Econ 352 - Income Disparity Among Countries and Endogenous Growth

(See Williamson Ch. 8)

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Introduction

- We saw our simple Solow Growth model
- And talked about what does and doesn't cause growth
- And how to measure z
- Does it have anything to say about why some countries are rich and some countries are poor?

Convergence

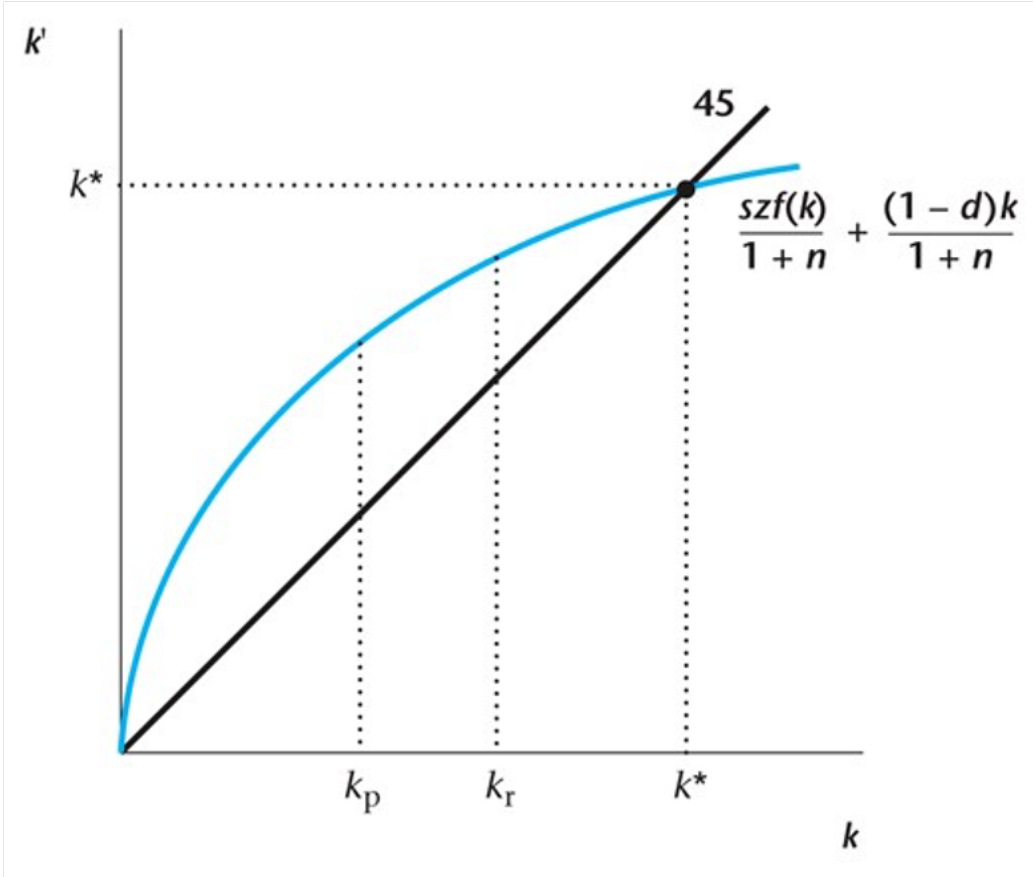
- Let's revisit our old model:

$$K' = \frac{szf(k)}{1+n} + \frac{(1-\delta)K}{1+n}$$

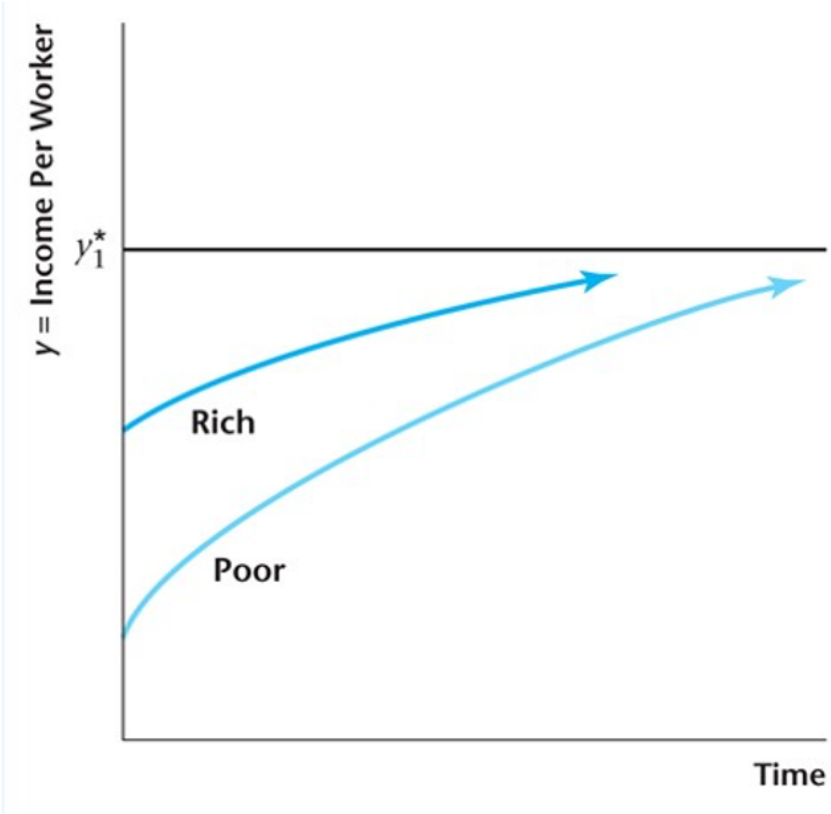
- Note that K^*, the steady state, is the same for two countries, no matter their K_0!

- Prediction: all countries should "converge" to the same level of capital

The Steady State is Identical, no matter K_0

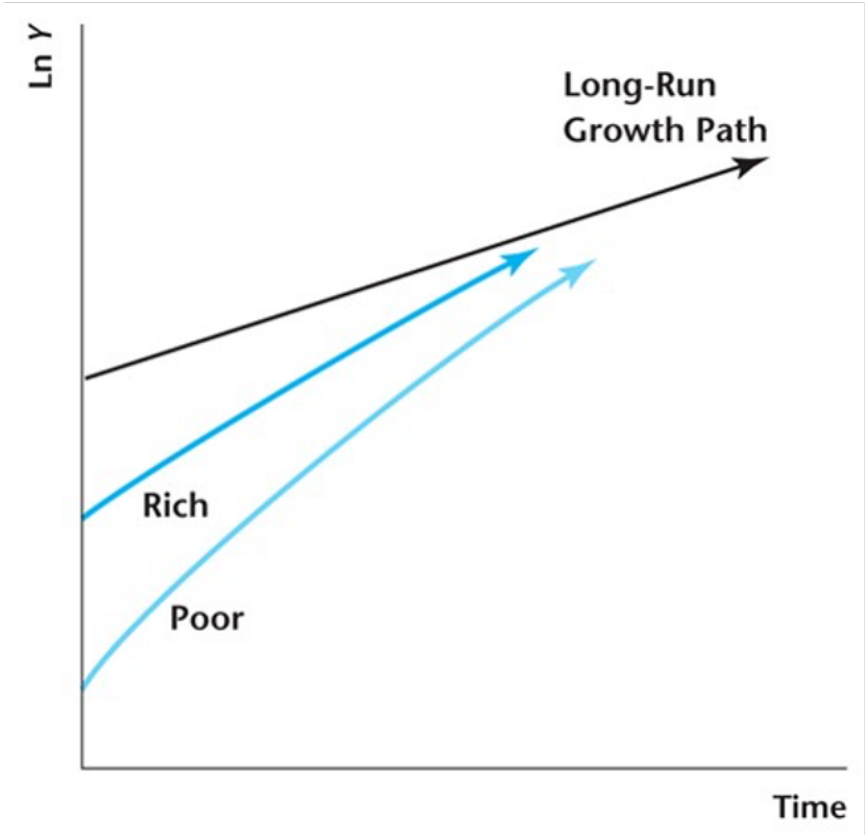


Convergence in Income Per Worker



Poor countries should "catch up" to rich ones

Convergence in Aggregate Income

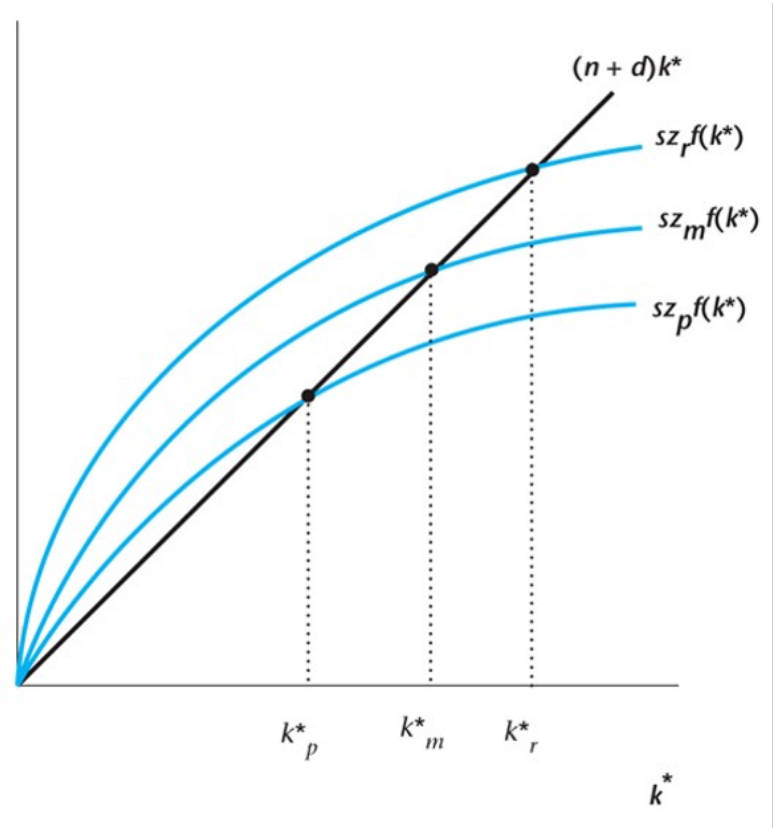


Poor countries should "catch up" to rich ones, even with shared TFP growth in z

Concrete Prediction(?)

- Poor countries should "catch up" to rich ones
- Important assumption is that all parameters z, s, n δ are the same!
- What if technology isn't spread evenly? z differences, for instance
- Why would z differ?
  - "Learning by doing"
  - Barries to technology adoption
  - Country-specific efficiency (taxes/regulation, for instance)
- These can cause a failure to converge

Convergence in Aggregate Income



Failure to converge

Endogenous Growth

- The great success of the Solow Growth model is to tell us what is *not* causing growth (labor hours and capital).
- But its big failure is that it doesn't tell us what *does*, only productivity "z," which is taken as exogenous
- Endogenous growth models try to explain changes in z over time
- We'll work through a "Lucas 1988" endogenous growth model
- Basic idea: a representative consumer splits time between work and learning (think "research")

Lucas Endogenous Growth Model: Representative Consumer

- Our worker now has H^s units of human capital
- The choose a fraction of time to work u, and their "efficiency units of labor" are uH^s. Someone with $H^s = 2$ would produce twice as much as someone with $H^s = 1$, if they both worked the same amount.
- Total earnings are wuH^s, which equal consumption:

$$C = wuH^s$$

- Human capital increases as a function of time spent "researching" $1 - u$:

$$(H^s)' = b(1 - u)H^s$$

- Where b is the "efficiency" of research

Lucas Endogenous Growth Model: Representative Firm

- Production is:
$$Y = zuH^d$$
- So that profit is:
$$\pi = Y - wuH^d$$
- Plugging in,
$$\pi = zuH^d - wuH^d = (z - w)uH^d$$
- Taking FOC's wrt H^d:
$$\frac{\partial \pi}{\partial H^d} = 0 \Rightarrow (z - w) = 0 \Rightarrow w = z$$
- Wages are a measure of human capital: $wH^d = zH^d$

Lucas Endogenous Growth Model: Competitive Equilibrium

- From the budget constraint:

$$C = zuH$$

- Human capital:

$$H' = b(1-u)H$$

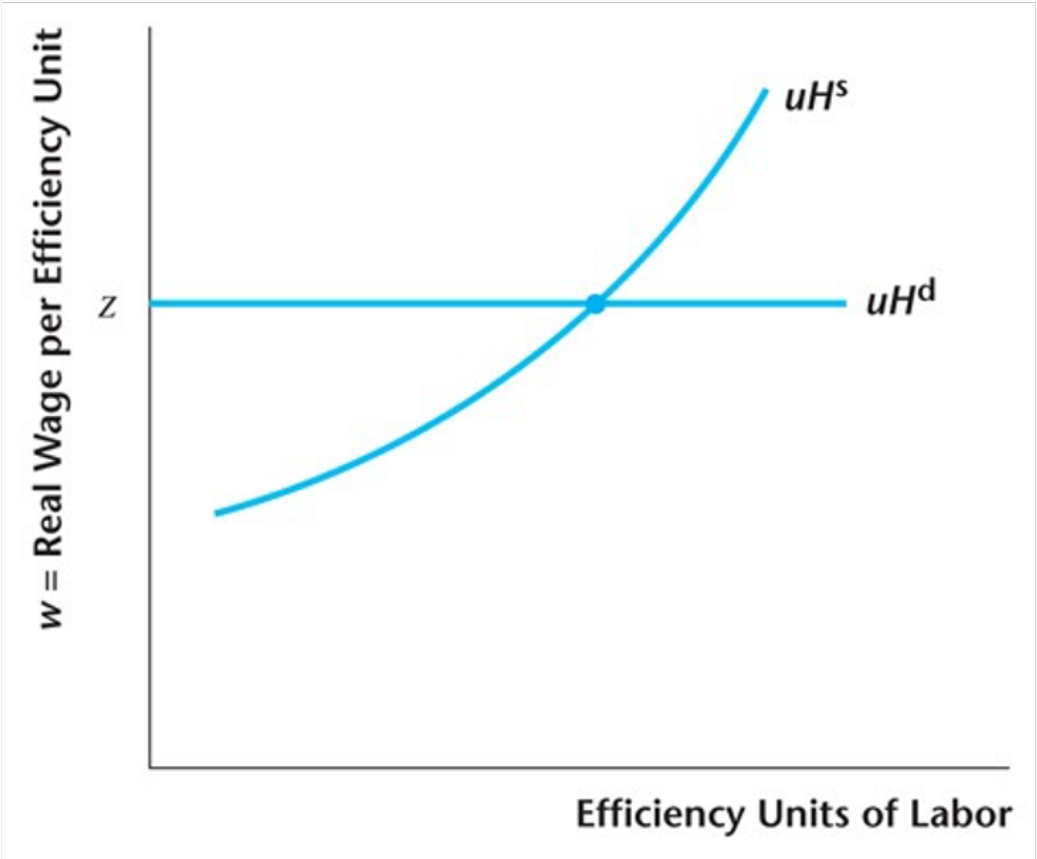
- Rephrasing for human capital growth:

$$\frac{H'}{H} - 1 = b(1-u) - 1$$

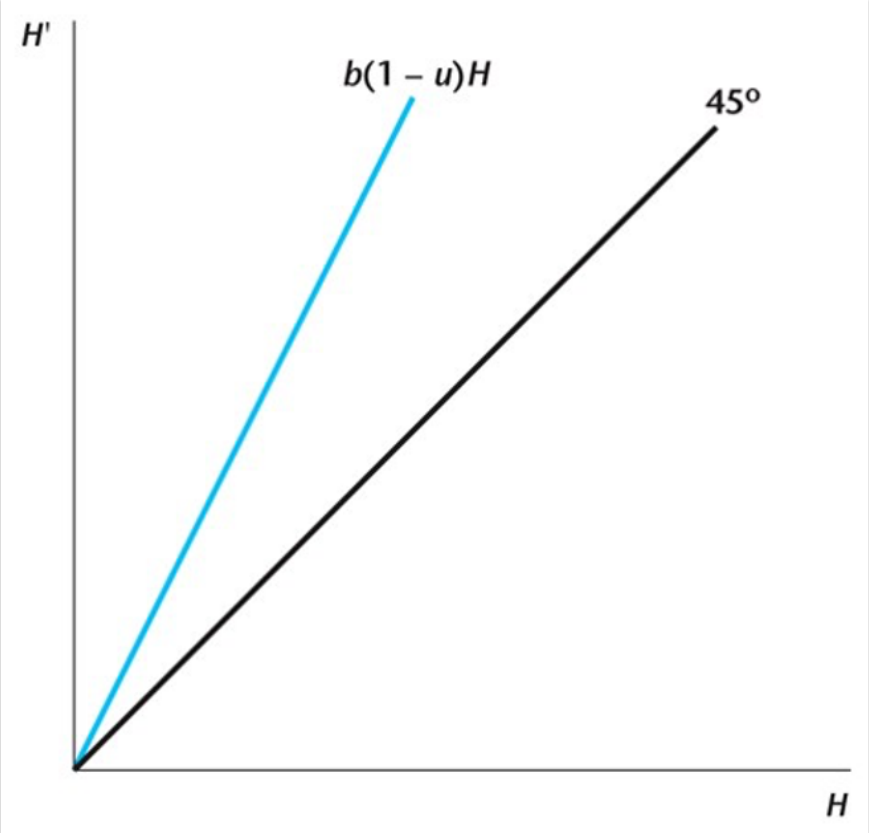
- The growth rate of human capital increases if b increases or u decreases
- More efficient educational system will have higher growth rate of human capital: no convergence
- And for C:

$$\frac{C'}{C} - 1 = \frac{zuH'}{zuH} - 1 = \frac{H'}{H} - 1 = b(1-u) - 1$$

Equilibrium Wage Rate (supply & demand)



Human capital accumulation



Growth is unbounded!

Lucas Endogenous Growth Model: Policy

- We now have a model of *endogenous* growth!
- Government policy can affect growth rates
- If the government increases efficiency of human capital accumulation b, then we would expect more growth!
- What happens to C tomorrow if we decreased u today (studied more, worked less)?

Lucas Endogenous Growth Model: Policy

- Consumption today:

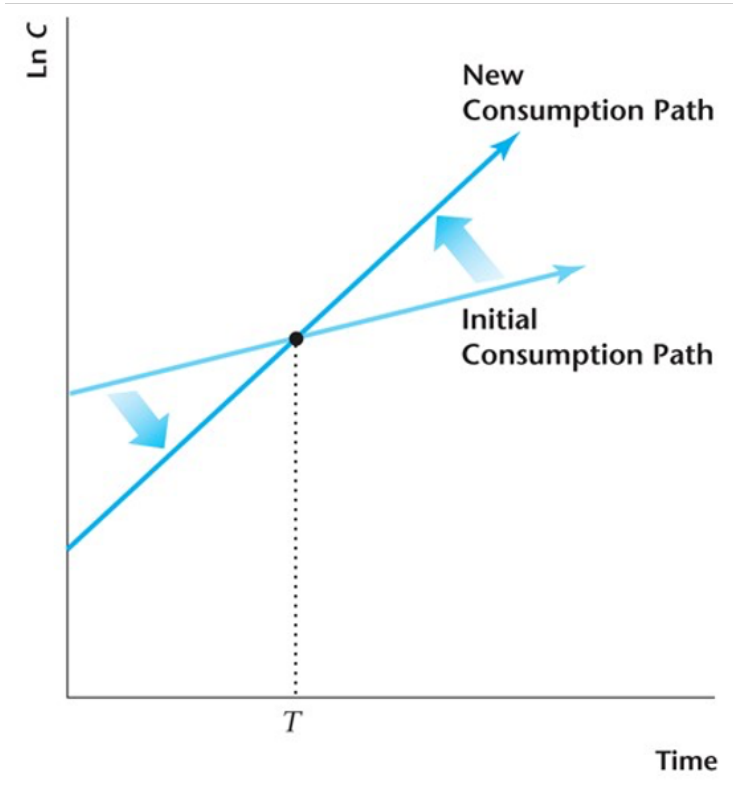
$$C = zuH$$

- Consumption growth:

$$\frac{C'}{C} = b(1-u) - 1$$

- When u decreases,*growth* picks up but C falls initially!

Effect of a decrease in u on consumption path



Tradeoff between today and tomorrow

Endogenous growth and convergence

- One big takeaway is that in this model, we do not have convergence/"catch-up" growth causing a convergence between countries
- "Catch up" on z may help, but there can still be divergence
- How do we reconcile the fact that rich countries seem to have converged but poor countries have not?
- One is if b and u are similar among rich countries, and human capital accumulation in one country "splils over" to another
- Similarly, if the high human capital in poorer countries earn more in rich countries, there may be a "brain drain" reducing the wages of all remaining workers, helping divergence