

Private and Social Returns to Education in Labour Surplus Economies

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The conceptual framework for the human capital approach to investment in education was developed mainly with reference to full employment economies. When we turn to the assessment of educational problems in less developed countries, we often encounter a situation of surplus labour.

In the sense used by Fei and Ranis,¹ there is surplus labour when removal of a worker leads to no reduction in output; the marginal product of the last worker is zero, and workers are paid their average products. However, a situation of surplus labour also exists when there is general unemployment throughout an economy, as in India, or in large segments of an economy, as in most other less developed countries. Such a situation is the result of institutionally rigid wages set, for any number of reasons, above the market-clearing rate. Marginal products are positive but unemployment persists. Throughout this discussion, I will use the term 'surplus labour' in the rigid wage sense.

The purpose of this paper is to consider the cost-benefit criterion for resource allocation in labour surplus economies calling particular attention to the contrasts with full employment economies. The specific plan is as follows. Section 1 reviews the debate over the applicability of cost-benefit analysis to problems of investment in education. Section 2 draws two important distinctions which are not always clear to educational planners and enumerates the likely benefits, both private and social, from education. Section 3 considers the case of full employment economies. Section 4 looks at the private returns to education in labour surplus economies in relation to the demand for education. Section 5 considers the social costs and benefits in labour surplus economies. Section 6 raises the problems of measuring marginal social rates of return and demonstrates the inadequacy of wage differentials as a measure of marginal social benefit. Section 7 summarizes the main points.

1. In Defence of a Cost-Benefit Approach to the Economics of Education

In order to assess the returns from social projects, economists and other social scientists have relied on cost-benefit analysis as the major technique for evaluation and decision-making.

The *cost-benefit criterion* may be stated as follows:

A project is profitable if the marginal social benefits (broadly defined) exceed the marginal social costs. The higher the ratio (or difference) between discounted benefits and costs, the more worthwhile the project.

The merits and deficiencies of cost-benefit analysis as a criterion for social decision-making have been discussed at length in the literature. Perhaps the most comprehensive look at the subject is the 1965 survey article by Prest and Turvey.² As they describe cost-benefit analysis:

Cost-benefit analysis is a practical way of assessing the desirability of projects, where it is important to take a long view (in the sense of looking at repercussions in the further, as well as the nearer, future) and a wide view (in the sense of allowing for side-effects of many kinds on many persons, industries, regions, etc.), i.e., it implies the enumeration and evaluation of all the relevant costs and benefits.

The authors then go on to give an exhaustive list of the main questions which must be answered in practical applications of the technique. These questions involve the specification and valuation of costs and benefits, choice of interest rate, and relevant constraints. Specific sub-issues under these headings are discussed in detail. While the problems are many and complex, Prest and Turvey conclude that cost-benefit analysis is a very useful technique, although they caution the reader that applications to the public-utility areas of government are apt to be more fruitful than in the social service areas.

Cost-benefit analysis has been applied in many studies evaluating educational and training projects.³ In addition to the many practitioners in the area, such leading economists as

Arrow,⁴ Becker,⁵ Blaug,⁶ Bowen,⁷ Bowman,⁸ Hansen,⁹ and Weisbrod,¹⁰ are among the firm believers in the social rate of return to education as a criterion for social investment. However, such a view is not unanimously held. Perhaps the strongest objection to the rate of return to education concept was raised by Merrett,¹¹ who, after considering the problems of enumerating costs and benefits and estimating rates of return by econometric techniques, concluded quite simply that ‘research into the rate of return on education should be discontinued’. Balogh and Streeten¹² scorn the social rate of return to education as the ‘coefficient of ignorance’. Others submit that a manpower planning approach is much more fruitful than cost-benefit.¹³ In general, there is little disagreement with the notion of cost-benefit analysis in principle. The contention is that the practical problems of the technique are so serious as to render it useless in educational research.

My own view is that the economist’s main contribution to social decision-making in the field of education is to raise explicitly the right questions pertaining to the marginal social costs and benefits of an educational endeavour.¹⁴

The manpower planner who plans supply to match demand asks the *wrong* questions. He asks, ‘What is the absorptive capacity of the economy for persons with different skills and educational attainments?’ and does not consider the costs of schooling at all. If employers say (or his calculations lead him to believe) that an extra graduate would be hired, the manpower planner directs the education system to produce an extra graduate. He does not ask, ‘What is the nature of the work the graduate will perform and what benefits will he confer on society?’ Nor does he ask, ‘How much will it cost society to educate another graduate? Do the benefits justify the costs?’ If educational expansion follows the path recommended by the manpower planner, an overproduction of education (in terms of costs and benefits) would be expected. This is because

the demand for educated persons does not reflect the costs of education. When private firms (and government ministries for that matter) report shortages of educated manpower, they are saying in effect that it is worthwhile to them to pay a salary and other fringe benefits in exchange for an educated man's services. If they were also required to pay the costs of education, the demand for educated labour would surely decrease. Thus, the manpower planner's goal of equating supply to demand would result in an overproduction of education.

The problems of evaluating the marginal social costs and benefits of education in labour surplus economies are challenging (if not downright discouraging) to advocates of a cost-benefit approach. However, economic research has exhibited an encouraging tendency to improve over time. As researchers are made more aware of the limitations of the initial efforts of their colleagues, as they seek new ways of dealing with conceptual and measurement problems, and as new and better data sets become available, more thorough and precise analysis will, hopefully, emerge.

2. Two Important Distinctions

Traditionally, economists have calculated average rates of return to education while generally neglecting to point out that they are in fact averages and not marginals. Further, the distinction between private and social rates of return seems to be little more than a difference of a few percentage points after adjusting for mortality, taxes, and public subsidization of schooling costs. Policy recommendations are often proposed on the basis of average returns. To help clarify these concepts and to be sure our terminology is consistent, let us review two main distinctions which have troubled educational planners.

Marginal versus Average

The average measures the mean outcome of an activity. The marginal measures the increment resulting from a change from the existing level. We note that the cost-benefit criterion is expressed in terms of *marginals*, not averages. In some circumstances, the average is a very good approximation to the marginal. As we shall see, however, the existence of unemployment due to institutional wage rigidities gives us good reason to believe that the marginal and average social returns to investment in education in labour surplus economies may diverge sharply.

Private Returns versus Social Returns

The costs incurred and benefits received by society are not *identically* equal to the costs and benefits to the individual, although they may be of the same general magnitude. The social costs of education include the value of the resources used to construct and maintain school facilities and to train teachers, the output foregone by employing highly-educated persons in teaching rather than in some other occupation, the output foregone by having potentially productive workers in school rather than on the job, and, if the government's budget is more or less fixed, the other government projects which must be foregone in order to provide students with financial aid. In contrast, the private costs to the student (and/or his family) include foregone earnings and out-of-pocket schooling costs. Social costs and private costs differ to the extent that (a) the general taxpayer subsidizes direct schooling costs, and (b) private foregone earnings differ from foregone aggregate production.

A stream of benefits may be considered at one level from the viewpoint of additional income, either national income or personal disposable income. More generally, benefits may be viewed as increments to social welfare or personal utility, one component of which is income. The welfare-utility approach is conceptually more appealing, although it may be of little value operationally.

Social welfare is presumed to depend positively on the present value of aggregate output (net of education costs), the fraction of the labour force employed, the fraction of the labour force educated beyond a certain level, and equality of opportunity and income distribution. Of course, there is no consensus social welfare function; the weights assigned to different components vary from individual to individual and policy maker to policy maker. Personal utility is presumed to depend positively on the present value of net lifetime disposable income and the quality, status, and other non-pecuniary aspects of the job a person holds.¹⁵ Neglecting the problems of trying to specify the form of social welfare and personal utility functions, the social and private benefits of education differ to the extent that additions to private incomes diverge from the marginal productivity to society.

The marginal social return to education is the difference (or ratio) between the marginal social benefits and the marginal social costs if one more person is educated. Similarly, the marginal private return to an individual from additional education is the net increment to personal utility if he becomes educated. We note that the cost-benefit criterion is expressed in terms of marginal *social* returns, not private.

The composition and total magnitude of the returns to investment in education depend critically on the nature of the labour markets for educated persons. The cases of excess demand for and excess supply of educated persons will be considered in turn.

3. Returns to Education in Full Employment Economies

By way of contrast with labour surplus economies, let us briefly consider situations of full employment, which apply not only to full employment economies but also to occupations requiring either very high-level or very specific training in economies which otherwise have surplus labour. In cases where wages are flexible and adjust so as to achieve full employment or where wages are rigid but set below the market-clearing level so that demand for educated labour exceeds the supply, graduates can easily find a job utilizing their skills and can expect only brief periods of frictional unemployment.

When a person is educated for a full employment or excess demand occupation, at a minimum, society gains the value of his marginal product on his new job, which may be very large if the presence of an additional educated person helps to relieve a skilled labour bottleneck which had been retarding production. There may be shortages of less educated persons to fill the job he would have had, but a replacement is often available. Even if a replacement is not available, there will be higher output to the extent that the educated worker's marginal product is higher on his new job than it would have been if he were not educated and worked in some lower-level job, and the output gains from relief of bottlenecks are still realized. Society benefits from higher output, additional employment, and a greater fraction of its labour force educated. Society incurs the costs enumerated in the previous section.

The educated person himself benefits from a higher-level job which generally offers higher pay, more stable employment, and superior working conditions and other non-pecuniary benefits.¹⁶ He may experience gains in utility from higher status or from a richer or more fulfilling life. Turning to the private costs, due to the abundance of job opportunities at most

educational levels in full employment economies, foregone earnings may be substantial. In addition, out-of-pocket costs may be very large, since students in full employment economies are often charged a large fraction of the costs of their education. While the benefits may be considerable, so also may be the costs, so that private rates of return, while positive, are not found to be particularly great.

Since there is virtually full employment of graduates, if wages reflect marginal productivity, the economic benefits to society and to the individual are similar.¹⁷ Furthermore, private costs and social costs are of the same order of magnitude. Thus, one would expect, as is indeed the case, the average social and private returns in full employment economies to be quite similar.

Since the newly-educated person in full employment economies becomes employed in a high-level job which utilizes his schooling and is paid about¹⁸ the same wage as those educated earlier, the marginal benefits are approximated by the averages. There is little reason to expect the marginal social cost to differ appreciably from the average. Thus, the conventional 'social rate of return' is a useful guide to educational decision-making in full employment economies.

We turn now to the case of labour surplus economies

4. Private Returns and the Demand for Education in Labour Surplus Economies

Private Costs

The private costs of education in labour surplus economies are in many cases quite small. The earnings foregone by an individual depend not only upon the wage rate but also upon the probabilities of employment, underemployment, and unemployment. The younger the individual and the lower his educational attainment, the lower the wage and the likelihood of employment. In labour surplus economies, in which there are large numbers of unemployed and underemployed in search of work, the probability of employment for a school-aged person may be very low indeed. Hence, foregone earnings may be a small item to the individual. Furthermore, under existing institutional arrangements in many less developed countries, either the entire amount or a large fraction of the out-of-pocket costs of education are paid by the central government.¹⁹ The higher the education level, the more likely this is to be the case. The out-of-pocket costs of schooling may therefore be very small or, to the extent that students receive cash allowances, even negative. In sum, the private costs of education in labour surplus economies may amount to very little.

Private Benefits

The private benefits from education in labour surplus economies may be very large. Percentage wage differentials between different skill levels in labour surplus economies, particularly those in Africa, are much greater than in full employment economies.²⁰ Furthermore,

those with the most education, and those trained in specific excess-demand skills, experience much more stable employment than persons with less education. Expected lifetime income for university graduates may be several times as high as for secondary school leavers, who in turn may expect to earn several times as much as primary school leavers. These high private benefits, compared with the low private costs, lead to a very high rate of return for most educational investments.²¹

The Demand for Education

Education is demanded by families who would like their children educated at a particular level. The demand for a given level of education may be presumed to depend on the *average private*²² rate of return to that level of education, which is greater

- (a) the higher the salaries and non-pecuniary benefits realized by persons with that level of education,
- (b) the lower the unemployment of persons with that level,
- (c) the lower the school fees at that level,
- (d) the lower the salaries and non-pecuniary benefits realized by persons with only the previous level of education,
- (e) the greater the unemployment of persons with only the previous level,
- (f) the greater the probability of admission to the next level of schooling,
- (g) the lower the school fees at the next level,
- (h) the higher the salaries and non-pecuniary benefits realized by persons with the next level of education,

(i) the lower the unemployment of persons with the next level.

This demand for education is not expressed in textbook fashion whereby citizens demand different quantities in a marketplace at different prices. Rather, demand for education is manifested through the political process as citizens bring pressure to bear on government officials to increase the number of school spaces, not only at the given level but at prerequisite levels as well.

The demand for a given level of education also depends on capital market conditions. The policy of paying the full costs of higher levels of education for virtually everyone who can find spaces in the schools exchanges one imperfection for another, resulting in a very high private demand for education. The original imperfection was that capital markets did not operate sufficiently well to allow students from low-income families to borrow long-term funds to pay the short-term costs of their schooling in cases where the marginal private benefits exceeded the marginal private costs. This capital market imperfection seriously retarded private demand amongst the local population. Particularly in the newly independent countries of Africa, this situation was judged socially undesirable in view of the goal of equality of educational opportunity for citizens. The full-subsidy scheme introduced a new imperfection. Not only does it exclude the very real capital costs from the price of investing in human capital but it also excludes all out-of-pocket costs as well, which leads to a very high private rate of return. Without any constraints imposed by the necessity of financing educational investment by recourse to a capital market, the very high private rate of return is readily translated into a very high private demand for education which is much greater than it would have been under the original scheme. Enrolments are limited not by a private rate of return which bears any relation to the true social costs and benefits, or by unavailability of capital, but rather by the capacities of

the educational institutions. The likely consequences—dissatisfaction and political pressure to expand the educational system beyond a socially optimal size—may be more serious than the original state of affairs.

*The Effect of Increasing the Supply of Educational Spaces on the Demand for Education*²³

If the government bows to political pressure and decides to educate another person, what will happen to the demand for education? The result depends critically on the labour market behaviour of the educated and employers. Let us consider three alternative cases.²⁴

Case 1: Labour market stratification.

Suppose a person seeks to avoid a low-level job which he regards as ‘menial’ or ‘dirty’. He therefore desires to be educated in order to qualify for a high-level job for which there is already a surplus of qualified workers, even though he (and they) expect to be unemployed at least part of the time. From the point of view of an employer, education may make a person *less* desirable for a job. For instance, the morale of a secondary school graduate employed as a sweeper may be so low that an illiterate would be more productive. In such a situation, (1) highly-educated workers enter the market for skilled jobs only, (2) employers do not wish to hire highly educated workers for low-level jobs, (3) workers with little education are unqualified for high-level jobs, and (4) employers prefer to hire persons with low education for low-level jobs. The net effect of this situation is to entirely separate the high-skill and low-skill labour markets,

except that the acquisition of an education (or at least the certificate) is the means by which a person moves from one to the other.

Rigid wages were presumed initially to be the cause of unemployment. If workers at each level are employed until the marginal product of the last worker hired equals the wage rate, employment is determined, which then determines output. If another person is educated, he enters the skilled labour force, thereby reducing the expected probability of finding a job and reducing expected life-time income for skilled workers. Simultaneously, the expected probability of finding an unskilled job is increased, since there is one fewer job seeker, which raises the expected lifetime income of unskilled workers. The difference (or ratio) between expected lifetime income for skilled and unskilled workers is reduced. Since demand for education depends positively on the expected lifetime income differential, which is now smaller, an increase in the supply of education would cause there to be less demand for education.

Case 2: 'Pure bumping'.

In contrast to the labour market stratification case, let us suppose that young people demand education on the margin specifically in order to stand a better chance of being hired for low-level jobs and that employers prefer to hire persons with more education at the prevailing wage rate, either because they are (or are believed to be) more productive or simply because employers prefer to associate with the better educated. For whatever reason it occurs, preferential hiring by educational level will lead to the general upgrading of hiring standards, and of the labour force in general, so long as the educational system produces more graduates than are needed to fill skilled positions and some of them are willing to seek employment at a lower level.

As in the labour market stratification case, since wages are rigid, if productivity effects are neglected, employment and output are determined. Ordinarily there will be fewer educated persons seeking unskilled jobs than the number of unskilled jobs available. If the government now decides to educate another person, due to preferential hiring, the educated person moves to the front of the queue for unskilled jobs and is hired first at the unskilled wage rate, ‘bumping’ a less-educated person from a job. This lowers the probability of getting an unskilled job and also lowers the present value of expected lifetime income for the unskilled. Since there are still the same number of educated workers looking for the same number of high-level jobs in the skilled labour market, the expected lifetime income for persons in the skilled labour market is unchanged. The difference (or ratio) between expected lifetime income for educated and uneducated workers is increased, resulting in a greater demand for education and even more political pressure.

Case 3: ‘Modified bumping’²⁵

As an alternative to the ‘pure bumping’ case, it is noted that school leavers probably do not automatically disqualify themselves from the market for high-level jobs. Rather, they first look for high-level jobs, the unsuccessful get discouraged, and then ‘bump’ the less educated out of lower-level jobs.²⁶ In this case, an increase in the supply of education does not lead to an unambiguous prediction concerning the effect on demand.²⁷

As before, employment and output are determined. If another person is educated, there are now more seekers for high-level jobs. This lowers the probability of finding high-level employment, thereby lowering the present value of expected lifetime income for the educated.

However, since the unsuccessful will, after a time, accept lower-level employment, the probability of a less educated person finding a job is reduced, which lowers the present value of expected lifetime income for the uneducated. Since both expected income streams fall, one cannot determine a priori whether the private rate of return to education, and hence demand, goes up or down. The direction of change depends on such factors as the number and skill distribution of job openings, the number of educated job seekers relative to the total number of new jobs, the wage structure, and schooling costs. In any event, we would expect this 'modified bumping' process to lead to the same kind of gradual upgrading of hiring standards as in the 'pure bumping' case.

The two bumping cases suggest the possibility that the private demand for education at all levels can constantly increase at the same time as employment prospects for those with a given educational attainment continually worsen. This process could continue indefinitely as people seek to be relatively the best educated.

In my judgement,²⁸ this chain of events is the major historical explanation of the growth of primary and secondary, and even to some extent, university education, in developed economies. It would explain such seemingly unnecessarily high educational requirements as a secondary school diploma to work on the automobile assembly line in Detroit, a university degree to work as a bank teller, and a post-graduate degree to teach primary school in New York City. Furthermore, if central governments only partially satisfy the demand, the disequilibrium will be resolved as citizens get together and construct their own community schools. This process, I believe, explains Kenya's post-independence growth of Harambee (self-help) community secondary schools, the simultaneous worsening of job prospects for secondary school leavers, and the persistence of high demand for education.

5. Social Returns to Education in Labour Surplus Economies

In labour surplus economies, the marginal social rate of return to education for labour surplus occupations might be very small or even negative. This is because the marginal social costs (in real terms) are positive and very possibly large and the marginal social benefits are positive and often quite small. Let us consider the social costs and benefits in some detail.

Social Costs

In labour surplus economies, the social costs of education may be very much higher than the private costs. Typically, labour surplus economies have a large and perhaps redundant supply of unskilled and uneducated labour, with severe shortages of both physical and human capital. The educational system is a large user of both human and non-human capital. A glance at the capital budgets, wage bills of teachers, and number of teacher training spaces relative to education for other occupations, confirms this view.²⁹ Thus, the resources devoted to education in labour surplus economies are extremely valuable in the light of the important alternative uses to which they could be put.

There is an important counter-argument to the view that the educational system is a large user of capital with valuable alternative uses. With respect to human capital, in some countries many teachers are themselves only generally educated secondary school graduates of whom there is a surplus.³⁰ If these persons were to enter the non-education labour market, they might find that they would fare no better than other secondary school leavers. Perhaps the low salary level of teachers as compared with those of other white-collar professionals is primarily a

reflection of low opportunity productivity. With respect to physical capital, the resources used to construct schools might simply not be supplied otherwise. To the extent that labour is specially volunteered and physical materials are gathered or made, the real resource cost of educational expansion may be quite small.

Another substantial component of the social costs of education is the financial aid granted to students. In many less developed countries, students in secondary and post-secondary education pay none or only a small fraction of the costs of their education, receive housing and other payments in kind, and in addition may receive a small cash living allowance. If the government's budget is relatively flexible, this is merely a transfer from taxpayers to students to enable them to pay the costs of their schooling. But if the government's budget is more or less fixed, the value of the financial aid is represented in real terms by the social welfare which would be realized if the money were used on the next best projects.

In contrast to full employment economies, the output foregone by having potentially productive workers in school in labour surplus economies is minimal. By the definition of a labour surplus economy, there are large numbers of unskilled workers. To the extent that uneducated persons are temporarily withdrawn from the labour force while in school, there are plenty of others to fill the jobs they would have held. There would be a loss of output only to the extent that the persons selected for further education are more productive on the job than those who replace them.

Social Benefits

Suppose that in a labour surplus economy, society educates another person and the educated person uses his newly-acquired skills to fill a high- level job which would otherwise have been vacant. This is equivalent analytically to the labour shortage case described in Section 3, and society gains all the benefits enumerated therein.

Suppose instead that an additional person is educated at a level which only qualifies him for jobs for which other persons are already queueing. To give a concrete example, suppose there are two kinds of jobs, clerks and gardeners. Secondary education is required to be a clerk. No education is required for gardeners. Let us assume for the moment that the provision of education is costless in both real and budgetary terms to the country in question.³¹ (We will relax this assumption shortly.) What are the benefits to society of having one more educated person?

Labour Market Stratification

If the graduate enters the labour force for clerks (the labour market stratification case of Section 4) and the wage rate for clerks is fixed at level W_c^* above the market-clearing wage, employment of clerks is unchanged at equilibrium level E^* , since demand curve D (the marginal product of labour curve) does not shift. (See Figure 1.) Whether this particular worker is hired, or some other secondary leaver is hired, society gains *no additional output*. The marginal social rate of return to investment in education in output terms is therefore negative in this case.

Bumping

Suppose instead that the marginal graduate enters the labour force for a less skilled occupation, in this case gardening; or equivalently, his presence in the labour force for clerks induces some other person in that labour force to seek a job as a gardener instead. Then the situation is as in Figures 2 through 4. Unemployment among clerks is the same as it was previously, since supply and demand in that labour market are unchanged (Figure 2). Figures 3 and 4 illustrate the labour market for gardeners. The original supplies of educated and uneducated gardeners are represented by S_o in Figures 3 and 4 respectively. The D_o 's are the demand curves, E_o^* 's the initial equilibria, and W_g^* the common rigid wage rates. Since by assumption educated gardeners are hired first and demand exceeds supply, all educated gardeners are employed. The presence of an additional supply of educated gardeners (shift of supply curve to S_1 in Figure 3) will increase employment of educated gardeners by the same amount. The greater availability and employment of educated gardeners will lead to the displacement of uneducated gardeners, either immediately by firing, or over time by replacement of retirees. If the level of employment of educated gardeners has no effect on the productivity of uneducated gardeners, the demand curve for uneducated gardeners will shift from D_o to D_1 , the leftward shift of the demand curve for uneducated gardeners equalling the rightward shift in the supply of educated gardeners. Hence, total employment of gardeners would be unchanged. To the extent that educated gardeners are more productive than uneducated ones, output is increased.

If the presence of additional, highly productive educated gardeners raises the productivity of the uneducated gardeners, the shift of the demand curve for uneducated gardeners will be to

some intermediate position such as D_1' in Figure 4. In this case there will be an increase in total employment of gardeners with subsequently greater output. The greater the productivity of educated workers relative to uneducated and the stronger the positive effects of employment of educated workers on the productivity of uneducated workers, the greater the output effects of educating more persons.

The productivity gains realized from a better-educated work force may be very small in many areas of the modern sector. Literacy may do little to raise the productivity of domestics, gardeners, and the like. General secondary education may do little for such persons as bus drivers, repairmen, and craftsmen. Society gains little additional output by educating the labour force at such levels. However, this is not always the case. In the crucial agricultural sector, there is some evidence to suggest that secondary, or even primary, education raises the output of farmers by improving organizational ability, facilitating optimal choices of crops and inputs, and making the farmer more receptive to innovations, information, and expert assistance.³² To the extent that this is the case, the output effects may be considerable.

Insert Figure 1 Here

Insert Figure 2 Here

Insert Figure 3 Here

Insert Figure 4 Here

Another possible source of productivity gains relates to the educational system as a means of discovering outstanding young people to become future national leaders. This argument has long been recognized by economists. As Marshall wrote:

‘We may then conclude that the wisdom of expending public and private funds is not to be measured by its direct fruits alone. It will be profitable as a mere investment to give the masses of the people much greater opportunities and to get the start needed for bringing out their latent abilities. And the economic value of one industrial genius is sufficient to cover the expenses of a whole town.’³³

I believe this argument has some merit. However, the number of budding young industrial geniuses is probably not very large. It is doubtful that poor countries can afford the large outlays required for the probably small and definitely uncertain benefits.

When costs of supplying education are introduced, it is questionable whether the positive output effects resulting from productivity gains exceed the negative output effects of using scarce physical and human capital to produce education. Although more teachers will be employed, employment in the output-producing sector would fall. This is because each unit of labour has less capital to work with and would be illustrated by leftward shifts of the demand for labour curves in Figures 2 through 4. Aggregate employment might well fall. There is presumably some social benefit from the fact that a larger fraction of the labour force is educated. However, there would be an adverse effect on income distribution (and thus a presumed negative social benefit) if the educated person comes from a well- to-do family and educational expansion is financed by a regressive tax structure. So all in all, there might be little if any social benefit from educating another person. The marginal social rate of return to investment in education might be negative in many labour surplus economies.

6. An Example of the Measurement of Rates of Return to Education in Labour Surplus Economies

The difficulty of computing a marginal social rate of return in labour surplus economies results from stringent data requirements. An aggregate production function and demand for labour functions *by educational category* are required in order to estimate additional and foregone output. These need to be expressed in the context of expected growth of the economy, which necessitates estimates of technical change and demographic trends. Few labour surplus economies have the required data. However, a static approximation, which only requires point estimates of marginal rates of substitution between one type of labour and another and between labour and capital, might prove feasible.

Traditionally, observed earnings differentials have been used to measure the output effects on society of additional education. However, a crucial and generally neglected point is: *in labour surplus economies, wage differentials are an inadequate measure of social productivity gains, even if employed workers are paid the value of their marginal products by their employers.* As a result, the average social rate of return as conventionally calculated may be a completely misleading guide to social decision making on educational investments.

For illustrative purposes, let us consider the following hypothetical data under the assumptions of the ‘modified bumping’ case of Section 4. Suppose the state of the economy is:

Wage of clerks (shs/day)	20
Employment of clerks	50
Supply of clerks	100
Wage of gardeners (shs/day)	10
Total employment of gardeners	40
Supply of educated gardeners	25
Employment of uneducated gardeners	15
Supply of uneducated gardeners	75

Let us now use these data to illustrate some important points.

Allocation of Educated Workers to Different Labour Markets

It may be hypothesized that educated workers allocate themselves among labour markets so that the mathematical expectations of the wages in the respective labour markets (wage times number of jobs divided by labour force) are equal. In our example, an educated person would expect to earn 10 shs/day either as a clerk or as an educated gardener $\left(20 \times \frac{50}{100} = 10 \times \frac{25}{25}\right)$. In the absence of systematic non-pecuniary preferences for one occupation or the other, or for certainty in preference to uncertainty (or vice versa), equality of expected wages is an equilibrium condition. For instance, suppose ten more persons are educated. If any of these persons enters the labour market for clerks, the expected wage for clerks $\left(20 \times \frac{50}{100+n}\right)$ where $n =$ the number who enter the labour market for clerks) would be less than for educated gardeners. The labour market for educated persons would be in disequilibrium, which would be resolved only if ten educated persons enter the labour market for gardeners.³⁴

The Appropriate Wage Ratio for the Private Rate of Return

The expected wage for uneducated persons is the uneducated wage times the probability of an uneducated person being employed: $10 \times \frac{15}{75} = 2$. The educated-uneducated expected wage ratio is therefore $\frac{10}{2} = 5$. This expected wage ratio, along with private costs, determines the private rate of return and the private demand for education. When there is unemployment, the

relevant wage ratio is not the wage ratio for employed clerks compared to employed gardeners (20/10). Neither is the correct ratio the wage of the average employed educated person

$\left(20 \times \frac{50}{75} + 10 \times \frac{25}{75} = 16\frac{3}{2}\right)$ compared to the average employed uneducated person (10).³⁵

The average private rate of return is that internal rate of return which equates the stream of discounted expected educated-uneducated wage differentials to the private costs of schooling.

To calculate the average private rate of return in our hypothetical economy, let us assume:

- (i) the current expected income differential (8 shs/day=2,000 shs/year) is expected to prevail forever,
- (ii) education takes one period, and
- (iii) the private costs of being educated (out-of-pocket cost plus foregone earnings) is shs 1,000.

Then the average private rate of return is given implicitly by $2,000 \left(\frac{1}{1+r} + \frac{1}{(1+r)^2} + \dots + \frac{1}{(1+r)^T} \right) = 1,000$, where T is the relevant time horizon, presumably retirement. For sufficiently large T, the left hand side is approximately $\frac{2,000}{r}$.

Substituting and solving for r, we find an average private rate of return of 200 per cent. From the individual's point of view, it would be an understatement to say that education would be a very lucrative personal investment.

Measurement of Social Productivity

If we take the stream of expected educated-uneducated wage differentials projected over time compared to the current average cost of educating one more person, the average internal rate of return which equates the two streams is what is commonly called ‘the social rate of return’. Under assumptions (i), (ii), and (iv) the social cost of educating one person is shs 10,000, the average social rate of return is given implicitly by

$$2,000 \left(\frac{1}{1+r} + \frac{1}{(1+r)^2} + \dots + \frac{1}{(1+r)^T} \right) = 10,000$$

and is found to be 20 per cent. By the conventional calculations, educational investment would appear desirable.

The internal rate of return which equates the marginal social benefits to the marginal social costs is ‘the marginal social rate of return’. This rate may be large, small, zero, or negative, depending on the size of the productivity gains resulting from education. Nothing in the data we have so far tells us which is the case. We simply cannot infer whether investment in education is a good investment or not.

If educated gardeners are only slightly more productive than uneducated ones, the marginal social rate of return is small or even negative and the investment would be undesirable. Suppose in our example, (v) an educated gardener is 2 per cent more productive than an uneducated one.

The marginal social rate of return is given implicitly by

$$50 \left(\frac{1}{1+r} + \frac{1}{(1+r)^2} + \dots + \frac{1}{(1+r)^T} \right) = 10,000, \text{ the solution of which gives a marginal social rate of}$$

return of one-half of one percent.³⁶ Although the average private and social rates of return (200

per cent and 20 per cent respectively) are very high, we would all agree that educational investment would be undesirable.

Care must be exercised in using average private and social rates of return. The private rate of return is an important index of the strength of the private demand and political pressure for educational expansion. The average social rate of return gives us an upper limit on the marginal rate. An average social rate of return which is below the rates which could be earned on other social projects is a clear indication that the educational investment is not desirable on economic grounds, but a higher rate is of little help. As a guide to decision-making for educational planners, the average private and social rates of return neither ask the right questions nor measure the right phenomena.

To the best of my knowledge, only one empirical cost-benefit study calculates a *marginal* social rate of return. Using shadow wage rates obtained by solving the dual of a linear programming model for Greece, Psacharopoulos³⁷ estimated marginal social rates of return to investment in education. For our purposes, the most interesting conclusion is; ‘In the case of Greece, investment priorities with respect to investment in skills estimated on the basis of observed labour earnings would have suggested a change *in the wrong direction* of the educational output.’ (Emphasis added.)

7. Conclusion

Let us conclude by summarizing some of the main points raised in the paper. The intention of this paper was to consider a specific criterion for decision on educational investments, the benefit-cost criterion, which evaluates *marginal social* costs and benefits. Some educational planners and advisers unfortunately fail to distinguish marginal from average returns or private returns from social ones.

The composition and magnitude of the private and social returns to education depend largely on the nature of the labour markets for educated persons. More specifically, if a person is educated for an excess demand occupation, the marginal social rate of return is approximated by the average social rate of return as conventionally measured. In contrast, education in labour surplus economies may confer a very high private rate of return on the educated person while at the same time the average social rate is high and the marginal social rate is small or negative. This would be the case unless bumping is accompanied by large productivity gains attributable to increased education. Furthermore, if bumping is prevalent, the private rate of return to education may actually rise if more education is supplied. Disequilibrium in the political market place for education might never be resolved unless education is offered to almost everyone.

Observed earnings differentials are a very poor approximation to the output gains to society from additional education in labour surplus economies. For such countries, the average social rate of return may convey a grossly distorted impression about the desirability of an educational investment. While few labour surplus economies at present have the data needed to accurately compute a marginal social rate of return, the data might be sufficient to permit point estimates of the relevant parameters in order to construct a first approximation.

Figures 1 & 2

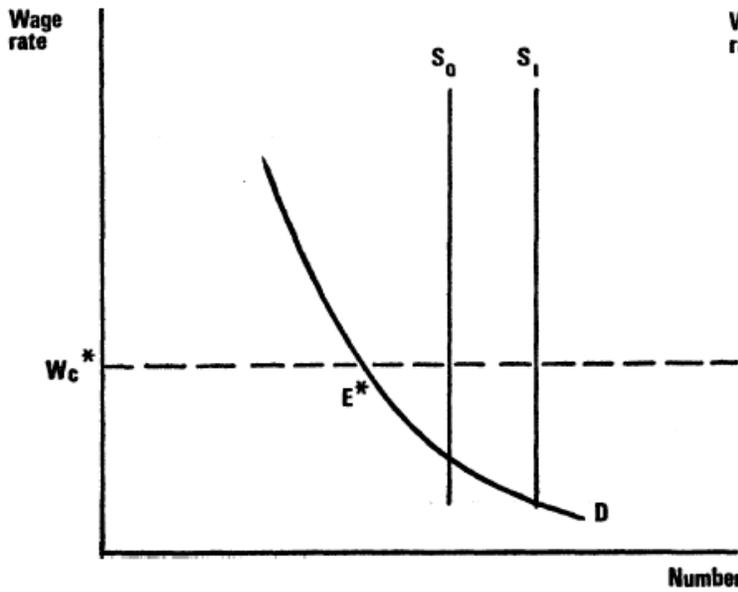


FIGURE 1
LABOUR MARKET FOR CLERKS IN CASE OF LABOUR MARKET STRATIFICATION

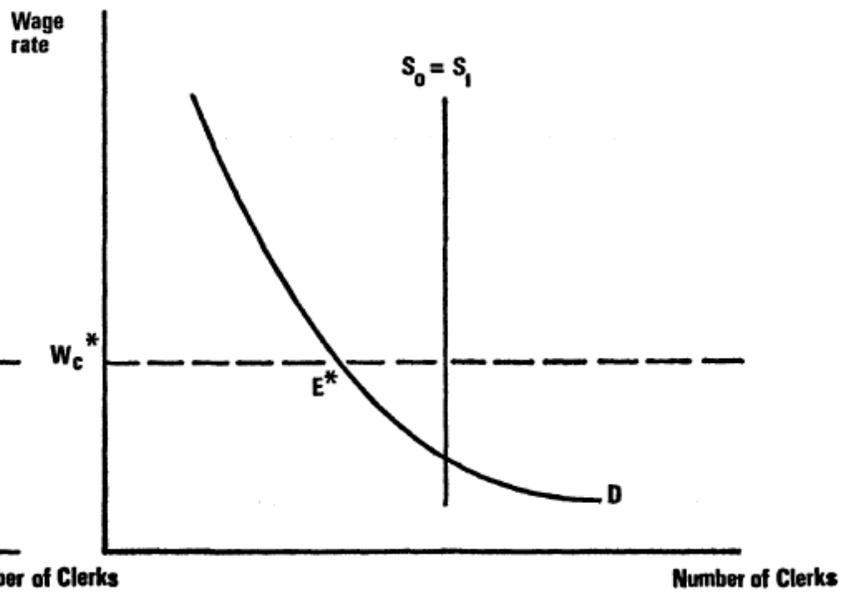


FIGURE 2
LABOUR MARKET FOR CLERKS IN CASE OF BUMPING

Figures 3 & 4

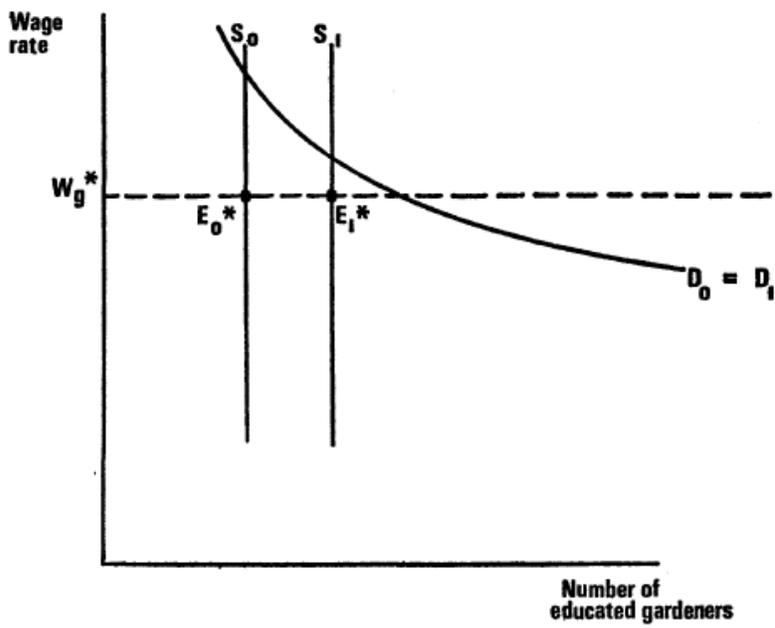


FIGURE 3
LABOUR MARKET FOR EDUCATED GARDENERS IN CASE OF BUMPING

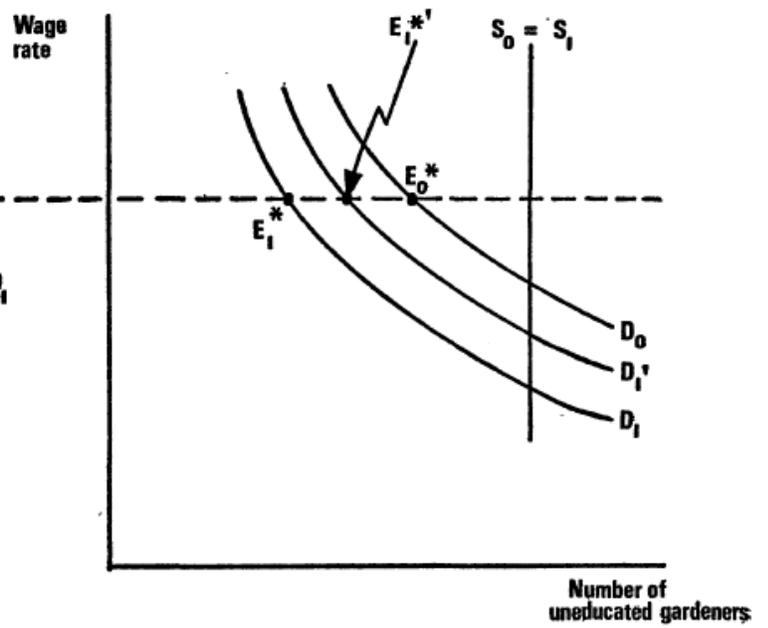


FIGURE 4
LABOUR MARKET FOR UNEDUCATED GARDENERS IN CASE OF BUMPING

Footnotes

- 1 John C. H. Fei and Gustav Ranis, *Development of the Labor Surplus Economy* (Homewood, Illinois: Irwin, 1964).
- 2 A. R. Prest and R. Turvey, 'Cost-Benefit Analysis: a Survey', *Economic Journal*, December 1965.
- 3 A summary of the applications to education is contained in G. Psacharopoulos and K. Hinchliffe, 'Rates of Return: International Comparison', London School of Economics, Higher Education Research Unit, 1970, mimeo. See also W. D. Wood and H. F. Campbell, *Cost-Benefit Analysis and the Economics of Investment in Human Resources: an Annotated Bibliography* (Industrial Relations Centre, Queen's University, 1969).
- 4 Kenneth J. Arrow, 'Criteria for Social Investment', in M. J. Bowman *et al.*, eds., *Readings in the Economics of Education* (Paris: UNESCO, 1968), pp. 869-880.
- 5 Gary S. Becker, *Human Capital* (New York: Columbia University Press, 1964).
- 6 M. Blaug, *A Cost-Benefit Approach to Educational Planning in Developing Countries* (International Bank for Reconstruction and Development, Report No. EC-157, December 1967).
- 7 William G. Bowen, 'Assessing the Economic Contribution of Education', in M. Blaug, ed., *Economics of Education I* (London: Penguin Books, 1968), pp. 67-100.
- 8 Mary Jean Bowman, 'Converging Concerns of Economists and Educators', *Comparative Education Review*, October 1962.
- 9 W. Lee Hansen, 'Total and Private Rates of Return to Investment in Schooling', *Journal of Political Economy*, 1963, pp. 128-141.

10 Burton A. Weisbrod, 'Education and Investment in Human Capital', *Journal of Political Economy*, October 1962, Part 2 (supplement), pp. 106-123.

11 Stephen Merrett, 'The Rate of Return to Education, a Critique', *Oxford Economic Papers*, November 1966, pp. 289-303.

12 T. Balogh and P. P. Streeten, 'The Coefficient of Ignorance', *Bulletin of the Oxford University Institute of Economics and Statistics*, May 1963, pp. 99-107.

13 Their views are summarized in Bowen, op. tit., and will not be repeated here.

14 For similar views, see W. C. Cash, 'A Critique of Manpower Planning in Africa', in M. Blaug, ed., *Economics of Education 2* (London: Penguin Books, 1969), pp. 98- 122, and M. Blaug, op. cit., footnote 6.

15 The omission of leisure as an argument in the utility function is intended to avoid the unnecessary complication of considering labour-leisure choices. Any gain in personal utility resulting from increased leisure may be subsumed under the private benefit package under lifetime disposable income.

16 I say 'generally' because there are cases in which persons may choose to be educated in order to receive additional non-pecuniary benefits at the expense of lower pay and/or less stable employment. Monetarily speaking, an economics major with a B.A. may earn more selling insurance than he would with a Ph.D. as an Economics professor. Many of us made such a choice, presumably on the basis of non-pecuniary benefits. It may also be that employment is less stable for the graduates in some fields. For instance, aerospace engineers in the United States chose an occupation which offered high salaries and the excitement of a new scientific endeavour. Thoughtful observers foretold the instability of the labour market, but many engineers are today regretfully experiencing the consequences of their lack of foresight.

17 In a forthcoming paper, Joseph E. Stiglitz examines educational systems in developed economies when viewed as a means of providing information on different persons' marginal productivities to employers. Although it is difficult and costly to evaluate the marginal product of any one person prior to hiring, Stiglitz sees educational attainment as a means of identifying a group of potential employees who, on average, are more productive than another group with less education. The private benefits of education result from employers paying higher wages to those with more education, because they are perceived (perhaps correctly) as more productive. Stiglitz concludes that to the extent that education serves a screening function, the social benefits of education are likely to be considerably less than the private benefits.

18 He may be paid less due to inexperience or because the highest paying jobs have already been filled by persons educated earlier.

19 For instance, in Kenya, school fees cover around one-fourth of the gross cost of primary education and one-fifth of the costs of secondary education. No fees are charged at post-secondary teacher's training colleges or agricultural training institutions. Kenyan university students studying in East Africa are in theory charged £300 per year tuition, but bursaries are so extensive that fees pay only about 6 per cent of the costs of the University of Nairobi. For these and other facts on the educational system of Kenya, see my 'The Educational System of Kenya: an Economist's View', University of Nairobi, Institute for Development Studies, Discussion Paper No. 103, April 1971.

20 See Elliot J. Berg, 'Major Issues of Wage Policies in Africa', in A.M. Ross, ed., *Industrial Relations and Economic Development* (London: MacMillan, 1966).

21 In Kenya, a university graduate can expect to earn about 3.4 times as much as a secondary school leaver over his lifetime. (This is the ratio of undiscounted lifetime earnings according to

government salary scales allowing for unemployment of secondary school leavers.) The private internal rate of return, unadjusted for background factors of ability, to university education over secondary school is over 30 per cent per year. The rates to teacher training are of a similar magnitude. For the details of these calculations, see my 'Private Rates of Return to Investment in Higher Levels of Education in Kenya', University of Michigan, Center for Research on Economic Development, forthcoming Discussion Paper.

22 The specification of the *average* private rate of return is consistent with the economist's standard assumption that there are no quality *differences between* workers with the same education-skill characteristics. The *marginal* private rate of return would be appropriate if the marginal student's labour market expectations (*in the sense of mathematical expected value, not subjective Bayesian prior notions*) differ from the average. This would be the case if those already being educated are higher in ability than the marginal student and therefore, (a) are less likely to flunk, (b) expect to rank higher in their classes and be hired for the choicest positions, or (c) have higher probabilities of continuing onward for further education. For simplicity, these factors are neglected in the remainder of the paper.

23 Besides demand *effects of* an increase in supply, a number of other questions remain. Will the disequilibrium characterized by excess demand for schooling be resolved if more education is supplied? Does a stable equilibrium exist? In what ways does it depend on the wage structure, employment probabilities, etc.? Are there multiple equilibria? These and other questions will be dealt with formally in a forthcoming paper with George E. Johnson.

24 An interesting study beyond the scope of this paper would be to try to classify the labour markets of a number of less developed countries into one or another of these types and to seek cultural explanations for the resultant pattern.

25 I wish to thank the participants in the Institute for Development Studies Economics Seminar for their helpful suggestions on this point.

26 They might continue for a time to look for high-level jobs while employed in low-level jobs. But the combination of reduced job-search time due to being fully employed and depreciation of their human capital tends to confine them to the lower levels.

27 A further source of ambiguity which, for simplicity, I have omitted from the discussion is the fact that the education system employs educated persons and uses scarce capital. If another person (or group of persons) is educated, school facilities must be expanded. This removes scarce resources from the production of output, thereby lowering the marginal product of labour and reducing employment. However, it also increases employment opportunities in the educational sector. One can only speculate on the relative magnitudes of the parameters with respect to specific cases, since they differ from one country to another. Few unambiguous results are attainable.

28 This judgement is shared by W. Arthur Lewis. See his 'Education and Economic Development', in M. J. Bowman, ed., *Readings in the Economics of Education* (Paris: UNESCO, 1968), pp. 135-147.

29 Out of the approximately 11,000 post-secondary students (excluding those at foreign universities) in Kenya, about two-thirds are enrolled in teacher education courses. Education accounts for 15 per cent of the Kenya government's budget and 10 per cent of its development expenditures. Personal emoluments to teaching and non-teaching staff in schools amounted to £10 million, which is 8 per cent of the budget. See my 'The Educational System of Kenya: an Economist's View', *op. cit.*

30 In 1969, about one-fourth of the teachers in Kenya had less than university education and no teacher training. Source: Republic of Kenya, Ministry of Education, *Annual Report, 1969*.

Moorthy and Thore propose an accelerator model for educational expansion, which they then test using Indian data. Their basic conclusion is that as low-level education is expanded, this requires an additional supply of ‘deep’ (i.e. high-level) levels of education. They then qualify their position by noting that ‘the education acceleration principle may be much more vigorous in a country of full employment than in India which at the moment is characterized by a large unemployed educated labour force especially at the non-technical levels’. See S. Krishna Moorthy and Sten A. O. Thore, ‘Accelerator Theory in Education’, *Indian Economic Review*, February 1959, pp. 57-69.

31 The world powers, development agencies, and missionary groups, among others, are likely candidates for this to be the case.

32 See Jon Moris, ‘Farmer Training as a Strategy of Rural Development’, in James R. Sheffield, ed., *Education, Employment and Rural Development* (Nairobi: East African Publishing House, 1967), pp. 322-365.

33 Alfred Marshall, *Principles of Economics*, p. 216, quoted in ‘Report of the Meeting of Ministers of Education of Asian Member States Participating in the Karachi Plan’, in M. J. Bowman, et. al., eds. *Readings in the Economics of Education* (Paris: UNESCO, 1968), pp. 148-150.

34 These need not be the same ten as the ones just educated.

35 For instance, the well-known World Bank study on rates of return to education in Kenya in effect uses such a measure. See H. H. Thias and M. Carnoy, *Cost-Benefit Analysis in Education: a Case Study on Kenya* (IBRD, Report No. EC-173, November, 1969).

36 50 = Wage of employed gardener (10 shs/day)

X number of workdays per year (250)

X productivity factor (2 per cent).

It is mathematically impossible for the internal rate of return to be negative if T, the length of the relevant time horizon, is allowed to approach infinity in the limit.

37 George Psacharopoulos, 'Estimating Shadow Rates of Return to Investment in Education', *Journal of Human Resources*, Winter 1970, pp. 34-50.