

Econ 133 – Global Inequality and Growth

The capital/income ratio in the long run

Gabriel Zucman

zucman@berkeley.edu

In past lecture we saw what determines Y in the long-run:

- Population: the race between fertility and mortality
- Productivity growth: ideas, innovation, education, institutions

Today we ask: what determines the long-run level of $\beta = W/Y$?

Key formula: in the long run $\beta = s/g$, where

- g = long-run income growth rate = productivity + pop. growth
- s = net-of-depreciation saving rate

Roadmap

1. The capital/income ratio in the long-run: $\beta = s/g$
2. Capital's comeback in rich countries
3. The role of land and other asset prices

1 The long-run capital-income ratio

1.1 Proof of the formula $\beta = s/g$

Transitional dynamics:

- $W_{t+1} = W_t + s_t Y_t$
- Divide both sides by $Y_{t+1} = Y_t(1 + g_t)$ to get:

$$\beta_{t+1} = \frac{W_t + s_t Y_t}{Y_t(1 + g_t)} = \frac{\beta_t + s_t}{1 + g_t}$$

In steady state:

- $\beta_t = \beta_{t+1}$, $s_t = s$, $g_t = g$
- Plug in above equation, solve for β , and get $\beta = s/g$
- Ex: if $s = 10\%$ and $g = 3\%$ then $\beta = 333\%$
- Ex: If $s = 10\%$ and $g = 1.5\%$ then $\beta = 666\%$
- Only assumption: $W_{t+1} = W_t + s_t Y_t$, i.e., no price effects

1.2 Where does s come from?

Different reasons why people save (see lecture 15)

- Precautionary saving
- Life-cycle saving
- Leaving bequests
- Wherever s comes from, $\beta = s/g$ if no price effect

Gross and net saving in rich countries, 1970-2010			
	Gross private savings (% national income)	Minus: Capital depreciation	Equal: Net private saving
U.S.	18.8%	11.1%	7.7%
Japan	33.4%	18.9%	14.6%
Germany	28.5%	16.2%	12.2%
France	22.0%	10.9%	11.1%
U.K.	19.7%	12.3%	7.3%
Italy	30.1%	15.1%	15.0%
Canada	24.5%	12.4%	12.1%
Australia	25.1%	15.2%	9.9%

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

Sources: Piketty and Zucman (2014)

Private and public saving in rich countries, 1970-2010			
	National saving (private + public) (net of depreciation) (% national income)	incl. Private saving	incl. Public saving
U.S.	5.2%	7.6%	-2.4%
Japan	14.6%	14.5%	0.1%
Germany	10.2%	12.2%	-2.0%
France	9.2%	11.1%	-1.9%
U.K.	5.3%	7.3%	-2.0%
Italy	8.5%	15.0%	-6.5%
Canada	10.1%	12.1%	-2.0%
Australia	8.9%	9.8%	-0.9%

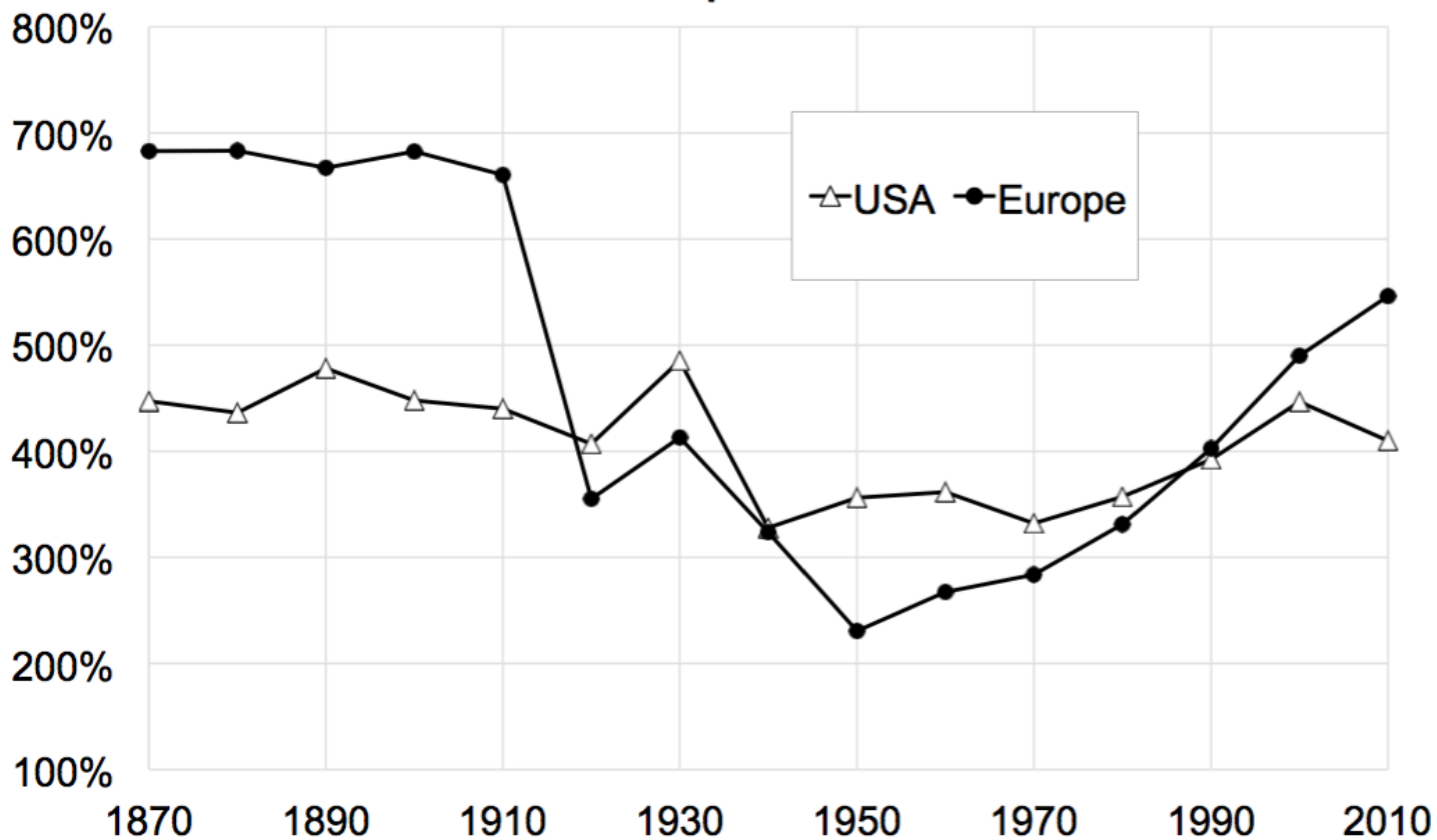
A large part (variable across countries) of private saving is absorbed by public deficits, so that national saving (private + public) is less than private saving.

Sources: Piketty and Zucman (2014)

1.3 What does the $\beta = s/g$ formula say?

- Any β possible in steady-state, because s and g vary for all sorts of reasons
- Countries with low g tend to have high β
- Explains why 18th century economies had high β
- Explains Europe vs. US
- Explains high Chinese saving rate

**Figure 4: Private wealth / national income ratios 1870-2010:
Europe vs. USA**

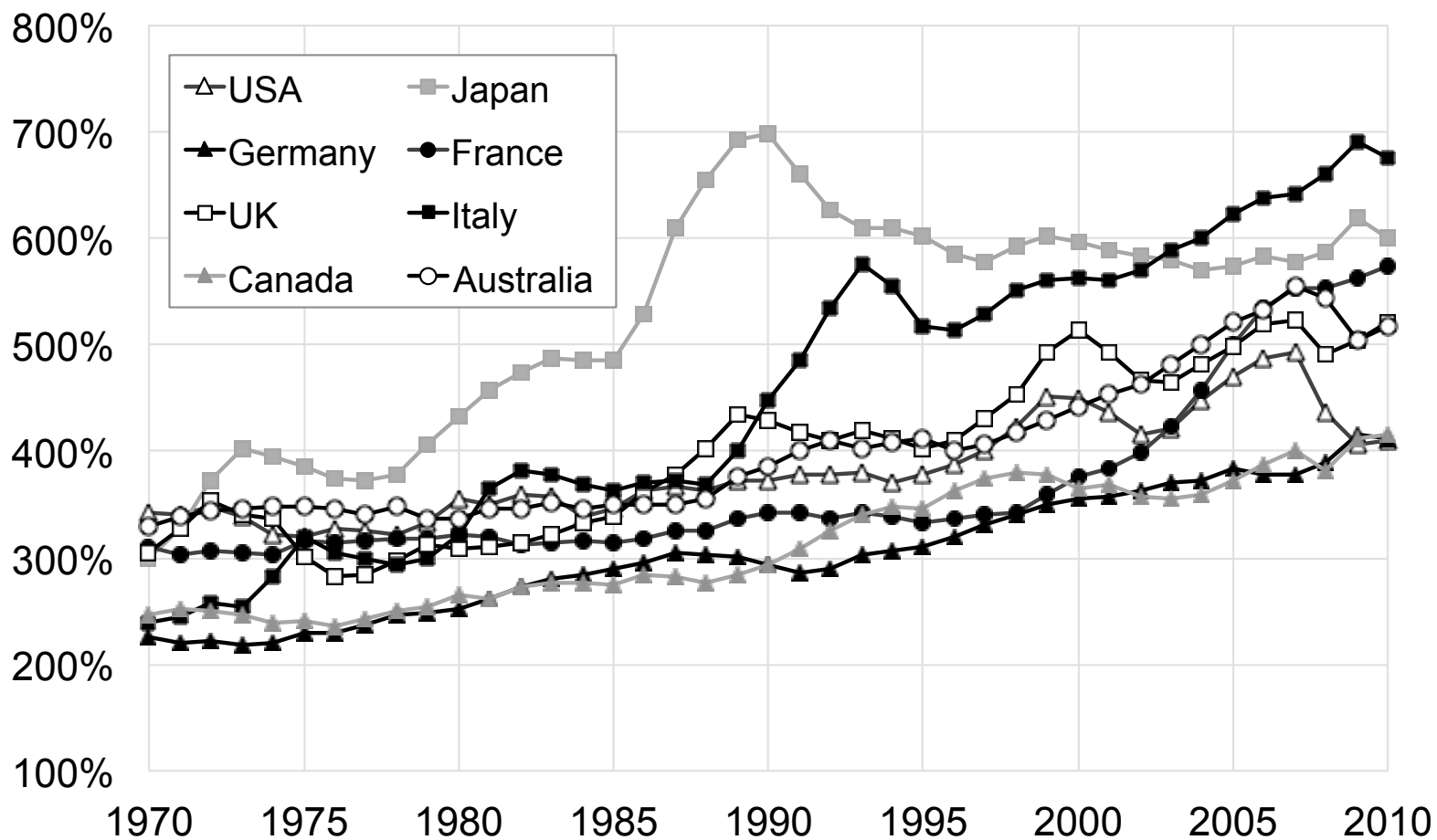


Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors). Data are decennial averages (1910-1913 averages for Europe)

Lessons of $\beta = s/g$ for the 21st century?

- Population growth will fall $\rightarrow \beta$ might become high at global level
- If in addition you believe like Gordon (compulsory reading 3) that productivity growth will be low, then β might become very high
- Are high β a good thing or a bad thing?
 - Good: capital is useful (e.g., infrastructure, houses, etc).
 - Problem: might exacerbate inequality

Private wealth / national income ratios 1970-2010



Source: Piketty and Zucman (2014). Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)

2 Capital's comeback in rich countries

To explain recent evolution of β , need to relax assumption of no price effect: $W_{t+1} = (W_t + s_t Y_t) \cdot (1 + q_t)$

Where q_t = real rate of capital gain (or loss) = excess of asset price inflation over consumer price inflation

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

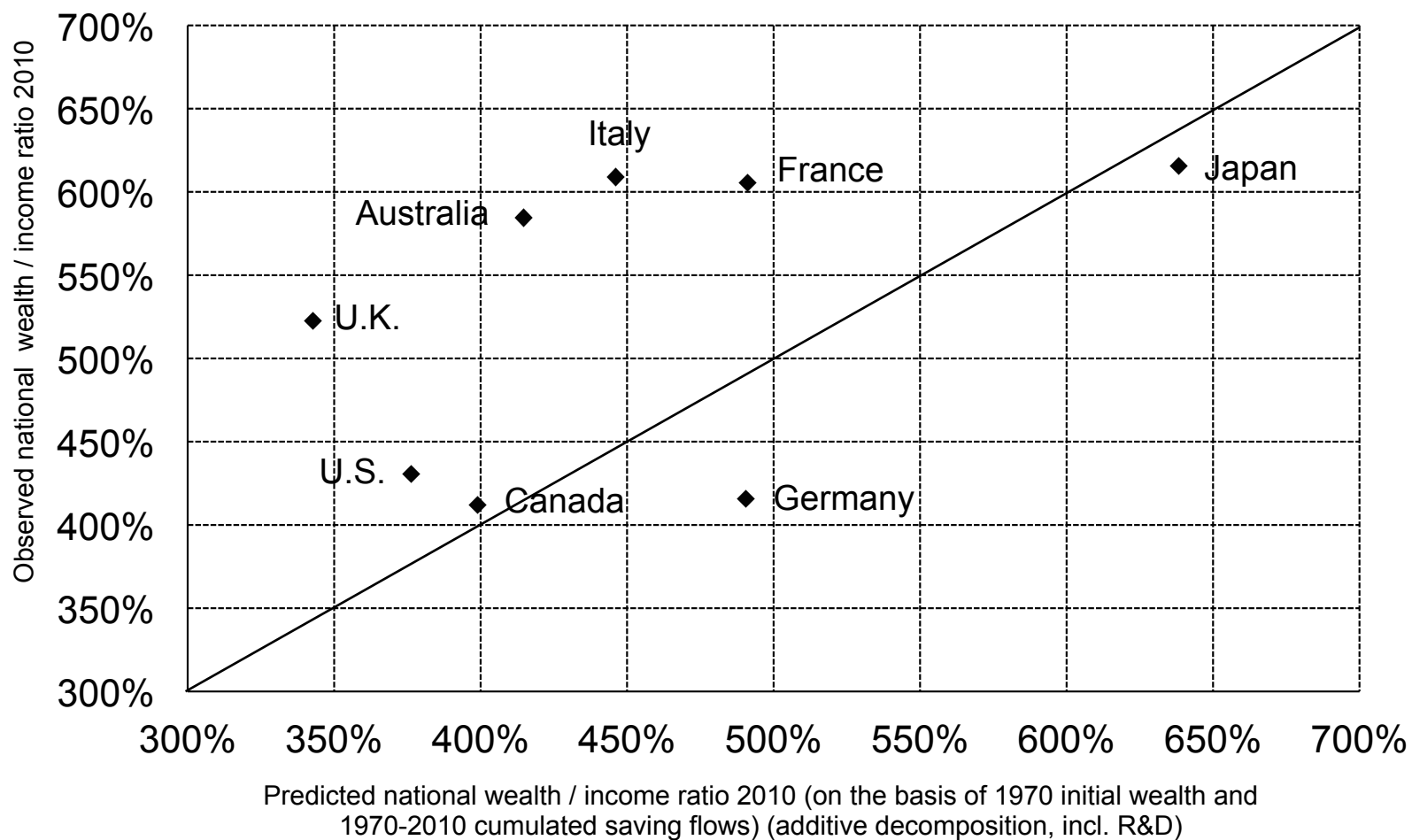
- $1 + g_{wst} = 1 + s_t/\beta_t$ = saving-induced wealth growth rate
- $1 + q_t$ = capital-gains induced wealth growth rate

- Question: Is the rise of β mostly due to saving or capital gains?
- Answer: both, with differences across countries
- Let's try to decompose the rise in β (see compulsory reading 1: Piketty and Zucman, 2014, section V)
- Strategy to identify the source of the rise of β : decompose the evolution of β into 2 multiplicative components:

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

	National wealth-national income ratios		Decomposition of 1970-2010 wealth growth rate		
	β (1970)	β (2010)	Real growth rate of national wealth	Savings-induced wealth growth rate	Capital-gains-induced wealth growth rate
			g_w	$g_{ws} = s/\beta$	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.	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%

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



3 Where do capital gains come from?

- UK, Australia, Italy, France: housing
- Race between progress in transportation sector and population growth. See Knoll, Schularick and Steger (2014)
- US: foreign capital
- Role of policy changes: rent controls, greater shareholder power
- Germany vs. Anglo-saxon countries

Table 6: National wealth accumulation in rich countries: domestic vs. foreign capital gains			
	1970-2010 capital gains on national wealth (% of 2010 national income)	Decomposition of 1970-2010 capital gains	
		Domestic wealth	Foreign wealth
U.S.	105%	72%	33%
Japan	27%	45%	-18%
Germany	-25%	-3%	-22%
France	164%	179%	-15%
U.K.	235%	217%	18%
Italy	213%	240%	-27%
Canada	63%	55%	7%
Australia	220%	178%	41%

Authors' computations using country national accounts. Other volume changes were put in saving flows and thus excluded from capital gains.

- Clearly, $\beta = s/g$ not true in the short-run
- Extreme case: from one year to the other, most of the changes in β come from changes in capital gains
- Also big role of wars, asset price booms/busts
- What about in the long-run: do price effects wash out? Some evidence they do but very uncertain

References

Knoll, Katharina, Moritz Schularick and Thomas Steger (2014). “No Price Like Home: Global House Prices, 1870-2012”, CEPR DP. (web)

Piketty, Thomas, and Gabriel Zucman, “Capital is back: wealth-income ratios in rich countries 1700-2010”, *Quarterly Journal of Economics*, 2014 (web)