Capital is Back: Wealth-Income Ratios in Rich Countries 1870-2010

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- **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

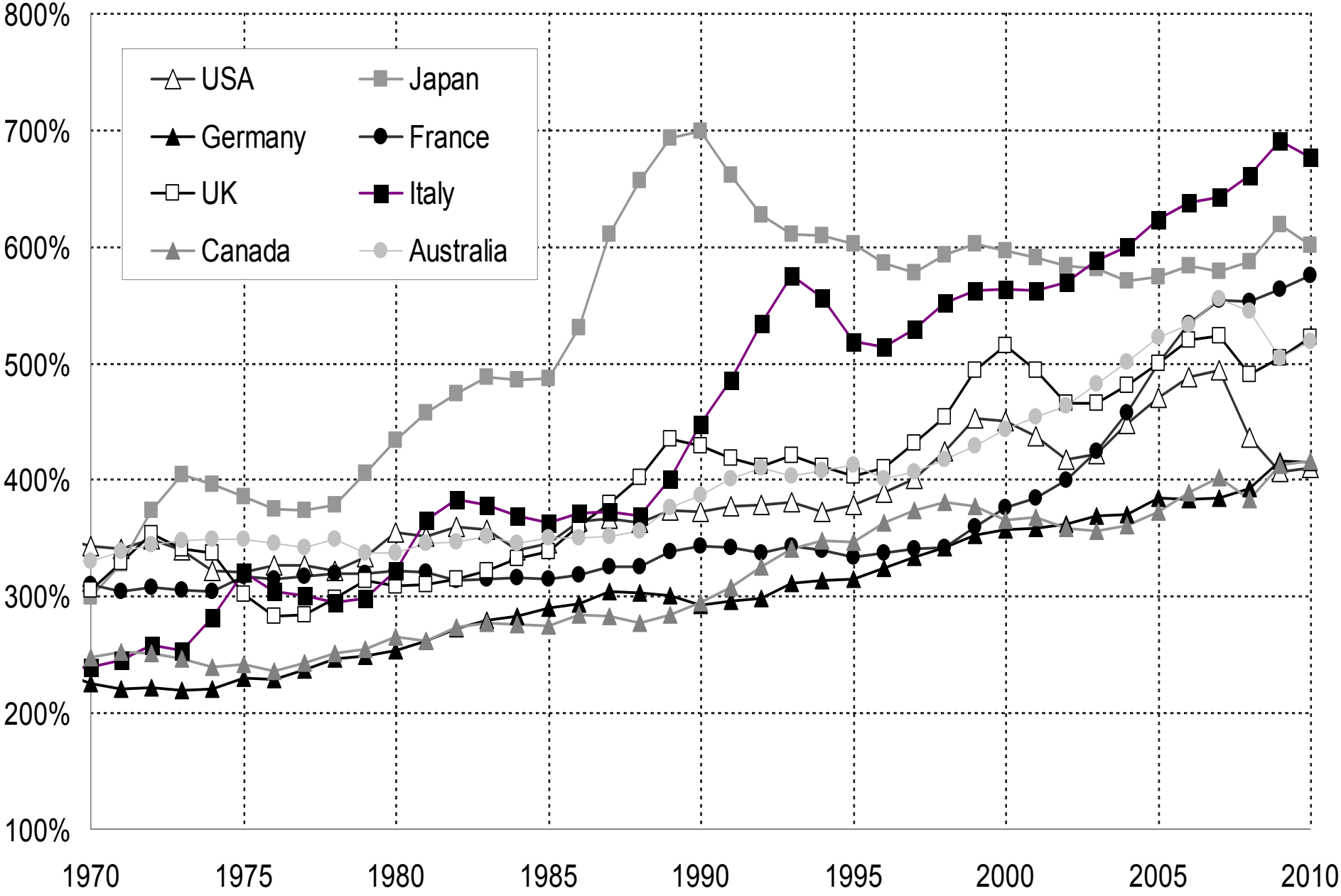
Harrod-Domar-Solow: wealth-income ratio **$\beta = s/g$**

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

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

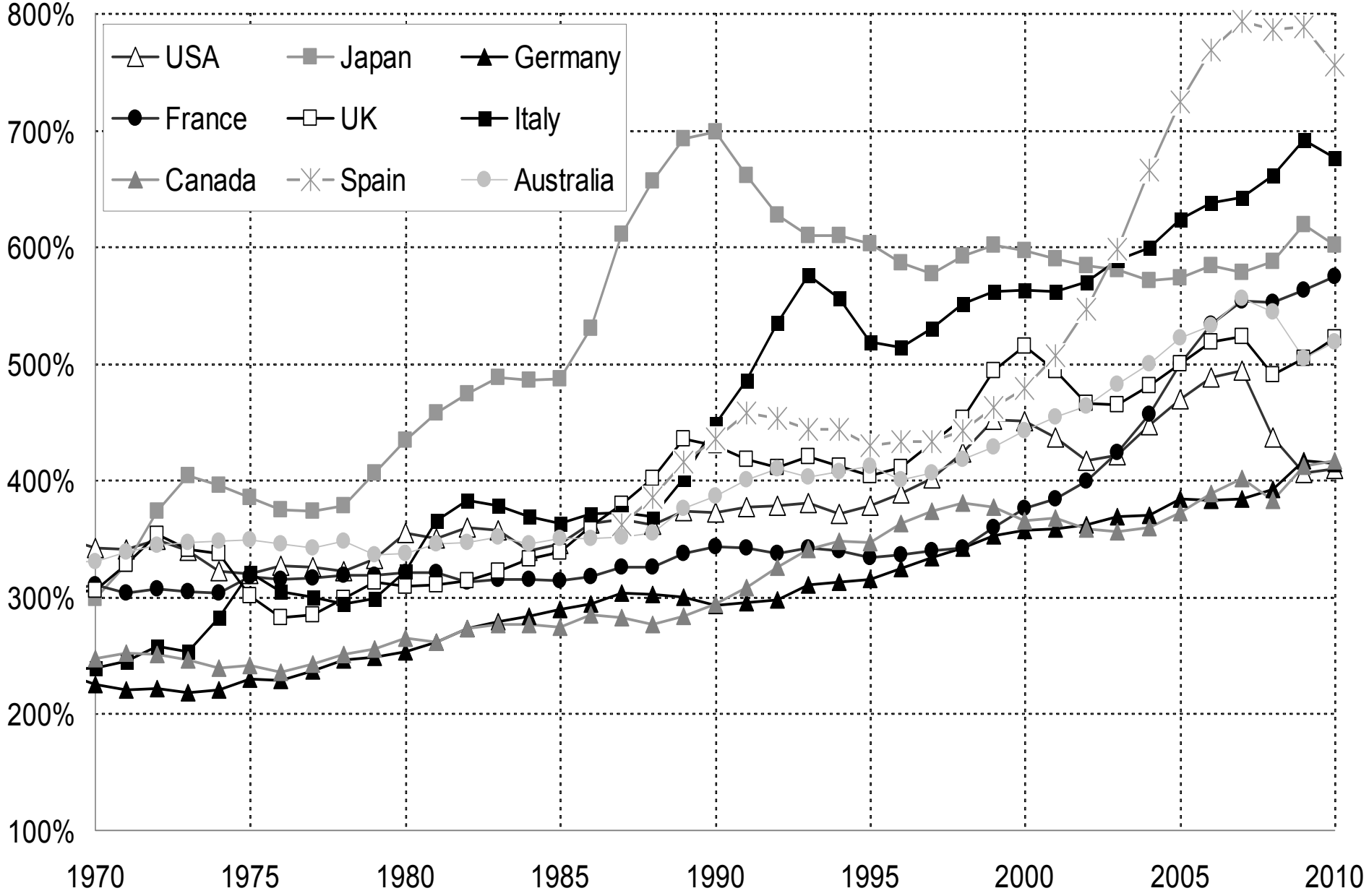
Explains long run change & level diff Europe vs US

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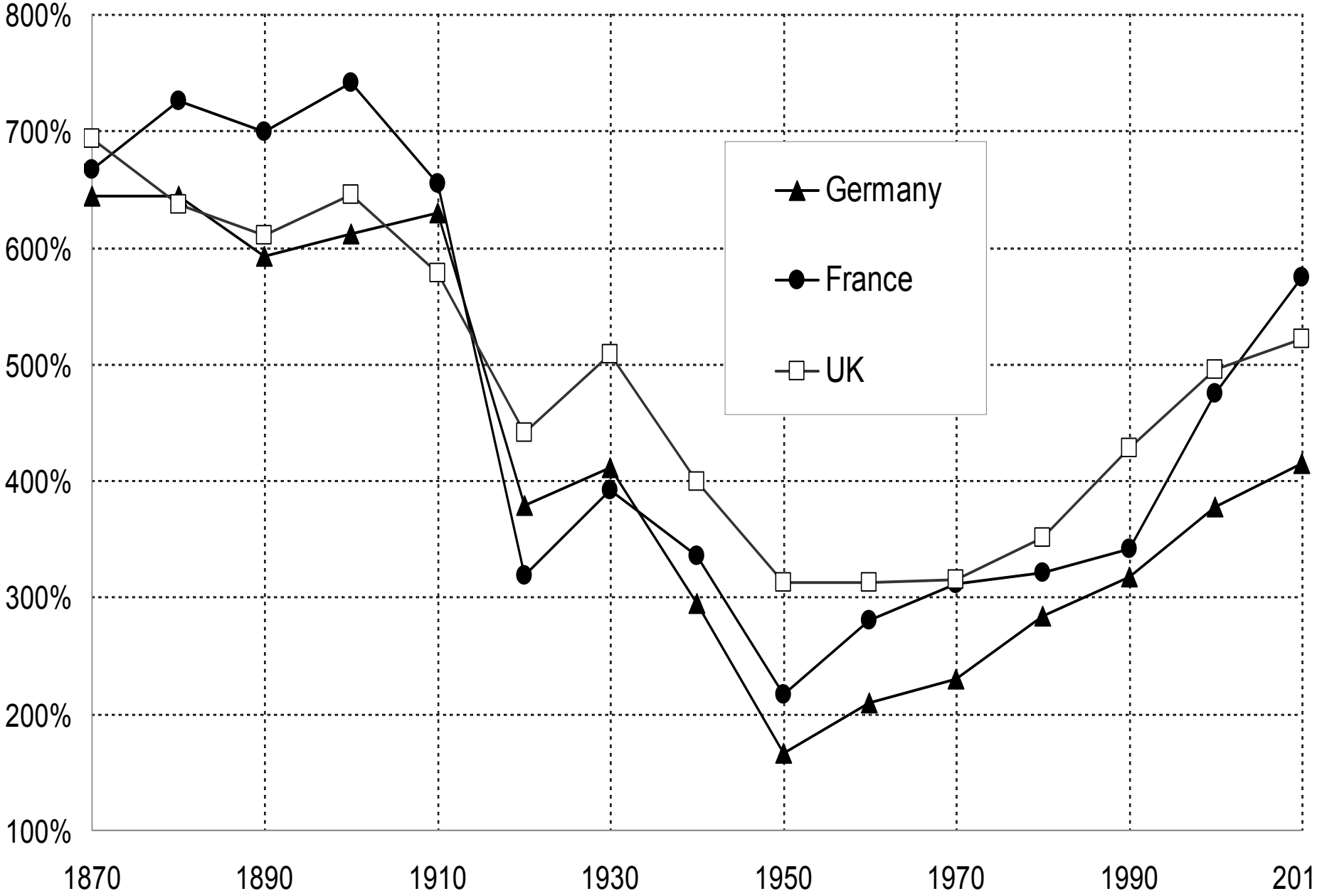
Private wealth / national income ratios in Europe, 1870-2010



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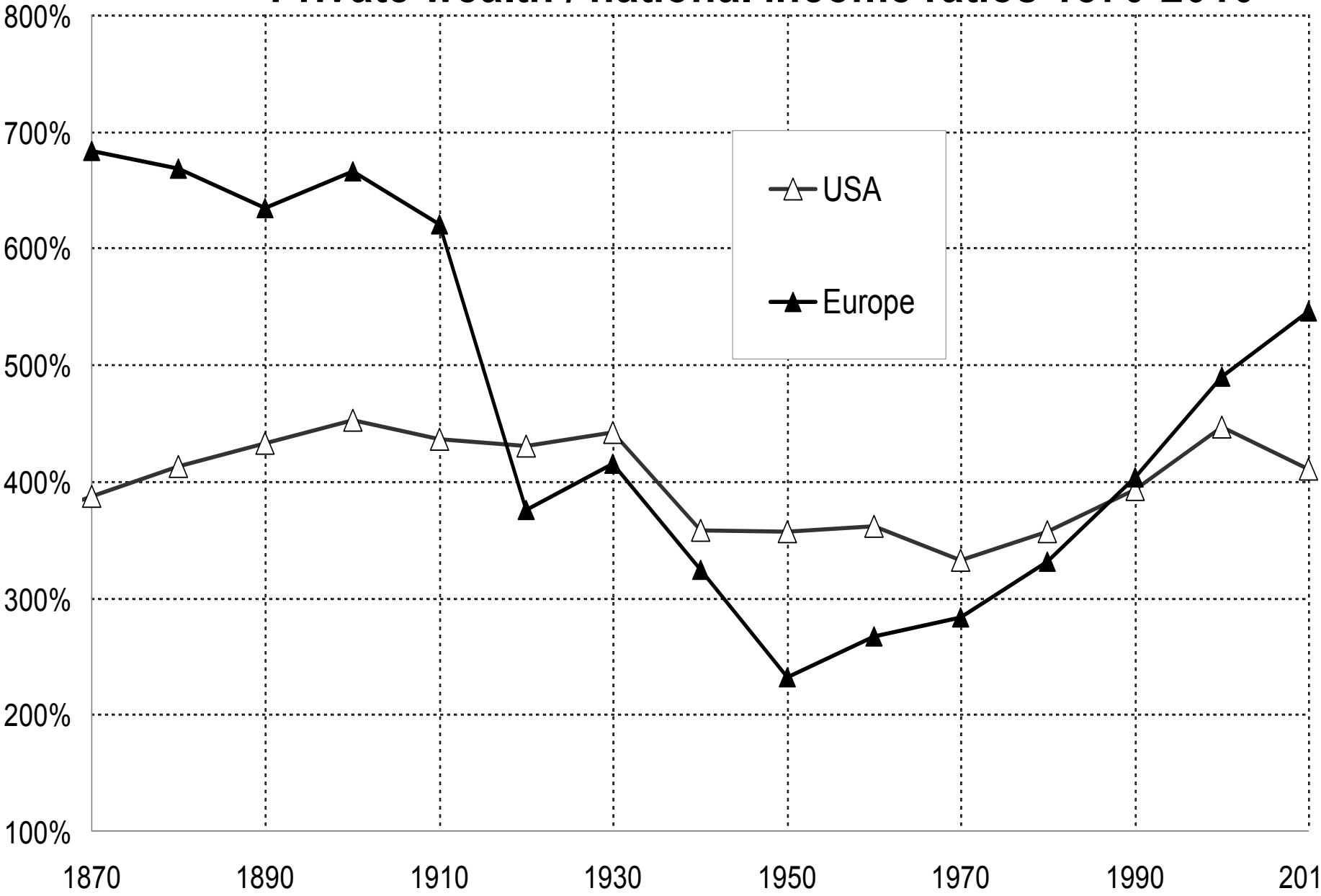
Private wealth / national income ratios 1870-2010



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

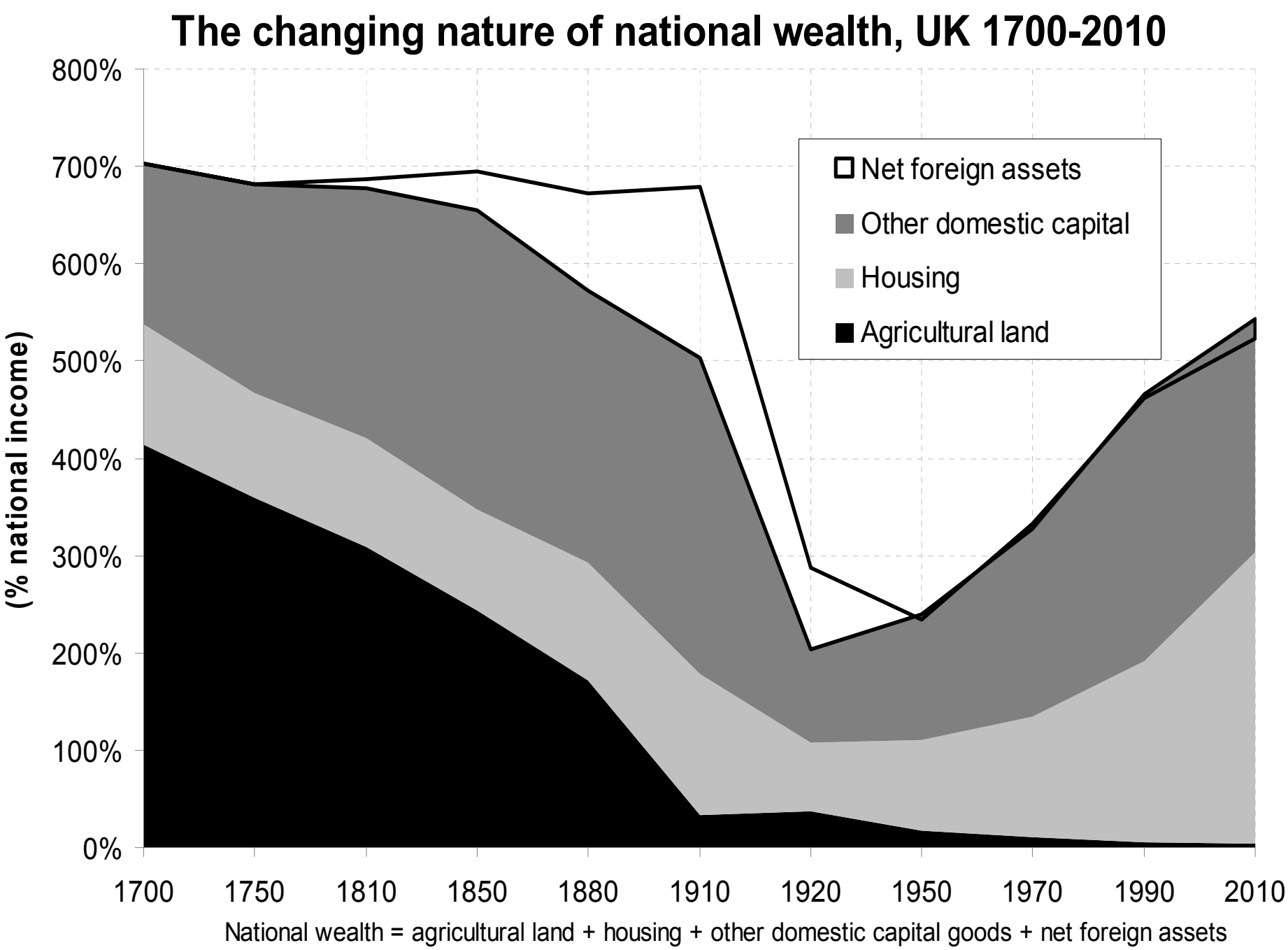
- **Lesson 1**: one-good capital accumulation model with factor substitution works relatively well in the long run; but in short & medium run, volume effects (saving flows) can be vastly dominated by relative price effects (capital gains or losses)
- **Lesson 2**: long run wealth-income ratios $\beta=s/g$ 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)

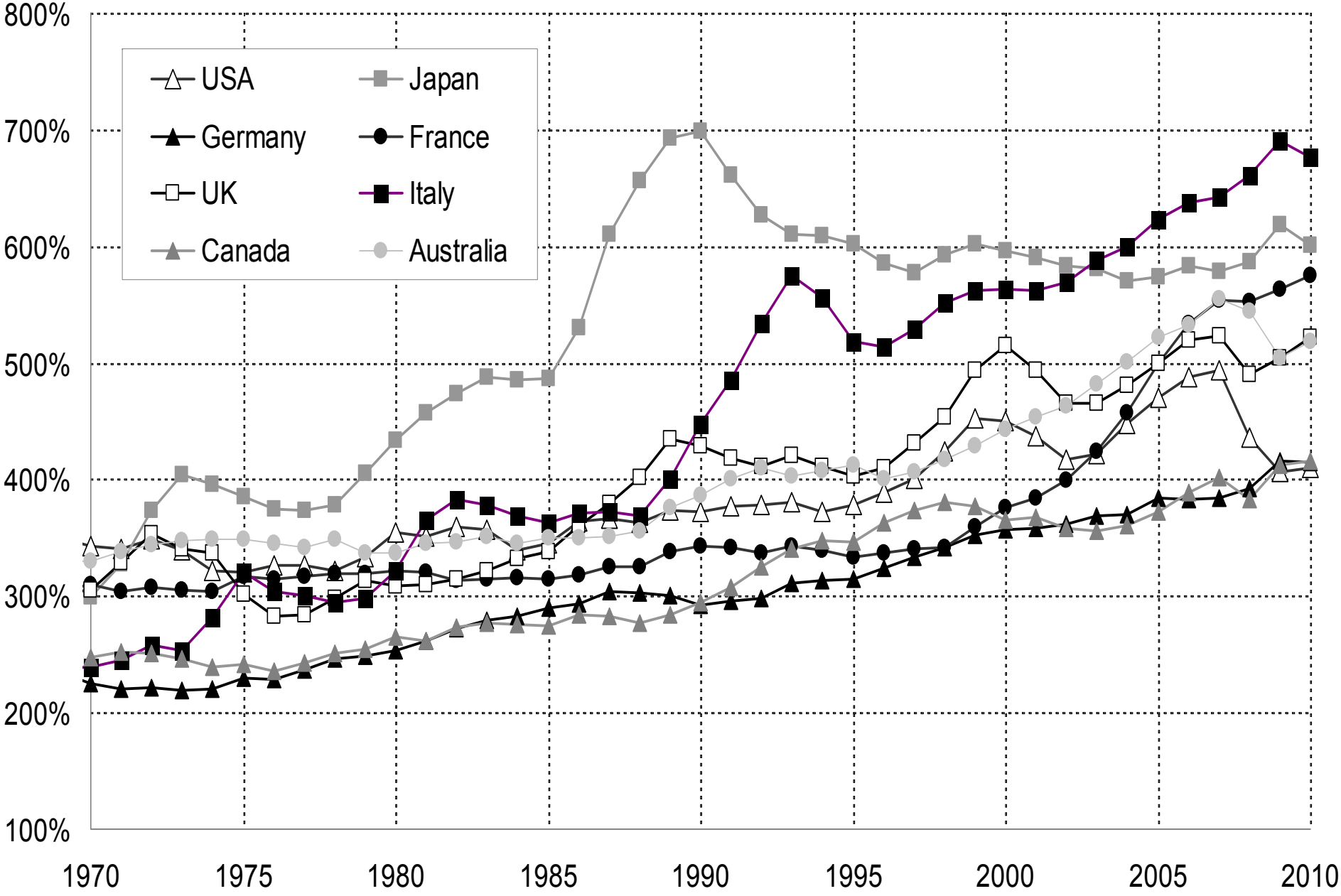
Decomposition results: 1970-2010

- 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

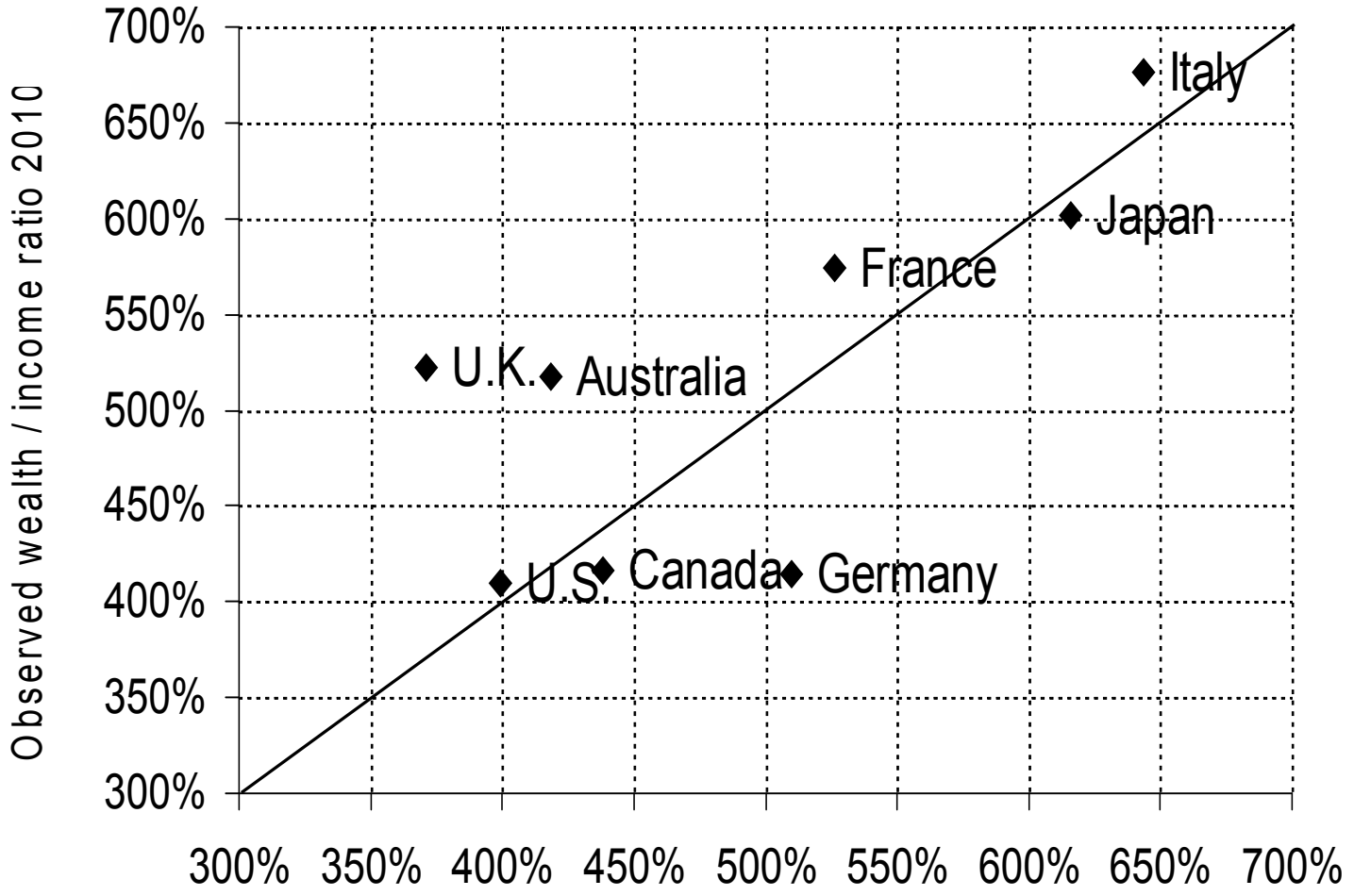


Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)

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%***

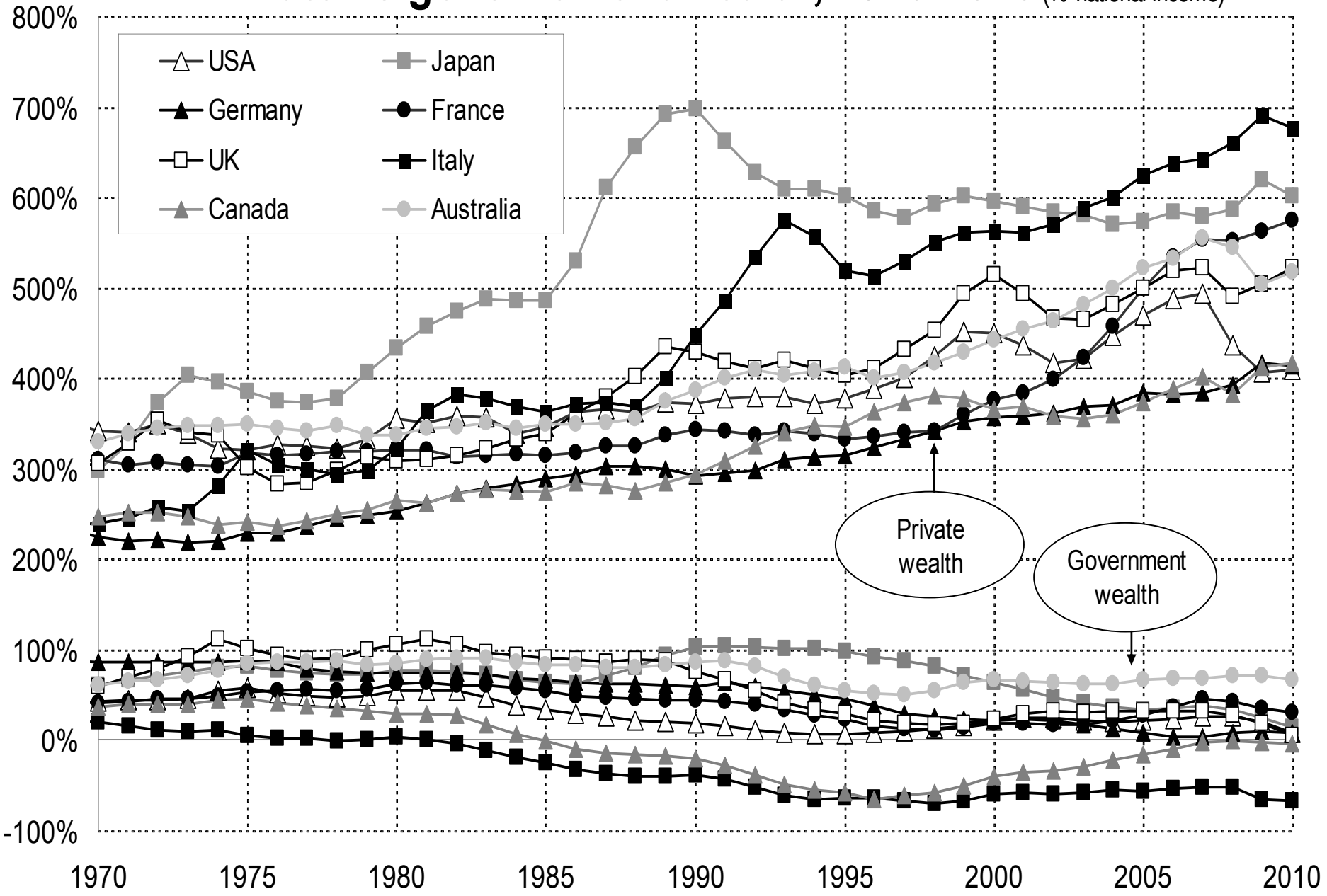
Table 4: Accumulation of private wealth in rich countries, 1970-2010 (multiplicative decomposition)

	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% ***88%***	0.4% ***12%***
Japan	299%	601%	4.3%	3.4% ***78%***	0.9% ***22%***
Germany	225%	415%	3.5%	4.3% ***121%***	-0.7% ***-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%***

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

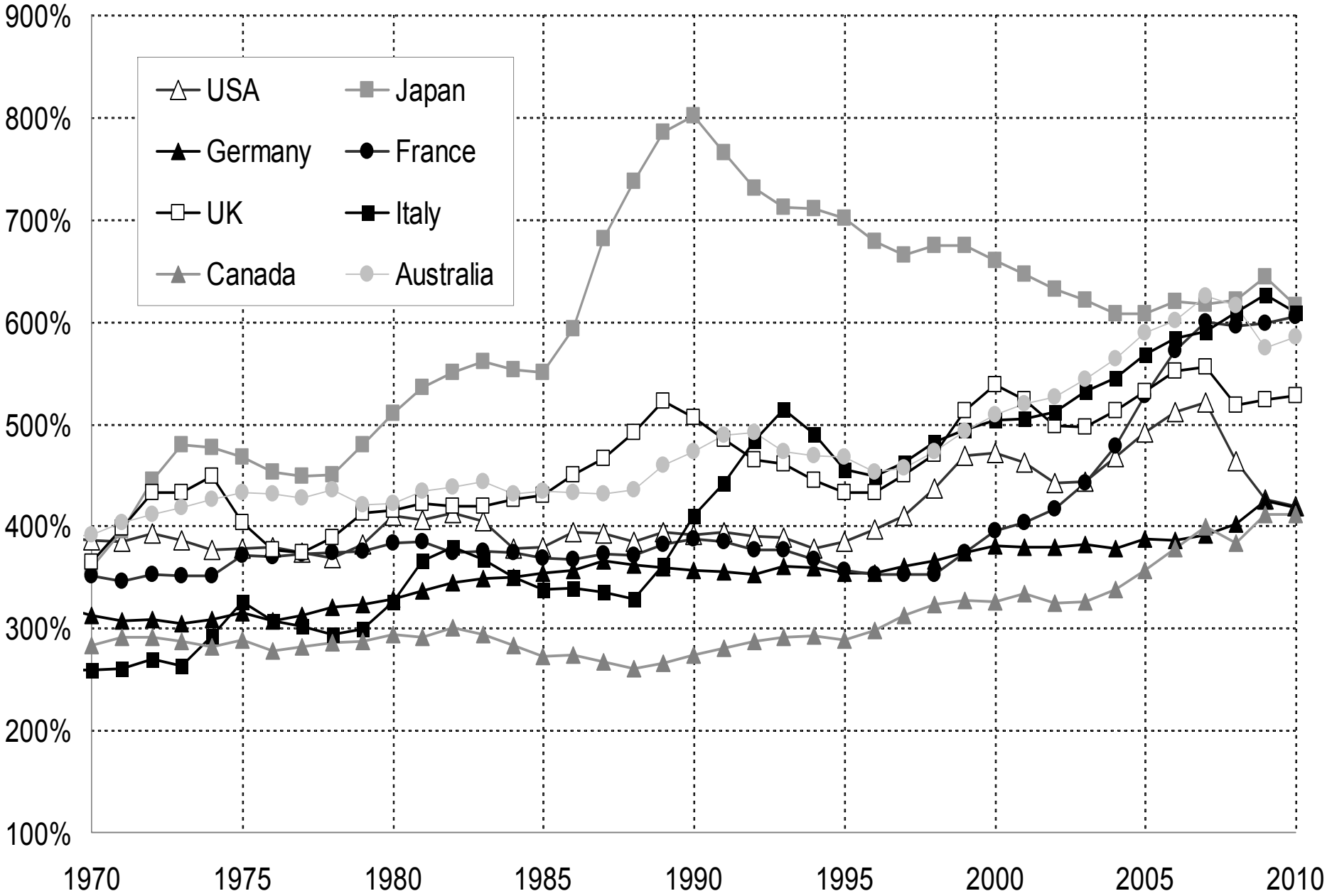
Average saving rates 1970-2010 (% national income)	Net private savings (personal + corporate)	incl. personal savings	incl. corporate savings (retained earnings)
U.S.	7.7%	4.6% ***60%***	3.1% ***40%***
Japan	14.6%	6.8% ***47%***	7.8% ***53%***
Germany	12.2%	9.4% ***76%***	2.9% ***24%***
France	11.1%	9.0%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

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



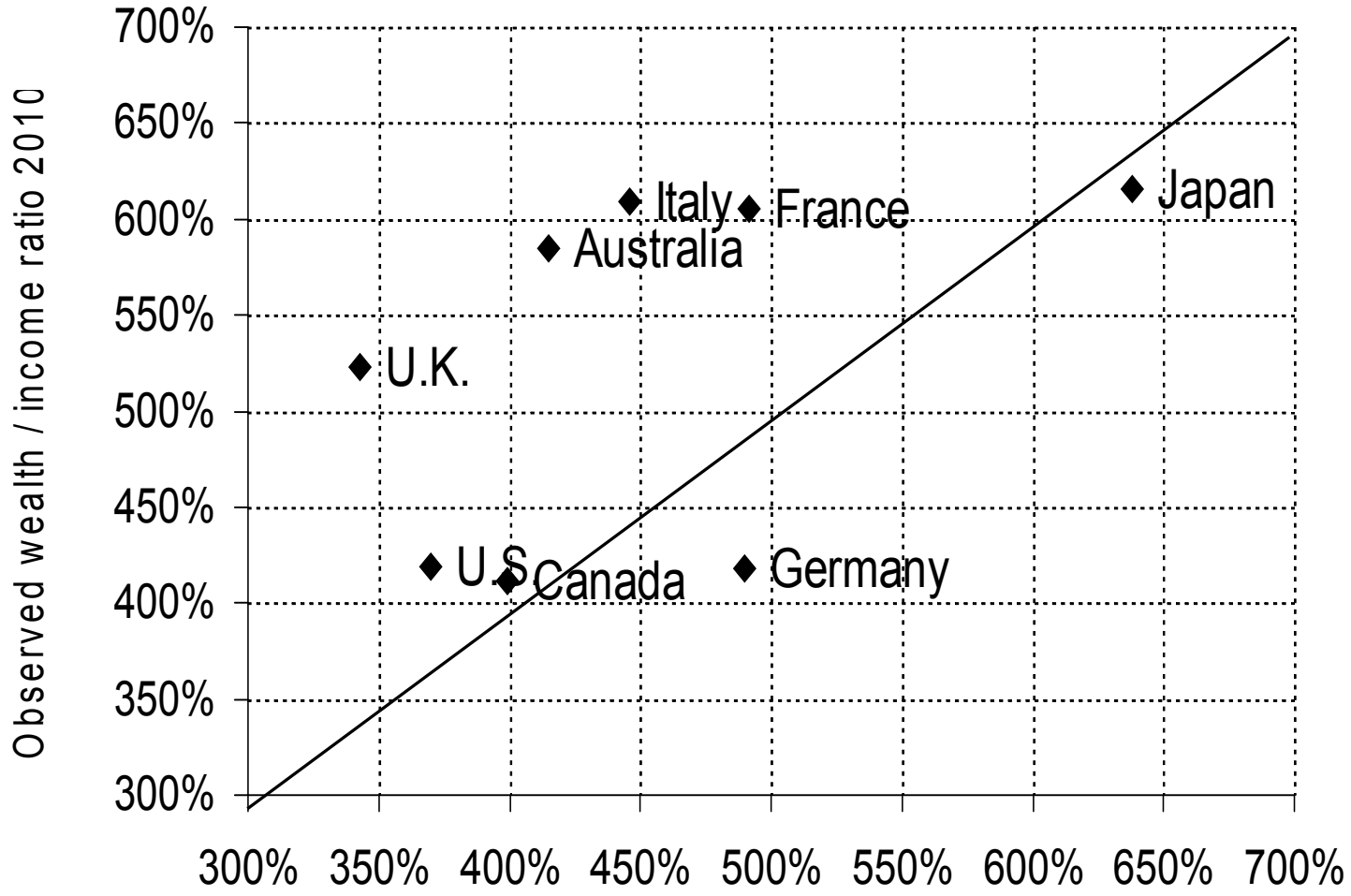
Authors' computations using country national accounts. Government wealth = non-financial assets + financial assets - financial liabilities (govt sector)

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)

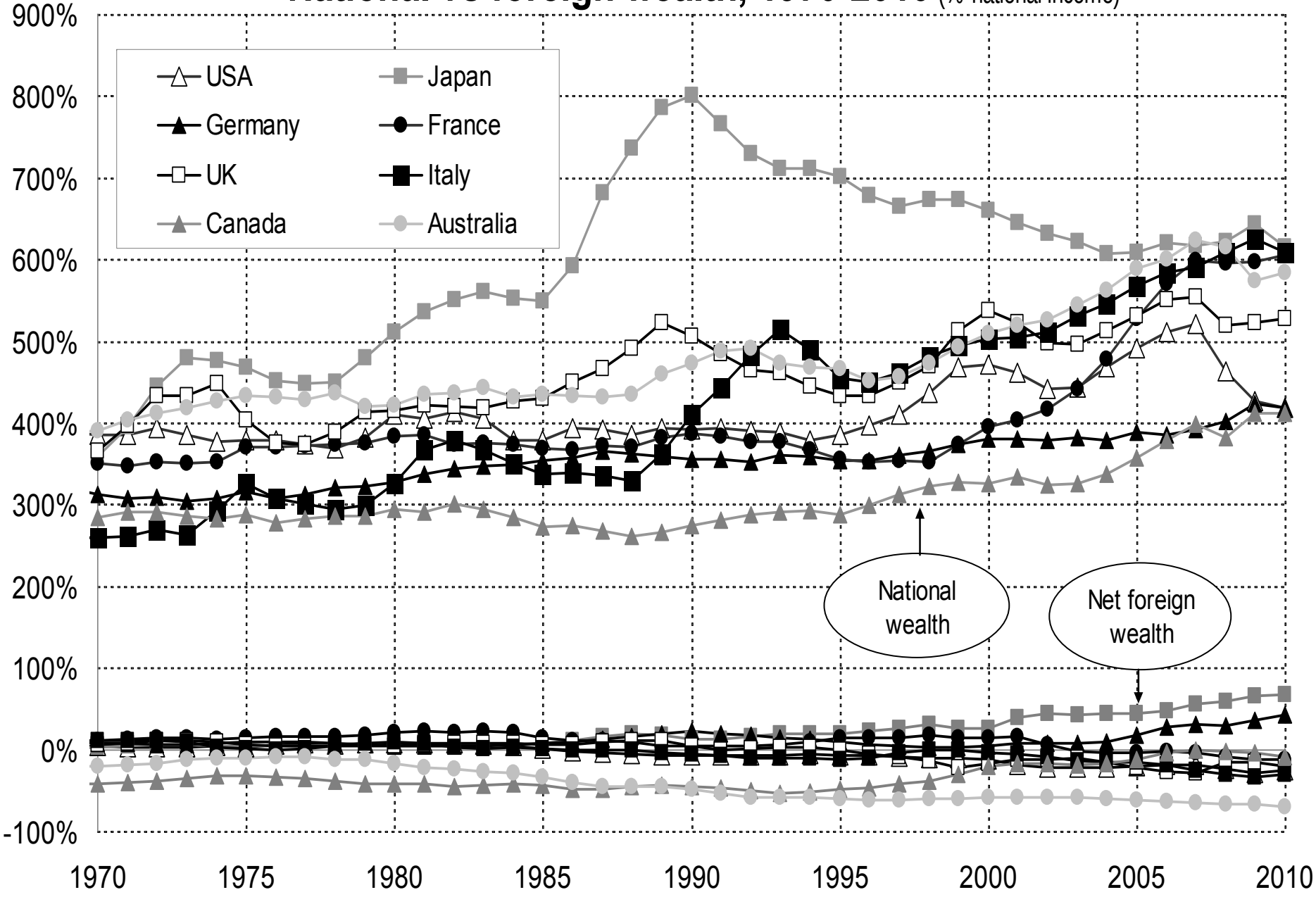


Predicted wealth / income ratio 2010 (on the basis of 1970 initial wealth and 1970-2010 cumulated saving flows) (additive decomposition, incl. R&D)

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)

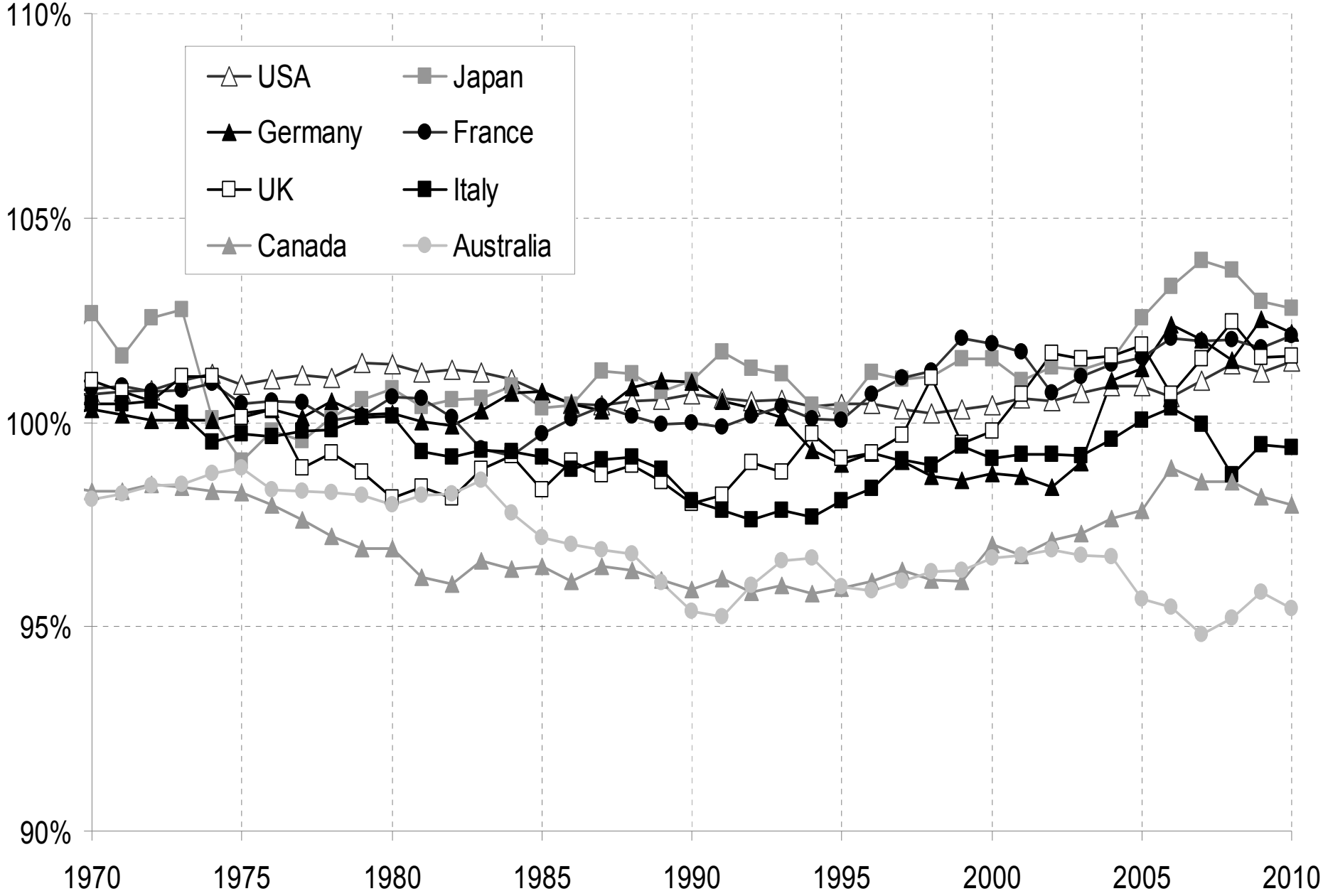


Authors' computations using country national accounts. Net foreign wealth = net foreign assets owned by country residents in rest of the world (all sectors)

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

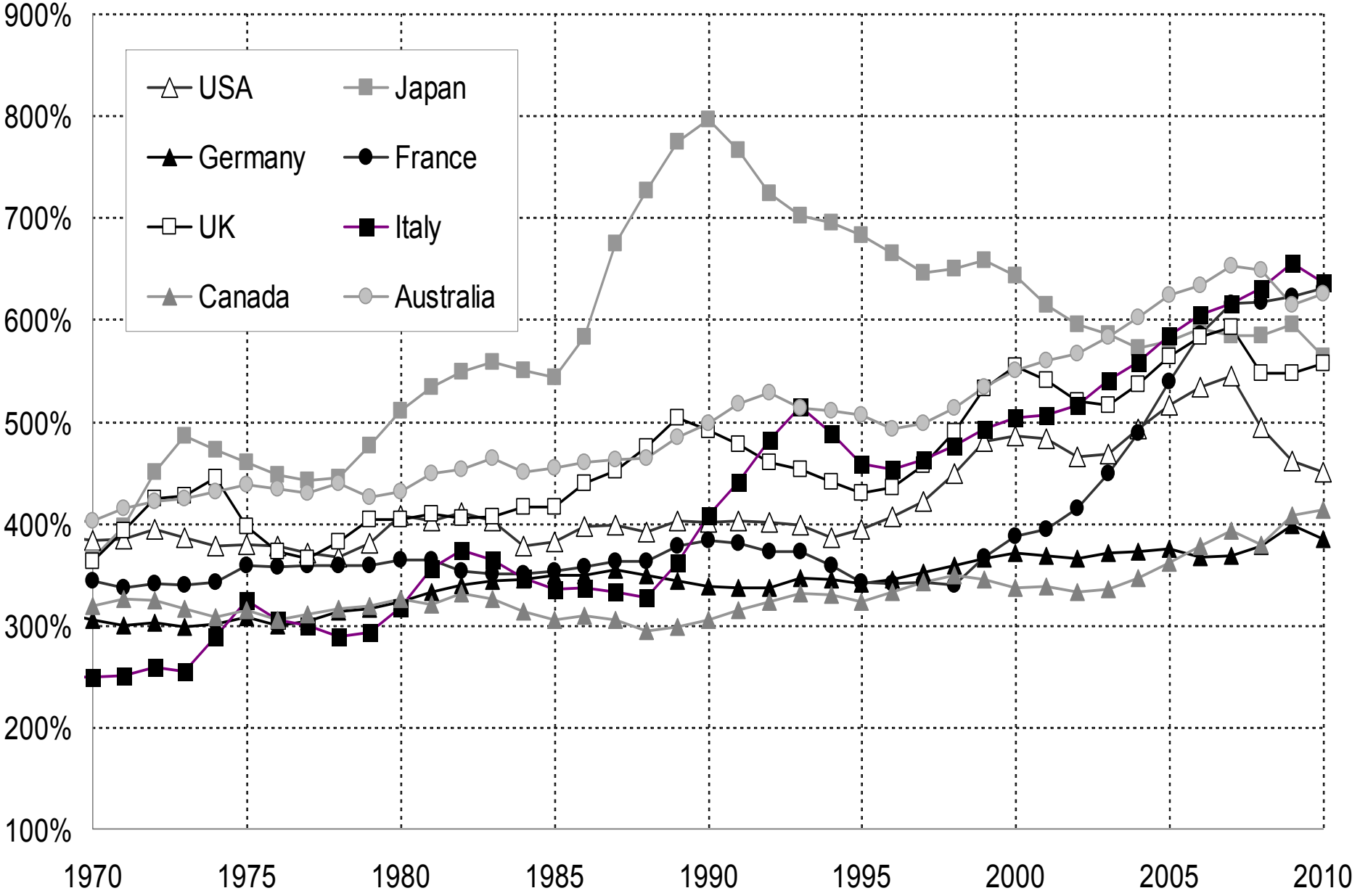
	National wealth / national income ratio (1970)		National wealth / national income ratio (2010)		Rise in national wealth / national income ratio (1970-2010)	
	incl. Domestic capital	*incl. Foreign wealth*	*incl. Domestic capital*	*incl. Foreign wealth*	*incl. Domestic capital*	*incl. Foreign wealth*
U.S.	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

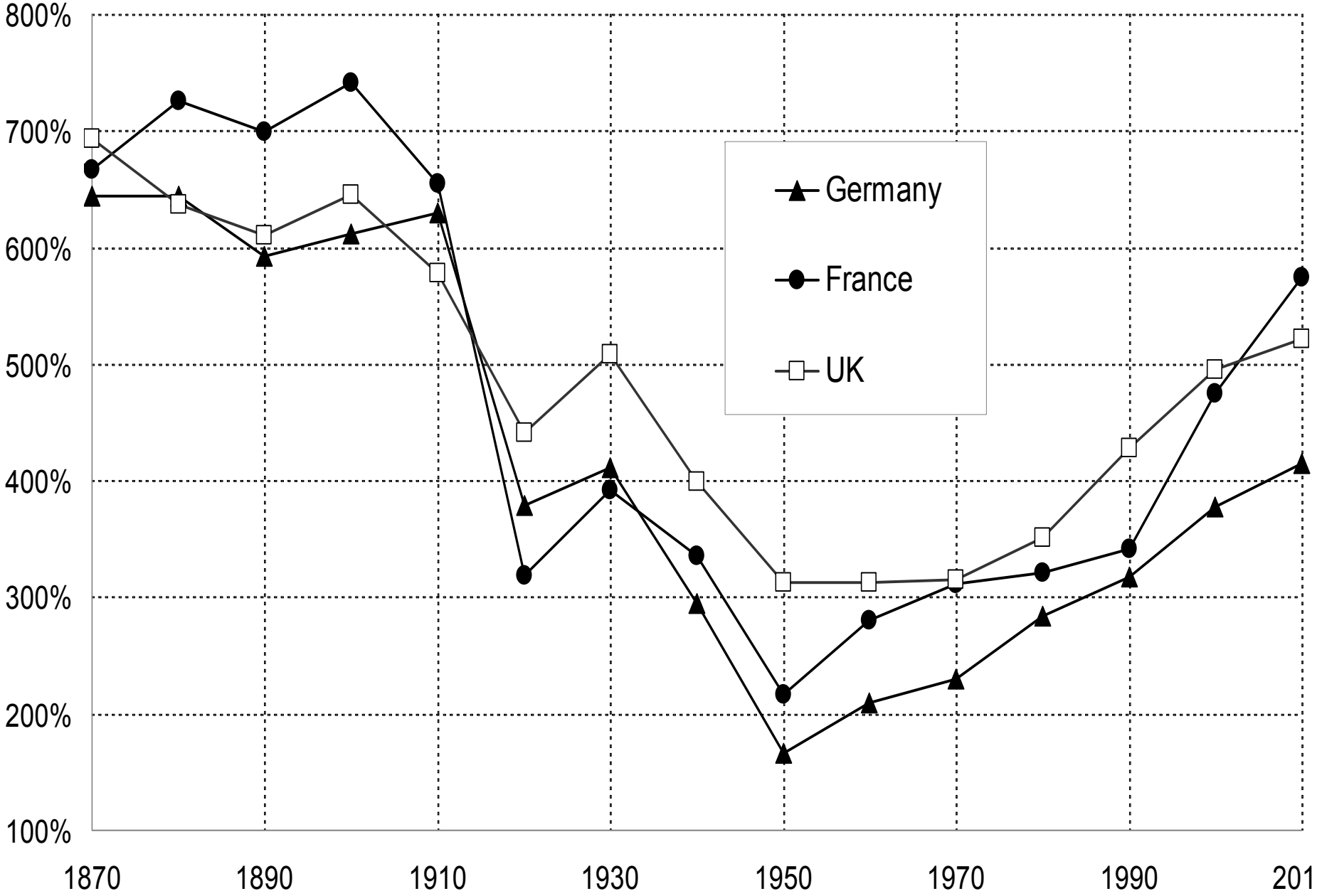
	Domestic capital / national income ratio (1970)		Domestic capital / national income ratio (2010)		Rise in domestic capital / national income ratio (1970-2010)	
	incl. Housing	*incl. Other domestic capital*	*incl. Housing*	*incl. Other domestic capital*	*incl. Housing*	*incl. Other domestic capital*
U.S.	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 $\beta=s/g$

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



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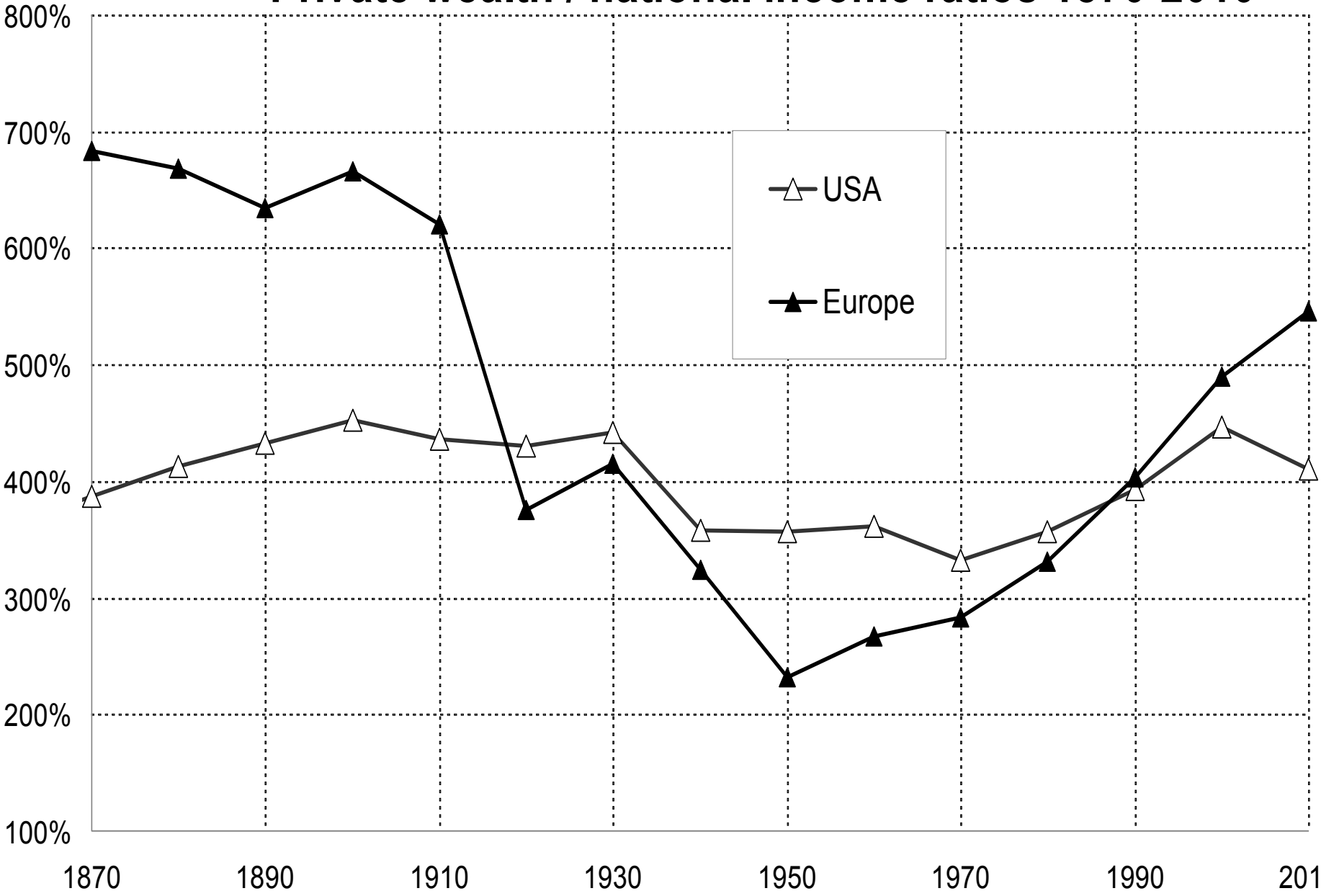
Private wealth / national income ratios 1870-2010



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

Table 20: Growth rate vs private saving rate in rich countries, 1870-2010

	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.	**3.4%**	1.5%	1.9%	**8.3%**
Germany	**2.3%**	0.5%	1.7%	**12.1%**
France	**2.1%**	0.4%	1.7%	**10.6%**
U.K.	**1.9%**	0.5%	1.4%	**6.7%**

Accumulation of private wealth in France, 1870-2010 (multiplicative decomposition)

	Private wealth-national income ratios		Real growth rate of private wealth	Savings-induced wealth growth rate (incl. war destructions)	Capital-gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
1870-2010	667%	575%	2.0%	2.4% ***121%***	-0.4% ***-21%***
1870-1910	667%	766%	1.5%	1.2% ***81%***	0.3% ***19%***
1910-2010	766%	575%	2.2%	2.9% ***132%***	-0.7% ***-32%***
1910-1950	766%	192%	-2.0%	0.9% ***-47%***	-2.9% ***147%***
1950-1980	192%	321%	6.3%	5.4% ***86%***	0.9% ***14%***
1980-2010	321%	575%	3.8%	3.0% ***81%***	0.7% ***19%***

Accumulation of private wealth in the U.K., 1870-2010 (multiplicative decomposition)

	Private wealth-national income ratios		Real growth rate of private wealth	Savings-induced wealth growth rate	Capital-gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
1870-2010	690%	522%	1.7%	1.5% ***85%***	0.3% ***15%***
1870-1910	690%	678%	1.8%	1.6% ***85%***	0.3% ***15%***
1910-2010	678%	522%	1.7%	1.4% ***85%***	0.3% ***15%***
1910-1950	678%	355%	-0.2%	0.6% ***-314%***	-0.8% ***414%***
1950-1980	355%	309%	1.6%	2.2% ***134%***	-0.6% ***-34%***
1980-2010	309%	522%	4.4%	1.7% ***40%***	2.6% ***60%***

Accumulation of private wealth in the U.S., 1870-2010 (multiplicative decomposition)

	Private wealth-national income ratios		Real growth rate of private wealth	Savings-induced wealth growth rate	Capital-gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
1870-2010	386%	410%	3.4%	2.9% ***84%***	0.6% ***16%***
1870-1910	386%	446%	4.3%	2.9% ***67%***	1.4% ***33%***
1910-2010	446%	410%	3.1%	2.9% ***93%***	0.2% ***7%***
1910-1950	446%	365%	2.7%	2.6% ***95%***	0.1% ***5%***
1950-1980	365%	355%	3.4%	3.8% ***110%***	-0.4% ***-10%***
1980-2010	355%	410%	3.3%	2.3% ***72%***	0.9% ***28%***

Accumulation of private wealth in Germany, 1870-2010 (multiplicative decomposition)

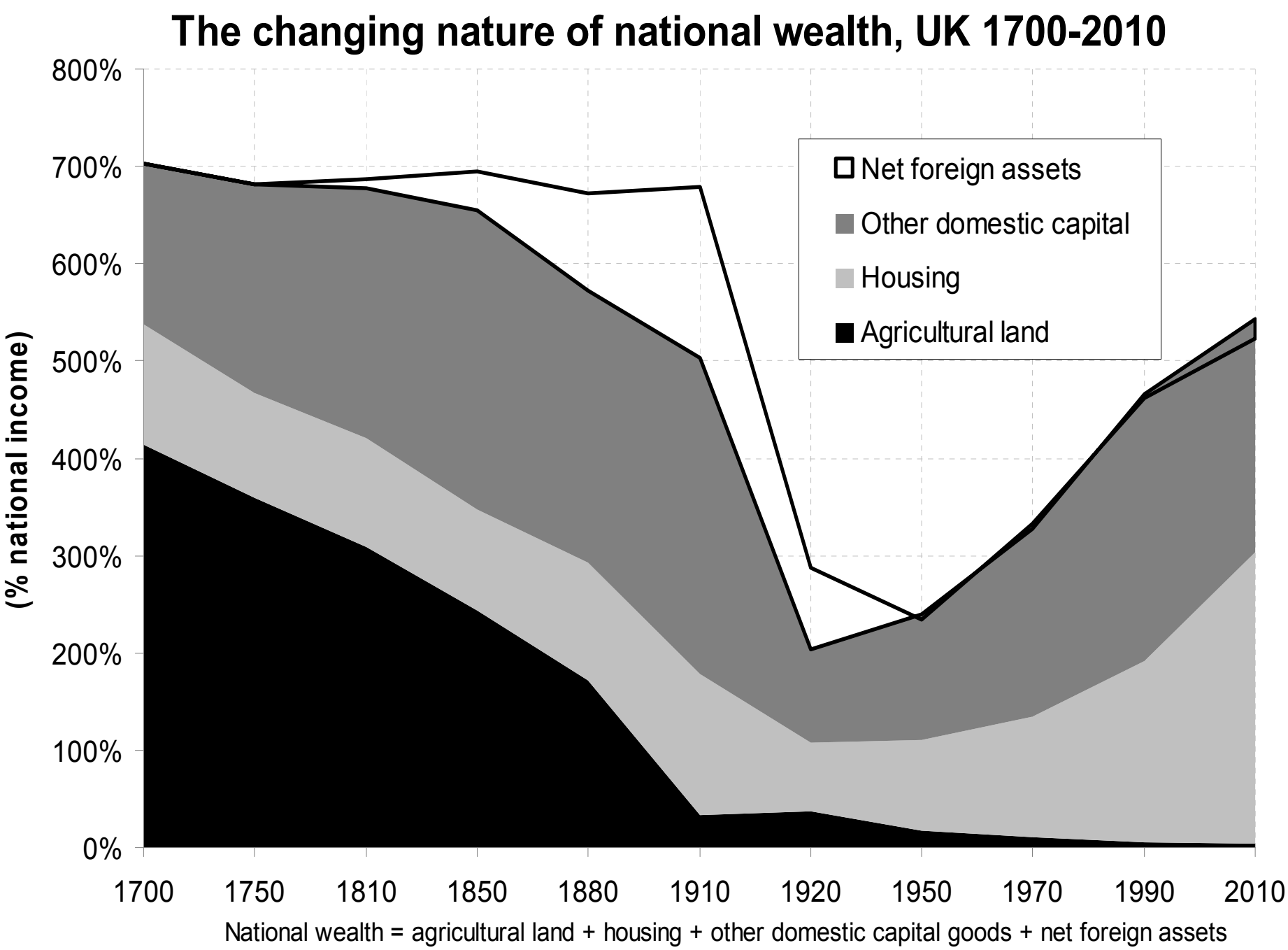
	Private wealth-national income ratios		Real growth rate of private wealth	Savings-induced wealth growth rate	Capital-gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
1870-2010	704%	415%	2.1%	3.5% ***163%***	-1.3% ***-63%***
1870-1910	704%	608%	2.1%	2.3% ***109%***	-0.2% ***-9%***
1910-2010	608%	415%	2.1%	3.9% ***184%***	-1.8% ***-84%***
1910-1950	608%	181%	-1.8%	1.4% ***-79%***	-3.2% ***179%***
1950-1980	181%	253%	6.1%	7.7% ***123%***	-1.5% ***-23%***
1980-2010	253%	415%	3.4%	3.7% ***107%***	-0.2% ***-7%***

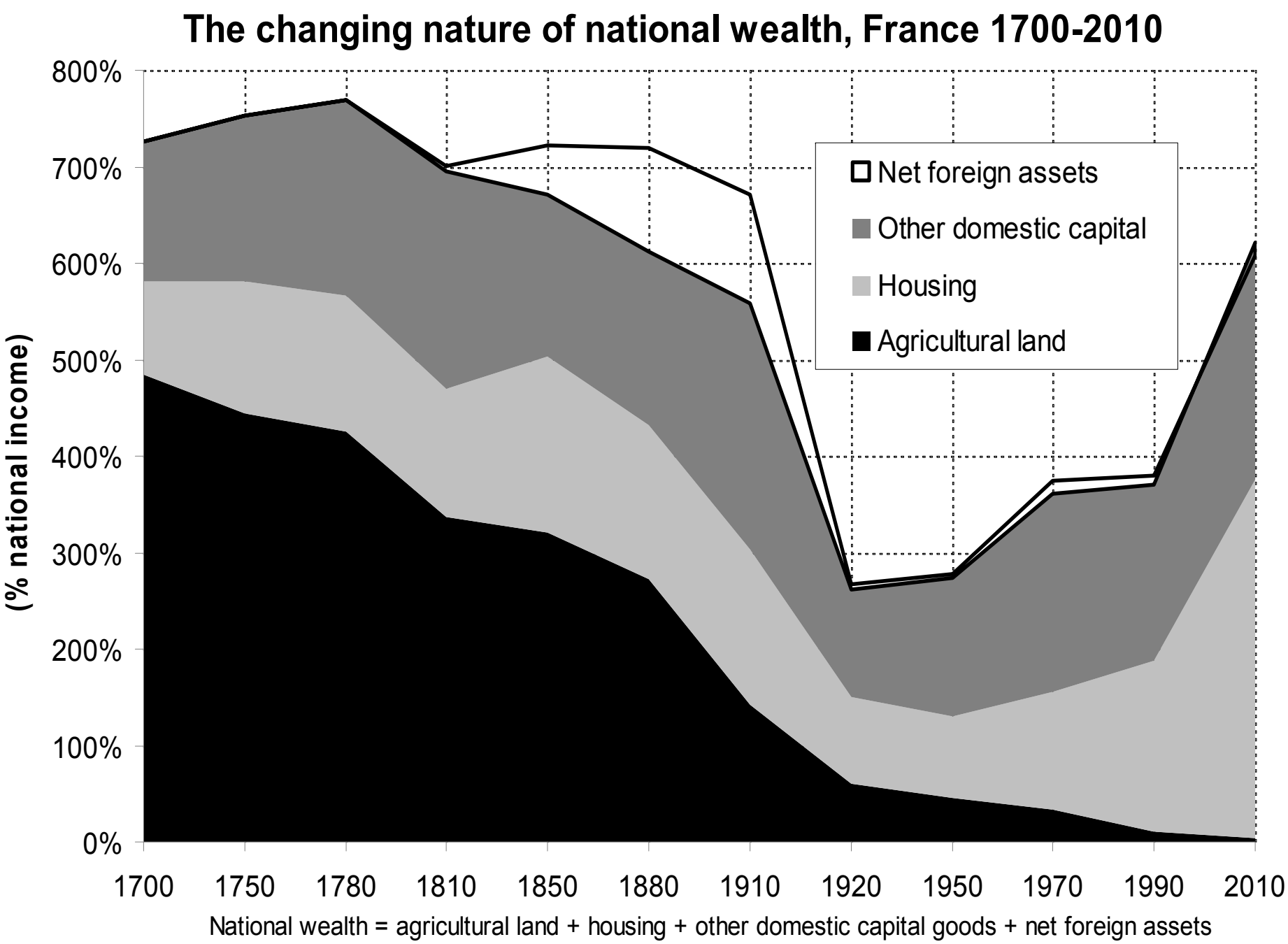
Accumulation of national wealth in Germany, 1870-2010 (multiplicative decomposition)

	Market-value national wealth-national income ratios		Real growth rate of national wealth	Savings-induced wealth growth rate (incl. war destructions)	Capital-gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
1870-2010	759%	418%	2.0%	2.2%	-0.2%
				110%	**-10%**
1870-1910	759%	638%	2.1%	2.2%	-0.2%
				108%	**-8%**
1910-2010	638%	418%	2.0%	2.3%	-0.2%
				111%	**-11%**
1910-1950	638%	236%	-1.3%	-1.2%	-0.1%
				95%	**5%**
1950-1980	236%	328%	6.1%	6.8%	-0.7%
				111%	**-11%**
1980-2010	328%	418%	2.6%	2.5%	0.0%
				99%	**1%**

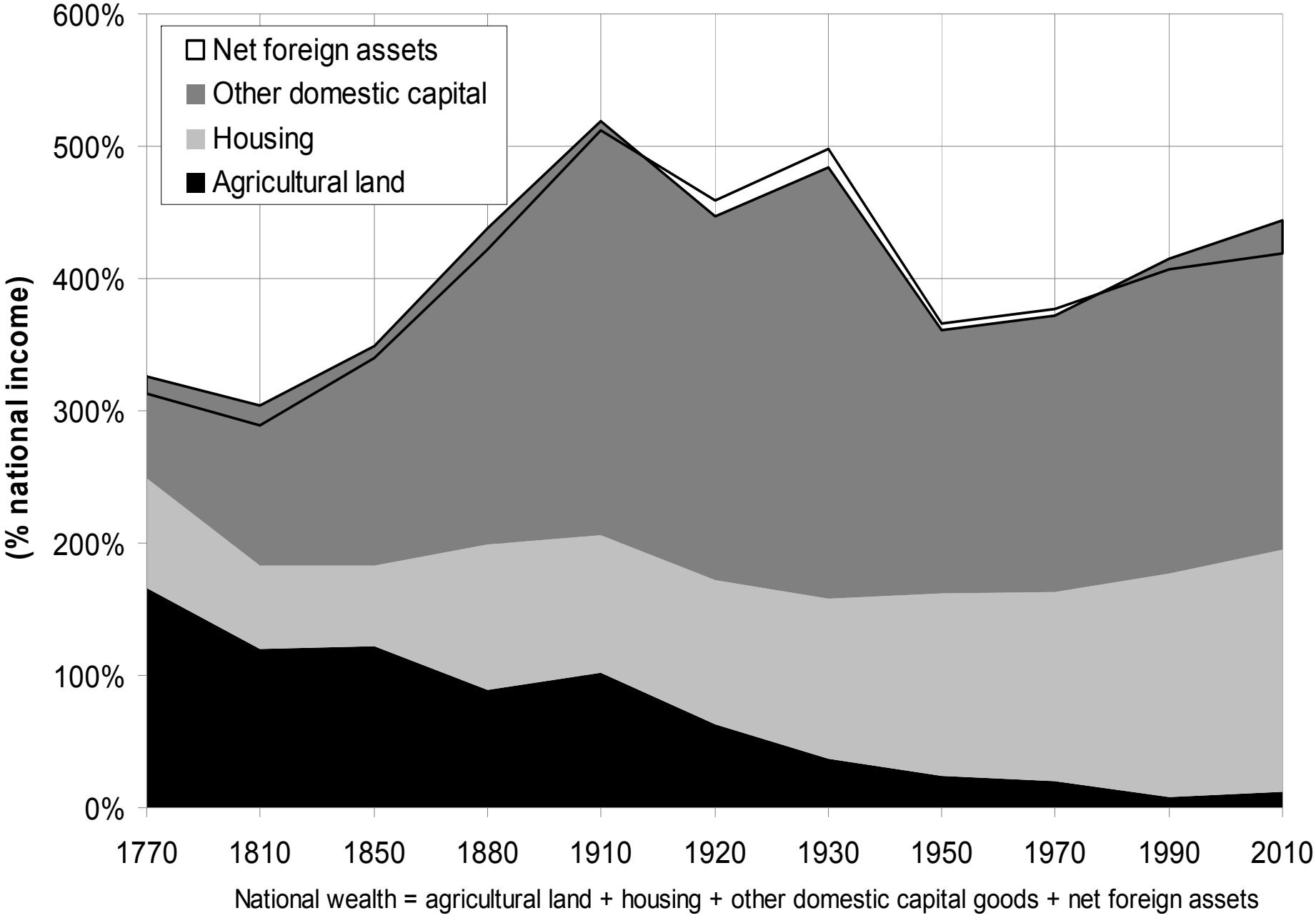
Very long run results: 1700-2010

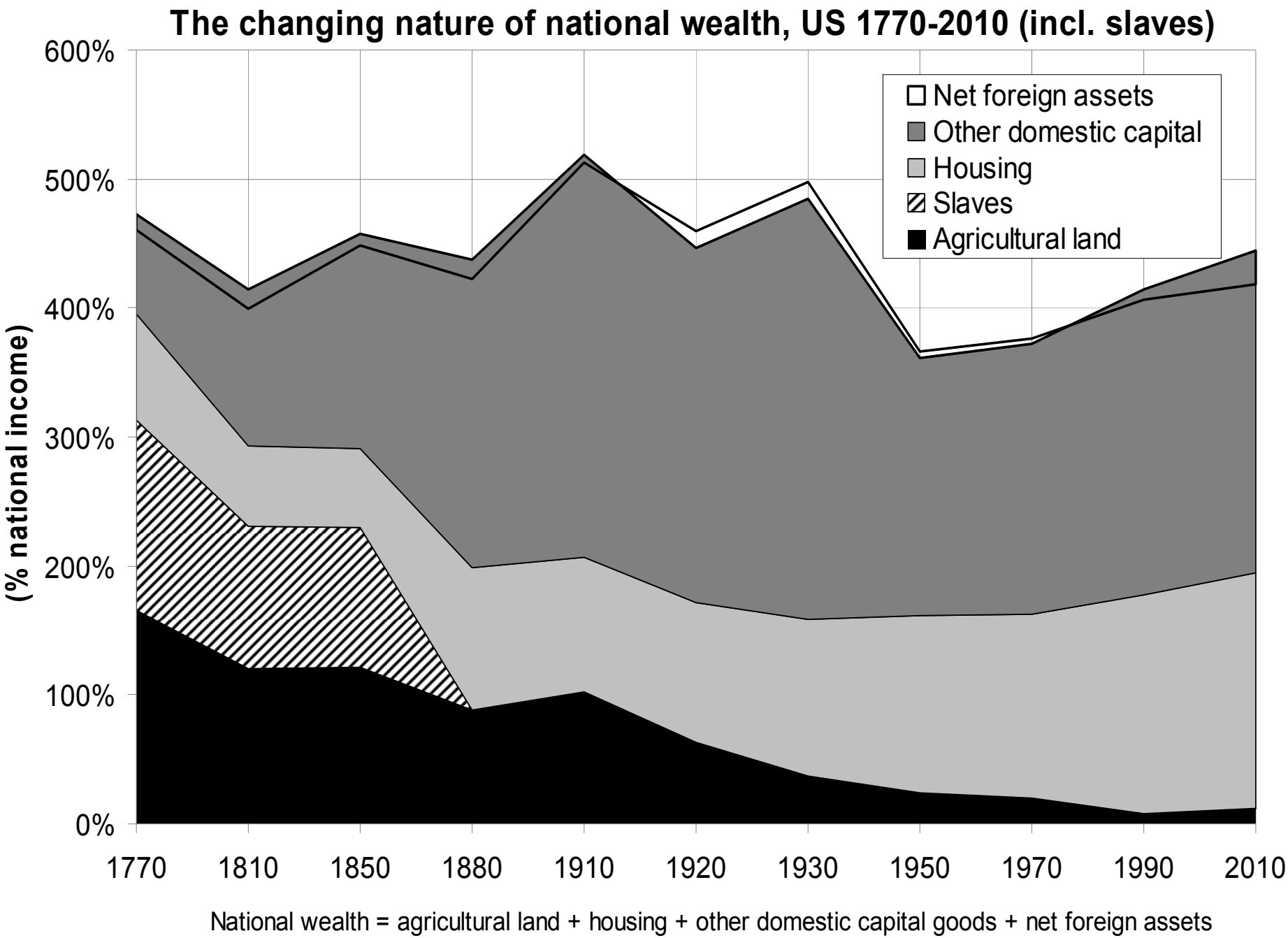
- For the UK and France, there are national balance sheets estimates starting around 1700-1750 (and for the US, starting around 1770-1800)
- These estimates are less precise than post-1870 series; in particular one cannot properly identify volume vs price effects in wealth accumulation equations: saving 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 β relatively stable around 600%-700% in UK & France, in spite of huge changes in wealth composition, from agricultural land to manufacturing capital and housing

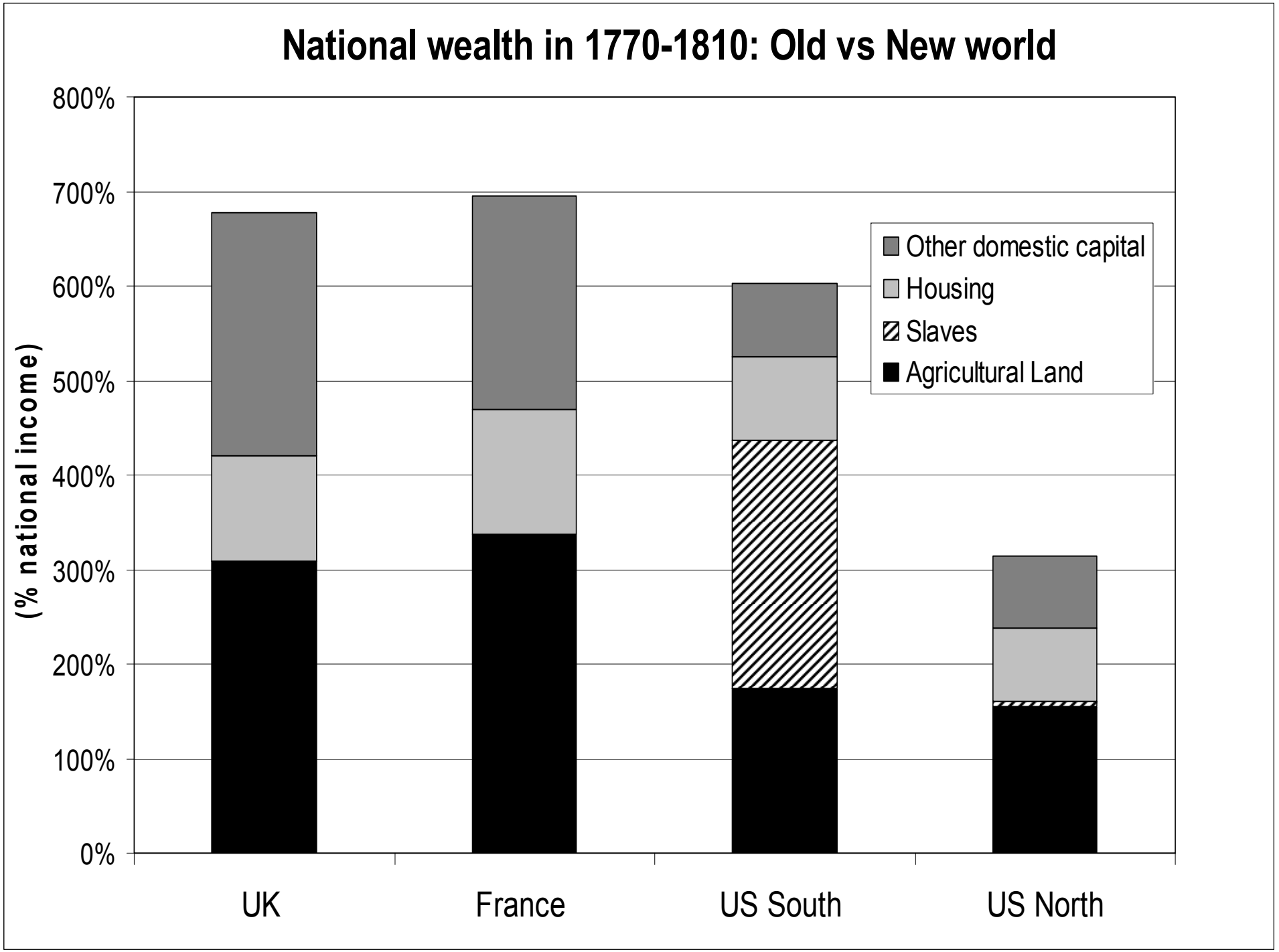

The changing nature of national wealth, UK 1700-2010
800%
700%
600%
500%
400%
300%
200%
100%
0%
(% national income)
Net foreign assets
Other domestic capital
Housing
Agricultural land
1700
1750
1810
1850
1880
1910
1920
1950
1970
1990
2010
National wealth = agricultural land + housing + other domestic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

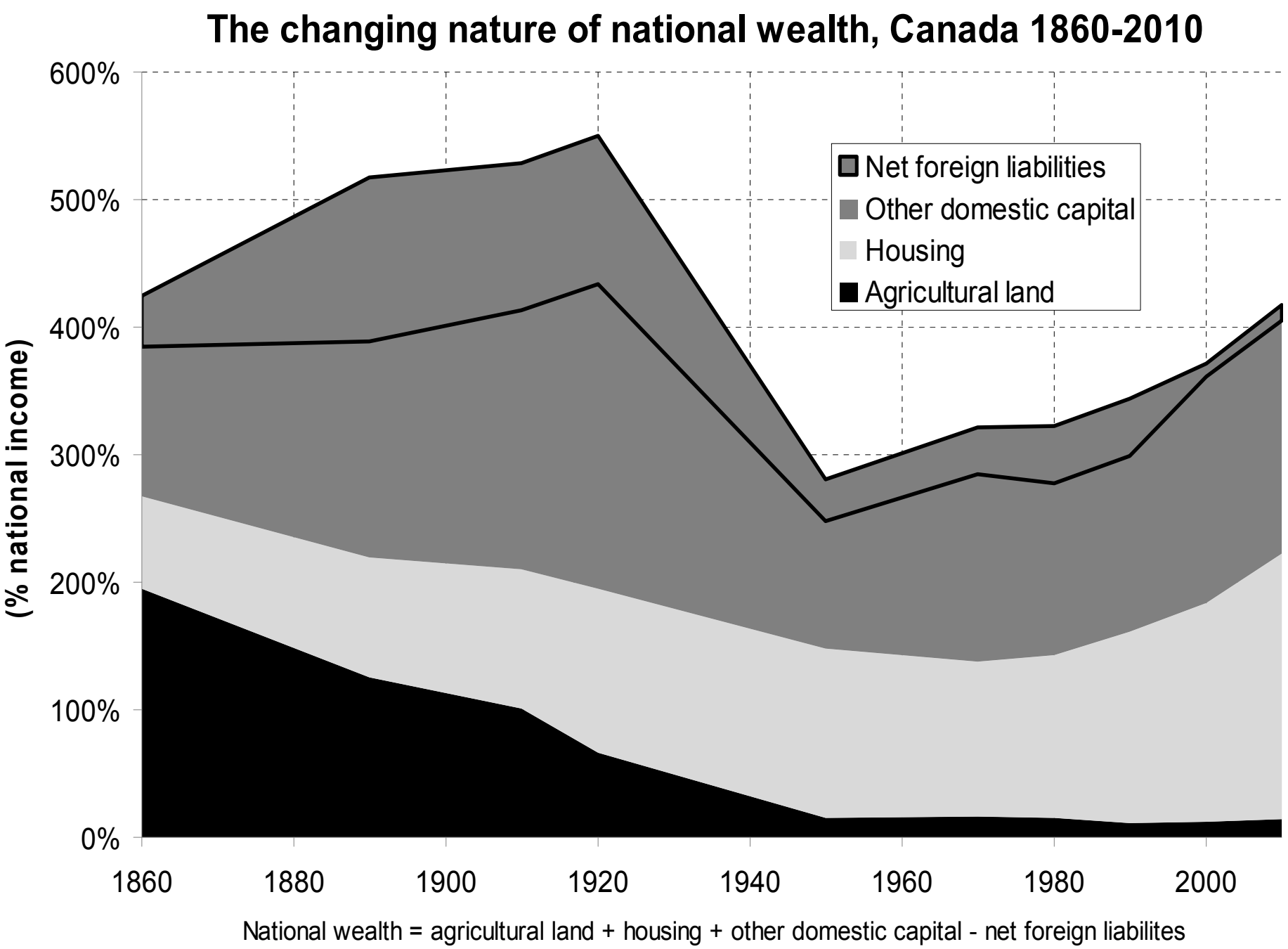

The changing nature of national wealth, France 1700-2010
800%
700%
600%
500%
400%
300%
200%
100%
0%
(% national income)
Net foreign assets
Other domestic capital
Housing
Agricultural land
1700
1750
1780
1810
1850
1880
1910
1920
1950
1970
1990
2010
National wealth = agricultural land + housing + other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

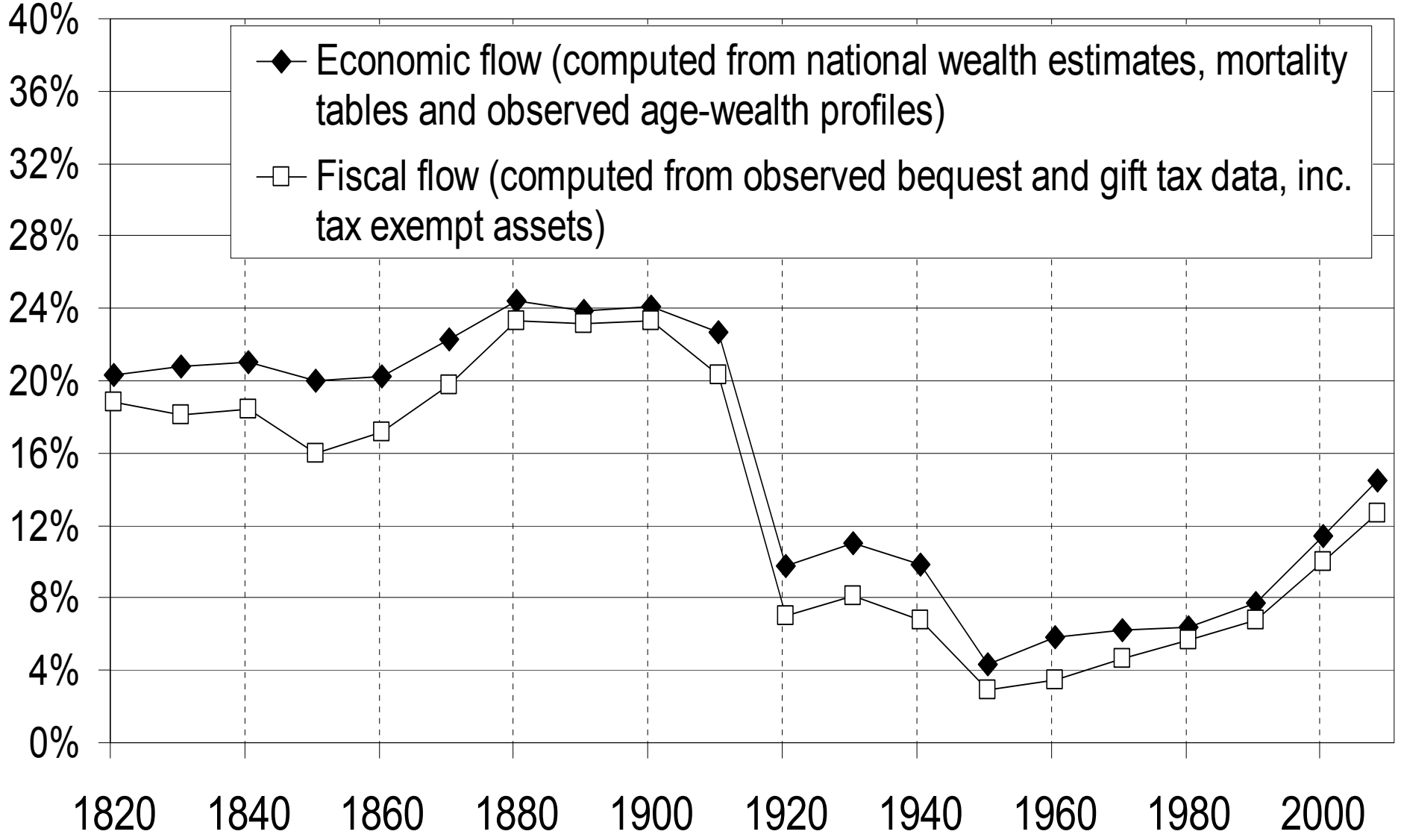
(simply because very abundant land is worthless: new world had more land in volume, but less land in value)

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

Conclusions & perspectives

- **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

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



Source: T. Piketty, "On the long-run evolution of inheritance", QJE 2011

Supplementary slides

- **Harrod-Domar-Solow formula $\beta = s/g$ is a pure accounting formula and is valid with any saving motive and utility function**

- **Wealth in the utility function**: Max $U(c_t, \Delta w_t = w_{t+1} - w_t)$

→ if $U(c,\Delta) = c^{1-s} \Delta^s$, then fixed saving rate $s_t = s$

- **Dynastic utility**:

  Max $\Sigma\, U(c_t)/(1+\delta)^t$, with $U(c) = c^{1-1/\xi}/(1-1/\xi)$

→ unique long rate rate of return $r_t \rightarrow r = \delta + \xi g > g$

→ long run saving rate $s_t \rightarrow s = \alpha g/r$, $\beta_t \rightarrow \beta = \alpha/r = s/g$

Table 5: Private saving 1970-2010: gross vs net

Average saving rates 1970-2010 (% national income)	Gross private saving (personal + corporate)	Minus: Capital depreciation	Equal: Net private saving (personal + corporate)
U.S.	18.8%	11.1%	7.7%
Japan	33.4%	18.9%	14.6%
Germany	16.3%	4.1%	12.2%
France	22.0%	10.9%	11.1%
U.K.	19.7%	12.3%	7.3%
Italy	30.1%	15.1%	15.0%
Canada	24.5%	12.4%	12.1%
Australia	25.1%	15.2%	9.9%

Table 7: Accumulation of market-value national wealth in rich countries, 1970-2010 (additive decomposition)

	National wealth-national income ratios		Decomposition of 2010 market value national wealth-national income ratio		
	β (1970)	β (2010)	Initial wealth effect	Cumulated new savings	Capital gains or losses
U.S.	385%	419%	127%	193%	98%
			30%	46%	24%
				66%	***34%***
Japan	359%	616%	132%	456%	27%
			21%	74%	4%
				94%	***6%***
Germany	312%	418%	144%	296%	-22%
			34%	71%	-5%
				108%	***-8%***
France	351%	605%	147%	294%	164%
			24%	49%	27%
				64%	***36%***
U.K.	365%	527%	153%	140%	235%
			29%	27%	44%
				37%	***63%***
Italy	259%	609%	123%	273%	213%
			20%	45%	35%
				56%	***44%***
Canada	284%	412%	92%	257%	63%
			22%	62%	15%
				80%	***20%***
Australia	391%	584%	111%	253%	220%
			19%	43%	38%
				54%	***46%***

Table 8: Accumulation of (market-value) national wealth in rich countries, 1970-2010 (multiplicative decomposition)

	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	$g_{ws} = s/\beta$	q
U.S.	385%	419%	3.0%	2.2% ***74%***	0.8% ***26%***
Japan	359%	616%	3.9%	3.1% ***78%***	0.8% ***22%***
Germany	312%	418%	2.7%	3.1% ***113%***	-0.4% ***-13%***
France	351%	605%	3.6%	2.7% ***75%***	0.9% ***25%***
U.K.	314%	523%	3.5%	1.5% ***42%***	2.0% ***58%***
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%***

Table 11: Accumulation of government wealth in rich countries, 1970-2010 (additive decomposition)

	Government wealth-national income ratios		Decomposition of 2010 government wealth-national income ratio			
	β (1970)	β (2010)	Initial wealth effect	Cumulated new savings & other vol. changes	*incl. net interest payments*	Capital gains or losses
U.S.	43%	9%	14%	*-44%*	*-68%*	38%
Japan	61%	14%	22%	*0%*	*-38%*	-8%
Germany	87%	3%	40%	*-60%*	*-55%*	23%
France	41%	31%	17%	*-52%*	*-46%*	66%
U.K.	59%	6%	25%	*-53%*	*-58%*	34%
Italy	20%	-68%	9%	*-207%*	*-231%*	130%
Canada	37%	-4%	12%	*-51%*	*-75%*	34%
Australia	61%	67%	17%	*-21%*	*-23%*	70%

Table 13: Foreign saving 1970-2010: trade vs investment balance

Average saving rates 1970-2010 (% national income)	Net foreign saving	incl. net exports & transfers	incl. net foreign investment income
U.S.	-2.8%	-3.6%	0.7%
Japan	2.8%	1.4%	1.4%
Germany	2.0%	1.7%	0.2%
France	-0.3%	-1.1%	0.8%
U.K.	-1.5%	-1.6%	0.1%
Italy	-0.3%	0.5%	-0.8%
Canada	-0.1%	2.9%	-3.0%
Australia	-4.7%	-1.3%	-3.5%

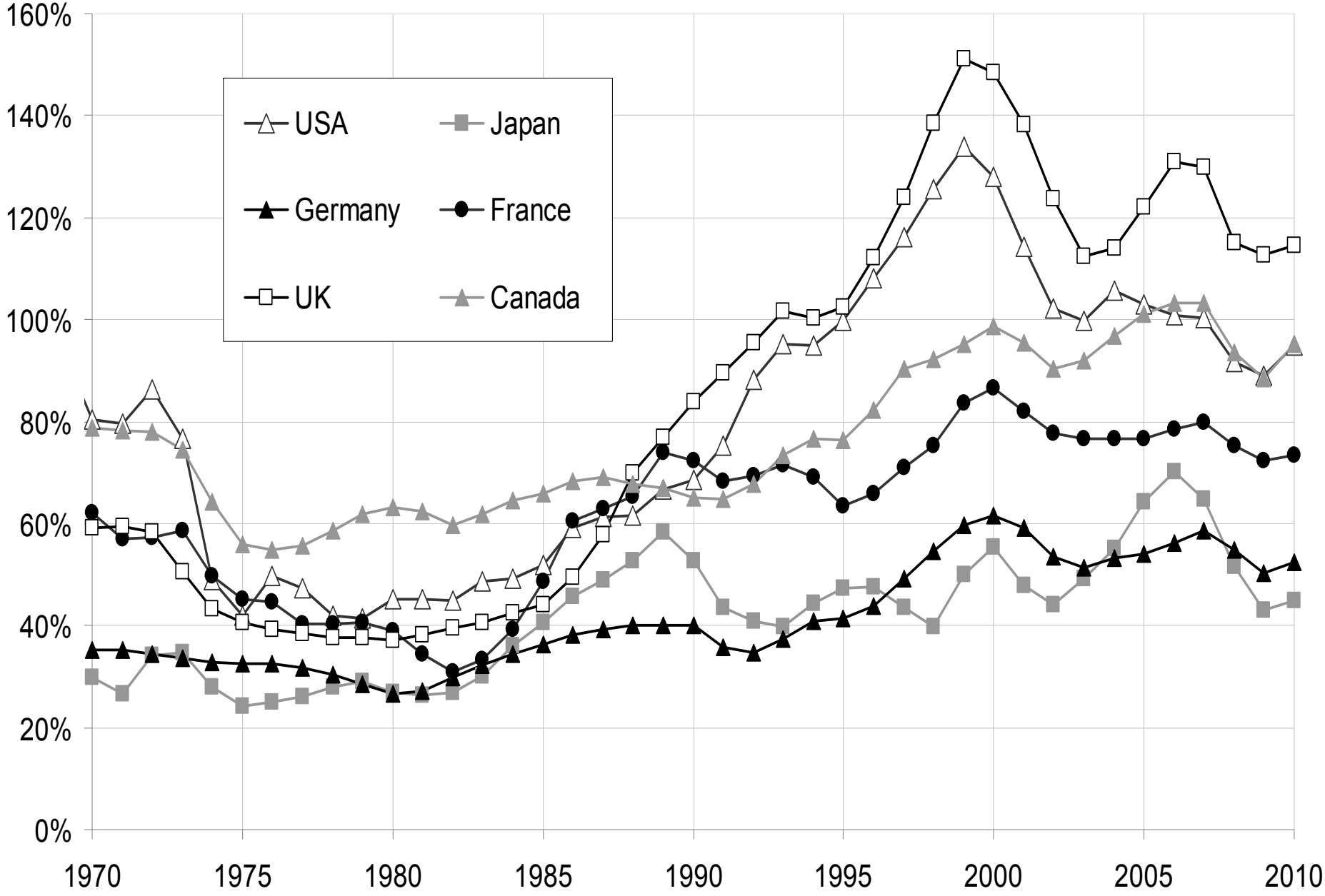
Table 14: Accumulation of foreign wealth in rich countries, 1970-2010 (additive decomposition)

	Foreign wealth-national income ratios		Decomposition of 2010 foreign wealth-national income ratio				
	β (1970)	β (2010)	Initial wealth effect	Cumulated saving & other volume changes	*incl. net exports & transfers*	*incl. net investment income*	Capital gains or losses
U.S.	4%	-25%	1%	-60%	*-90%*	*19%*	33%
Japan	3%	67%	1%	84%	*43%*	*41%*	-18%
Germany	8%	42%	4%	57%	*51%*	*6%*	-19%
France	11%	-13%	5%	-2%	*-33%*	*23%*	-15%
U.K.	6%	-20%	3%	-41%	*-42%*	*2%*	18%
Italy	12%	-31%	5%	-9%	*17%*	*-26%*	-27%
Canada	-41%	-10%	-13%	-4%	*74%*	*-77%*	7%
Australia	-20%	-70%	-6%	-106%	*-28%*	*-78%*	41%

Table 15: Accumulation of national wealth in rich countries: domestic vs. foreign capital gains

	1970-2010 capital gains on national wealth (% of national income)	Decomposition of 1970-2010 capital gains	
		Domestic wealth	Foreign wealth
U.S.	98%	66%	33%
		67%	33%
Japan	27%	45%	-18%
		164%	-64%
Germany	-22%	-3%	-19%
		14%	86%
France	164%	179%	-15%
		109%	-9%
U.K.	235%	217%	18%
		92%	8%
Italy	213%	240%	-27%
		113%	-13%
Canada	63%	55%	7%
		88%	12%
Australia	220%	178%	41%
		81%	19%

Corporate market value / book value Q-ratios 1970-2010



Authors' computations using country national accounts. Q ratio = market value/book value = equity/(assets - debt) (corporate sector)