

Lecture 6

Accounting for cross-country income differences

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Cross-Country Income Differences

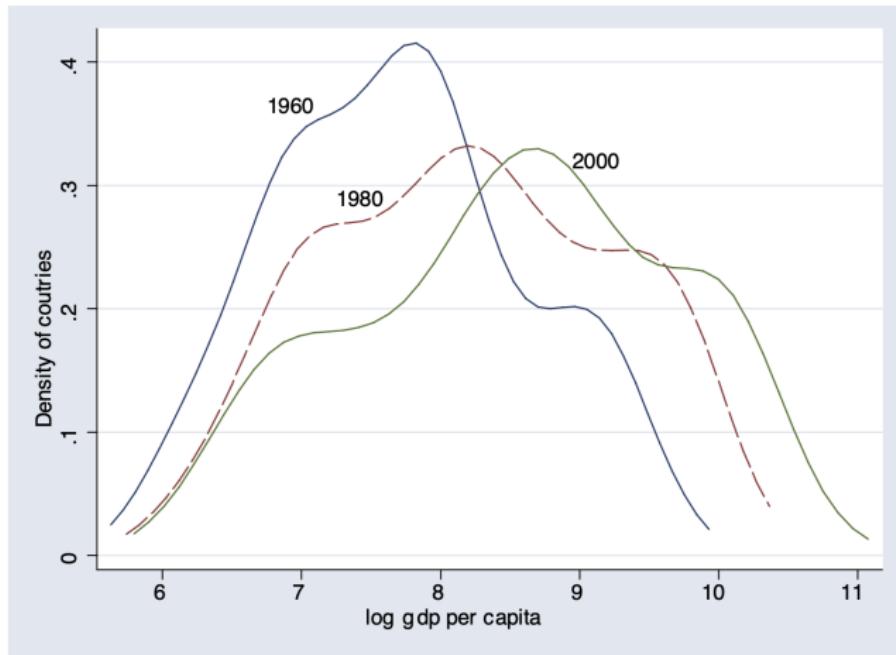


Figure: Estimates of the distribution of countries according to log GDP per capita (PPP-adjusted) in 1960, 1980 and 2000.

Cross-Country Income Differences

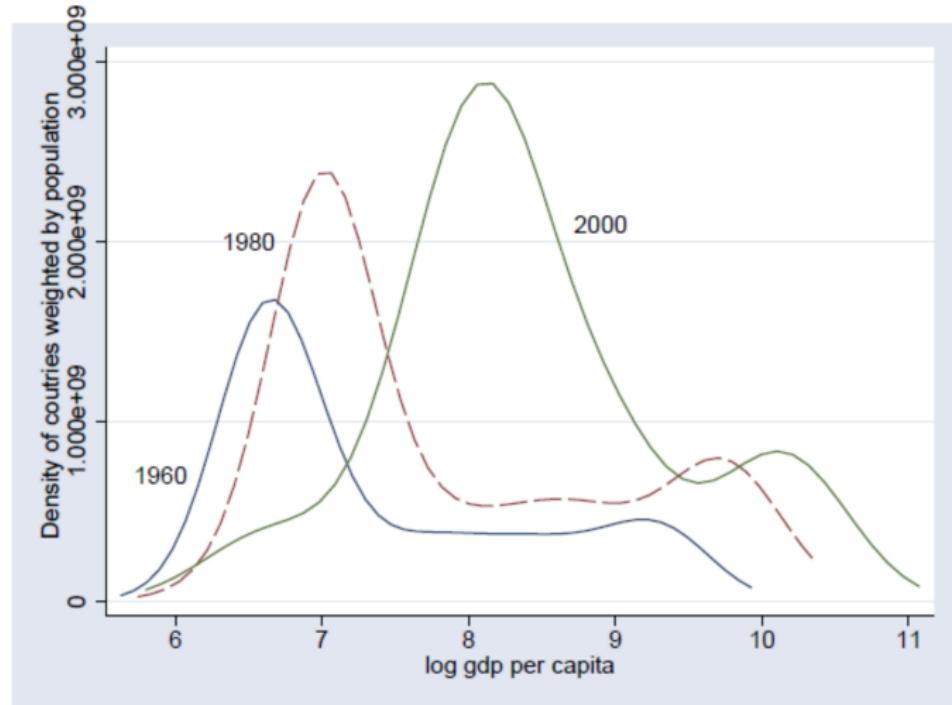


FIGURE 1.3. Estimates of the population-weighted distribution of countries according to log GDP per capita (PPP-adjusted) in 1960, 1980 and 2000.

Some evidence of convergence in OECD...

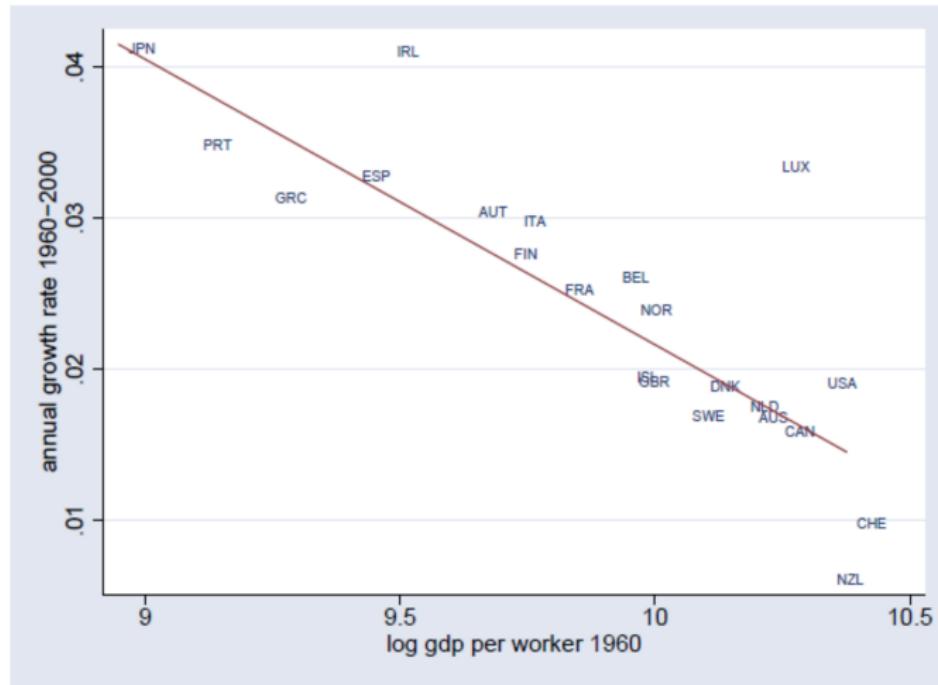


FIGURE 1.14. Annual growth rate of GDP per worker between 1960 and 2000 versus log GDP per worker in 1960 for core OECD countries.

But little evidence of convergence globally

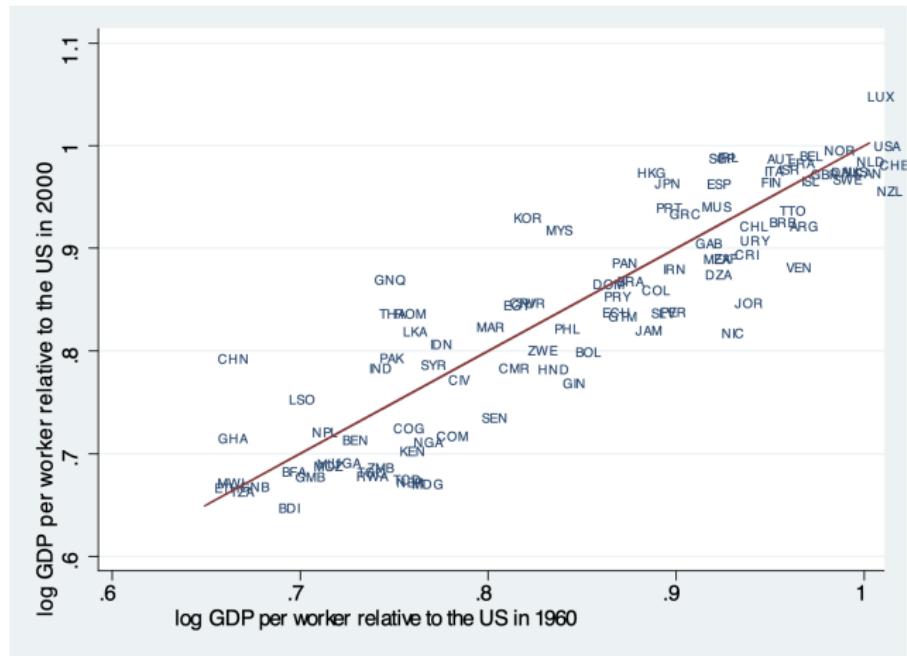


Figure: Log GDP per worker in 2000 and 1960.

World and neoclassical growth model

- All country on average grew with similar rates but had very different income levels
- Inconsistent with standard growth model where everyone can access the same technology
- What accounts for these differences?
- Starting point

$$Y = AK^\alpha L^{1-\alpha}$$

- Can measure Y , K , L in the data

Differences in physical capital

- Klenow and Rodriguez-Clare (1997); Hall and Jones (1997); Caselli (2005)
- Penn World Tables for Y , I , and L .
- Building K from perpetual inventory method:

$$K_{t+1} = I_t + (1 - \delta)K_t$$

- Impute K_0 as $I_0 / (g + \delta)$ (steady state capital stock in Solow model).
- Conclusion: variation in physical capital explains no more than 20% of variation in output per capital
 - with possible exception of East Asian growth miracle

Differences in human capital

- Can "quality-adjusted" L explain cross-country differences?
- Starting point: Mincer regressions of returns to schooling S

$$\ln w_i = \mathbf{X}'_i \mathbf{f} \mathbf{l} + \phi S_i,$$

- Assume ϕ do not vary much across poor and rich countries (Banerjee-Duflo (2005)), compute human capital
 - see Caselli (2005) handbook chapter on extensive discussion, robustness check
- Can explain at best 30% of income differences

Putting all factors together

- Define $Y_{KH} = K^\alpha H^{1-\alpha}$, so that $Y = AY_{KH}$
- How much of the cross-country variation does Y_{KH} explain?

$$\text{var} [\ln Y] = \text{var} [\ln Y_{KH}] + \text{var} [\ln A] + 2\text{cov} [\ln A, \ln Y_{KH}]$$

- If all countries had the same TFP

$$\text{var} [\ln A] = 2\text{cov} [\ln A, \ln Y_{KH}] = 0$$

- So one measure of explanatory power of K and H is

$$\frac{\text{var} [\ln Y_{KH}]}{\text{var} [\ln Y]}$$

- Y_{KH} can explain less than 40% of cross-country variation, even less of differences between top and bottom 10% of countries

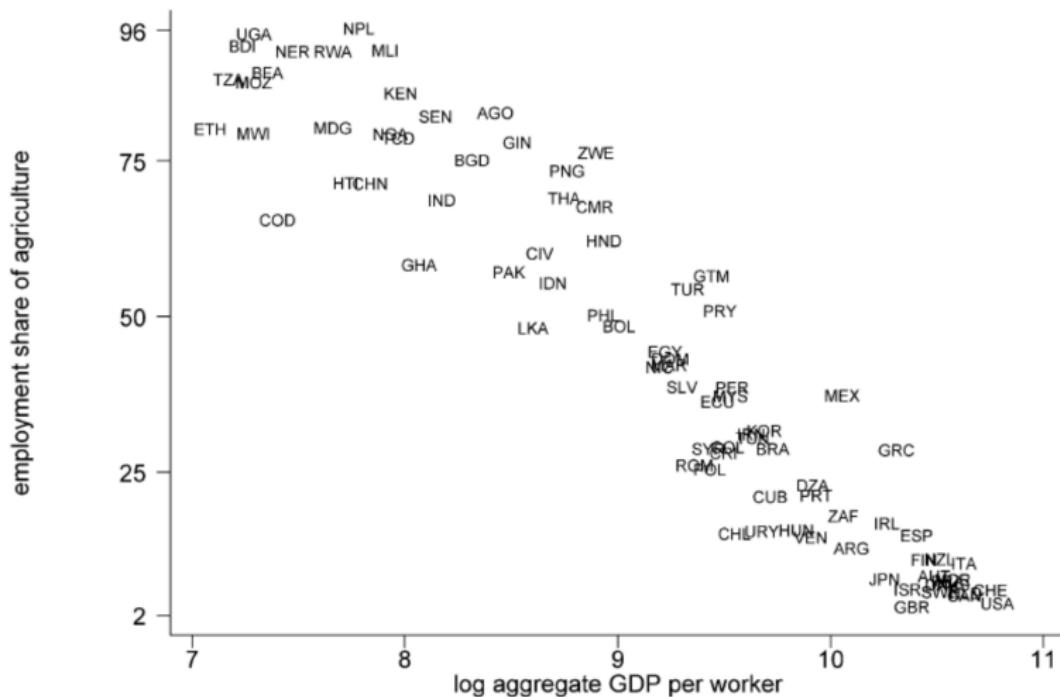
TFP

- TFP accounts for most of cross-country dispersion of income?
- Why does it differ across countries?
- Next: looked at a deeper level
 - productivity differences across sectors
 - productivity differences within sectors

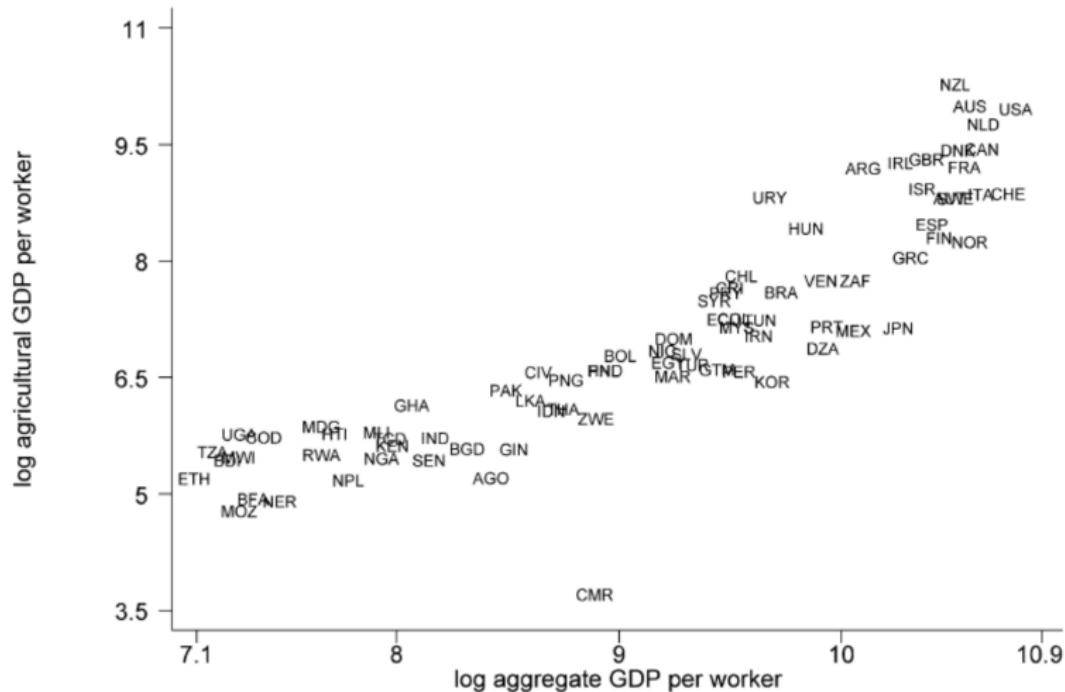
Productivity differences across sectors

- Look at agriculture and non-agriculture
 - not enough internationally comparable data to have finer disaggregation
- Consider three figures

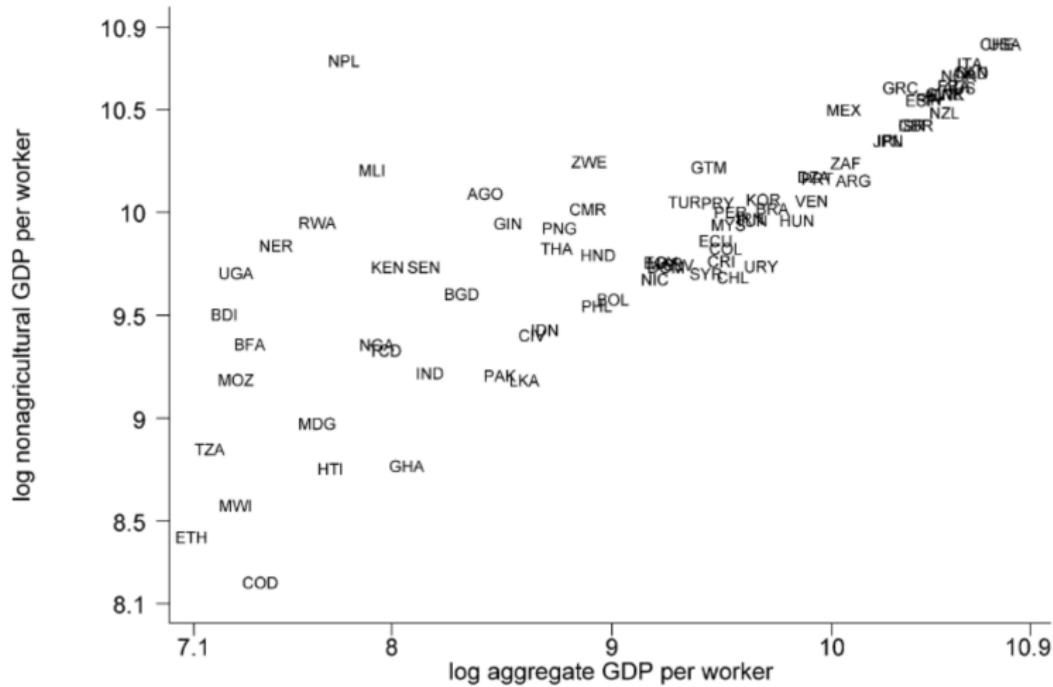
Importance of agriculture



Labor productivity in agriculture



Labor productivity outside of agriculture



Conclusion and counterfactuals

- Poor countries are mostly employed in agriculture *and* agriculture has particularly low productivity *and* that productivity is especially low in poor countries
- Consider three counterfactuals
 - ① All countries have US level of agricultural GDP per worker but keep their employment shares and GDP per work in non-agriculture
 - ② All countries have US level of non-agricultural GDP per worker but keep their employment shares and GDP per work in agriculture
 - ③ All countries have US labor shares, but keep their GDP per worker in both sectors

Counterfactuals

Counterfactual World income distributions

Variable	log-variance	Int. range
Actual real output per worker	1.18	22
Counterfactual 1: US y_A , own $y_{\bar{A}}$ & l_A	0.04	1.6
Counterfactual 2: US $y_{\bar{A}}$, own y_A & l_A	0.58	7.0
Counterfactual 3: US l_A , own y_A & $y_{\bar{A}}$	0.34	4.2

Observations

- Elimination of productivity differences in agriculture could eliminate most of dispersion in income distribution
- Even adjustment of labor shares keeping GDP per worker the same could lead to substantial increase in income
- See Gollin, Lagakos, Waugh (QJE, 2014) for much more extensive robustness
 - adjustments for human capital
 - adjustments for works worked
 - analogous computations using survey micro data (as opposed to national macro accounts)