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4

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SARA NOSARI (*Università degli Studi di Torino*)
(Dietro) le ombre cinesi

ANDREA CEGOLON (*Università degli Studi di Macerata*)
The Private Rate of Return to Education Analysis

ILARIA MATTIONI (*Università Cattolica, Milano*)
Pagina dopo pagina: la formazione della «buona» bambina attraverso le pubblicazioni cattoliche per «giovanette» dal dopoguerra agli anni Settanta

Religione ed educazione religiosa nella ricerca pedagogica

A cura di, MARIA TERESA MOSCATO (*Università degli Studi di Bologna*)

ANDREA PORCARELLI (*Università degli Studi di Torino*)
Identità epistemologica e potenzialità formative dell'Irc in prospettiva pedagogica

LAURA CAVANA (*Università degli Studi di Bologna*)
La religiosità nelle conversioni adulte: l'esempio del Buddhismo

MICHELE CAPUTO - GIORGIA PINELLI (*Università degli Studi di Bologna*)
La "crisi" dell'identità religiosa nell'età dell'adolescenza

The Private Rate of Return to Education Analysis

Andrea Cegolon

Il saggio prende in esame il problema delle differenze tra lavoratori salariati nel mercato del lavoro. Viene dato ampio spazio alla teoria del “capitale umano” che, in questo ambito, attribuisce valore prevalente alle abilità maturate dal soggetto nel suo percorso scolastico prima che al tipo di attività svolta nel lavoro. Le pagine hanno l’obiettivo di rispondere alla domanda: quale il peso e l’importanza della scuola riguardo alla produttività del lavoratore e di conseguenza quali sono i vantaggi economici che da essa derivano al soggetto.

The essay examines problem of differences between salaried workers in the labor market. Wide space is given to the theory of “human capital” which, in this context, assigns a prevailing value to the skills gained by the subject in his schooling period if compared to the type of activity carried out in the work. The pages are intended to answer this question: what is the weight and importance of the school with regard to worker productivity and consequently what are the economic benefits that flow from it to the subject.

What explains wage differences between workers in the labour market has recently got a lot of attention from researchers. From a certain point of view, the issue can intuitively be attributed both to the type of economic activity workers are involved in and to the level of their skills and knowledge with which they perform their work. The “human capital” theory tends to emphasize especially the latter side of the problem: the body of skills and knowledge acquired by an individual through training and especially through schooling (broadly termed as “human capital”) thanks to which a worker is more productive (Schultz, 1961; Becker, 1962; Mincer, 1974). As a result, the wage differentials in the labour market can be explained by the different level of human capital between workers. Given that, a rewarding line of research has focused on estimating the impact of education on an individual’s labour market productivity and wage premia. This strand of literature is known as *rate of return to education analysis*.

The Methodology

There are two main methods of estimating rates of return to investment in education.

The first approach, defined by Carnoy (1995) the “traditional method”, follows an algebraic definition of the rate of return, that is the rate of discount equating the net present value of life-time benefits of education of the individual, to the net present value of costs of education. In other words, according to this approach the internal rate of return consists in setting the discounted value of costs ($\sum \frac{C_i}{(1+r)^i}$) and benefits ($\sum \frac{B_i}{(1+r)^i}$), over the time

equal to zero and solving for the implicit discount rate, r .

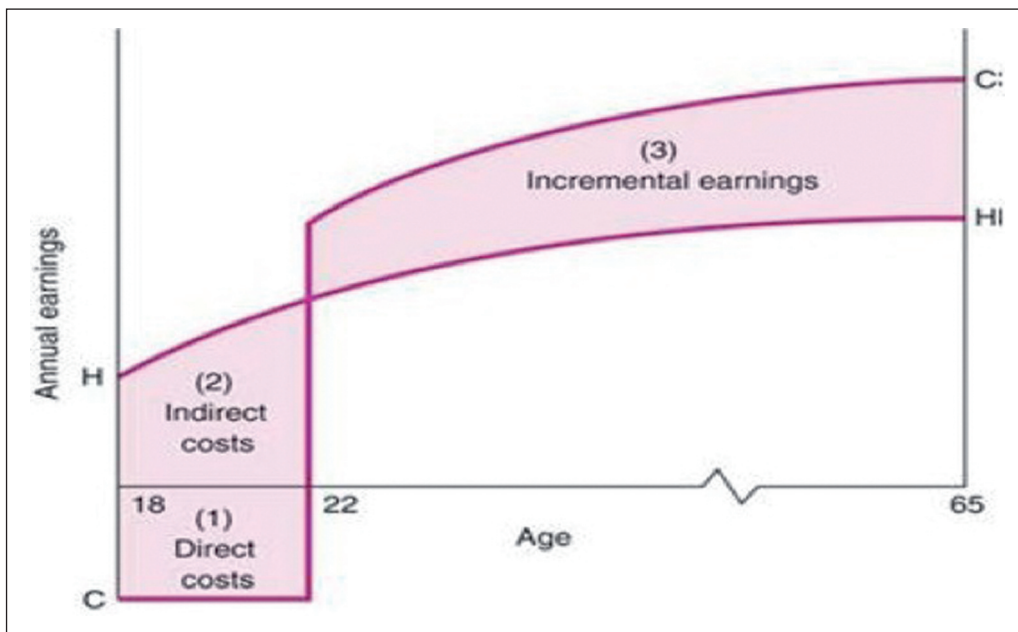
$$0 = \sum \frac{C_i}{(1+r)^i} + \sum \frac{B_i}{(1+r)^i}$$

The above equation shows that the individual spends for education or other cost incurred (C) are negative whereas the additional income or other benefits the individual gains from the education (B) are positive.

From the individual’s standpoint, the pecuniary benefits of additional education are the additional income the individual earn as a consequence; the nonpecuniary consumption benefits educational investment provides over a person’s life, such as a greater enjoyment of cultural activities or higher social status, and the direct consumption derived from taking education. However, owing to the difficulty to assign a value to non-pecuniary benefits in measuring private rates of return, economists have checked out nonpecuniary benefits. In particular, according to the OECD (2002), the benefits taken into account in computing the rate of return are the gains in post-tax earnings adjusted for higher employment probability, less the repayment of public support during the period of study.

Private costs of education include the income incurred by students while attending school or other educational activities; the additional expenditures associated with taking education, namely direct costs (such as tuition fees, books, transport); and non-monetary-costs (such as the distaste for learning). Of course, as seen above for the schooling benefits, it is hard to measure some of the cost components, namely the non-monetary ones. As a result, usually the costs of schooling investment equal tuition fees, foregone earnings net of taxes adjusted for the prob-

Figure 1: Potential Earnings Streams Faced by a High School Graduate and College Graduate (Borjas, 2010).



ability of being in employment, less the resources made available to students in the form of grants and loans (OECD, 2002).

Essentially, according to this method, individuals undertake a cost-benefit analysis to determine a quantifiable economic rate of return to education and, consequently, whether education would be obtained. As an acceptable criterion, future earnings need at least to compensate individuals for the direct and indirect costs of education – as can be seen in **Figure 1**.

Borjas (2010) shows the direct and indirect costs of acquiring education, which will hopefully be counteracted by the higher earnings faced by the college graduate, thus justifying his decision to acquire more education. Although not primarily interested in whether a pupil is a college or high school graduate, the same principle can be applied to a child on the decision of whether to stay in class, after compulsory school, or not. The foregone earnings of attending school, rather than perhaps working in the agricultural sector, can be seen by the shaded area 2 in the figure. In addition to this area the direct costs of acquiring education – such as books and tuition fees - as shown in area 1. If these costs (the two areas, 1 and 2) are lower than the benefits of increased earnings obtainable in the future (area 3), then an individual will attend school. An issue related to the traditional method is the impossibility of taking into account all the costs and benefits associated to the schooling investment. Furthermore it is quite demanding because it needs complete longitudinal life histories of the earnings of individuals, beginning with

their entry age into the labor force and ending with their retirement, with additional information about the costs of education. Unfortunately, such ideal data are seldom available. For this reason most empirical literature estimates the private returns to education using the Mincerian earnings function which refers to cross-sectional data. This method, originally proposed by Jacob Mincer (1972), typically adopts an ordinary least squares (OLS) regression, where log earnings is regressed on years of study and age/experience in the labour market, as follows:

$$\ln W_i = \alpha + \sum_k \beta_{ik} S_{ik} + \gamma_1 E_1 + \gamma_2 E_2 + \delta X_i + u_i \quad i = 1, \dots, N$$

W , the dependent variable, is an earnings measure for an individual: typically the hourly net wage obtained by dividing the total wages and salaries receivable for work by the total number of working hours. Regarding the independent variables, S represents a measure of schooling attainment: it is generally measured by the number of years spent at school. Tough, often data set do not contain information about this number of years, but only on the highest degree attained by individual. In this case the educational attainment of the individual is calculated by imputing the number of years required to complete her/his reported level of educational attainment¹. Practically, the

1. Standard, not actual, years of formal schooling are recorded. Since students who fail to reach a standard have to repeat the year, the actual number of years is likely to be underestimated.