



Lecture 12 – AAE 374

- Human Capital (HC)
 - Health
 - Education
 - Missing pieces?
- A Walk on the Weil Side (Me and Lou)
- Solow Model w/ Human Capital
- Empirical Importance of HC in growth



Health & Income: Positive Dynamics

- Income → Health Logic
 - More income allows more nutrition
 - More income leads to improved public health (clean water, hygiene, etc.)
 - More income increases health care exp.
 - Others?
- Empirical Evidence:
 - Figure 6.1, GDP/Capita – Nutrition
 - Figure 6.2, GDP/Capita – Life Expectancy



Health & Income: Positive Dynamics

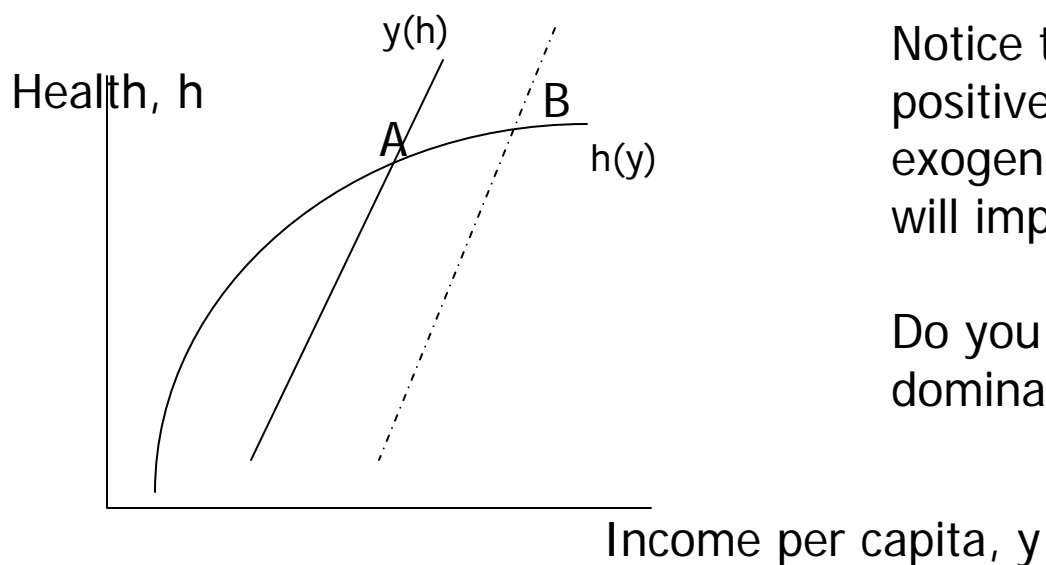
- Health → Income Logic
 - More people can work
 - Working people can be more productive
- Empirical Evidence
 - Fogel's calculation- bottom 20% of workers in 1780 not having energy for even one hour of manual labor. 1980 no malnourishment, so 1.25 factor increase in L
 - Caloric intake raises labor input by 56%.
 - Combined - 1.95 increase, which spread over 200 years is 0.33%/year, or about 25-30% of per capita income growth.

 - Malnourishment evident in Figure 6.1 in developing world amounts to about 774 million people, ~ 10% of world's work force and much higher percentage in home countries.

 - Health – Income nexus remains A KEY GLOBAL ISSUE.

Health & Income: Positive Endogenous Dynamics

- Why add the word “endogenous”?
- Because of the slopes of $y(h)$ and $h(y)$?



Notice the potential for positive dynamics, a positive exogenous shift in one curve will improve both outcomes.

Do you think one explanation dominates the other? Why?



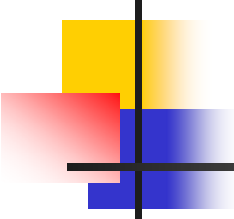
Human Capital - Education

- Why is education economically important at the individual level?
- Why is education economically important at the social level?
- When would there be room for policy to enhance education?
 - Financing education investment
 - Externalities
 - Increasing Returns



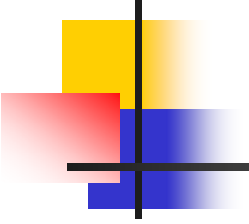
Education Basics

- Developed countries more educated (T6.1)
- Education levels increasing over time (T6.1)
- Education spending levels rising fast, too.
- What are typical returns to education?
 - Higher in earlier years – why?
 - Rising still through college – increasing returns to college in US?
- More education leads to higher wages but is that due to the time or other factors?



What about calculating human capital share of wages?

- Compare educated at various levels to individuals with no education to see how payments change from “raw labor” to more educated.
- Start with Table 6.2
- Rising wages relative to no schooling and then weight the share by population in each category of education. Figures 6.9 & 6.10.
- Share of wages for HC in developing countries = **49%**, developed countries = **65%**
- Share of national income due to HC = $\frac{2}{3}$ * the % or 33% in developing countries, and 43% in developed countries (> Physical capital).



Does rising share of human capital reduced the relevance of the worker vs capitalist divide?

- Why might it?
- Why wouldn't it?
- What does this view of human capital omit when it comes to "class" relations?

World Income Variation and Education Difference

- Revisit the Solow Model
- Rewrite labor input as hL , where h is units of labor that increase with schooling.
- $Y = AK^\alpha(hL)^{1-\alpha} = h^{1-\alpha}AK^\alpha L^{1-\alpha}$
- Only difference is now we have the “ h ” term in front.
- Now, we derive the steady state y as before and the corresponding ratio of income between 2 countries:
$$y^{SS} = h(A)^{(1/1-\alpha)}(\gamma/\eta+\delta)^{(\alpha/1-\alpha)};$$
$$y_i^{SS}/y_k^{SS} = h_i/h_k \quad \text{So, ratio of human capital gives relative income in steady state.}$$



World Income Variation and Education Difference

- What are differences in “h” across countries?
- How would we calculate that?
 - If we equate returns per year of schooling to input, then we can use the difference in school years and the “rate of return” to derive “h” values.
- Let’s take 8% per year on average.
 - Then, 1 year ed = 1.08, 2 years = $(1.08)^2 = 1.17$
 - Take 12 years vs 2 years (US vs Africa), then $h_{US}/h_{AF} = (1.08)^{12}/1.17 = 2.16$. 11% return would give 2.84 ratio.
 - Remember we have differences across countries that amount to 30 times, so human capital differences account for a small share about 1/10 of that difference.



Empirical Evidence?

- Figure 6.12 shows poor fit (45 degree line would be good fit).
- Mali example with predicted 34% of US income but only 3% actually.
- What if we combine physical capital, population, and human capital factors from the course so far?
 - Savings predicts 2.4 difference between rich and poor; population predicts 1.12; and education 2.16, so combined:
 $2.4 * 1.12 * 2.16 = 5.8$. So the gap would be 6, not 30 based on savings rate, population, and education if the Solow Steady State world w/ human capital was whole story.
 - We clearly still have some other factors to consider.



Biased Human Capital Measures?

- Weil mentions 2 omissions that could provide a downward bias to human capital gap.
- Quality of schooling
 - Years of education could understate differences in rich and poor countries given resources schools have.
 - Test score comparisons
- Externalities (social returns $>$ private returns?)
 - Educated person makes others more productive.
 - If the social returns are greater than private returns, then we underestimated returns and notice that the gap grows with higher returns.
 - Social policy to raise education could be an improvement, and
 - Human capital might be more important than our estimates suggest in explaining income gaps across countries.



What else might we be missing about human capital?

- Another look at Solow Model
 - $Y = AK^\alpha(hL)^{1-\alpha} = h^{1-\alpha}AK^\alpha L^{1-\alpha}$
- What if the level of technology adopted depends on h , too?
 - Write that as $Y = A(h)K^\alpha(hL)^{1-\alpha} = h^{1-\alpha}A(h)K^\alpha L^{1-\alpha}$
 - Then, technology differences might depend on human capital, too.
 - We will begin to look more carefully at the technology side in next lecture, but notice that so far all countries have the same technology available in “ A ” which has not depended on “ h ”
- Is $A(h)$ sensible? Why or why not?



Rethinking big picture so far

- Growth as function of:
 - Savings, population, and human capital
 - Technology, inequality, and institutions?
 - Growth accounting suggests that we need much more than s , n , and h , but to be fair we may not have let human capital do its full work yet as an endogenous variable.
- What is your intuition about the links between:
 - Technology and human capital?
 - Technology, inequality, and human capital?
 - Technology, inequality, institutions, and human capital?



A Quick Hitter on Institutions

- Human capital is created in schools, organizations, churches, homes, and other institutions.
- Quality of those institutions will shape quality of human capital. Elementary school kids example.
- So, institutions are part of Weil's missing human capital return argument, and also front and central for Nelson in his article:
 - "What enables rapid economic progress? What are the needed institutions?"



Institutions and Technology – What does Nelson argue?

- Institutions as source of growth
 - Main argument of Douglas North, Nobel in Econ
 - Increasingly popular argument in economics
- But, technological change is seen as heart of the process, so...
- Need to integrate these ways of understanding – how do they link.



Nelson's core argument

- Economic growth driven by co-evolution of physical and social technologies.
- Institutions provide the broad background conditions that allows technical advance to occur, and some arise to support new technologies.
- But, institutional change is hard to control, and it can cut both ways. Article develops examples of this issue.
- Where would human capital fit into this view?
 - Human capital affects both types of technologies
 - Human capital would affect the quality and evolution of institutions.



Looking Again to Midterm 1

- 2 more lectures on technology and then
- Review session, Monday, October 26, 7pm B-30, Taylor Hall
- Midterm 1 - Tuesday, October 27
- Old midterms at class website – same template for exam structure.