

**LABOR MARKET RATE OF RETURN TO EDUCATION IN DEVELOPING COUNTRIES**

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## **Introduction**

The pioneering education economist Theodore Schultz began his 1979 Nobel lecture with, “Most of the people in the world are poor, so if we knew the economics of being poor we would know much of the economics that really matters.” Schultz inspired a large body of research that considers the educational decisions (i.e., enrollment and attainment) of individuals and their families. Education economists assess these decisions using the private labor market rate of return to education (henceforth LMRRE). Essentially, the LMRRE is a measure (expressed as a percentage) of whether monetary educational costs are worth incurring for future monetary labor market benefits. LMRRE estimates help education economists and policymakers understand patterns and determine interventions; for example, low LMRRE estimates for secondary education may explain low enrollment in secondary schools, and lead to the abolishment of tuition and fees in secondary schools. This entry examines the estimation methods, evidence, limitations, and possibilities of LMRRE studies of developing countries. In general, LMRRE estimates from developing countries are larger but less accurate than estimates from industrialized countries.

## **Methods**

For individuals and their families, the benefits of education include after-tax labor market earnings associated with a certain level of education. The costs of education include direct costs, such as tuition, fees, uniform, school transportation, and private tutoring; the indirect costs include the earnings foregone while studying and not working. Data on benefits and costs are obtained from nationally representative household surveys,

labor force surveys, or both. Household surveys are multipurpose surveys that include data on income, expenditure, and other items (e.g., gender, ethnicity, educational attainment, time use); direct costs can be inferred from educational expenditure, and indirect costs can be inferred from earnings of child and adult workers. Usually, labor force surveys offer better data on earnings and foregone adult labor earnings, but do not include data on educational expenditure or child labor earnings.

There are two methodological options for estimating or computing the LMRRE with these data: the Full-Method and the Mincerian Method. The first method, referred to as the Full-Method, is identical to formulas used for computing the rate of return to physical capital, such as a bridge, farm or house. The Full-Method formula is:

$$\sum_{t=1}^n \frac{B_t - C_t}{(i + r)^{t-1}} = 0$$

where  $B$  is the benefit,  $C$  is the cost, and  $t$  is the year in a series ranging from 1 to  $n$  (where  $n$  is the last year of employment), and  $r$  is the internal rate of return or LMRRE. The computations are then completed using a spreadsheet like Microsoft Excel. For each time period, five columns may be used: (1) age, (2) direct costs, (3) indirect costs or foregone earnings, (4) benefits or earnings, and (5) net benefits, which is benefits minus direct costs and indirect costs. The mean benefits and indirect costs are computed using samples of wage-earning workers for a particular age, and the mean direct costs are computed using samples of students. Net benefits are initially negative and eventually become positive. The spreadsheet solves for  $r$  by using the net benefits values from 1 to  $t$ . Typically, separate analyses are conducted for males and females.

The majority of LMRRE estimates from developing countries have been produced not by the Full-Method, but by an econometric technique, the Mincerian Method,

developed by the late labor economist Jacob Mincer. Economists have used this method extensively to estimate LMRRE in industrialized countries. Part of the Mincerian Method's appeal is its modest data requirements: direct costs are not included, and smaller sample sizes can suffice. A LMRRE estimation using the Mincerian Method involves the following columns of data: (1) after-tax earnings, (2) the natural log of earnings (because actual earnings have large ranges), (3) educational attainment (either years of schooling or dummy variables for levels of education), (4) years of work experience, and (5) years of work experience-squared (to reflect the curvi-linear nature between earnings and experience). The unit of observation is a full-time wageworker, and the data are fitted using ordinary least squares regression and statistical packages such as Stata and SPSS. Separate analyses are typically conducted for males and females.

### **Interpretation and Patterns**

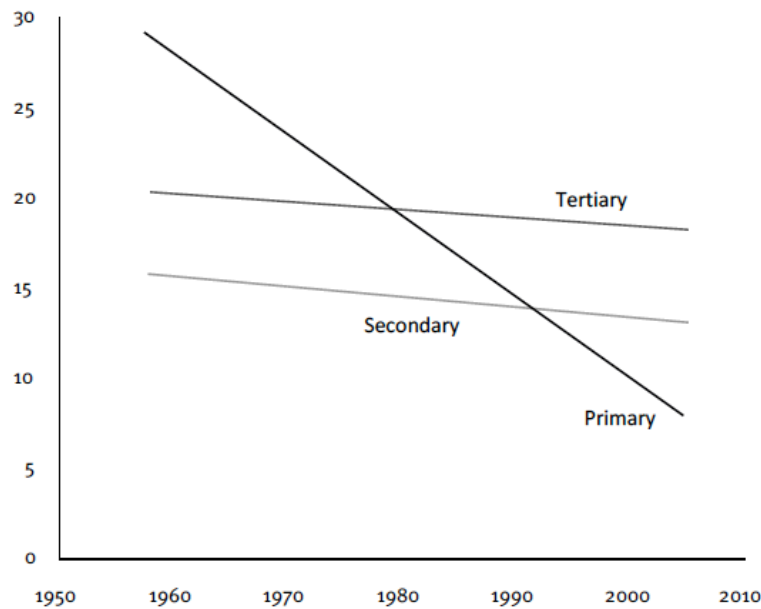
There are at two least scenarios in which an individual or family will not invest in a particular level of education. The first is when poverty and high costs make schooling infeasible and therefore not an option. But even if a family is able to afford education, they may choose to not invest if the LMRRE is small or negative. Indeed, a positive LMRRE is a necessary but insufficient condition for investment in education because the family may also hope for a LMRRE to exceed the returns from non-education investments (such as land or business), bank interest rates on educational loans (in case the family needs to borrow for financing education), and family discount rates (indicating the preference for current consumption over future consumption).

From a policy perspective, a higher LMRRE should encourage educational attainment. Low LMRRE is a policy cue to improve educational quality and create jobs for skilled workers. Harry Patrinos and George Psacharopoulos have created a database of worldwide LMRRE estimates from 1960 to 2005. They conclude that, on average, the LMRRE are positive for all levels of education. This satisfies the minimum condition for investment in education. However, families may choose not to invest in education if feasible non-education investments offer higher returns.

The Patrinos and Psacarapoulos database reveals several LMRRE patterns. First, the LMRREs are greatest for primary and tertiary education, and lower for secondary education. According to studies from 52 developing countries, the LMRRE is 23.0 percent for primary education (versus below primary education), 17.9 percent for secondary education (versus primary education), and 21.1 percent for tertiary education (versus secondary education) in developing countries. Second, across developing regions, LMRREs are highest in Sub-Saharan Africa (ranges between 24.6-37.6 percent), followed by the Latin America and the Caribbean region (17-26.6 percent), and the returns in Asia and the Middle East and North Africa are comparable (13.6-20 percent).

Third, the returns by level have been changing over time. Patrinos and Psacharopoulos illustrate in Figure 1 that the LMRRE for primary education has drastically fallen over time, from nearly 30 percent in 1960 to 8 percent in 2007; the returns to secondary and tertiary education have only slightly declined. The reasons for this shift are unclear; some hypotheses blame the declining quality of primary education while others attribute the shift to decreasing wages because of an increased supply in workers with primary education.

**Figure 1: LMREE patterns in developing countries, 1958-2005**



### **Limitations and Possibilities**

The available LMRRE estimates provide a general picture of the labor market benefits of education in developing countries. Nevertheless, such estimates suffer from the same methodological issues as studies from industrialized countries, such as a lack of data on student ability and school quality. In addition to these issues, LMRRE estimates from developing countries suffer from further methodological issues.

*Direct cost neglect:* In industrialized countries, direct costs for public education are small because of free tuition, fees, and transportation; parents make modest contributions towards clothing, supplies, and food, while private tutoring is relatively uncommon. In developing countries, direct costs are common and large relative to household incomes, especially for the poorest households. Since studies using the Mincerian Method cannot incorporate direct costs, the resulting LMRRE estimates are

exaggerated. For example, in a study of LMRRE in rural Bangladesh, the return to secondary education fell from 24.8 percent (Mincerian Method) to 9.8 percent (Full Method) after the inclusion of direct costs.

*(Childhood) indirect cost neglect:* Conventional LMRRE analyses consider the indirect cost of education in the form of foregone adult earnings that are incurred at post-secondary levels of education. In studies of industrialized countries, the assumption of zero indirect cost during childhood is sensible because child labor bans are enforced. In developing countries, however, child labor persists; according to the International Labor Organization, there are 200 million child laborers. Thus, foregone child labor earnings are indirect costs that arise because of the time spent at school and studying rather than working. One reason for the neglect of this indirect cost is that child labor data has only recently become available. Again, in the study of rural Bangladesh, the LMRRE estimate for primary education fell from 31.0 percent (Mincerian Method) to 14.3 percent (Full Method) after the inclusion of indirect costs incurred during childhood.

*Measurement of informal employment earnings:* Developing countries are characterized by dual economies: the formal sector and informal sector. Between 20-80 percent of workers are employed in the informal sector, which is beyond government regulation, taxation, and observation. There are many obstacles to obtaining earnings data for informal sector workers. For example, fearing legal action, informal sector workers are likely to underreport earnings to survey staff. Another issue is determining the earnings of self-employed informal sector workers; in particular, family farm and business income are not attributable to a single worker and instead accrue to the entire household. Thus, researchers have no choice but to either include faulty data or omit the

informal sector workers. Anecdotal evidence suggests that the LMRRE for informal sector employment is lower than that of formal employment. Thus, for individuals and families engaged in informal employment, educational investment is less attractive than what LMRRE estimates suggest.

*Female self-selection:* Female self-selection is a concept that addresses the difference between the women who self-select or choose to participate in the formal labor force versus the women who choose not to participate. Because of female self-selection, LMRRE estimates obtained from samples of full-time female waged workers do not reflect the prospective LMRRE of other females. In LMRRE studies on industrializing countries, James Heckman's Nobel-prize winning two-step correction technique is usually combined with the Mincerian Method to correct for self-selection. Though used for female LMRRE estimates in developing countries, the correction technique is unsuitable where the majority of women are outside formal sector wage employment. Thus, the LMRRE estimates for women are especially unreflective of the realities girls and women experience. For this reason, some studies only report male LMRRE estimates.

*Sensitivity to life expectancy:* LMRRE estimates using both the Full-Method and Mincerian method typically assume that the child goes on to complete the entire work life, which usually ends at the common retirement age of 60. This assumption, however, is inappropriate for several sub-Saharan African regions, where the average life expectancy is often below 40 years because of the HIV/AIDS epidemic, malaria, and conflict. Since short life expectancy reduces the years of benefits, the standard assumptions and estimation methods exaggerate the LMRRE. For most individuals and



families in Sub-Saharan Africa, the prospective LMRRE is far lower than suggested by available estimates. LMRRE estimates' sensitivity to life expectancy can easily be explored with the Full-Method by reducing  $t$ .

### **Conclusion**

This entry examined the attractiveness of education for individuals and families in developing countries, who make up most of the world population. Studies suggest that LMRRE are in the 17.9-23.0 percent range, and that the benefits of primary education have declined considerably since 1960. Though useful, existing studies typically exaggerate the attractiveness of education as an investment for individuals and families in developing countries. Nevertheless, investment in education continues not only because of its monetary LMRRE, but also its numerous non-monetary benefits, such as happiness and health, that are not accounted for in LMRRE estimates.

*See also* Age-Earnings Profile; Benefits of Primary/Secondary Education; Demand for Education; Dual Labor Markets/Segmented Labor Market; Economic Development and Education; Globalization; International Datasets in Education; Opportunity Costs.

### **Further Readings**

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