Planning Education for Economic Development

Abstract
[Excerpt] This paper presents the most important approaches to the economics of education. Three topics are developed:

1. The logic of economic analysis of educational planning
2. Three approaches to educational planning
3. Evaluating the social rate-of-return approach in a developing country context.

Keywords
education, educational planning, development

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This paper presents the most important approaches to the economics of education. Three topics are developed:

1. The logic of economic analysis of educational planning
2. Three approaches to educational planning
3. Evaluating the social rate-of-return approach in a developing country context.

1. ECONOMIC ANALYSIS OF EDUCATIONAL PLANNING

A. Why Conduct Economic Analysis of Education?

To some readers, the whole idea of analyzing education in economic terms may seem strange. Some might ask: is it not crass to think of education in economic terms? Does not investment in education represent an obviously meritorious use of social resources? Is there not overwhelming evidence that countries that spend more on education are richer, at least materially? Would not educational expansion be especially beneficial to the poorest citizens of a country--- those who are most likely excluded from education when enrollment ratios are less than universal? How can educators and social scientists with Ph.Ds even think it possible to have too much education?

The answers to all these questions are the same. Yes, education is a good, but it comes at a cost. To spend more on education is to forego expenditures on health care, housing, construction of infrastructure, or whatever else the resources might have been used for had they not been devoted to education. The concern is not whether more education would produce benefits, since the benefits could hardly be nil. The proper issue is whether spending more on education is the best use of resources, taking account of what must be given up to provide education. In deciding on the desirability of education and in planning educational systems, the benefits of education need to be assessed in relation to the costs. Never is economic analysis more important than when resources are scarcest as in poor countries.

Recognizing, then, that an economic approach to educational planning is to be desired and not avoided, the appropriate question is how is it
to be done? The answers are developed in the remainder of this report.

B. The Idea of Social Costs and Social Benefits

The economics of education compares the marginal social costs of education to the marginal social benefits. The term "social" is meant to indicate that the costs and benefits faced by all members of society, both students and others, should be included. Among the social costs are such items as buildings, teachers' salaries, pupils' fees, and the earnings foregone by students while in school (Caution: Avoid double-counting.) The social benefits include many factors: better jobs gained by the recipients of education; positive or negative effects of their employment on job opportunities for the less educated; higher on-the-job productivity; better ability to deal with disequilibria; enhanced social mobility; improved health, sanitation, nutrition and child-rearing practices; diminished birth rates; a more informed citizenry; greater community awareness and pride because of the presence of school; and spillovers into other areas of effective local development efforts. The adjective "marginal" in "marginal social benefits" signifies that any educational project or program should be evaluated in terms of the extra benefits that would be expected to result relative to the extra costs.

Typically, educational systems are set up so that costs preceed benefits. During the school years, society expends resources on education. The pay-off comes later, when the student is on the job and in the world. The importance of this time pattern is that it enables us to draw upon a theorem in capital theory. The theorem states that when costs preceed benefits, the two methods for evaluating investment programs—present value and internal rate of return—yield equivalent decision rules. Let us now briefly review these two methods.

C. The Present Value Method

The present value method, as its name implies, determines the present value of future streams of costs and benefits. The descriptor "present" is meant to emphasize that a dollar today is worth more than a dollar in the future. Or put differently, a dollar accruing in the future must be discounted compared to a dollar offered at present. Denote the rate of discounting by r. Ordinarily, we would expect that the appropriate discount rate would be the market rate of interest, i. For example, suppose i equals 10%. Then if I am offered the choice between receiving $100 today or $110 a year from now, I would consider these two income opportunities equally attractive.
Thus:

(1) Value of income this year = \frac{\text{Value of income next year}}{1 + \text{discount rate}}

The present value of any project is the difference between the present value of benefits and the present value of costs:

(2) PV_{\text{projects}} = PV_{\text{benefits}} - PV_{\text{costs}}

The present value of costs is the sum of the costs in each time period, appropriately discounted:

(3) PV_{\text{costs}} = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_T}{(1+r)^T}

Likewise, the present value of benefits is:

(4) PV_{\text{benefits}} = B_0 + \frac{B_1}{1+r} + \frac{B_2}{(1+r)^2} + \ldots + \frac{B_T}{(1+r)^T}

The present value decision rule is:

Rule 1. Invest in a project if its present value is positive; do not invest otherwise.

Note that this decision rule is general enough so that any and all presumed social benefits and social costs of education can be factored into the equation.

D. The Social-Rate-of-Return Method

The other method for social cost-benefit analysis is to calculate a social rate of return. This too relies on the notion of time discounting. However, it is done differently. Instead of using a specified interest rate, the rate of return method finds that discount rate for which the present value of costs equals the present value of benefits. This is known as the "internal rate of return," or "rate of return" for short. So in the preceding example, if I could invest $100 today and receive $110 a year from now, I could calculate (using equation (1)) that the rate of return on my investment is 10%. In this example, in which we have only a one year lag between the time of investment and the payoff date, the rate of return is given implicitly by equation (1) and explicitly by:

(5) \text{Rate of return on investment} = \frac{\text{Income Next year}}{\text{Income This year}} - 1

To evaluate education projects, which involve many periods, the idea is the same, but the arithmetic is a bit more difficult. Use the same principle, i.e., equate the present value of costs to the present value of benefits; by equations (3) and (4), this is:

(6) C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_T}{(1+r)^T} = B_0 + \frac{B_1}{1+r} + \frac{B_2}{(1+r)^2} + \ldots + \frac{B_T}{(1+r)^T}
The internal rate of return is that particular value of \( r^* \), denoted here by \( r^* \), which makes the left hand side of (6) equal the right hand side. Having found \( r^* \), use the following internal rate of return decision rule:

**Rule 2.** If the internal rate of return \( r^* \) is greater than the market rate of interest \( i \), then the project under evaluation is worthwhile; otherwise not.

**E. Equivalence of the two Methods**

Now let us recollect from above the theorem stating that Rule 1 (the present value decision rule) and Rule 2 (the internal rate of return decision rule) are equivalent under the conditions that apply to most education investments. That is, we can talk about present value analysis as being equivalent to rate of return analysis. In view of this equivalence, the terms "social returns to education" and "social cost-benefit analysis" may be used interchangeably.

**II. THREE APPROACHES TO EDUCATIONAL PLANNING**

Any comprehensive approach to educational planning should take account of the welfare gains and losses resulting from the provision of education. The first step in doing this is to specify what factors enter into one's judgements about social welfare and how education might affect those factors. Education has at least four such effects:

1. Education affects GNP, which affects social welfare;
2. Education affects inequality, which affects social welfare;
3. Education affects poverty, which affects social welfare;
4. Education itself affects social welfare.

This is summed up in the following flow chart:

![Flow Chart](attachment:image.png)
A formal model of these effects is available from the author. The key result is that the information requirements are many and include such data as the types of jobs available to graduates, the impact of their employment on job opportunities for persons with less education, etc. But if perfect competition in labour markets is taken as working assumption, many of these information requirements are unnecessary, because the answers are assumed in the competitive framework. This may explain why the competitive framework is so popular in educational planning models; the data requirements are much less severe.

A. The Manpower Requirements Approach

Insofar as educational planning is done with an eye on costs and benefits, a frequent starting point is an analysis of manpower requirements. The "needs" of the economy for educated personnel are estimated, either by projecting employment patterns in various occupations or industries into the future, by asking employers how many persons of a given type they want, by consulting employment services and advertisements, or some combination of these. The outcome is a set of "requirements"; e.g., 500 engineers, 100 doctors, 0 economists, etc. The educational system in total and its specific faculties are then enlarged or contracted according to the dictates of the manpower forecast.

This way of planning education has been severely criticized. One complaint is that the method is excessively rigid; it does not allow for substitutability among educational or occupational groups. For example, school might be taught by untrained teachers, by teachers with secondary-level teacher training, or by graduates of university colleges of education, but substitution of one category for another is not permitted in such manpower forecasts. Another criticism of the manpower requirements approach is that past forecasts have proven to be notoriously inaccurate. There is no reason to believe that future projections would be any better.

These and other criticisms are relatively minor as compared with a fundamental conceptual flaw: the manpower requirements approach takes no account of costs. When employers state their manpower "requirements", they typically do so without regard to the cost of educating the engineers, lawyers, economists, or teachers they are hiring. Would employers still want to hire the same number if they had to pay the costs of their education? The likely answer is no. In economic analyses of education, all the benefits and costs of educated manpower must be considered. Since the manpower requirements criterion neglects costs entirely and looks only at private benefits, it is basically flawed as a method for
educational planning.

In sum, the manpower requirements approach starts with a good question: what jobs will there be for the graduates of the educational system? However, the manpower requirements approach does not ask enough questions. What it leaves out is: to get these benefits, what costs have to be paid? For rational educational planning, the manpower requirements approach is a useful starting point, but we must go further.

B. The Social-Demand-for-Education Approach

The social-demand-for-education approach is popular among educators, less so among economists. What this approach does is to quantify the "social demand for education," by which is meant the number of people who want to attend school (or parents who want to send their children to school). If the number desiring education is greater than the number of spaces, adherents of this approach would argue that more education should be provided. After all, so this line of reasoning goes, who would know more about the value of education than the people themselves?

This approach also is conceptually flawed. When people decide whether to send their children to school, they do so on the basis of the private costs of education in relation to the private benefits. The private costs are what the individual or family must pay for education. The private benefits are what the individual or family receives. The private costs and benefits may diverge systematically from the social costs and benefits. On the cost side, educational systems in developing countries are typically heavily subsidized. The school fees charged to students and their parents cover only a fraction of the total resource cost. Because the difference must be paid by taxpayers in the society, the social cost of education may be presumed to exceed the private cost.

On the benefit side of the equation, only by happenstance would the social benefits of education exactly equal the private benefits. There are two possibilities:

(i) It may be that the individual who is educated benefits more from education than does society. This is likely to arise when wages do not fulfill a market-clearing function; more will be said about this later in this report. What is important for us now is that in this case the private benefits to education are apt to exceed the social benefits. Alternatively,

(ii) It may be that society benefits more from education than does the individual who is educated. Society may receive a whole host of benefits, some of which are alluded to earlier. Some of these
benefits accrue to persons other than the individual who is educated. Economists call these benefits that accrue to other "externalities." When external benefits are large relative to private benefits, the possibility arises that the private benefits of education will be less than the social benefits.

In case (1), we have:

1. (A) The private cost of education is less than \(<\) the social cost of education.

(B) The private benefit of education is greater than \(\geq\) the social benefit of education.

(C) The private cost-benefit ratio is greater than the social cost-benefit ratio.

Condition (7.e) implies that the private rate of return to education will be larger than the social rate.

Consider now what would happen if resources were to be allocated to education on the basis of the "social demand," i.e., on the basis of the private return. If both the private and the social rates of return surpass the market rate of interest, i.e., if

\[\text{Private rate } \geq \text{Social rate } \geq \text{Market rate of return},\]

We will reach the **socially correct decision** --- namely, to expand the educational system. but we will have done so using the **wrong decision rule**. This is because we would have based the decision on the **private rate** of return when the logic of social cost-benefit analysis leads us to view the **social rate** of return as the appropriate decision criterion.

Suppose, however, that the market rate of interest were in between the private and social rates of return:

2. \[\text{Private rate } \geq \text{Market rate } \geq \text{Social rate of return}\]

In such a case, by using the private rate of return criterion, the **socially incorrect decision** would be reached. Too much education would be supplied, and it would be appropriate not to expand the educational system.

Alternatively, consider case (ii), in which society benefits more from education than does the individual who is educated. In this case, we have:

3. (A) The private cost of education is less than the social cost of education.

(B) The private benefit of education is less than the social benefit of education.

(C) The private cost-benefit ratio may be greater than, less
than, or equal to the social-cost-benefit ratio. It follows from
condition (10.c) that the private rate of return to education may be
greater than, less than, or equal to the social rate of return. As in
the case (i) of allocating resources to education on the basis of the "social
demand" would entail the wrong decision rule but unlike case (ii), the
way in which the decision deviates from the social optimum (i.e. whether
we end up with too much education being provided or too little) cannot
be determined a priori. Once again, the "social demand" for education
is a fallacious guide to public policy.

Actually, the very term "social demand" is a misnomer. It does
not reflect the desires of taxpayers and other members of society who
have to pay the costs of education or who may receive external benefits.
It reflects only the perceptions by potential pupils and their parents
of the private costs and private benefits of education. Consequently,
economists typically refer to the number wanting education not as the
"social demand" but rather as the "private demand for education," ther­
efore emphasizing that the basis for this demand is a comparison of the
private costs with the private benefits.

In sum, the social-demand-for-education approach improves upon the
manpower forecasting approach by including the costs of education as well
as the benefits. However, the social-demand-for-education approach rem­
ains deficient, because those costs and benefits that are included are
private costs, whereas social decisions should be made on the basis of
social costs and benefits. It is this which social rate of return
analysis attempts to do.

C. The Social Rate of Return Approach

The social-rate-of-return approach endeavors to compare the social
benefits of education with the social costs. Sometimes, social rates of
return are calculated; other times, present values. Here is a brief out­
line of how it's done in practice. (The following two paragraphs are
adapted from an article by one of the leading figures in the field,
Dr. George Psacharopoulos).³

Estimates of the rate of return to a given level of education are
calculated by comparing the discounted benefits over the lifetime of an
educational investment "Project" to the costs of such project. Thus, for
the calculation of the social rate of return to four years of university
education, benefits are estimated by taking the difference between exist­
ing statistics on the mean pre-tax earnings of university graduates by
age and those of a sample group of secondary school graduates.
The earnings of the latter also represents the opportunity cost of staying in school. Direct costs should include the full amount of resources committed per student to higher education, rather than the usually smaller part of expenditure borne by the student. Given these data, the rate of return to investment in a college degree compared with a secondary school qualification is the rate of interest that reduces to zero the net present value of the discounted difference between the costs and benefits. A simple equation for the social rate of return is:

\[
\text{(11) social rate of return} = \frac{\left( \frac{\text{Mean annual pre-tax earnings of university graduates}}{\text{four years}} \right) - \left( \frac{\text{Mean annual pre-tax earnings of secondary school graduates}}{\text{study}} \right) \times \left( \frac{\text{Mean annual pre-tax earnings of secondary school graduates}}{\text{cost of study}} \right)}{\left( \frac{\text{Mean annual social direct cost of study}}{\text{cost of study}} \right) + \left( \frac{\text{Mean annual pre-tax earnings of secondary school graduates}}{\text{cost of study}} \right)}
\]

Note that this formula can be interpreted as the yield of a permanent constant stream of benefits (the difference in earnings appearing in the numerator) over lump sum cost of projected earnings plus direct outlays (appearing in the denominator). Neither the permanent benefits assumption nor the lumping together of cost are critical in the calculation, since the latter occur within four years and the former extend over several decades.

A private rate of return to college education could be calculated in the same way, although earnings should be post-tax (as the individual does not receive the earnings that are taxed) and the direct costs are obtained from statistics on a student's out-of-pocket expenditures that are stictly due to the cost of college attendance.

Social-return-to-education analysis seeks to weigh the social benefits of additional education against the social costs. In so doing, it asks the right questions. This is a major advantage compared to the manpower requirements and social demand for education approaches. How good a job does the social-return-to-education approach do in answering these questions? An evaluation of this method appears in Section III.

III EVALUATING THE SOCIAL RATE-OF-RETURN APPROACH IN A DEVELOPING COUNTRY CONTEXT

To evaluate social-return-to-education analysis, let us ask four questions:
1. Are all costs included?
2. Are all costs valued properly?
3. Are all benefits included?
4. Are all benefits valued properly?
In this section and in an unpublished appendix, I evaluate social cost-benefit analysis according to these criteria. I conclude that social rates of return to education in developing countries as conventionally calculated have two serious problems:

1. Much of what should be included is missing, and
2. Much of what is included is not valued properly.

A. Are all the Relevant Costs Included?

Yes. The relevant costs include such direct outlays as costs of buildings, teachers' salaries, and educational materials, plus the indirect cost due to foregone output while the children are in school. Nothing important is left out in the social rate-of-return calculations.

B. Are the Included Costs valued Properly?

It depends. In computing social rates of return, the direct outlays are valued according to their dollar cost. This is appropriate if it does not matter who pays the costs. But if public policy is concerned with alleviating poverty and inequality and reaching the poor majority, the incidence of costs matters. This is where the progressivity or regressivity of the tax structure and the size of the overall budget surplus or deficit enter in. In many LDCs, taxpayers as whole, including many poor families, help subsidize the education of the few, draw disproportionately from the upper and middle classes.

The indirect costs (i.e., foregone output) in social return analysis are measured by the average earnings of persons without the educational level in question. Implicitly, this assumes that society loses output, because the jobs the students would have filled had they not been in school remain vacant. This assumption may or may not be correct; it depends on the characteristics of the economy in question.

C. Are all the Relevant Benefits Included?

No. Social-rate-of-return analysis deals explicitly only with the extra output that the economy is presumed to gain by educating more people. In a poor country, this probably is the most important benefit of education. But other benefits, such as those listed at the beginning of Section I, are important too. Some of these benefits are indirect (e.g., the effect of education on improved child-rearing practices) and others are non-quantifiable (e.g., a well-informed populace able to enjoy the arts, literature, and the good things of life). The omission of these indirect and non-quantifiable benefits from social cost-benefit calculations is not particularly troublesome. It can be justified in the following way: We
know these other benefits exist. If investing in education is cost-effective when only the output gains are considered, then education is all the more worthwhile when these other benefits are added in. But suppose the measured social benefits are smaller than the social costs, say by $1,000. We then have an explicit standard against which to gauge the miscellaneous gains from education: are the unmeasured benefits worth $1,000? Though the economist can pose this question, he cannot answer it—that must be left to educationists, planners, and the people themselves.

Less aggregatively, conventional social cost-benefit analysis ignores such micro development objectives as reducing poverty and inequality and raising employment. When these concerns are relevant, besides looking just at the number of beneficiaries, it is of interest as well to examine the beneficiaries in terms of their socio-economic status. It should be shown that the beneficiaries will be drawn in large numbers from the target group; fears that educational expansion will cater exclusively or primarily to the elites should be allayed.

D. Are the Included Benefits Valued Properly?

It depends. If the labour market is competitive, yes; if not, no. The included benefit is the extra output that would be produced by a better-educated labour force. As indicated earlier, this extra output is approximated by the difference in annual earnings of persons with the educational level in question as compared to persons without. How appropriate is this procedure?

On the positive side, this methodology is well-warranted in the theory of competitive labour markets. In that theory, the last worker hired is paid according to what he produces—the value of his marginal product. Furthermore, in competitive markets, wages adjust so that the supply and demand for different labour categories are in balance. If educated workers are paid more than less-educated workers, competitive theory says it is because the educated workers are more productive than the less educated. The extra output due to education is the value of marginal product of an educated worker minus the value of marginal product of a less-educated worker. Under the competitive assumption, the difference in their value of marginal products is identical to the difference in their earnings. And it is this difference in earnings that is taken as the measure of social benefits from education in social cost-benefit analysis.

The standard methodology has been questioned on several grounds. One is that some part of the earnings differential between educated and less-educated person is not due to education. The most important factor is
differential ability. Secondary schools, colleges, and universities try to admit the most able students. These individuals probably would earn more than the average even if they didn't have the education. So some part of the earnings differential reflects ability, not education per se. In some studies, an adjustment factor (usually called "alpha") is introduced to deal with this problem, but alpha is selected arbitrarily rather than on the basis of scientific measurement.

Another difficulty with the standard methodology is the failure to distinguish between average and marginal returns to education. The average return to education is what is conventionally used. It is the difference in mean annual earnings. But economic theory tells us that decisions should be based on marginal costs and benefits. The implicit assumption in the conventional literature is that marginal benefit equals the average benefit. This is a very strong assumption which may not be correct. To determine the marginal benefits from a proposed educational program, projections are needed on what the newly-educated persons will do. What type of work will they find when they leave school in the future and how much will they earn from it? How much more productive will they be in that work with education than without it? Are others with less education likely to be displaced, and if so, what will they do instead? All these questions require a forward-looking approach. This is where educational planners and manpower planners need to work hand-in-hand.

But the most important difficulty with the standard methodology as applied to developing countries is the heavy reliance on an implicit conception of how these countries' labour markets work. The standard approach is warranted in terms of competitive labour market theory. But what if the labour market is not competitive? Suppose, instead, that wages are set institutionally above the market-clearing level, and hence the quantity of labour supplied exceeds the quantity demanded at the institutionally-determined wage. Then it may be shown that the conventional method of calculating social benefits overstates the output gains from additional education. The basic reason is that in non-competitive labour markets the newly-educated workers may not find jobs comparable to what previously-educated workers had been able to find. If the newly-educated workers are unemployed, then the marginal benefit to education (at least in output terms) is zero. Alternatively, if the newly-educated workers take jobs that previously had been filled by less-educated workers, then the relevant question is: how much more productive are well-educated workers in those jobs than less-educated workers? There is no reason to think that they are as productive as the product of the marginal product of a well-educated worker and the marginal product of a less-educated worker.

IV. CONCLUSIONS

Economists expend much effort determining the marginal social cost and marginal social benefit of various educational policies. In doing so, they must make decisions about how much to educate the population, how to spend the funds available, and at what age education should start and stop. These decisions are influenced by the marginal social cost of education and the marginal social benefit of education. If the marginal social cost is greater than the marginal social benefit, then there is no incentive to educate the population. If the marginal social cost is less than the marginal social benefit, then there is an incentive to educate the population. The optimal level of education is the level at which the marginal social cost equals the marginal social benefit. However, if the marginal social cost is greater than the marginal social benefit, then there is no incentive to educate the population.
they are several times more productive, which is what would be assumed if
the productivity gain is approximated by the mean difference in earnings
between educational groups.

IV. CONCLUSIONS

Economic analysis of education should be conducted because the resour-
ces expended on education could be put to alternative uses. The marginal
social benefits of education must be estimated and evaluated in light of
these opportunity costs.

The cost and benefits of education may be compared by calculating
either a net present value or a social rate of return. These two methods
give the same answers in educational projects, and so may be used inter-
changeably.

Various approaches are available for educational planning. The "man-
power requirements approach" is deficient, both because it neglects costs
and because manpower projections have not proven very accurate. The
"social demand approach" also is deficient. Despite its name, it examines
private costs and benefits; but social decisions should be based on
social costs and benefits, not private ones. The "social cost-benefit
approach" endeavors to quantify these social costs and social benefits.
In so doing, it embodies important aspects of both the manpower foreca-
verting and the social demand approaches.

How useful are the results from conventional social cost-benefit calcu-
lations? The answer depends on the circumstances in a particular country
-- specifically, on the competitiveness of its labour markets. If the
labour market is approximately competitive, then conventional social cost-
benefit calculations are useful; otherwise not. Intuitively, the reason
is that the conventional methods present average rates of return; the
appropriate criterion for allocating resources is the marginal rate of
return; and the average and the marginal can be presumed equal only when
labour markets are competitive. In the majority of less developed coun-
tries labour markets are thought to be very far from competitive. Only
in relatively unusual instances, therefore, can conventional social
rate of return calculations in developing countries be justified. This
is not to say that social cost-benefit analysis should be dismissed.
Rather, it should be done in more sophisticated ways.

Looking ahead, the social rate of return approach can and should be
refined. One refinement would be to include some of the things that are
now excluded, such as the effects of educational expansion on inequality
and poverty, looking both on the beneficiary side and on the cost side of the ledger. Another refinement would be to devise a methodology for assessing marginal social costs and benefits in the non-competitive labour market. The kinds of questions that planners should ask economists to answer are: What kinds of jobs will the newly-educated workers get? How much more productive will they be in those jobs than less-educated workers? How many less-educated workers will be displaced? Where will they go and how productive will they be elsewhere, if in fact they are employed at all? These are not easy questions to answer empirically; a great deal of new information is needed to compute a marginal social rate of return to education, but unless planners have this information, how wise can their education decisions be?

Footnotes:


2. The market rate of interest is the correct criterion when capital markets are perfect. When they are not, e.g., when interest rates are artificially low, then the appropriate discount rate is higher. Consult project appraisal manuals for more on this.