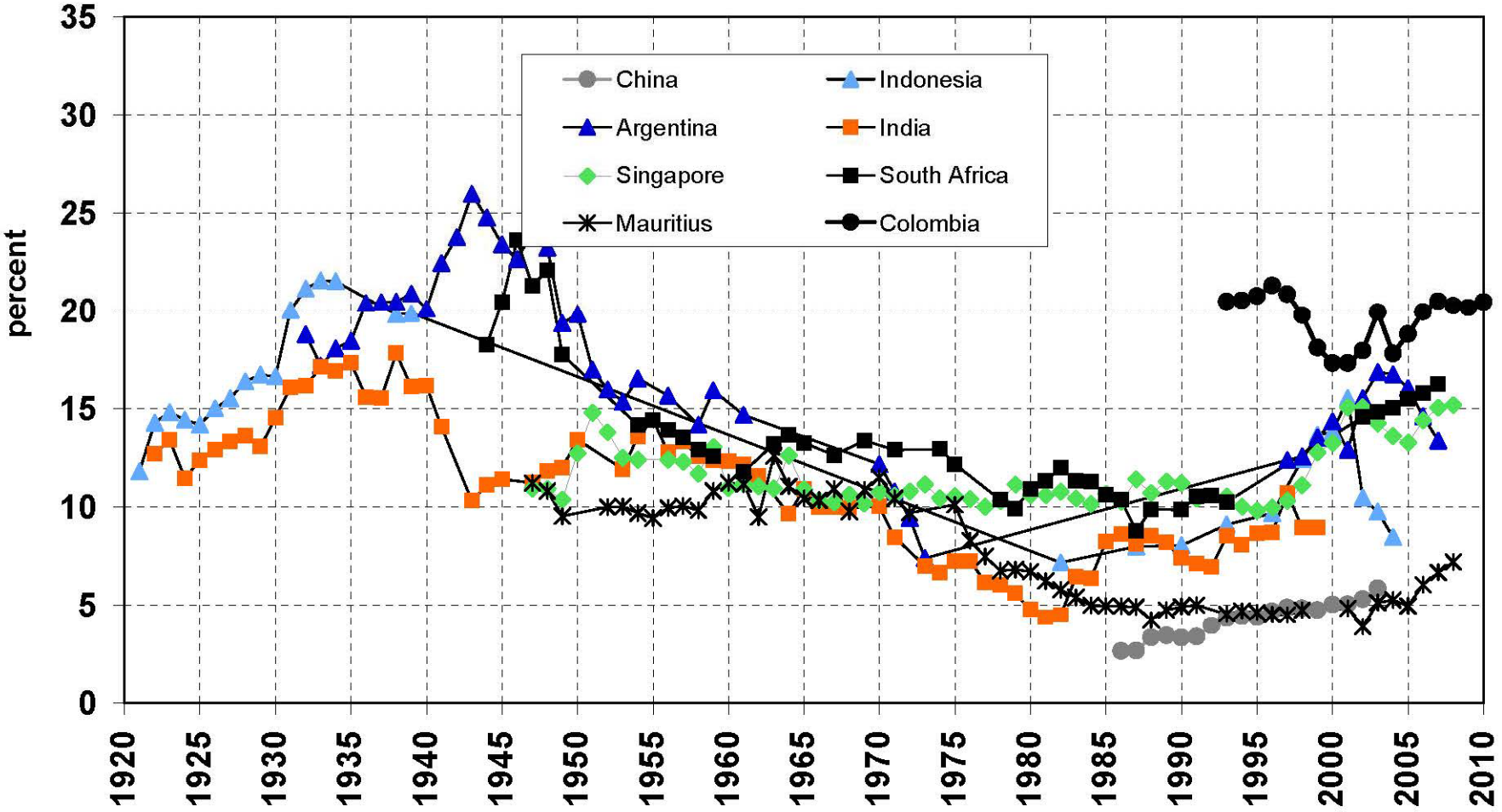
## Top 1% share: Continental Europe and Japan (L-shaped), 1900-2010



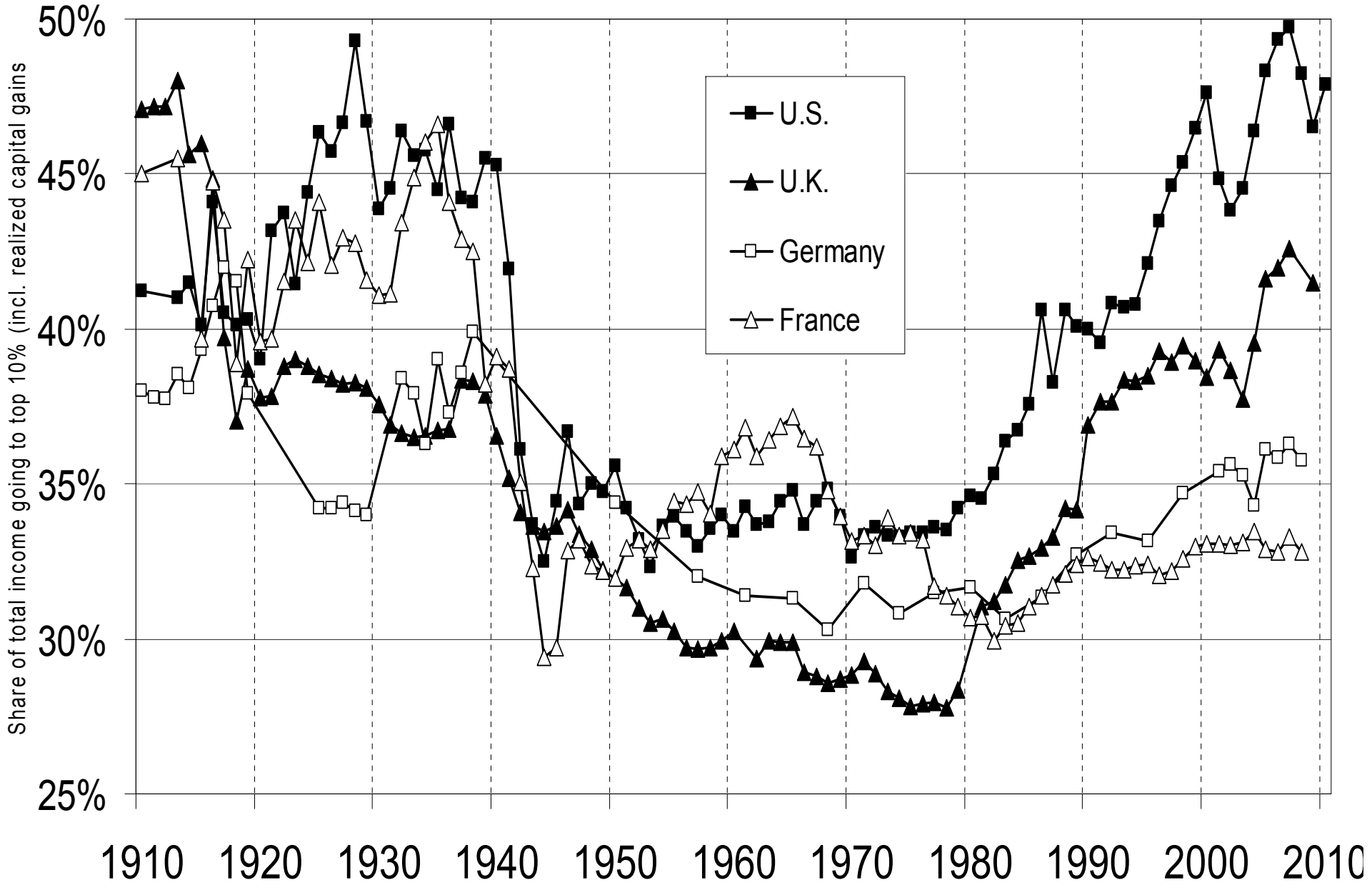

Top 1% share: Continental Europe, North vs South (L-shaped), 1900-2010
Top Percentile Share (in percent)
0
5
10
15
20
25
30
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
France
Germany
Spain
Italy
Sweden


Top 1% share: Developing and emerging countries, 1920-2010
percent
35
30
25
20
15
10
5
0
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
China
Indonesia
Argentina
India
Singapore
South Africa
Mauritius

## Top 1% share: Developing and emerging countries, 1920-2010



# Top Decile Income Shares 1910-2010




Source: World Top Incomes Database, 2012. Missing values interpolated using top 5% and top 1% series.

# Why did top incomes rise so much?

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

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

→ very naïve view of the top end labor market…

& very ideological: we have zero evidence on the marginal product of top executives; it could well be that prices are distorted upwards…

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

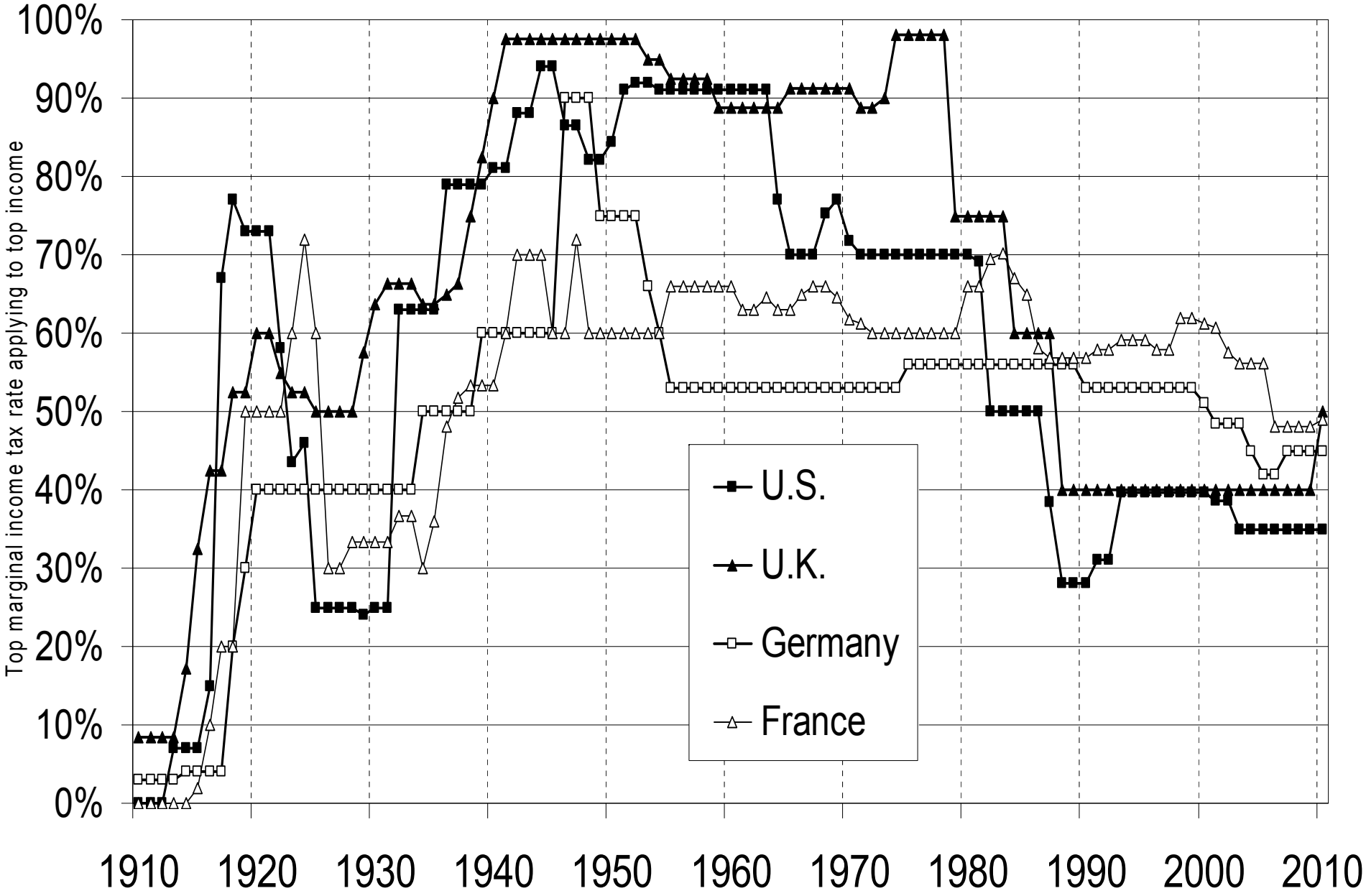
→ when pay setters set their own pay, there's no limit to rent extraction... **unless confiscatory tax rates at the very top**

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

(no more fringe benefits than today)

→ see Piketty-Saez-Stantcheva, NBER WP 2011

# Top Income Tax Rates 1910-2010




Source: World Top Incomes Database, 2012.

# 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 $\rightarrow$ ≈1.5 in 2010s; b=a/(a-1)≈1.5 $\rightarrow$ ≈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 | |
|---|---|
| $e_1 =$ | 0.5 |
| $e_2 =$ | 0.0 |
| $e_3 =$ | 0.0 |

| Scenario 2: Tax avoidance effects | |
|---|---|
| (a) current narrow tax base | (b) after base broadening |
| $e_1 = 0.2$ | $e_1 = 0.2$ |
| $e_2 = 0.3$ | $e_2 = 0.1$ |
| $e_3 = 0.0$ | $e_3 = 0.0$ |

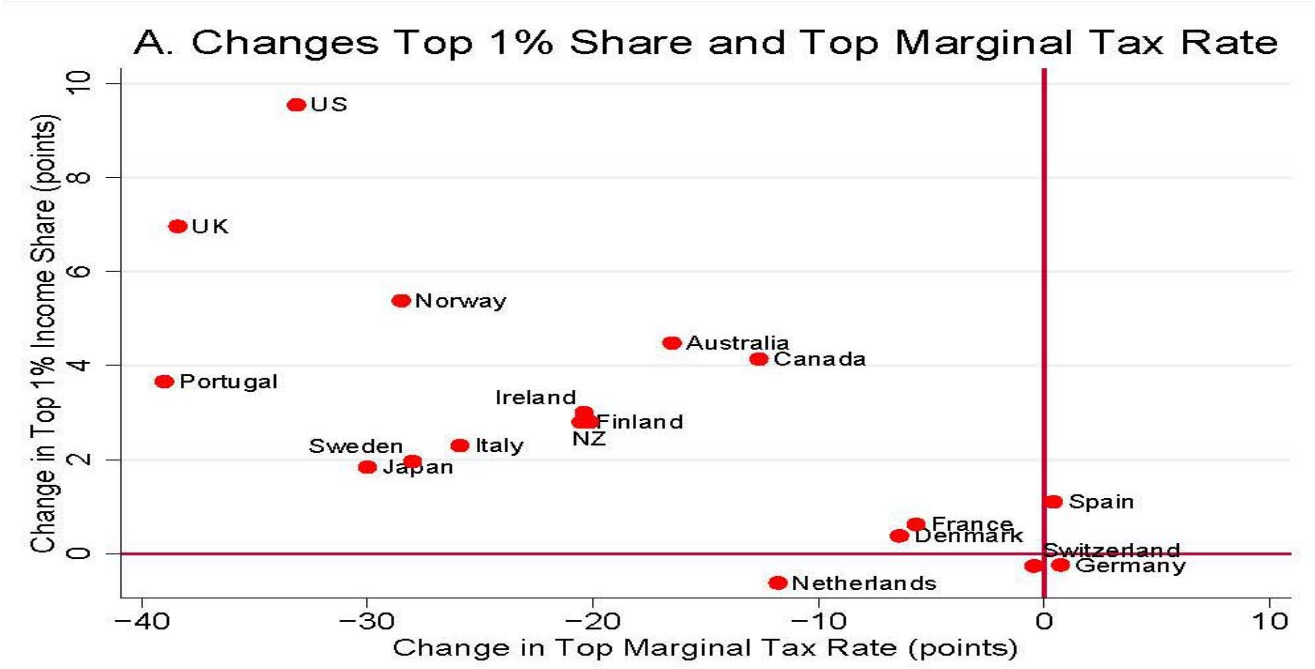
| Scenario 3: Compensation bargaining effects | |
|---|---|
| $e_1 =$ | 0.2 |
| $e_2 =$ | 0.0 |
| $e_3 =$ | 0.3 |

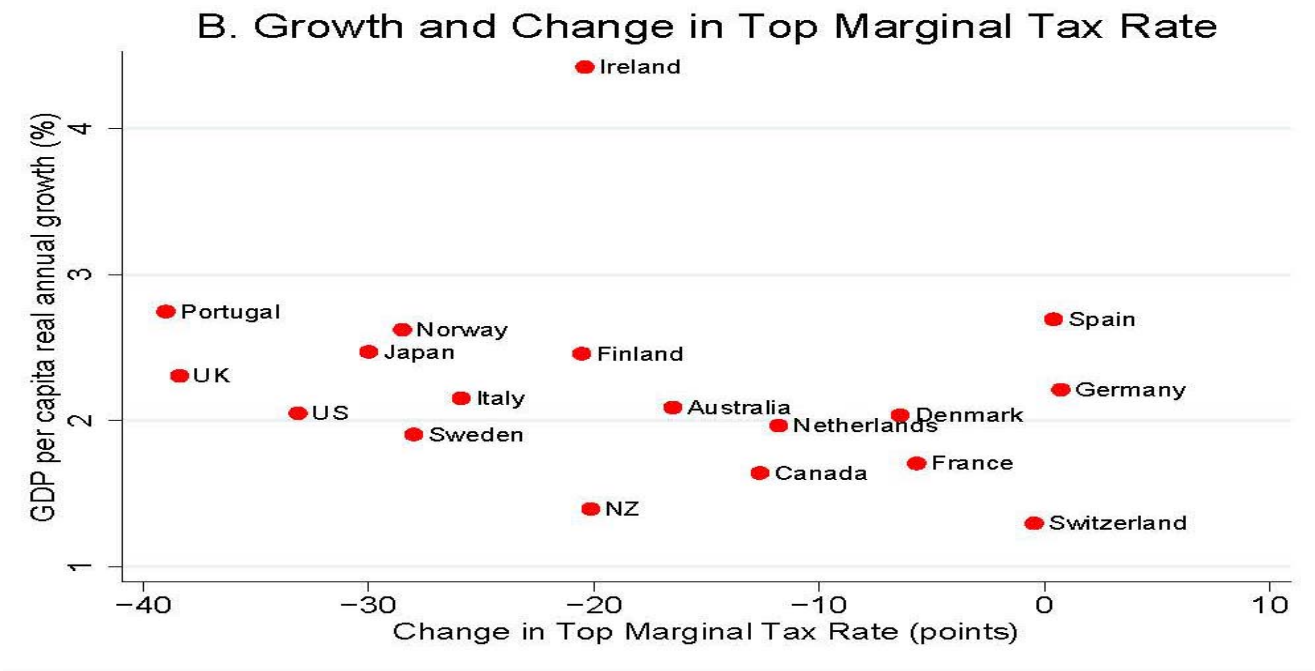
| Optimal top tax rate $\tau^* = (1+ tae_2 + ae_3)/(1+ae)$ | |
|---|---|
| Pareto coeffient a = | 1.5 |
| Alternative tax rate t = | 20% |

| Scenario 1 | |
|---|---|
| $\tau^* =$ | 57% |

| Scenario 2 | |
|---|---|
| (a) $e_2$=0.3 | (b) $e_2$=0.1 |
| $\tau^* = 62$ % | $\tau^* = 71$ % |

| Scenario 3 | |
|---|---|
| $\tau^* =$ | 83% |


A. Changes Top 1% Share and Top Marginal Tax Rate
Change in Top 1% Income Share (points)
0
2
4
6
8
10
US
UK
Norway
Australia
Canada
Portugal
Ireland
Finland
NZ
Sweden
Italy
Japan
Spain
France
Denmark
Switzerland
Germany
Netherlands
−40
−30
−20
−10
0
10
Change in Top Marginal Tax Rate (points)


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

# 2. The return of wealth & inheritance

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

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

- Two different effects (could go separately):

**(2a) The return of wealth**

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

**(2b) The return of inherited wealth**

(Be careful with « war of ages » illusion: the war of ages did not replace class war)

# 2a. The return of wealth

- The « human capital » illusion: « in today's modern economies, what matters is human capital and education, not old-style financial or real estate wealth »
- Technocractic model : Parsons, Galbraith, Becker
  (unidimensional class structure based upon human K)
- But the share of old-style capital income (rent, interest, dividend, etc.) in national income is the same in 2010 as in 1910 (about 30%), and the ratio between aggregate private wealth and national income is also the same in 2010 as in 1910 (about 600%)
- Today in France, Italy, UK: $\beta = W/Y \approx 600\%$

Per adult national income $Y \approx 30\,000€$

Per adult private wealth $W \approx 200\,000€$

(wealth = financial assets + real estate assets – financial liabilities)

(on average, households own wealth equal to about 6 years of income)

- There are sevreal long-run effects explaining the return of high wealth-income ratios :

- it took a long time to recover from world war shocks
  (1913 stock mkt & real estate capitalization recovered during 2000s)
- financial deregulation & tax competition → rising capital shares and wealth-income ratios
- growth slowdown in rich countries: **r > g**

  → rise of wealth-income and inheritance-income ratios

  + rise of wealth inequality (amplifying mechanism)

  (r = rate of return to wealth, g = productivity growth + pop growth)

- **Aggregate effect: Harrod-Domar-Solow formula: β* = s/g**

  (β* = wealth-income ratio, s = saving rate)

(i.e. s=10%, g=2% → β*=500%; if g=1%, then β*=1000%)

(i.e. if we save 10% of income each year, then in the long run we accumulate 5 years of income if growth rate is 2%)

→ highly unstable process if growth rate is low

- Main results from Piketty-Zucman, « Capital is Back: Wealth-Income Ratios in Rich Countries 1870-2010 »
- **How do aggregate wealth-income ratios evolve in the long run, and why?**
- Until recently, it was impossible to adress properly this basic question: national accounts were mostly about flows on income, output, savings, etc., and very little about stocks of assets and liabilities
- **In this paper we compile a new data set of national balance sheets in order to adress this question:**

- 1970-2010: US, Japan, Germany, France, UK, Italy, Canada, Australia (= top 8 rich countries)
- 1870-2010: US, Germany, France, UK

(official national accounts + historical estimates)

- **Result 1**: we find in every country a gradual rise of wealth-income ratios over 1970-2010 period, from about 200%-300% in 1970 to 400%-600% in 2010
- **Result 2**: in effect, today's ratios seem to be returning towards the high values observed in 19$^{c}$ Europe (600%-700%)
- This can be accounted for by a combination of factors:

- Politics: long run asset price recovery effect (itself driven by changes in capital policies since WWs)
- Economics: slowdown of productivity and pop growth

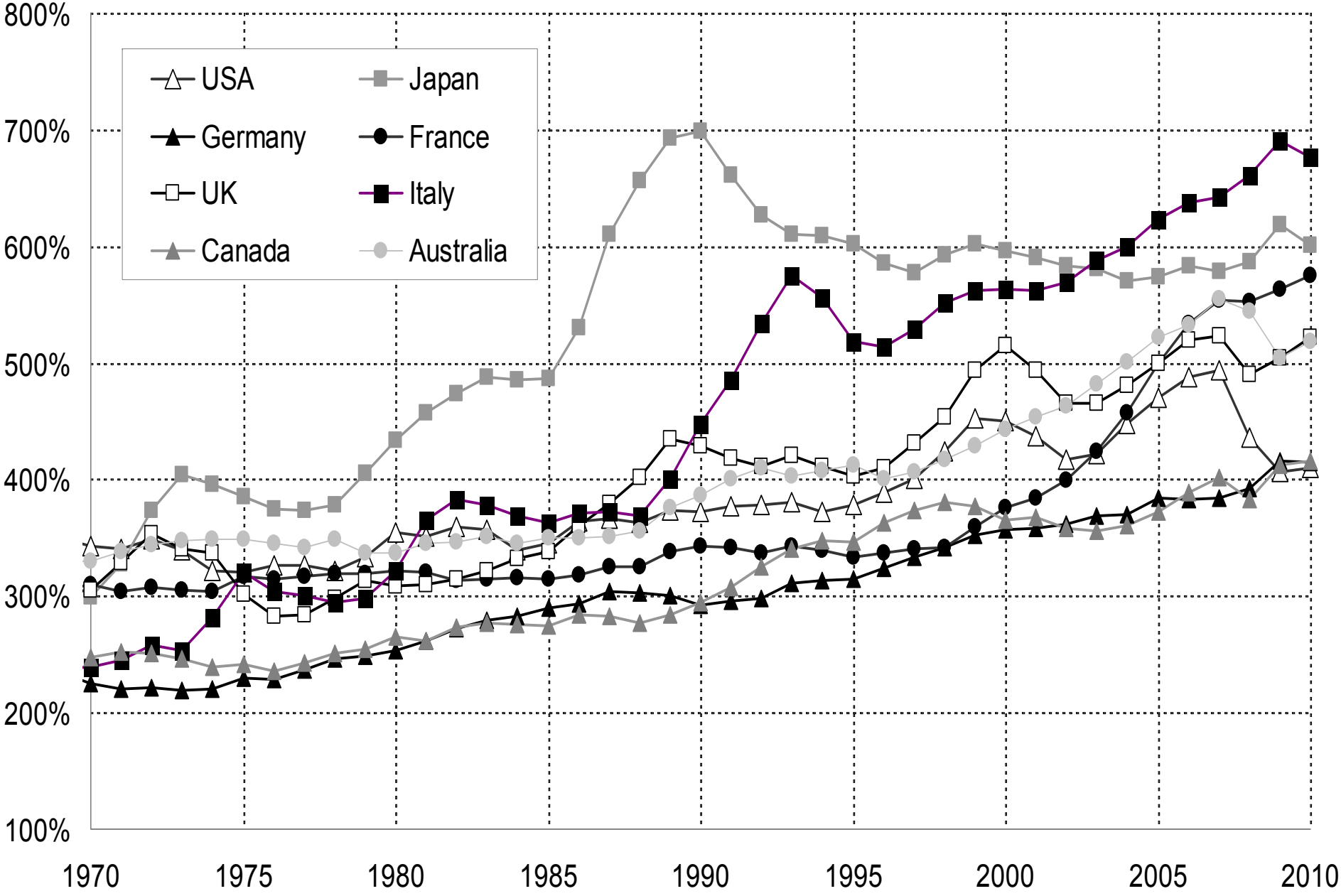
Harrod-Domar-Solow: wealth-income ratio **$\beta = s/g$**

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

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

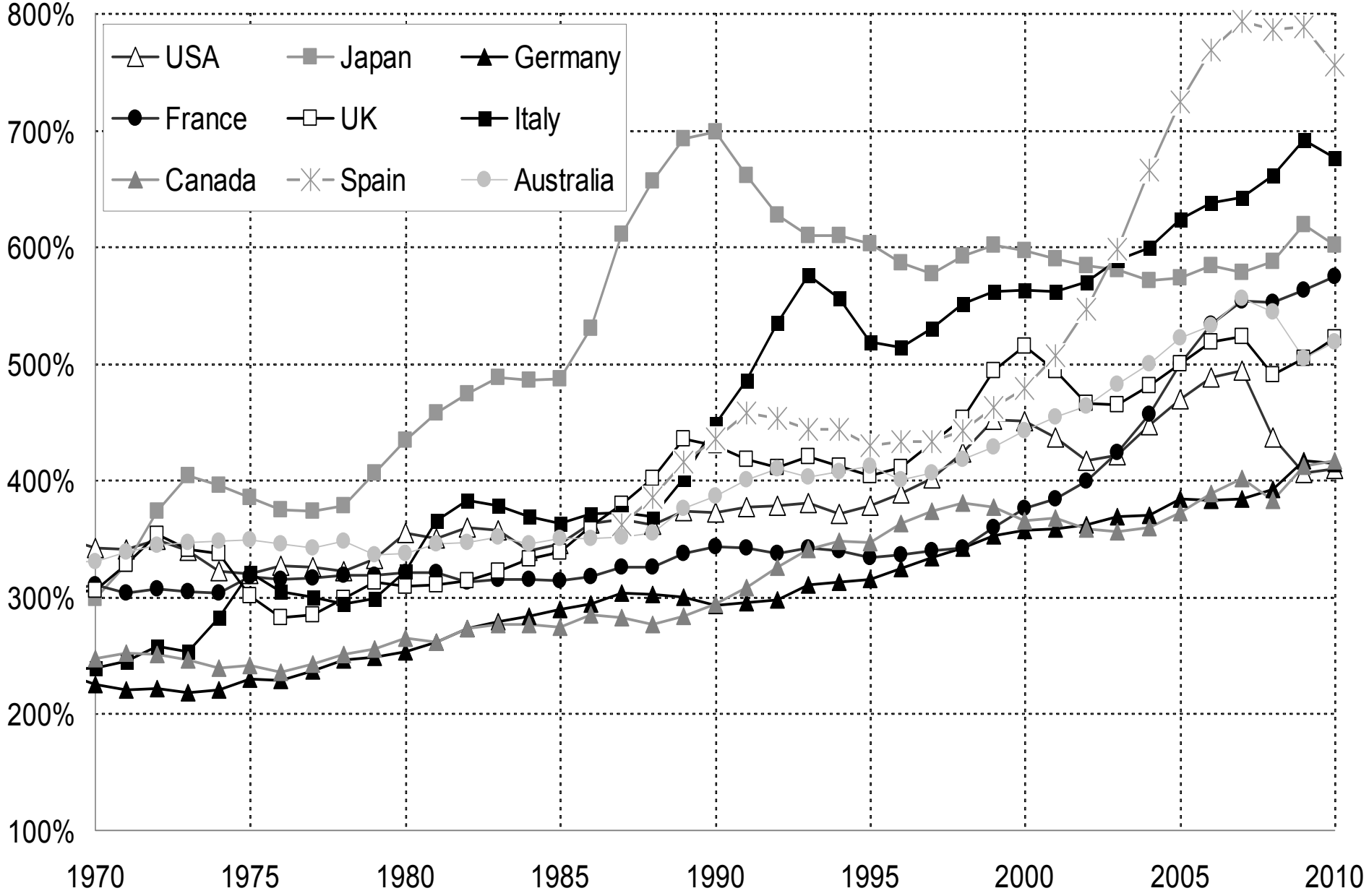
**Explains long run change & level diff Europe vs US**

# Private wealth / national income ratios, 1970-2010




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

# Private wealth / national income ratios, 1970-2010 (incl. Spain)

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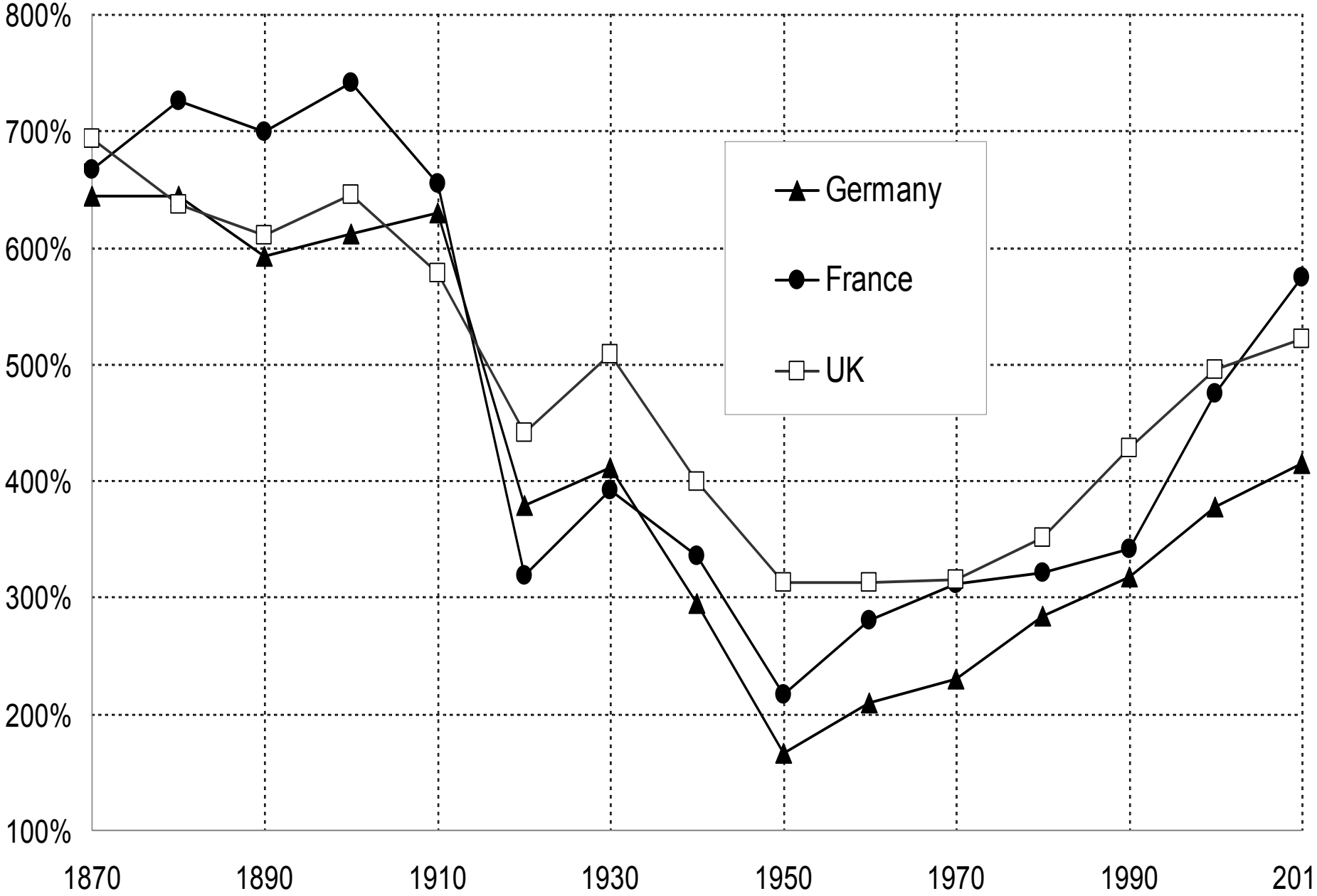
# Private wealth / national income ratios in Europe, 1870-2010

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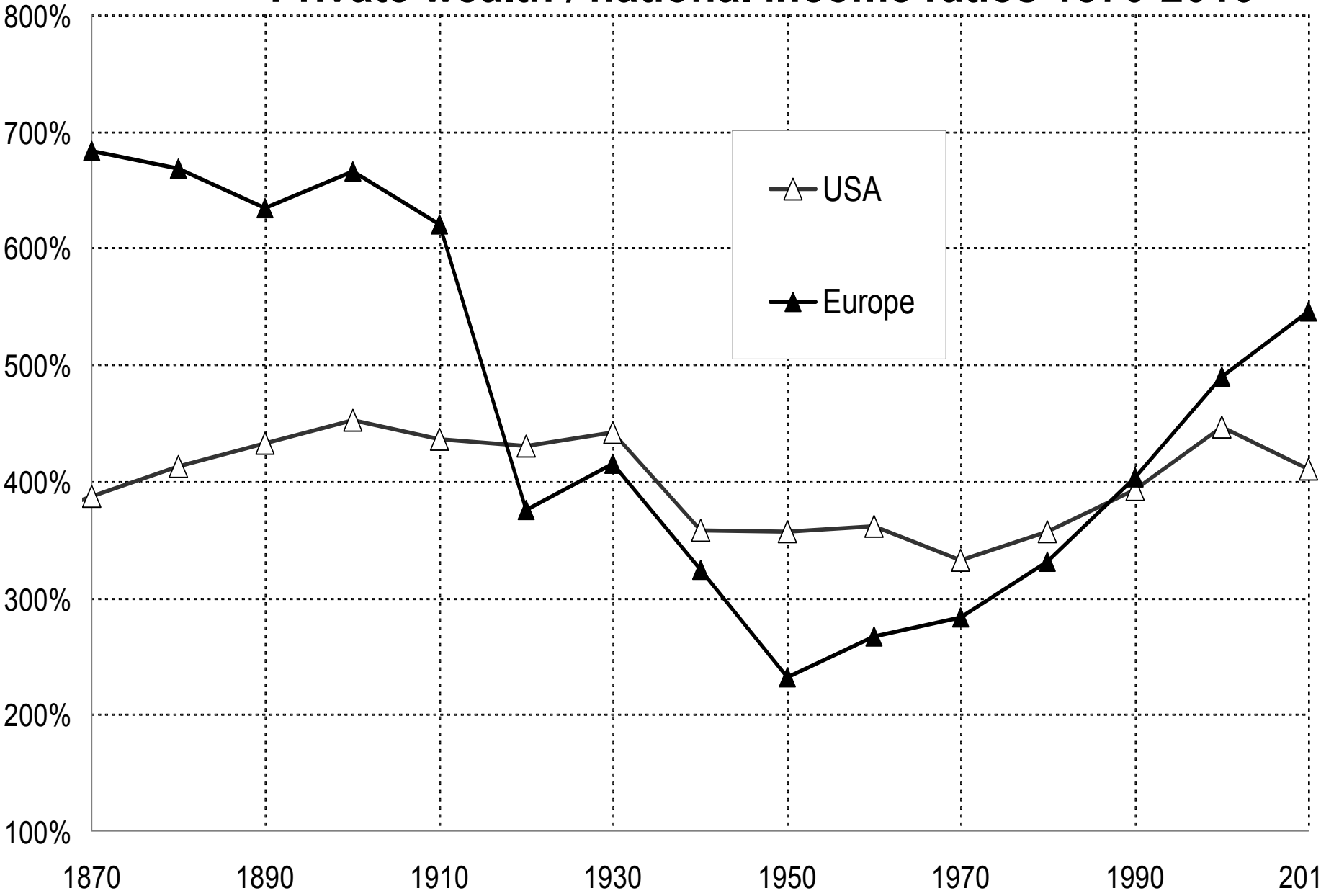
# Private wealth / national income ratios 1870-2010




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

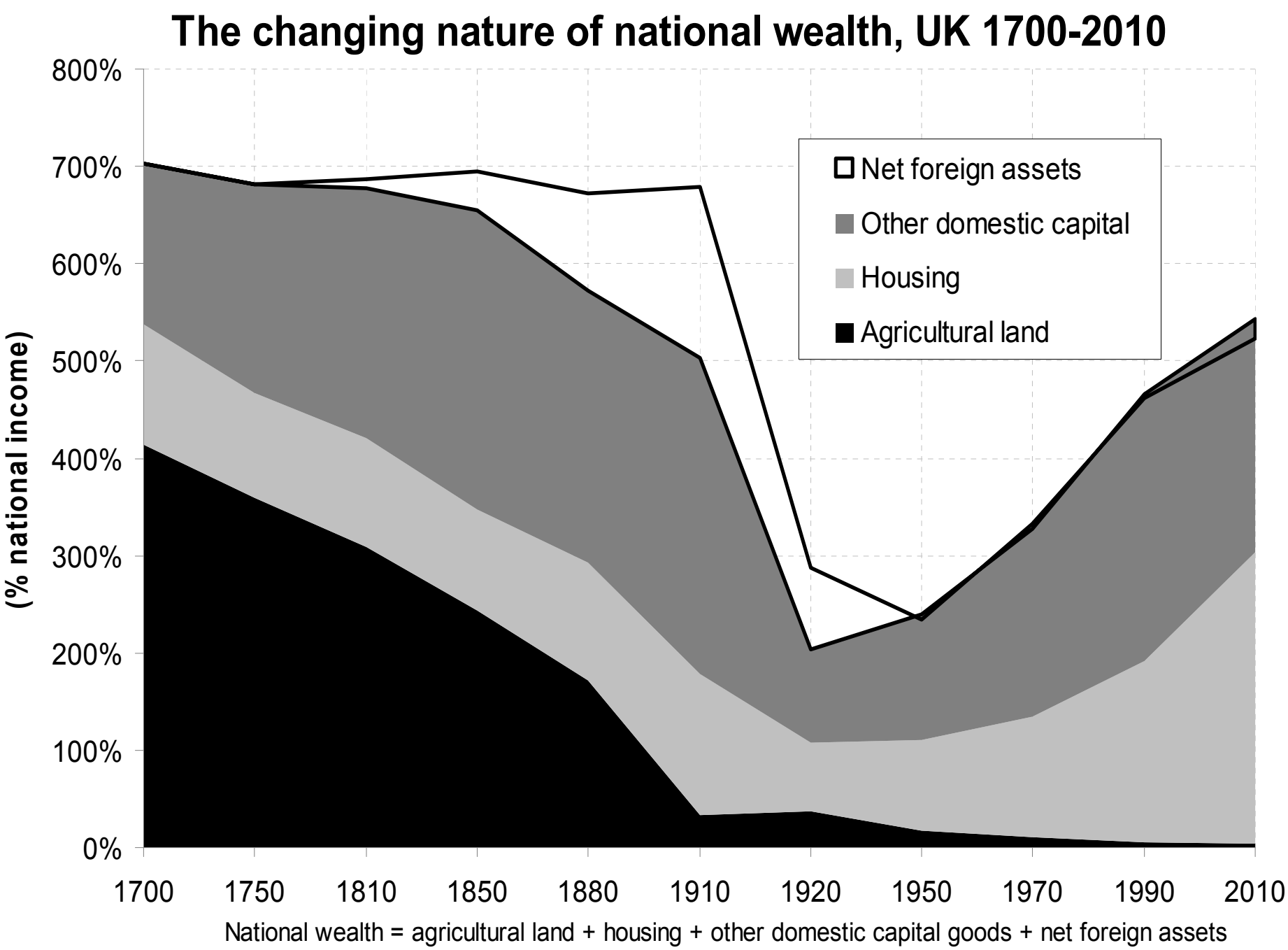
- **Lesson 1**: one-good capital accumulation model with factor substitution works relatively well in the long run; but in short & medium run, volume effects (saving flows) can be vastly dominated by relative price effects (capital gains or losses)
- **Lesson 2**: long run wealth-income ratios $\beta=s/g$ can vary a lot btw countries: s and g determined by diff. forces; countries with low g and high s naturally have high β; high β is not bad per se (capital is useful); but **high β raises new issues about capital regulation and taxation**:
- With integrated capital markets, this can generate large net foreign asset positions, even in the absence of income diff (or reverse to income diff); so far net positions are smaller than during colonial period; but some countries positions are rising fast (Japan, Germany,.)
- With limited capital mobility, and/or home portfolio biais, high β can lead to large domestic asset price bubbles: see Japan, UK, Italy, France, Spain,.

- **Lesson 3**: **wealth and technology in 21c : $\sigma>1$**

  Global rate of return r doesn't seem to decline as much as the rise in global β, i.e. global capital share $\alpha=r\beta\uparrow$ as $\beta\uparrow$ since 1970 → long run K/L elasticity of substitution $\sigma>1$, or rising market power for K, or both ?
- **Lesson 4**: **wealth and technology in 18c : $\sigma<1$**
- In the very long run, i.e. using national wealth estimates over 1700-2010 for UK & France, we find β stable around 600%-700%, in spite of huge changes in wealth composition, from agricultural land to manufacturing and housing
- In agrarian, very-low-growth societies, however, it is unclear which forces dominate: $\beta = s/g$ or $\beta = \alpha/r$ ? Probably $\beta = \alpha/r$
- I.e. with α = capital share = mostly land rent: determined by technology, politics, & land availability ($\alpha\approx30\%-40\%$ in Europe, vs 10%-15% in land-rich New world, i.e. elast. subst. $\sigma<1$), and r = rate of return = 4%-5% = rate of time preference

→ β = 600%-700% in Europe, vs 200%-300% in New World

(simply bc very abundant land is worthless; nothing to do with the $\beta = s/g$ mechanism, which bumped it in later, with migration)


The changing nature of national wealth, UK 1700-2010
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

# Concepts & methods

- National income Y = domestic output $Y_d$ + r NFA
- Private wealth W = non-financial assets + financial assets – financial liabilities (household & non-profit sector)
- $\beta = W/Y$ = private wealth-national income ratio

- Govt wealth $W_g$ = non-fin + fin assets - fin liab (govt sector)
- National wealth $W_n = W + W_g = K + NFA$

with K = domestic capital (= land + housing + other domestic k)

NFA = net foreign assets

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

- Domestic output $Y_d = F(K,L)$ (L = labor input) (e.g. $K^{\alpha}L^{1-\alpha}$)
- Capital share $\alpha = r\,\beta$ (r = average rate of return to wealth)

- **One-good capital accumulation model**: $\mathbf{W_{t+1} = W_t + s_t Y_t}$
  $\rightarrow \quad \beta_{t+1} = \beta_t \, (1+g_{wt})/(1+g_t)$

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

$1+g_t = Y_{t+1}/Y_t$ = exogenous output growth rate (productiv.+pop)

- With fixed saving rate $s_t=s$ and growth rate $g_t=g$, then:
  $\boldsymbol{\beta_t \rightarrow \beta = s/g}$ (Harrod-Domar-Solow steady-state formula)
- E.g. if s=10% & g=2%, then β = 500%

- **Pure accounting formula**: valid with any saving motive or utility function, i.e. wherever s comes from
- Wealth or bequest in the utility function: saving rate s set by u() (intensity of wealth or bequest taste) and/or demographic structure; then β=s/g follows
- Dynastic utility: rate or return r set by u(); if α set by technology, then β = α/r follows (s=αg/r, so β=α/r=s/g)
- With general utility functions, both s and r are jointly determined by u() and technology

- **Two-good capital accumulation model**: one capital good, one consumption good
- Define $1+q_t$ = real rate of capital gain (or capital loss)

= excess of asset price inflation over consumer price inflation

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

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

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

Our empirical strategy:

- we do not specify where $q_t$ come from (maybe stochastic production functions to produce capital vs consumption good, with diff. rates of technical progress);
- we observe $\beta_t,..,\beta_{t+n}$, $s_t,..,s_{t+n}$, $g_t,..,g_{t+n}$, and we decompose the wealth accumulation equation between years t and t+n into volume (saving) vs price effect (capital gain or loss)

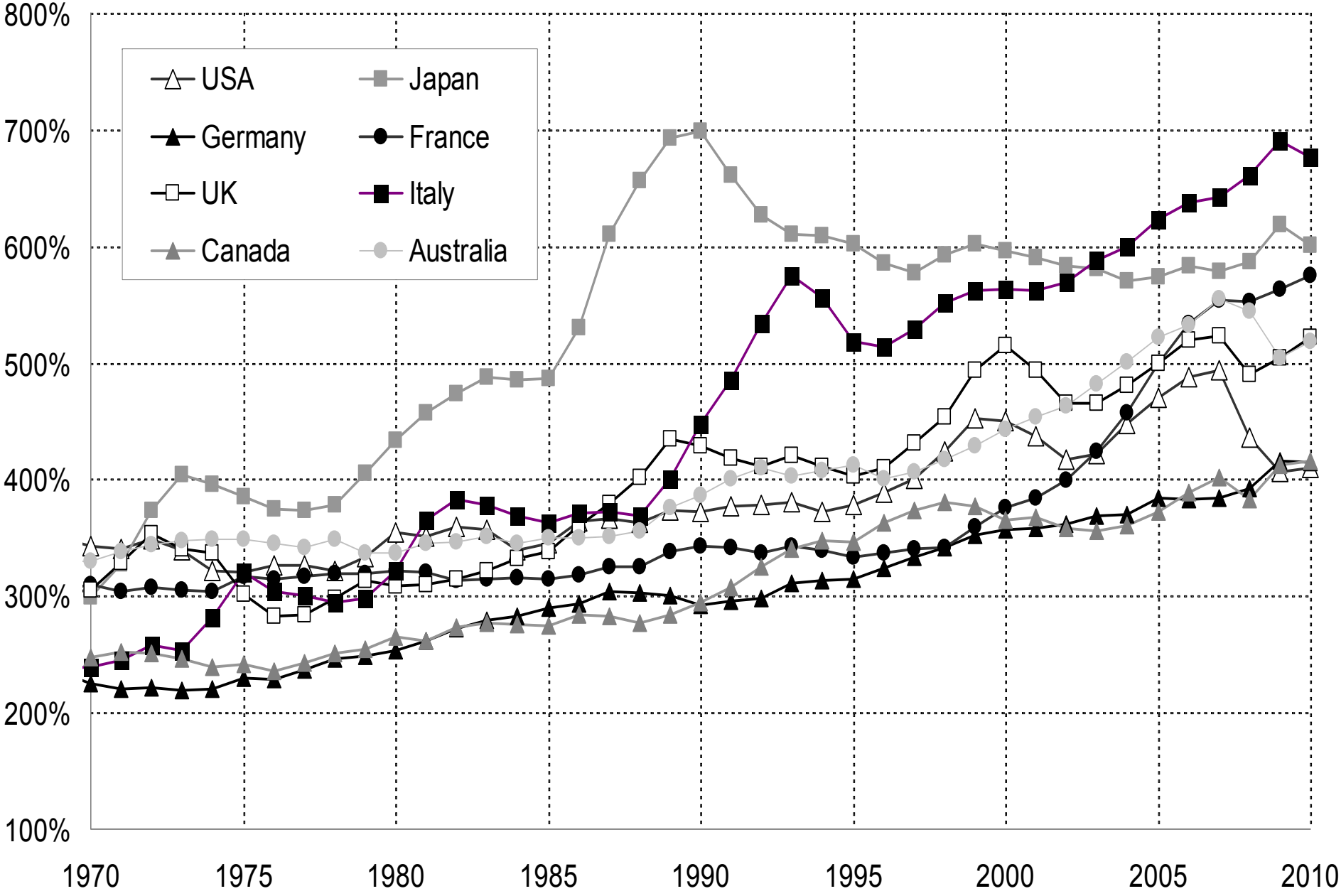
# Decomposition results: 1970-2010

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

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

→ we need to put 1970-2010 period into longer perspective

# Private wealth / national income ratios, 1970-2010

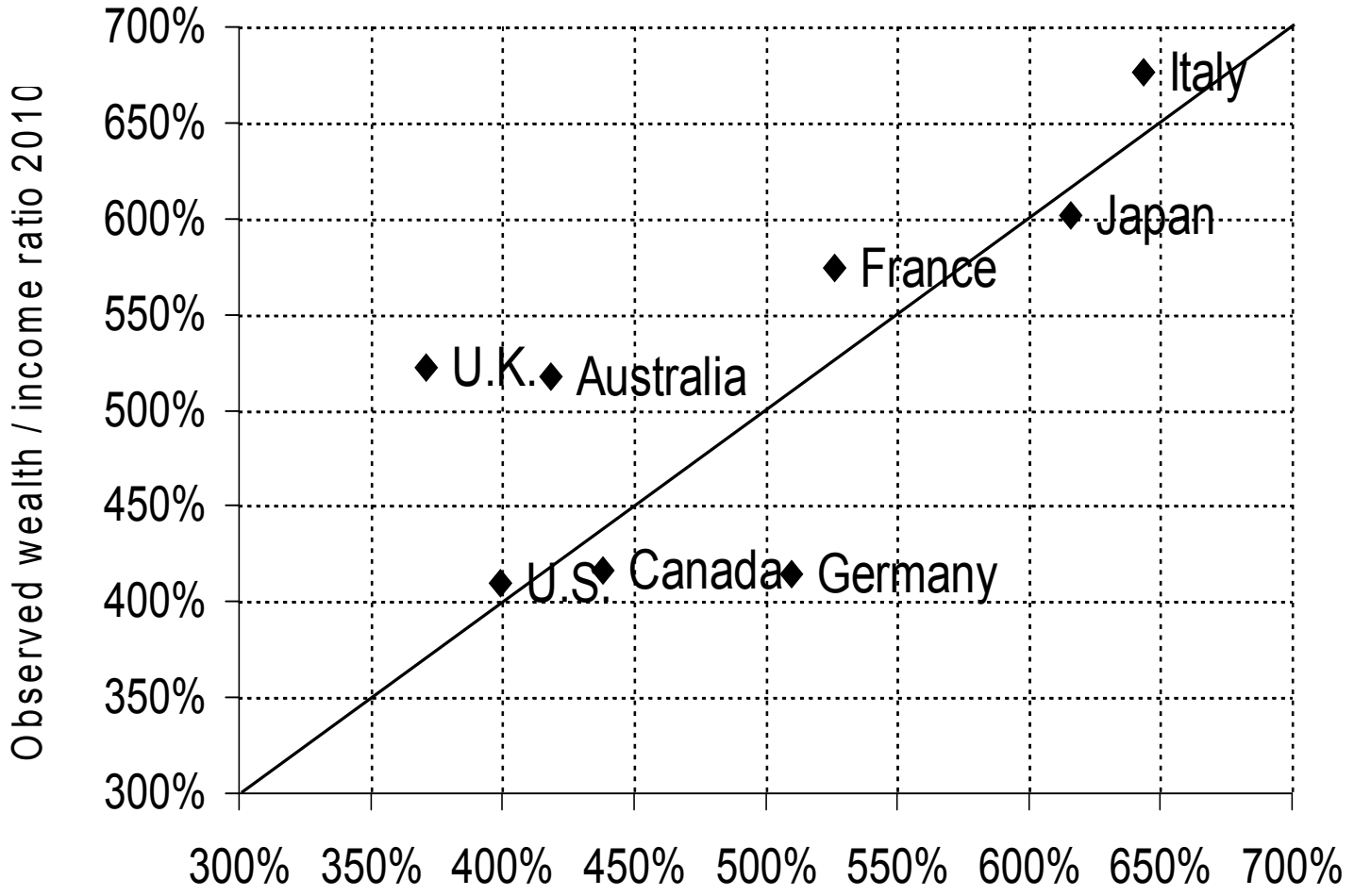



Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)

**Table 2: Growth rate vs private saving rate 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%** |
| Australia | **3.2%** | 1.4% | 1.7% | **9.9%** |

## Observed vs predicted private wealth / national income ratio (2010)




Predicted wealth / income ratio 2010 (on the basis of 1970 initial wealth and 1970-2010 cumulated saving flows) (additive decomposition, incl. R&D)

**Table 3: Accumulation of private wealth in rich countries, 1970-2010 (additive decomposition)**

| | Private wealth-national income ratios | | Decomposition of 2010 private wealth-national income ratio | | |
|---|---|---|---|---|---|
| | β (1970) | β (2010) | Initial wealth effect | Cumulated new savings | Capital gains or losses |
| U.S. | 342% | 410% | 113% | 236% | 60% |
| | | | 28% | 58% | 15% |
| | | | | ***80%*** | ***20%*** |
| Japan | 299% | 601% | 110% | 456% | 35% |
| | | | 18% | 76% | 6% |
| | | | | ***93%*** | ***7%*** |
| Germany | 225% | 415% | 104% | 356% | -45% |
| | | | 25% | 86% | -11% |
| | | | | ***115%*** | ***-15%*** |
| France | 310% | 575% | 130% | 346% | 98% |
| | | | 23% | 60% | 17% |
| | | | | ***78%*** | ***22%*** |
| U.K. | 306% | 522% | 128% | 193% | 201% |
| | | | 25% | 37% | 39% |
| | | | | ***49%*** | ***51%*** |
| Italy | 239% | 676% | 114% | 480% | 83% |
| | | | 17% | 71% | 12% |
| | | | | ***85%*** | ***15%*** |
| Canada | 247% | 416% | 80% | 308% | 28% |
| | | | 19% | 74% | 7% |
| | | | | ***92%*** | ***8%*** |
| Australia | 330% | 518% | 94% | 275% | 149% |
| | | | 18% | 53% | 29% |
| | | | | ***65%*** | ***35%*** |

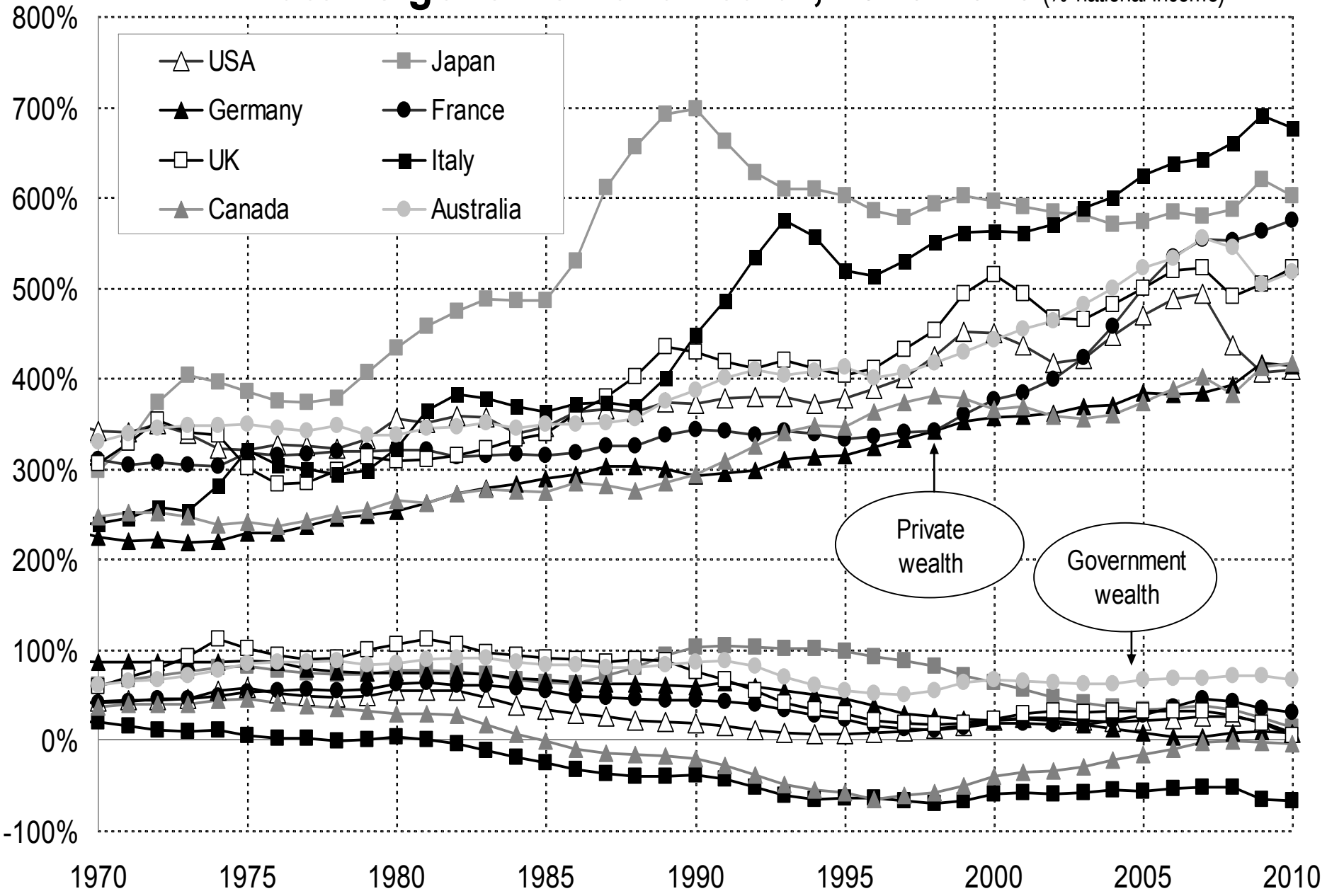
**Table 4: Accumulation of private wealth in rich countries, 1970-2010 (multiplicative decomposition)**

| | Private wealth-national income ratios | | Decomposition of 1970-2010 wealth growth rate | | |
|---|---|---|---|---|---|
| | | | Real growth rate of private wealth | Savings-induced wealth growth rate | Capital-gains-induced wealth growth rate |
| | β (1970) | β (2010) | $g_w$ | $g_{ws} = s/\beta$ | q |
| U.S. | 342% | 410% | 3.3% | 2.9%<br>***88%*** | 0.4%<br>***12%*** |
| Japan | 299% | 601% | 4.3% | 3.4%<br>***78%*** | 0.9%<br>***22%*** |
| Germany | 225% | 415% | 3.5% | 4.3%<br>***121%*** | -0.7%<br>***-21%*** |
| France | 310% | 575% | 3.8% | 3.4%<br>***90%*** | 0.4%<br>***10%*** |
| U.K. | 306% | 522% | 3.6% | 1.9%<br>***55%*** | 1.6%<br>***45%*** |
| Italy | 239% | 676% | 4.6% | 4.2%<br>***92%*** | 0.4%<br>***8%*** |
| Canada | 247% | 416% | 4.2% | 4.3%<br>***103%*** | -0.1%<br>***-3%*** |
| Australia | 330% | 518% | 4.4% | 3.4%<br>***79%*** | 0.9%<br>***21%*** |

**Table 6: Private savings 1970-2010: personal vs corporate**

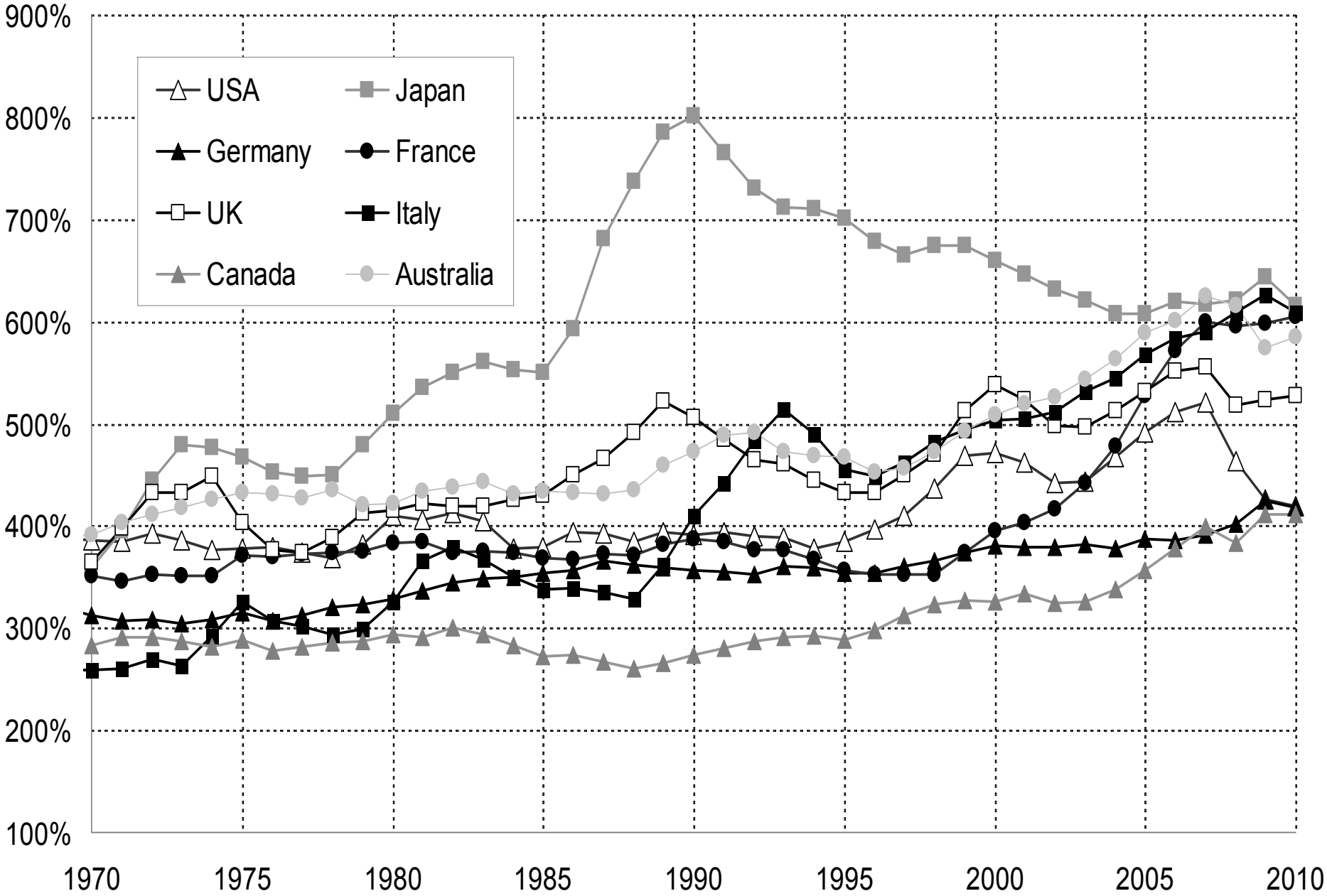
| *Average saving rates 1970-2010 (% national income)* | Net private savings (personal + corporate) | incl. personal savings | incl. corporate savings (retained earnings) |
|---|---|---|---|
| U.S. | 7.7% | 4.6%<br>***60%*** | 3.1%<br>***40%*** |
| Japan | 14.6% | 6.8%<br>***47%*** | 7.8%<br>***53%*** |
| Germany | 12.2% | 9.4%<br>***76%*** | 2.9%<br>***24%*** |
| France | 11.1% | 9.0%<br>***81%*** | 2.1%<br>***19%*** |
| U.K. | 7.3% | 2.8%<br>***38%*** | 4.6%<br>***62%*** |
| Italy | 15.0% | 14.6%<br>***97%*** | 0.4%<br>***3%*** |
| Canada | 12.1% | 7.2%<br>***60%*** | 4.9%<br>***40%*** |
| Australia | 9.9% | 5.9%<br>***60%*** | 3.9%<br>***40%*** |

# Private vs governement wealth, 1970-2010 (% national income)



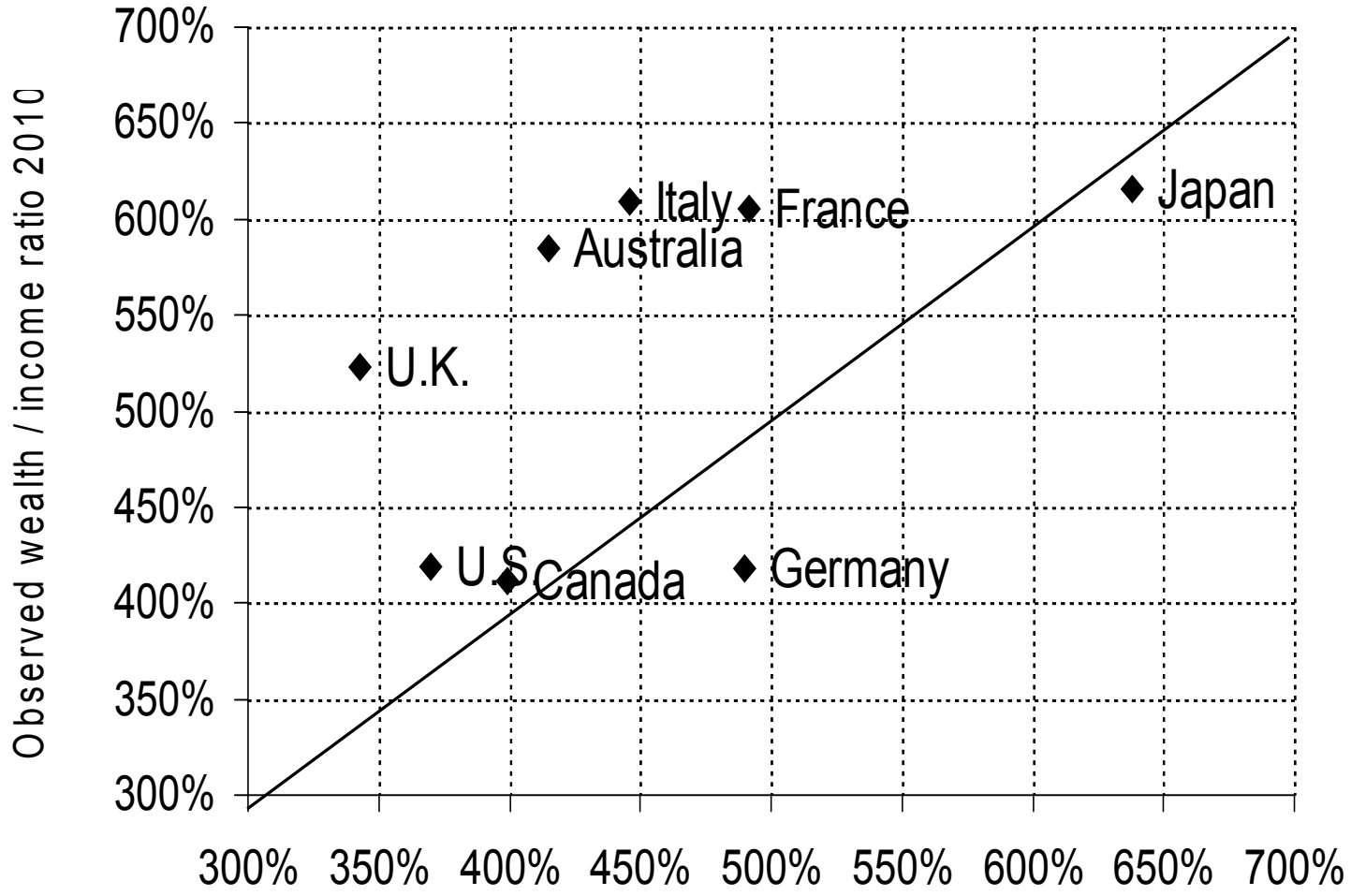

Authors' computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)

# National wealth / national income ratios, 1970-2010




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

## Observed vs predicted national wealth/national income ratio (2010)

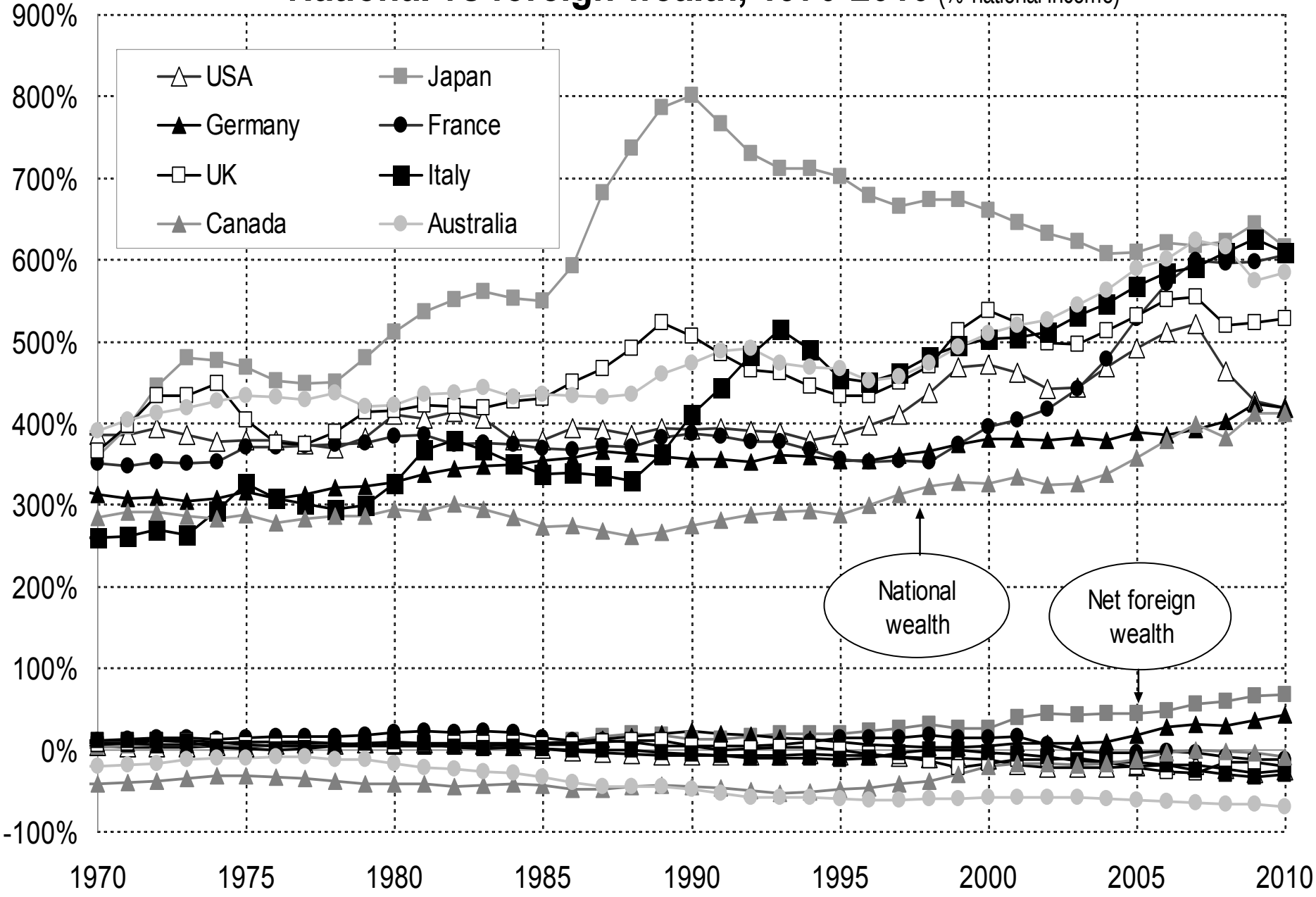



Predicted wealth / income ratio 2010 (on the basis of 1970 initial wealth and 1970-2010 cumulated saving flows) (additive decomposition, incl. R&D)

**Table 9: 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% |

# National vs foreign wealth, 1970-2010 (% national income)

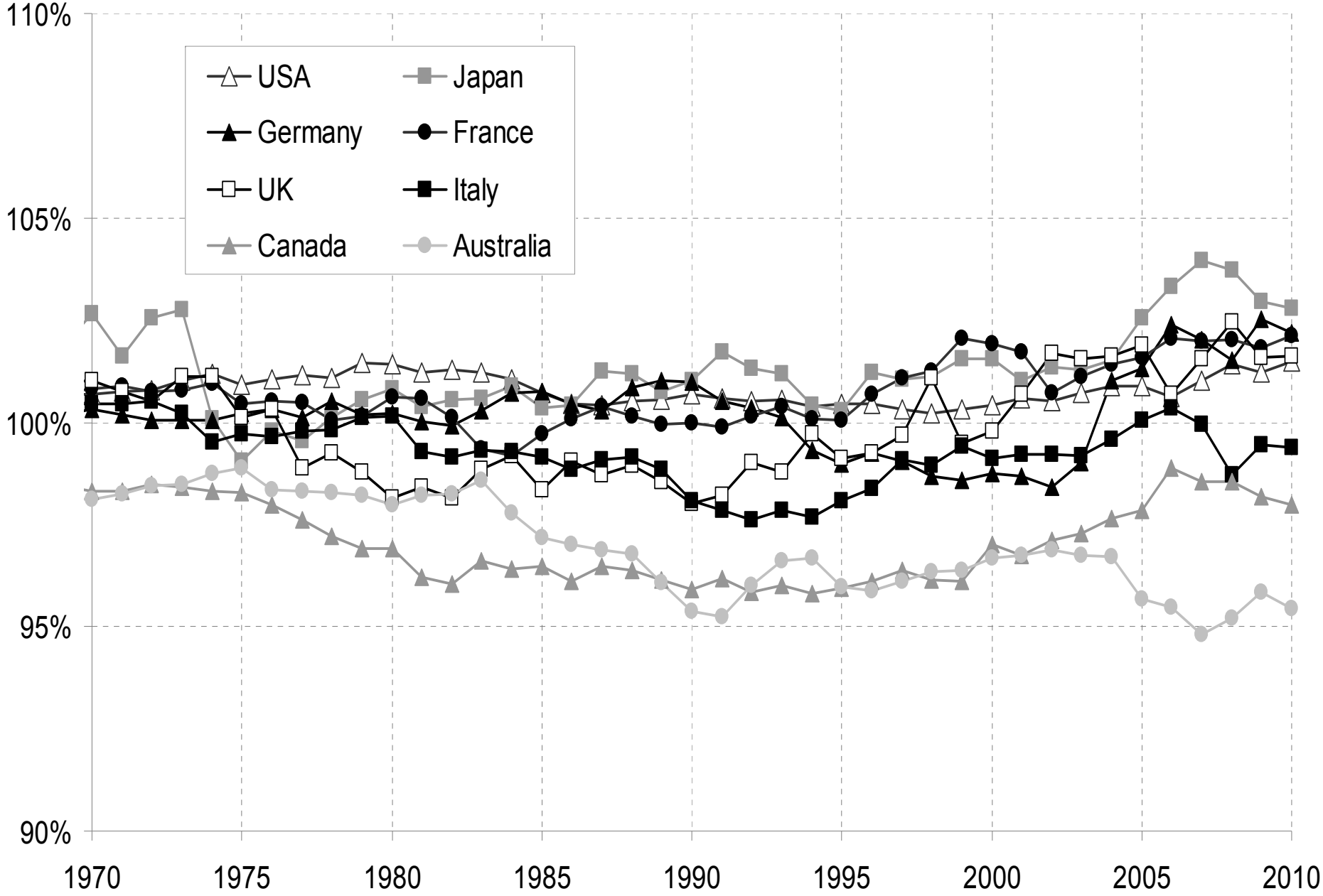



Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors)

**Table 12: National wealth accumulation in rich countries, 1970-2010: domestic capital vs foreign wealth**

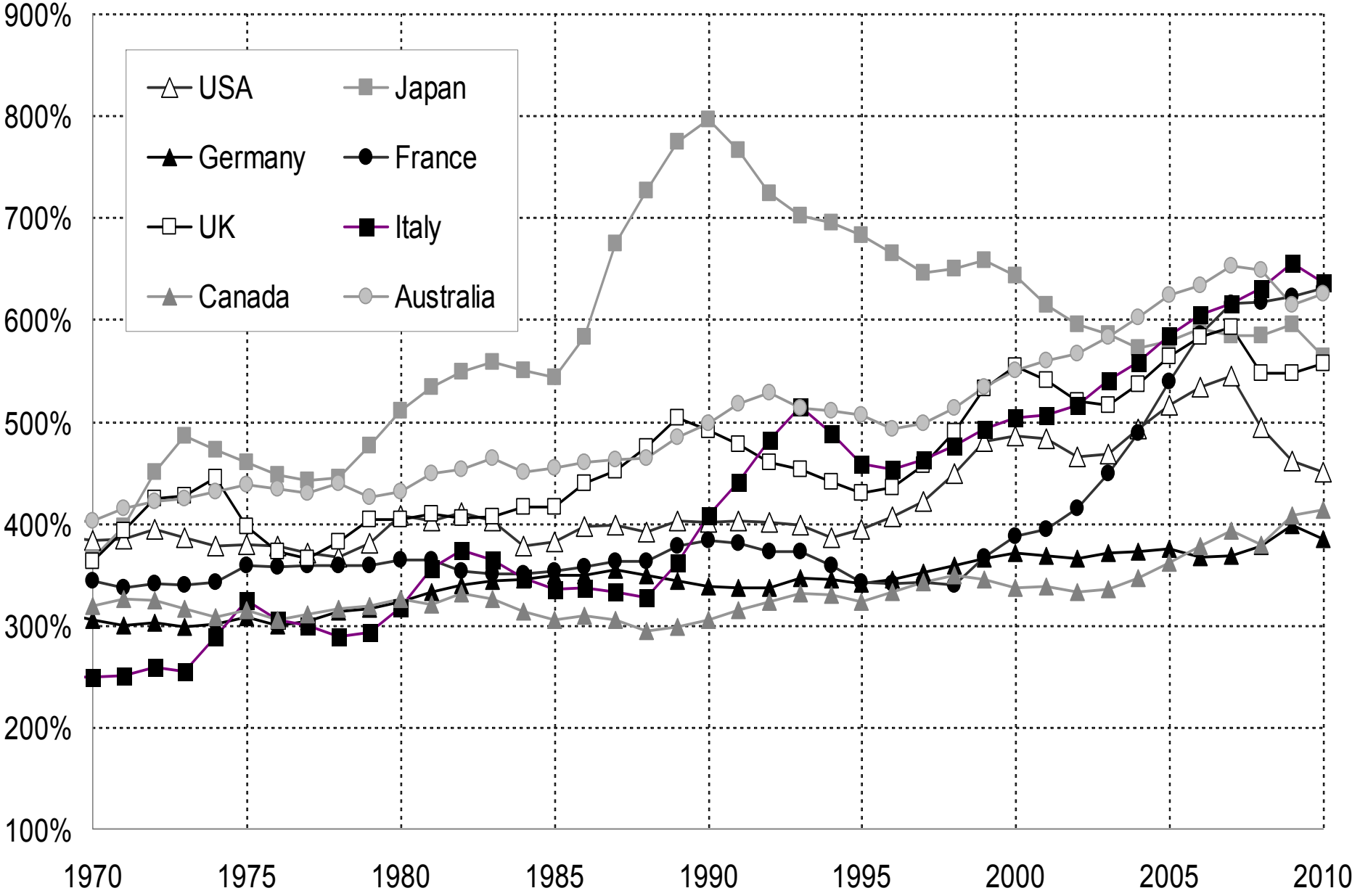
| | National wealth / national income ratio (1970) | | National wealth / national income ratio (2010) | | Rise in national wealth / national income ratio (1970-2010) | |
|---|---|---|---|---|---|---|
| | *incl. Domestic capital* | *incl. Foreign wealth* | *incl. Domestic capital* | *incl. Foreign wealth* | *incl. Domestic capital* | *incl. Foreign wealth* |
| U.S. | 385% | | 419% | | 33% | |
| | 381% | 4% | 444% | -25% | 63% | -30% |
| Japan | 359% | | 616% | | 256% | |
| | 356% | 3% | 548% | 67% | 192% | 64% |
| Germany | 312% | | 418% | | 106% | |
| | 304% | 8% | 376% | 42% | 72% | 34% |
| 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% |

# National income / domestic product ratios, 1970-2010




Authors' computations using country national accounts. National income = domestic product + net foreign income

# Domestic capital / output ratios, 1970-2010




Authors' computations using country national accounts. Domestic capital/output ratio = (national wealth - foreign wealth)/domestic product

**Table 16: Domestic capital accumulation in rich countries, 1970-2010: housing vs other domestic capital**

| | Domestic capital / national income ratio (1970) | | Domestic capital / national income ratio (2010) | | Rise in domestic capital / national income ratio (1970-2010) | |
|---|---|---|---|---|---|---|
| | *incl. Housing* | *incl. Other domestic capital* | *incl. Housing* | *incl. Other domestic capital* | *incl. Housing* | *incl. Other domestic capital* |
| U.S. | 381% | | 444% | | 63% | |
| | 142% | 239% | 182% | 262% | 41% | 23% |
| Japan | 356% | | 548% | | 192% | |
| | 131% | 225% | 220% | 328% | 89% | 103% |
| Germany | 304% | | 376% | | 72% | |
| | 129% | 175% | 241% | 135% | 112% | -40% |
| France | 340% | | 618% | | 278% | |
| | 104% | 236% | 371% | 247% | 267% | 11% |
| U.K. | 359% | | 548% | | 189% | |
| | 98% | 261% | 300% | 248% | 202% | -13% |
| Italy | 247% | | 640% | | 392% | |
| | 107% | 141% | 386% | 254% | 279% | 113% |
| Canada | 325% | | 422% | | 97% | |
| | 108% | 217% | 208% | 213% | 101% | -4% |
| Australia | 410% | | 655% | | 244% | |
| | 172% | 239% | 364% | 291% | 193% | 52% |

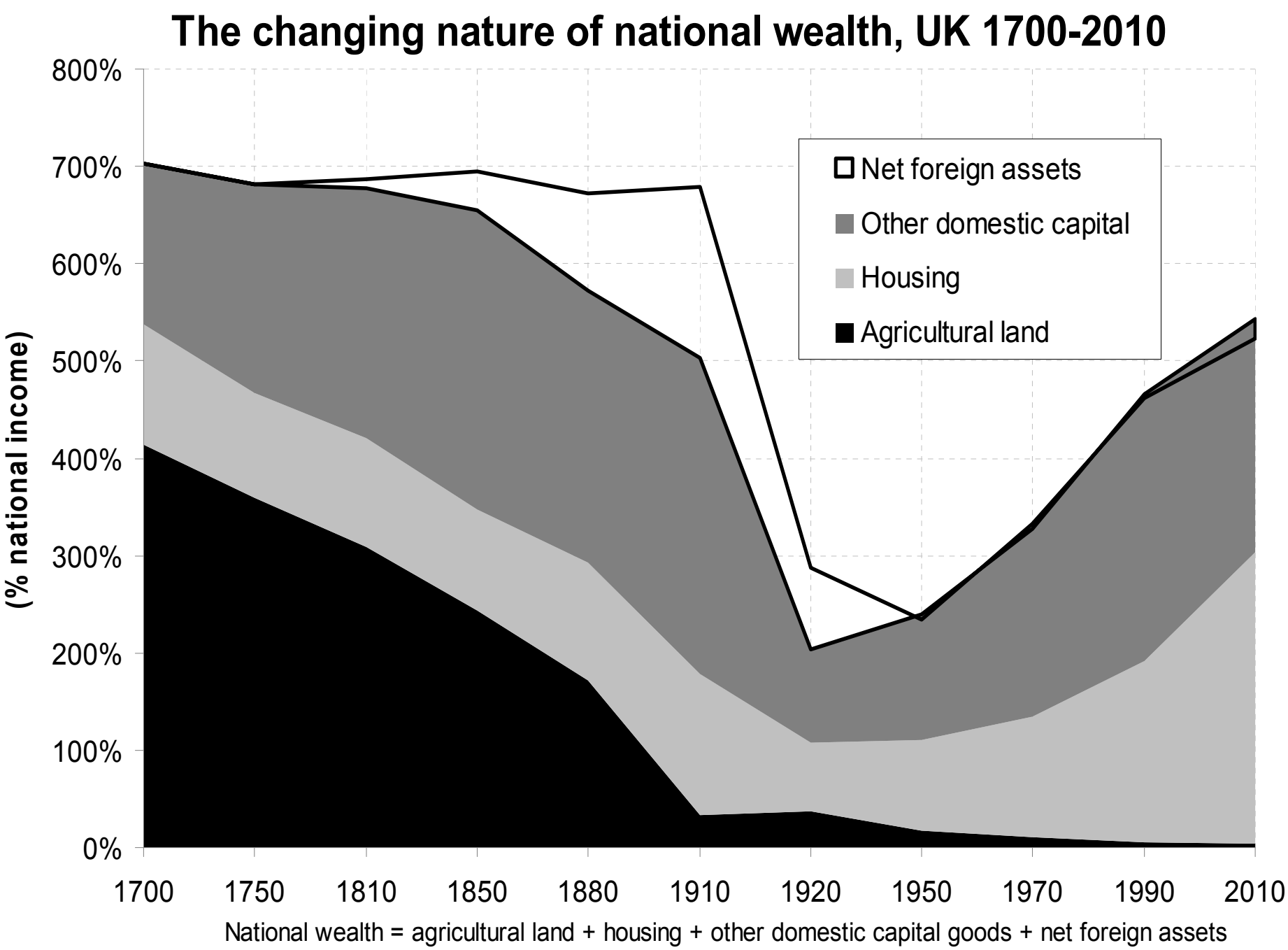
# Decomposition results: 1870-2010

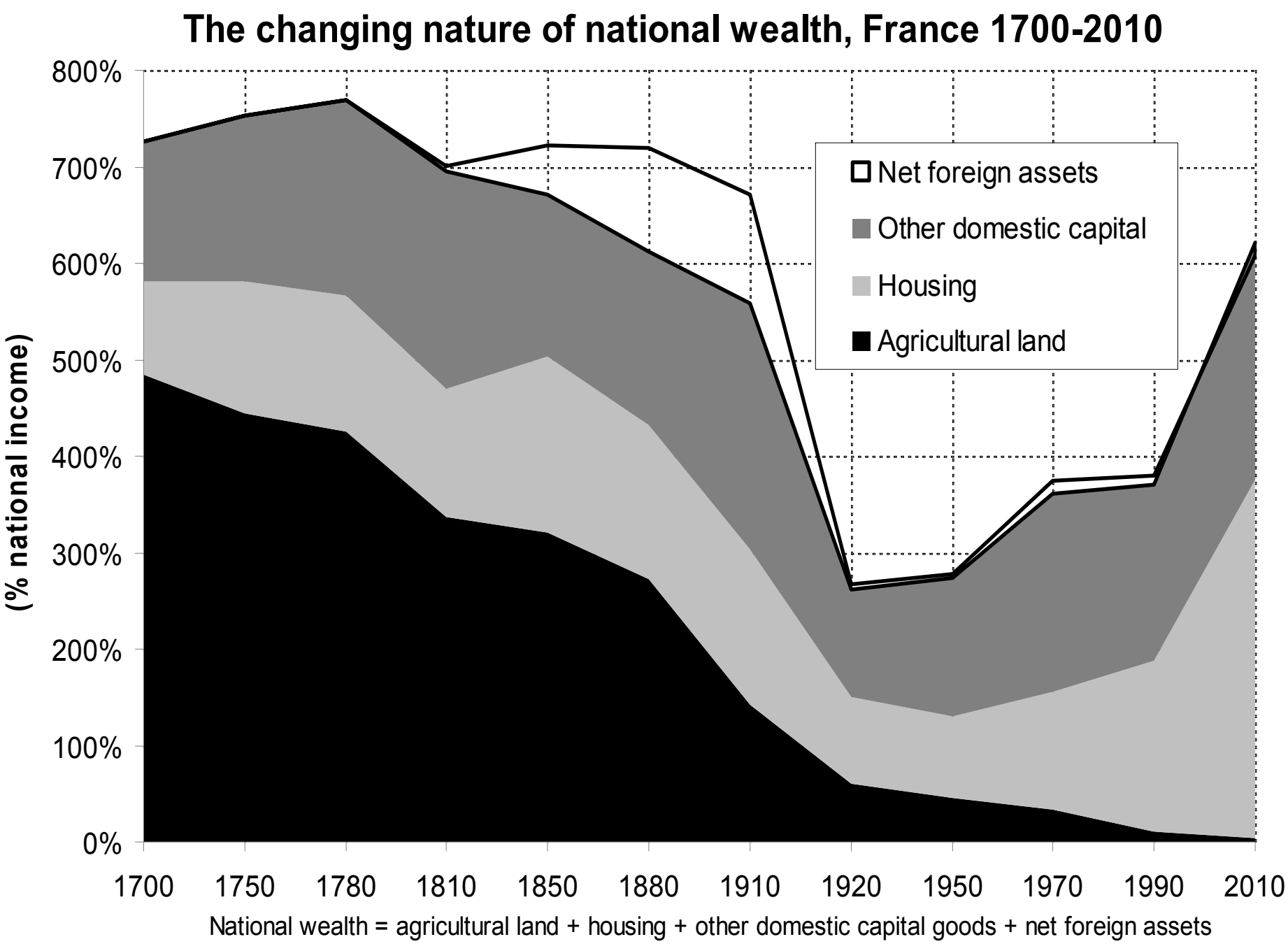
- Annual series for US, Germany, France, UK, 1870-2010
- Additive vs multiplicative decomposition of wealth accumulation equation into volume vs price effects
- Private saving (personal + corporate) vs personal
- Private wealth vs national wealth accumulation
- Domestic vs foreign wealth accumulation

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

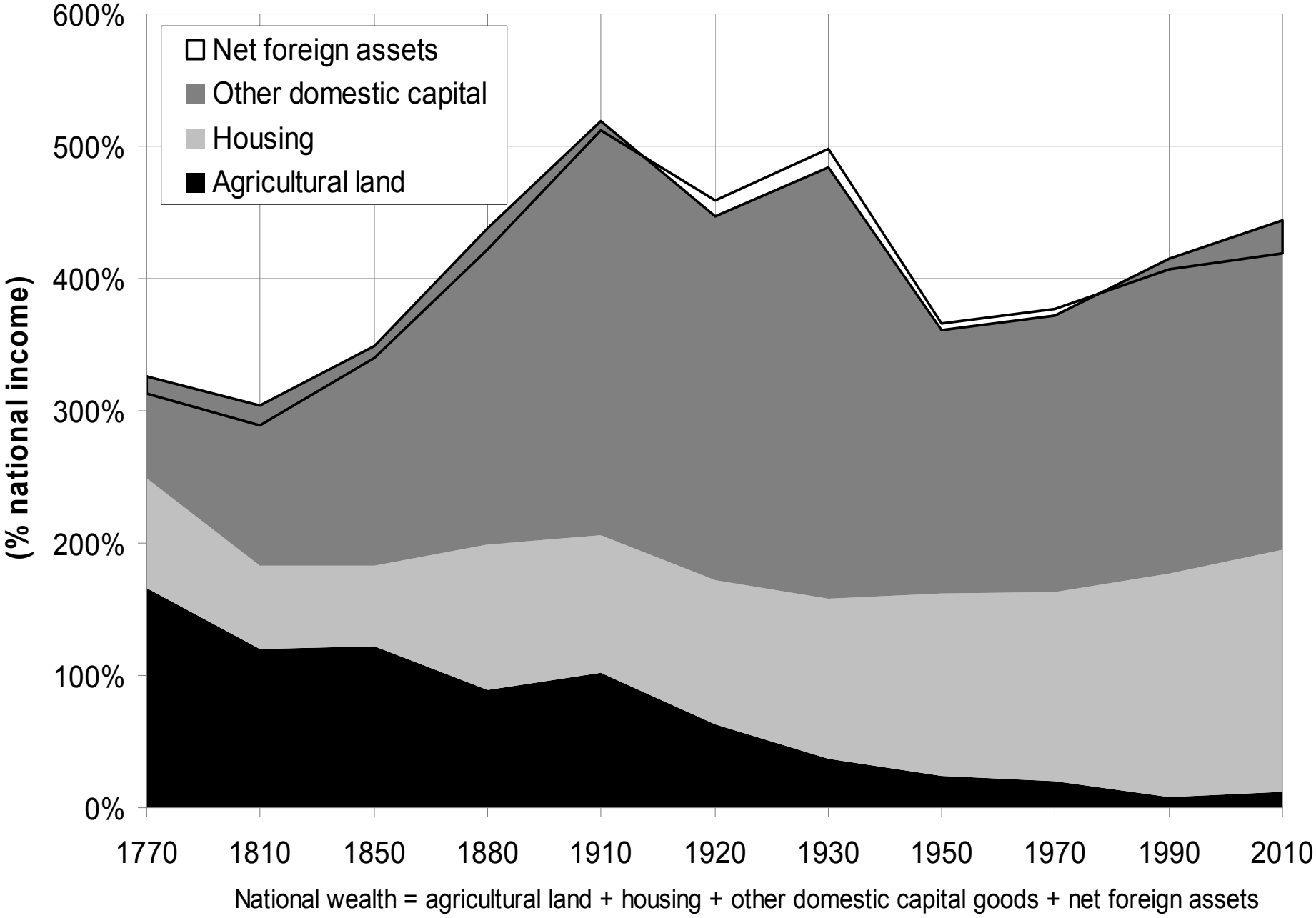
# Very long run results: 1700-2010

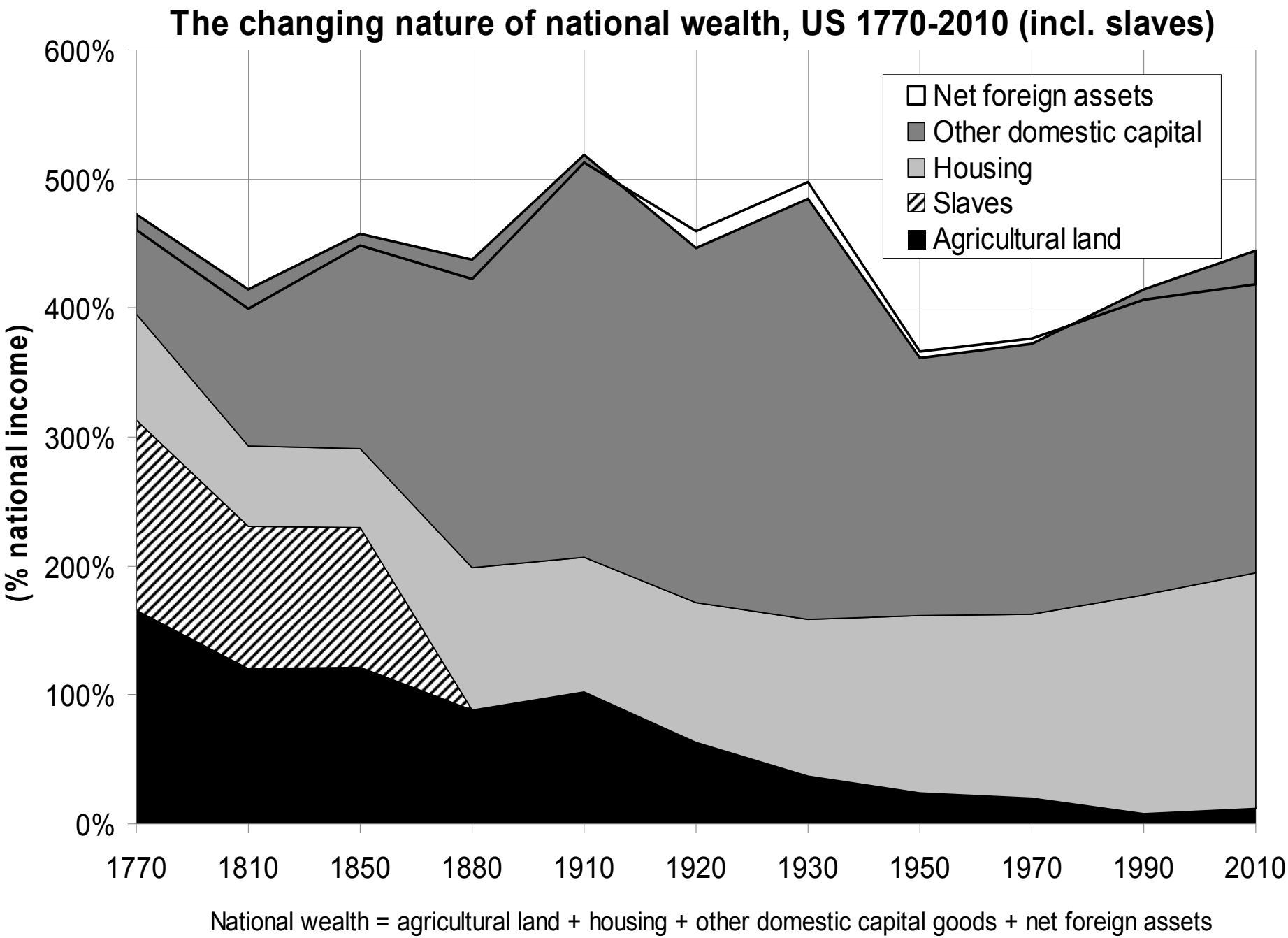
- For the UK and France, there are national balance sheets estimates starting around 1700-1750 (and for the US, starting around 1770-1800)
- These estimates are less precise than post-1870 series; in particular one cannot properly identify volume vs price effects in wealth accumulation equations: saving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

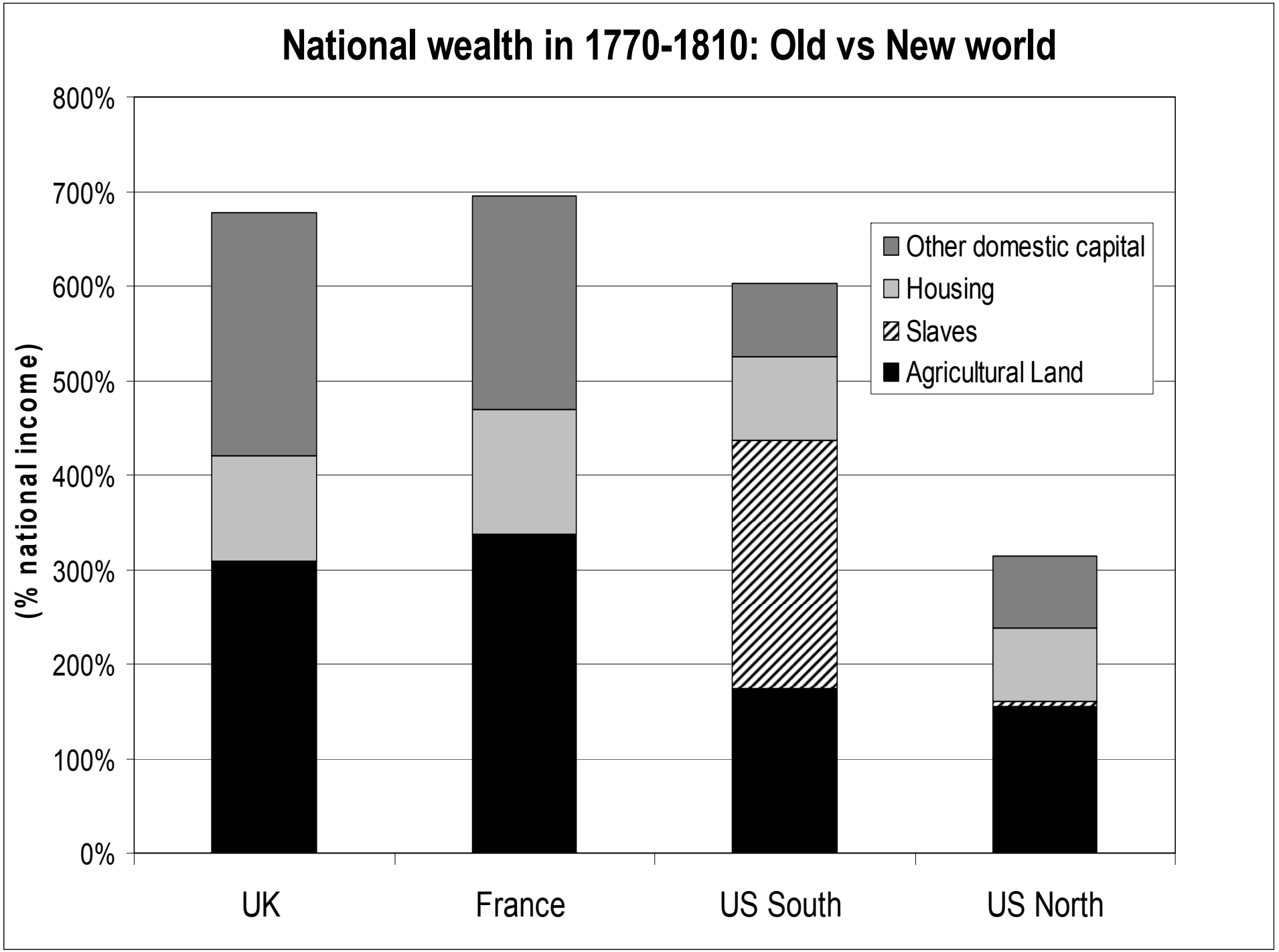

The changing nature of national wealth, UK 1700-2010
800%
700%
600%
500%
400%
300%
200%
100%
0%
(% national income)
Net foreign assets
Other domestic capital
Housing
Agricultural land
1700
1750
1810
1850
1880
1910
1920
1950
1970
1990
2010
National wealth = agricultural land + housing + other domestic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

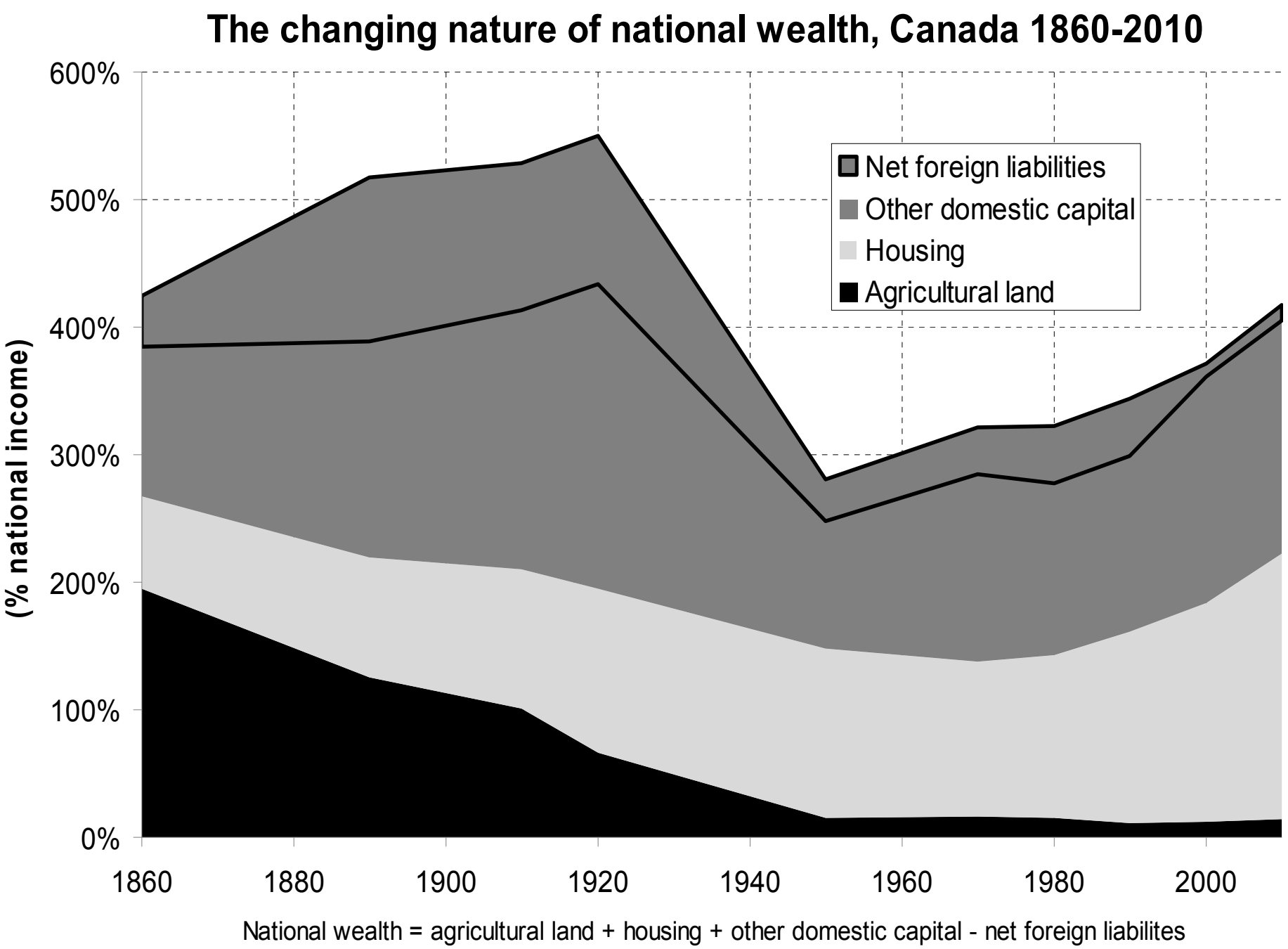

The changing nature of national wealth, France 1700-2010
800%
700%
600%
500%
400%
300%
200%
100%
0%
(% national income)
Net foreign assets
Other domestic capital
Housing
Agricultural land
1700
1750
1780
1810
1850
1880
1910
1920
1950
1970
1990
2010
National wealth = agricultural land + housing + other domestic capital goods + net foreign assets

# The changing nature of national wealth, US 1770-2010




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


The changing nature of national wealth, Canada 1860-2010
600%
500%
400%
300%
200%
100%
0%
(% national income)
1860
1880
1900
1920
1940
1960
1980
2000
Net foreign liabilities
Other domestic capital
Housing
Agricultural land
National wealth = agricultural land + housing + other domestic capital - net foreign liabilites

- **Why is** β stable around 600%-700% in the very long run in UK & France?
- In agrarian, very-low-growth societies, it is unclear which forces dominate: $\beta = s/g$ or $\beta = \alpha/r$ ? Probably $\beta = \alpha/r$
- I.e. with α = capital share = mostly land rent: determined by technology, politics, & land availability ($\alpha \approx 30\%$-$40\%$ in Europe, vs 10%-15% in land-rich New world, i.e. elasticity of substitution $\sigma<1$), and r = rate of return = 4%-5% = rate of time preference

  → β = 600%-700% in Europe, vs 200%-300% in New World

(simply because very abundant land is worthless: new world had more land in volume, but less land in value)

(nothing to do with the $\beta = s/g$ mechanism, which bumped it in later, with migration)

- **Capital is back**: the low wealth-income ratios observed in Europe in 1950s-1970s (200%-300%) were an anomaly; with low growth, long run wealth-income ratios are naturally very large (600%-700%); key is $\beta = s/g$
- There's nothing bad about the return of capital: k is useful; but it raises new issues about k regulation & taxation
- National accounts used to be mostly about flows; we now need to focus on stocks
- Next steps: **Dynamics of world distribution of wealth**: Will China or global billionnaires own the world? Both divergence can occur, but 2nd one more likely, esp. if r>g
- **Inherited vs self-made wealth**: long-run U-shaped pattern in France; on-going work on UK, Germany & US

# 2b. The return of inherited wealth

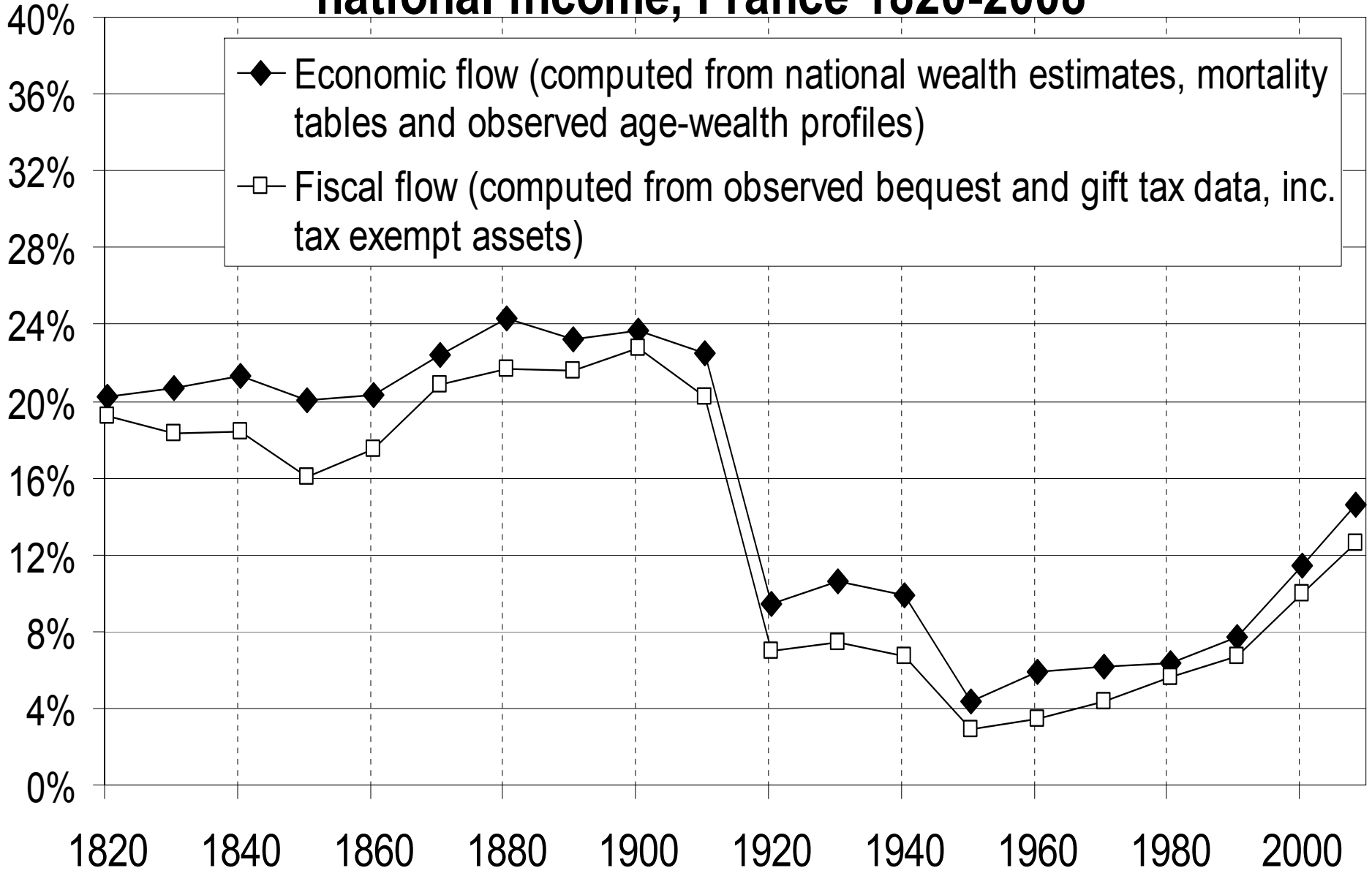
- In principle, one could very well observe a return of wealth without a return of inherited wealth
- I.e. it could be that the rise of aggregate wealth-income ratio is due mostly to the rise of life-cycle wealth (pension funds)
- Modigliani life-cycle theory: people save for their old days and die with zero wealth, so that inheritance flows are small
- However the Modigliani story happens to be wrong (except in the 50s-60s, when there's not much left to inherit…)
- Inheritance flow-private income ratio $B/Y = \mu\, m\, W/Y$

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

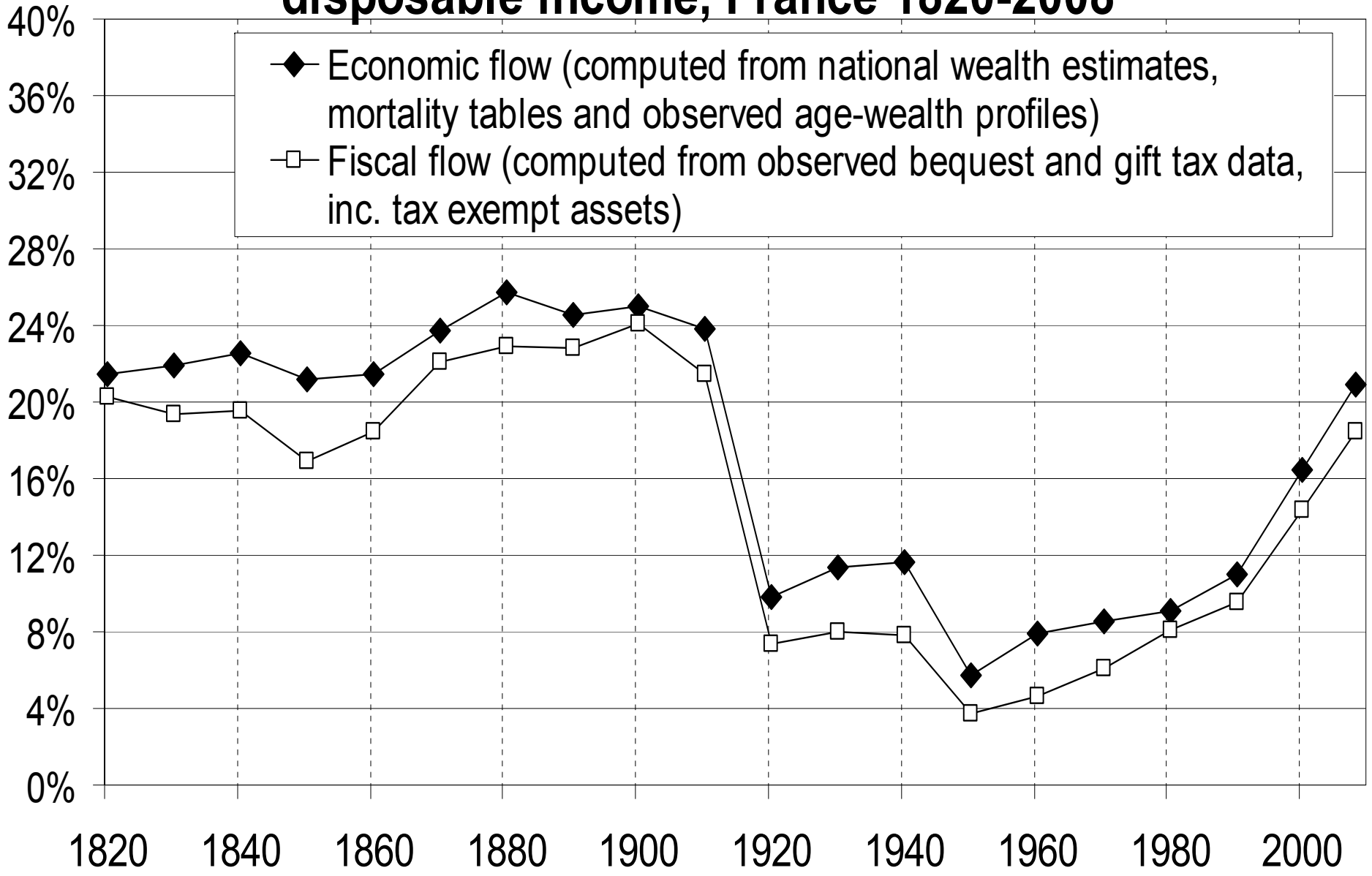
- B/Y has almost returned to 1910 level, both because of W/Y and because of μ: with g low & r>g, $B/Y \to \beta/H$

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

# 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 r>g, inheritance is bound to dominate new wealth; the past eats up the future**

Note: r = rate of return to capital = (net profits + rents)/(net financial + real estate wealth) ; g = growth rate (g+n)

- **Intuition**: with r>g & g low (say r=4%-5% vs g=1%-2%), wealth coming from the past is being capitalized faster than growth; heirs just need to save a fraction g/r of the return to inherited wealth → $b_y=\beta/H$ (with $\beta=W/Y$)

→ with $\beta=600\%$ & $H=30$, then $b_y=20\%$

- It is only in countries & time periods with g exceptionally high that self-made wealth dominates inherited wealth (OECD in 1950s-70s or China today)
- r>g also has an amplifying effect on wealth inequality

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

| Shares in aggregate labor income or inherited wealth | Labor income 1910-2010 | Inherited wealth | |
|---|---|---|---|
| | | 1910 | 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%** |

# 2c. Implications for optimal capital taxation

- Main results from Piketty-Saez, « A Theory of Optimal Capital Taxation »
- **Result 1: Optimal Inheritance Tax Formula**
- Simple formula for optimal bequest tax rate expressed in terms of estimable parameters:

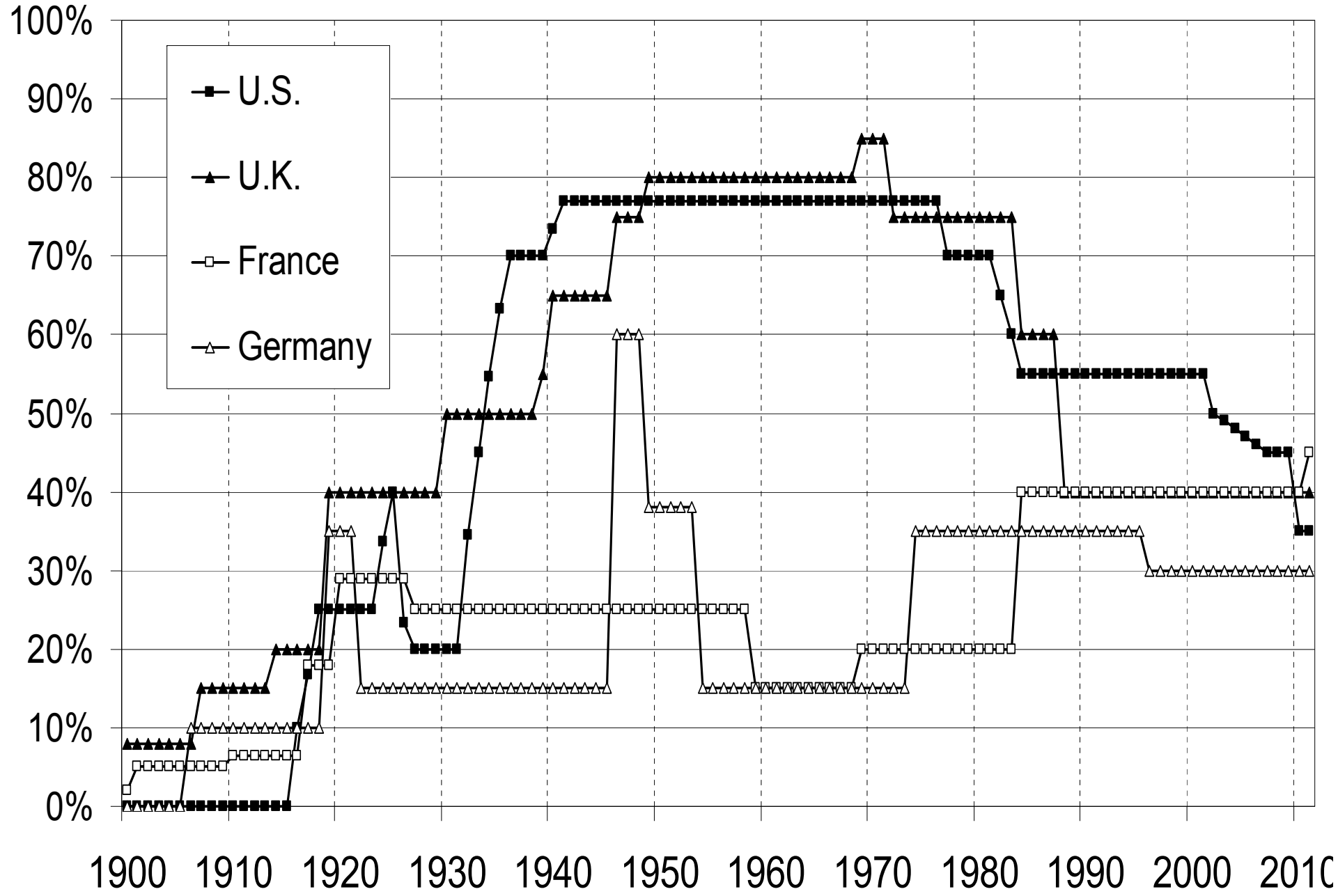
$$\tau_B = \frac{1-(1-\alpha-\tau)s_{b0}/b_y}{1+e_B+s_{b0}}$$

with: $b_y$ = bequest flow, $e_B$ = elasticity, $s_{b0}$ = bequest taste

→ $\tau_B$ increases with $b_y$ and decreases with $e_B$ and $s_{b0}$

- For realistic parameters: $\tau_B$=50-60% (or more..or less...)

→ **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%
U.S.
U.K.
France
Germany
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

- **Result 2: Optimal Capital Tax Mix**

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

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

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

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

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

**Proposition** (zero-receivers tax optimum)

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

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

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

→ 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:** $\tau$=30%, $\alpha$=30%, $s_{bo}$=10%, $e_B$=0

- If $b_y$=20%, then $\tau_B$=73% & $\tau_L$=22%
- If $b_y$=15%, then $\tau_B$=67% & $\tau_L$=29%
- If $b_y$=10%, then $\tau_B$=55% & $\tau_L$=35%
- If $b_y$=5%, then $\tau_B$=18% & $\tau_L$=42%

→ 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:** $\tau$=30%, $\alpha$=30%, $s_{bo}$=10%, $b_y$=15%

- If $e_B$=0, then $\tau_B$=67% & $\tau_L$=29%
- If $e_B$=0.2, then $\tau_B$=56% & $\tau_L$=31%
- If $e_B$=0.5, then $\tau_B$=46% & $\tau_L$=33%
- If $e_B$=1, then $\tau_B$=35% & $\tau_L$=35%

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

Kopczuk-Slemrod 2001: $e_B$=0.2 (US)

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

# General conclusion

- One substantial conclusion: a world with g low & r>g is gloomy for workers with zero initial wealth… especially if global tax competition drives capital taxes to 0%… especially if top labor incomes take a rising share of aggregate labor income → divergence forces can be stronger than convergence forces

- One methodological conclusion: there is a lot to learn from the long run evolution of income and wealth concentration; the analysis of socially optimal tax policy must be more closely related to empirical parameters