Econ 133 – Global Inequality and Growth

Inequality between labor and capital

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What we've learned so far:

- All income derives from labor or capital

- The share of income that goes to capital (α) is equal to the capital/income ratio β times the rate of return to capital r

- In the long run, $\beta \rightarrow s/g$ where $g =$ pop. + demo. growth

- For most of world history g was low, and β was high

- Some believe g will be low again at global level ($\approx$ 1%-1.5%) by 2100 $\rightarrow \beta$ might become high again

Today we ask:

- If β rises, does this automatically imply that α will rise?

- What are the implications of a high capital share α? Why do we care?

- What determines factor shares in the long run? [Factor shares: share of capital in national income α and share of labor in national income $1 - \alpha$]

- Reference for this lecture: Piketty and Zucman (2014) Section VIII; Piketty's (2014) book, page 215–234

Roadmap

1. Factor shares in a Cobb-Douglas world

2. Factor shares with CES production

3. The role of institutions and bargaining power

1   Factor shares in a Cobb-Douglas world

1.1   Definition of factor shares

- Capital income = all income flows going to capital owners (independently of any labor input)

- Labor income = all income flows going to labor earners (independently of any K input)

- Caveat: In practice, frontier between capital and labor can be hard to draw

1.2   The Cobb-Douglas production function

- Cobb-Douglas production function: $Y = F(K, L) = K^{\alpha} L^{1-\alpha}$

- With perfect competition, wage rate $v =$ marginal product of labor, rate of return r $=$ marginal product of capital:

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

- So capital income $Y_K = rK = \alpha Y$ and labor income $Y_L = vL = (1 - \alpha)Y$

- Capital and labor shares are entirely set by technology and do not depend on quantities of capital and labor
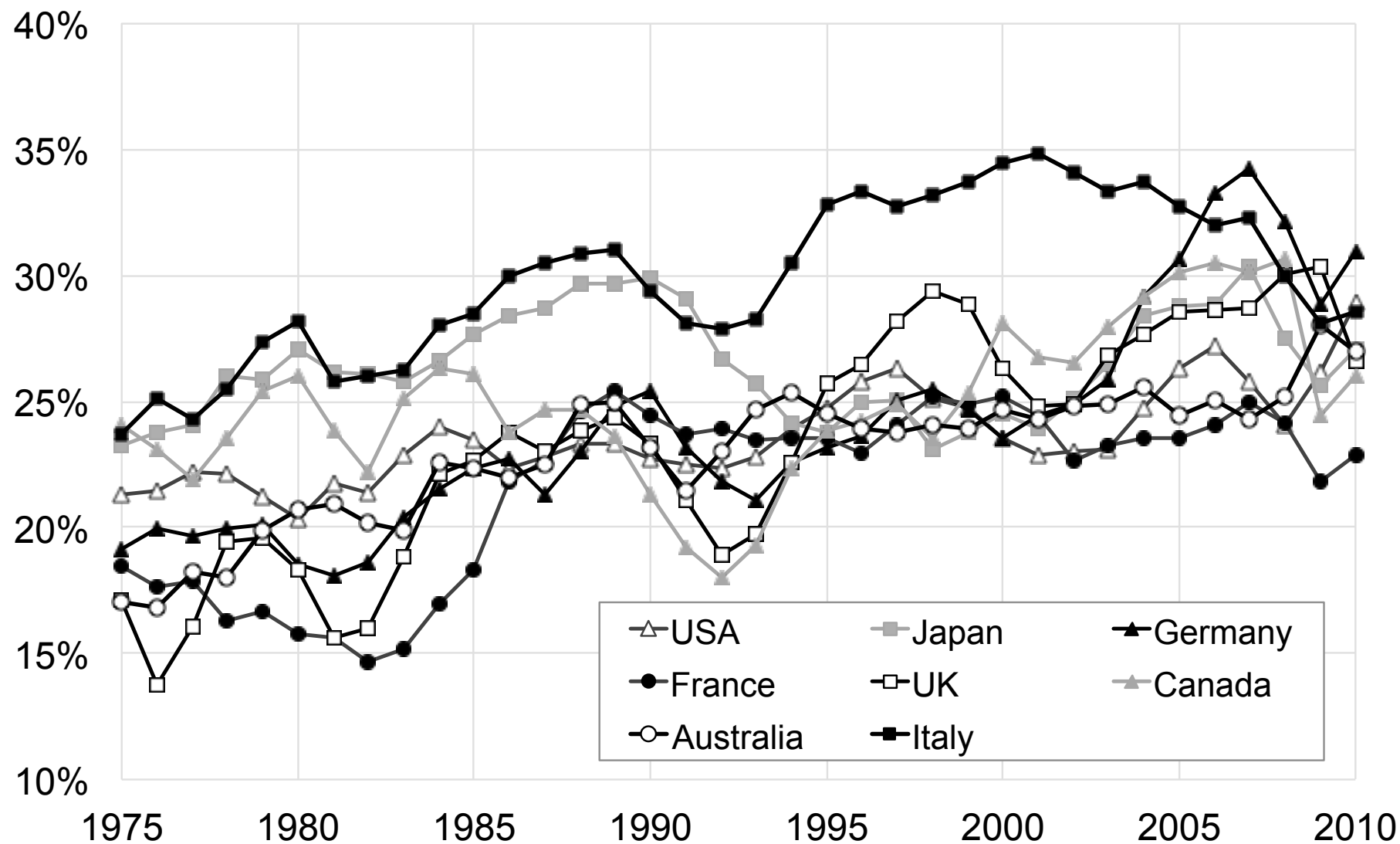
1.3   The limits of Cobb-Douglas

- Cobb-Douglas production very popular for a long time

- Writing in the 1920s, Keynes saw stable factor shares; became one of Kaldor's (1957) six stylized facts.

Two problems:

- Recent data show increase in capital share at global level. Reference on this: Karabarbounis and Neiman (2014)

- Evidence that α was higher in the 19th century than today

Capital shares in factor-price national income 1975-2010

Factor shares in factor-price national income 1820-2010: UK and France
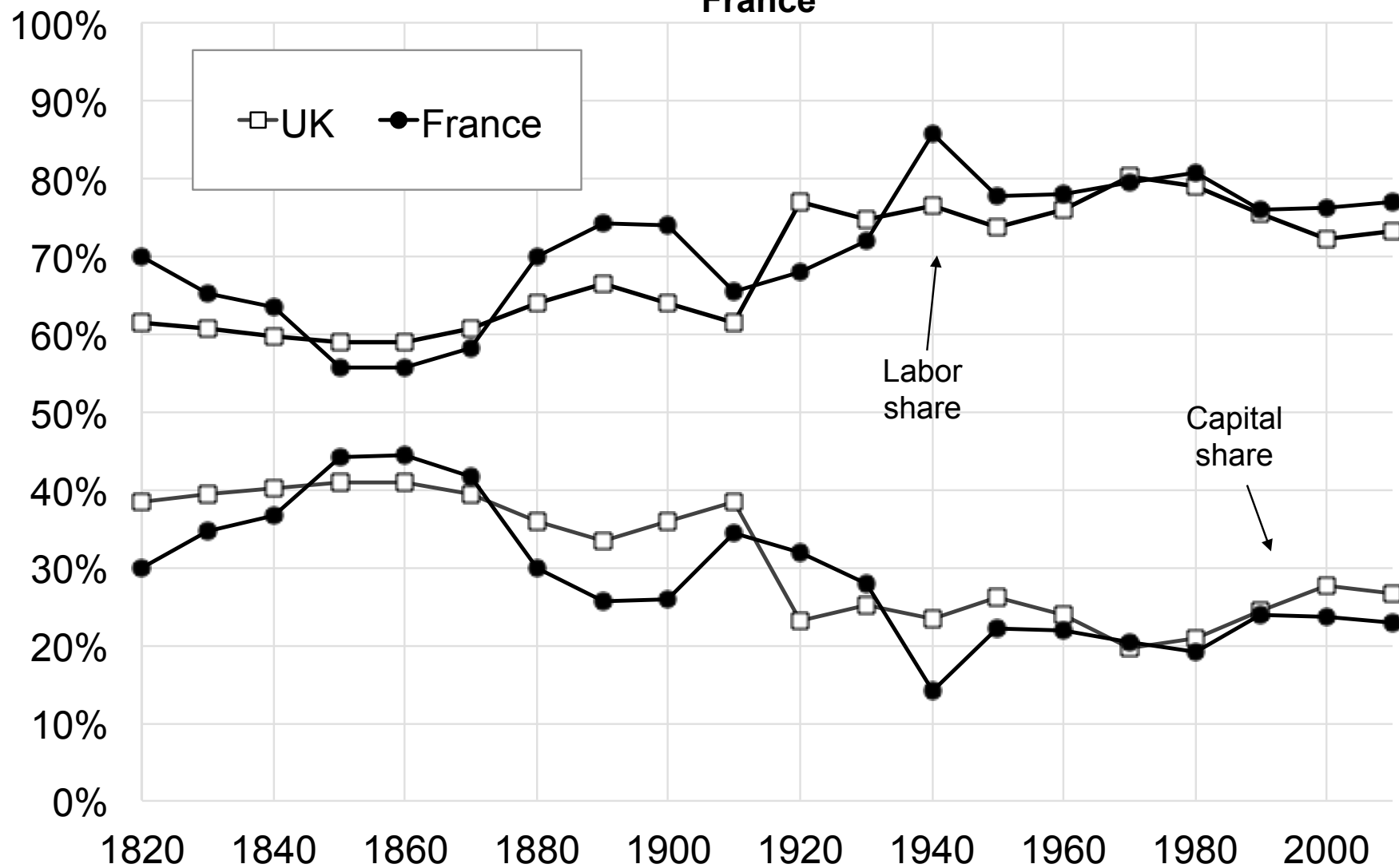
2   Factor shares with CES production

2.1   The elasticity of substitution

- The elasticity of substitution σ captures the response of the capital-labor ratio K/L to a change in relative factor prices v/r:

$$\sigma = -\frac{\mathsf{d}log(K/L)}{\mathsf{d}log(F_K/F_L)} = \frac{\mathsf{d}log(K/L)}{\mathsf{d}log(v/r)}$$

- In the Cobb-Douglas case, σ is exactly equal to 1. Proof:

- Ex: if wages rises by 1% relative to r, then firms use 1% less labor relative to K, so that labor share in output remains constant

- However, there is no reason why σ should be equal to 1 (Keynes: "a bit of miracle")

2.2   The CES production function

- In the CES production function, the elasticity of substitution can take any value

- With CES production, factor shares are not necessarily constant $\rightarrow$ useful to think about real world

- A CES production function is given by:

$$F(K, L) = (a \cdot K^{\frac{\sigma-1}{\sigma}} + (1-a) \cdot L^{\frac{\sigma-1}{\sigma}})^{\frac{\sigma}{\sigma-1}}$$

- $\sigma =$ constant elasticity of substitution

- As $\sigma \to \infty$, the production function becomes linear: $Y = rK + vL$. Robot economy

- As $\sigma \to 0$, the production function becomes putty-clay, i.e. $F(K, L) = min(rK, vL)$: no substitution possibility

2.3   Factor shares in a CES world

- The CES function helps think about the rise of the capital share

- Theorem: α is a rising function of β iff $\sigma > 1$

- Remember the accounting identity: $\alpha = r \cdot \beta$

- σ links the capital/income ratio β and the capital share α: it determines how much the rate of return r falls when β rises

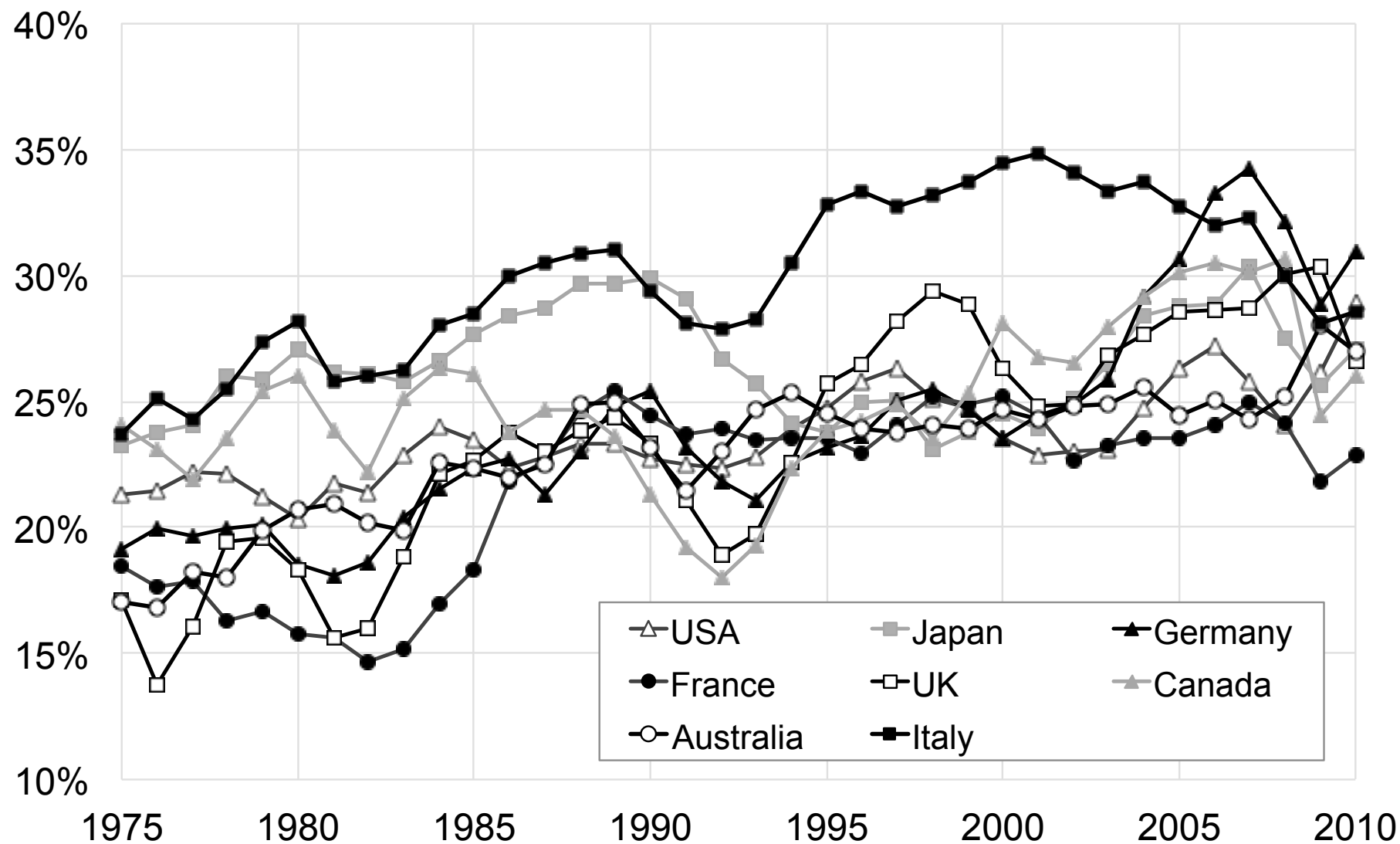# Private wealth / national income ratios 1970-2010
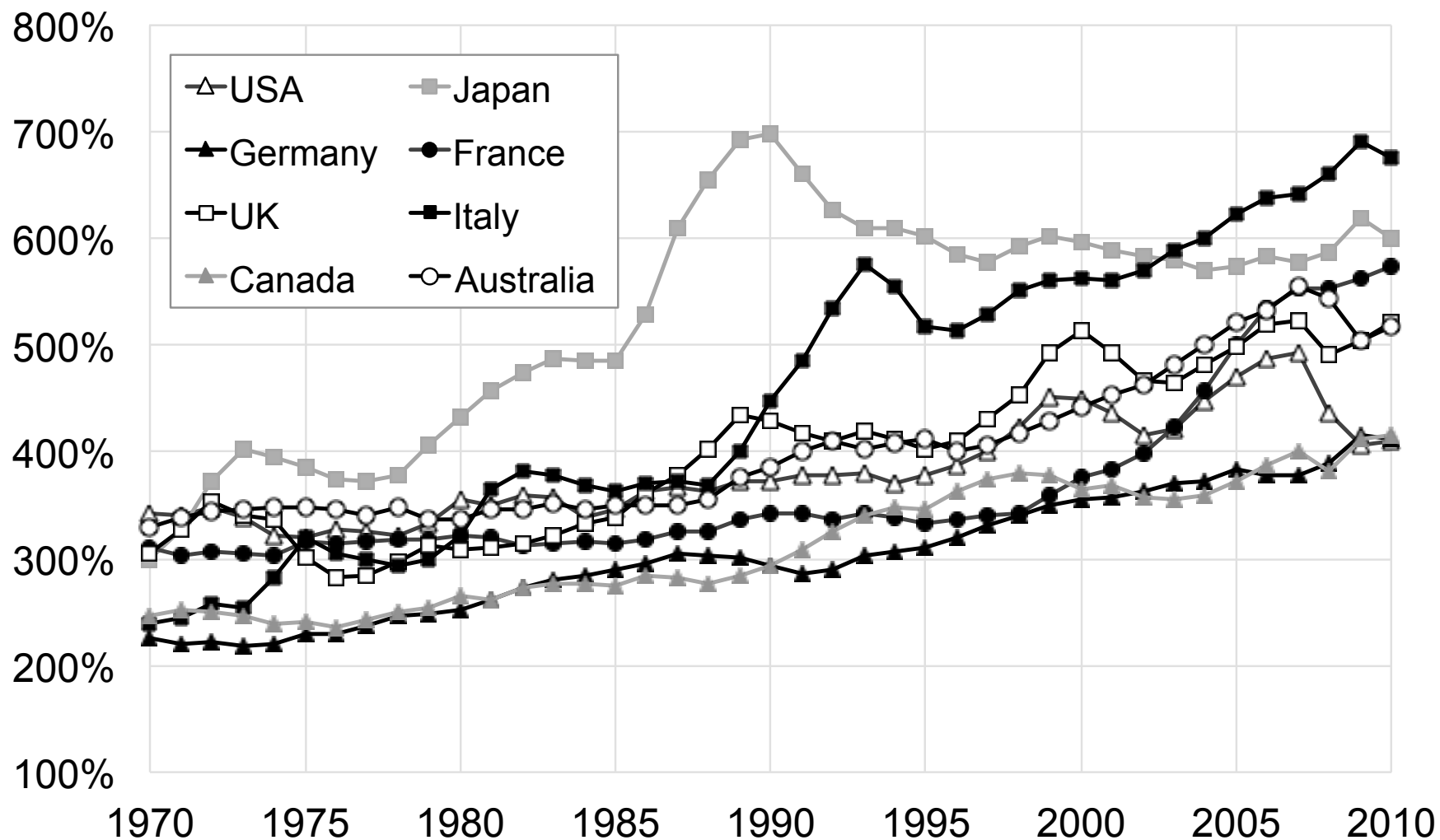
Source: Piketty and Zucman (2014). Authors' computations using country national accounts. Private wealth = non-financial assets + financial assets - financial liabilities (household & non-profit sectors)

Average return on private wealth 1975-2010
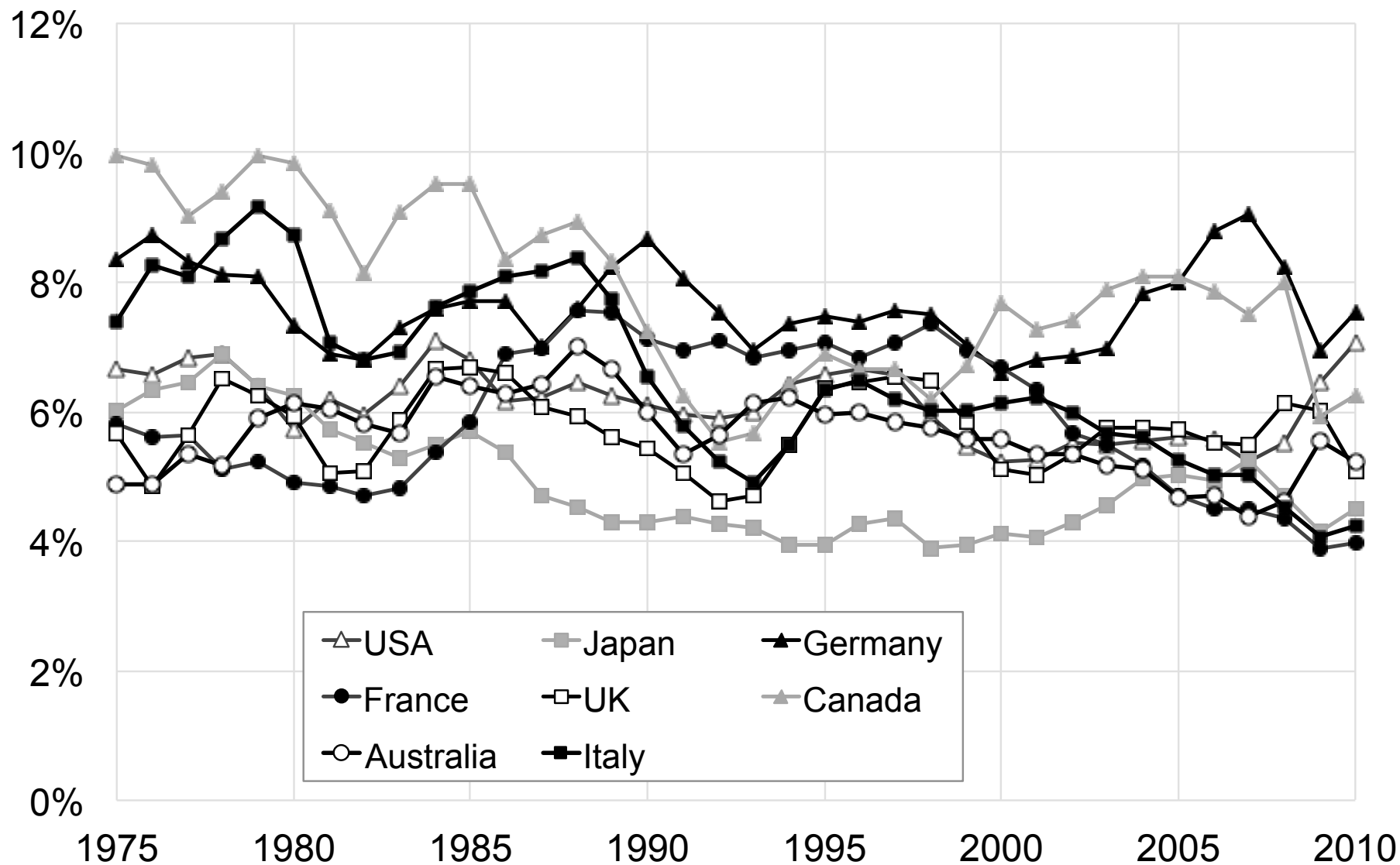
Capital shares in factor-price national income 1975-2010

- σ doesn't have to be much > 1 to account for observed trends

- If $\sigma = 1.5$, capital share rises from $\alpha =$28% to $\alpha =$36% when β rises from 250% to 500%

- In case β reaches 800%, α would reach 42%

- In case $\sigma=$1.8, α would be as large as 53%

2.4   What do we know about σ?

- Micro literature usually finds $\sigma < 1$

- A recent macro literature finds $\sigma > 1$. Example: Karabarbounis and Neiman (2014)

- Possible that σ has increased over time: change in the nature of wealth, globalization

3   Change in the market power of capital

- So far we assumed perfect competition: capital and labor are paid their marginal product

- What if capital is paid more (or used to be paid less) than its marginal product?

- Possible channels: decline of unions, globalization, rise of network industries (Facebook, Twitter), change of social norms

- Evidence of change in market power for capital: rise of Tobin's Q

Figure 5.6. Market value and book value of corporations
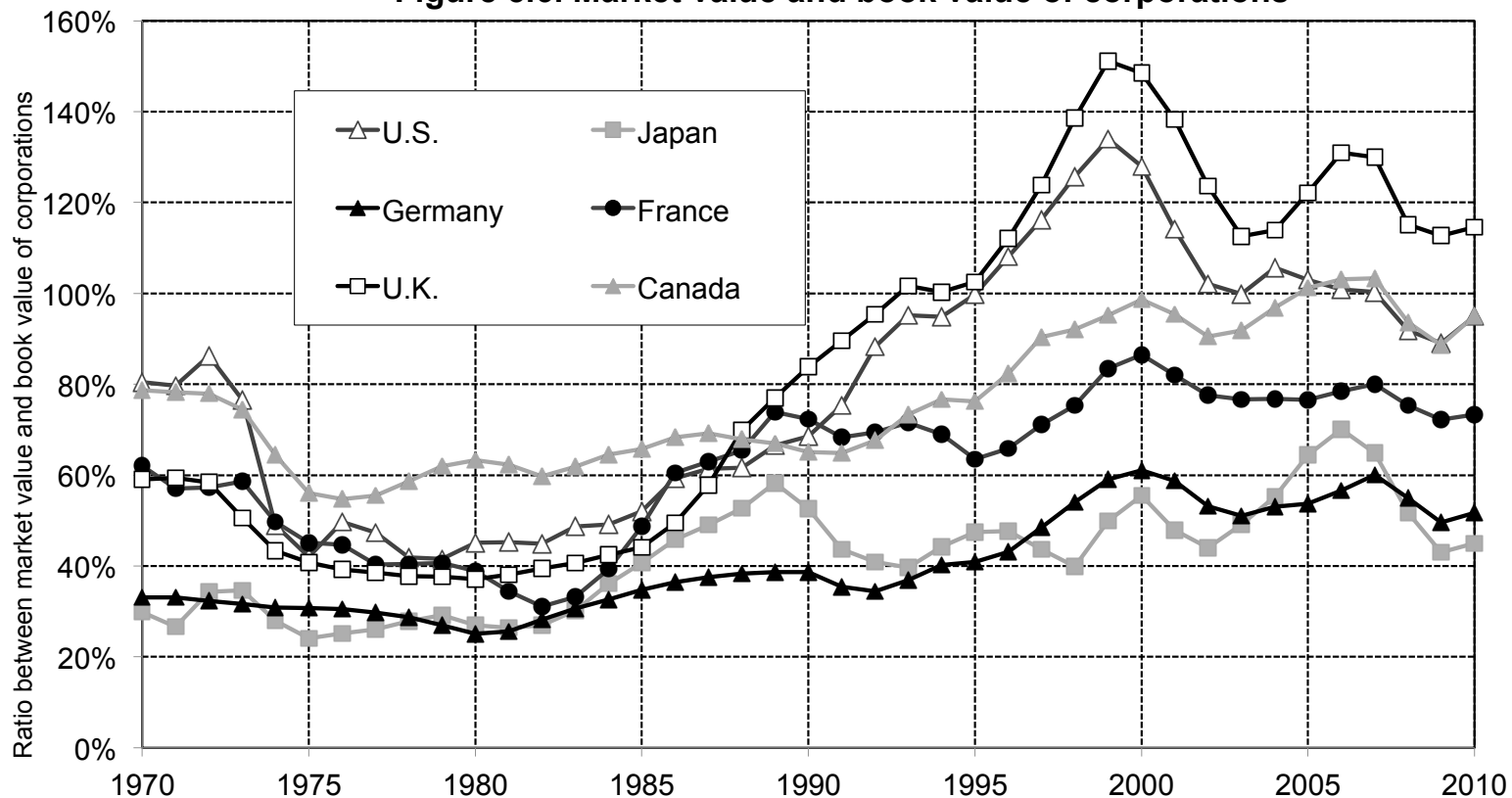
Tobin's Q (i.e. the ratio between market value and book value of corporations) has risen in rich countries since the 1970s-1980s. Sources and series: see piketty.pse.ens.fr/capital21c.

Summary

- Factor shares are not constant: the capital share α is rising, the labor share $1 - \alpha$ falling

- One explanation is that the rise of the capital share of income may be the consequence of the rise of the stock of capital (rising β).

- If capital and labor are relatively substitutable $(\sigma > 1)$, a rise in the wealth/income ratio β will trigger a rise in the capital share α

- Another explanation is that market power for capital may be rising

- Because K income is v. unequally distributed (more than L income), $\uparrow \alpha$ can have big consequences for interpersonal ineq.

References

Karabarbounis, Lukas and Brent Neiman, "The Global Decline of the Labor Share", *Quarterly Journal of Economics*, 2014 (web)

Piketty, Thomas, *Capital in the 21st Century*, Cambridge: Harvard University Press, 2014, Chapter 1

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