

Lecture 8. Human Capital Investment and Economic Growth

1. Theory

(1). Human capital model

Education leads to higher productivity.

Challenged by the signalling model of education. However, even if the signalling model of education reflects the full truth education can still improve productivity through better matching and sorting.

(2). Growth model

a. The Uzawa-Lucas model

The output is a function of human capital, and long-run growth can only be sustained if human capital can grow without a bound.

b. The endogenous growth model

An increasing return to scale for economic growth is possible due to the constant development in technology, and the human capital is a key input in the production of new technologies. This is because the accumulated level of human capital creates an externality effect on research and development (R&D) that offsets the diminishing return to scale. The various versions of this endogenous growth model give the following prediction:

- The initial level of human capital is important for subsequent economic growth.
- Greater investment in education and training might raise expenditure on R&D, and vice versa.
- Individuals, left-alone, may under-invest in education.

(3) Other externality and indirect effects

In addition to its direct effect on growth through productivity and R&D development, human capital investment can also promote economic growth through the following externality and indirect

effects:

- public health
- democracy and political stability
- fertility and population growth
- migration and job search
- home production
- female labour-force participation rate
- poverty reduction and crime

See McMahon (1998), *Education Economics* 6(3), for detailed summary.

2. Empirical findings

(1) Micro-level evidence

World-wide evidence on rates of return to education from Mincerian wage equation estimation. See Psacharopoulos and Patrinos (2002):

http://econ.worldbank.org/files/18081_wps2881.pdf

The potential problems associated with these estimations have been tackled by recent studies using experimental and twins data. A general consensus has therefore been reached that there is a sizable private return to education. However, it is still not sure that such a sizable return is due mainly to the increased productivity brought by educational investment.

(2) Macro-level evidence

a. Growth accounting model

The growth accounting model incorporates the human capital level of the workforce into the aggregate production function. Such an approach enables us to identify the effect of human capital investment on growth.

$Q = AK^\alpha H_1^{\beta_1} H_2^{\beta_2} L^\gamma$, where Q is output; K is physical capital; L is quantity of raw labour; H_i ($i=1,2$) is human capital stock for i th type of human capital.

The empirical studies carried out for advanced countries find that

the growth of human capital accounts for a tenth to a fifth annual growth of output for the period of 1960s to 1980s.

The use of growth accounting model relies two assumptions:

- Differences in observed market rewards correspond reasonably closely to differences in marginal products.
- Differences in market rewards across schooling levels originate in schooling, and not other factors such as native ability or family background.

Besides, this approach does not shed any light on the possible contribution of externalities and indirect effects.

b. Cross-country studies

The cross-country growth regressions estimate a macro-Mincerian equation as follows:

$$\Delta Y_t = c + aY_{t-1} + bE_{t-1} + DZ_{t-1} + e$$

Where ΔY_t denotes growth rate of GDP per capita at year t ; Y_{t-1} measures GDP per capita at year $t-1$; E_{t-1} is average years of education of the population at year $t-1$; Z_{t-1} is a vector of other variables, such as inflation rate, capital accumulation rate, and rule of law index, etc; c , a , b , and D are coefficients. b here measures the contribution of education to economic growth.

The key attraction of growth regressions is that they provide a way of testing directly for productivity effects of education, which may also include the externality and indirect effects. The empirical studies use the measure of initial level of education often find a dubious large effect of education on growth, while the studies use the change of education attainment often find small or no effect of education on growth. The imprecise estimation of the cross-country regressions may be due to the measurement error and missing information problems.

Essential Readings:

Temple, Jonathan. (2001). "Growth Effects of Education and Social Capital in the OECD Countries", OECD Economic Studies, No.33.

<http://www.ecn.bris.ac.uk/www/ecjrw/abstracts/Article2ES33.pdf>