THE QUAID-I-AZAM LECTURE

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Higher Education and the Markets for Educated Labour in LDCs: Theoretical Approaches and Implications

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INTRODUCTION

Education policy is a fascinating and controversial subject. Part of the reason is that it is an area where jurisdiction is divided. The analysis and recommendations of professional educators are often quite different from those of economists, and purely political factors also play a major role, both because large amounts of public funds are used, and because access to education appears to be an important determinant of the distribution of income. Furthermore, as I will discuss below, even if we confine attention to the *economic* analysis of educational issues, there are different approaches with substantially different policy conclusions. Given what is at stake, in terms of resource use and the fundamental importance of education for the future of a society, it is very important that we "get it right" in studying educational issues. And for the policy-maker, "getting it right" doesn't just mean making sure that our conclusions are consistent with the assumptions of our models; making sure that we are using the right model in the first place is even more important. There is, therefore, a strong need for empirical work that would enable us to discriminate between competing analytical approaches. Yet, as I will discuss later, education is an area where it has proved particularly difficult to use empirical observation for this purpose.

In my presentation, I will be discussing education policy from the viewpoint of an economist. That does not necessarily mean, however, that I consider the narrowly economic aspects of education the most important ones. It is true that education

can be seen in part as something that is valuable because it raises a country's ability to produce goods and services. But at the same time, individuals value it for its own sake; the odd economist may even admit that education could have intangible but real benefits for the general quality of a country's political and social environment. In my personal view, a commitment to a basic level of education for all men and women, at least to the level of literacy, is something that could be justified even if education did not raise the measured productivity of those who acquire it. As I see it, education at a basic level should be a part of the minimum level of real welfare that a compassionate society should seek to provide for each of its members, male or female. Universal access to basic education is a goal that should continue to enjoy a high priority in Pakistan.

Having said this, however, let me go on to say that I also believe that the equity objective becomes less important as we consider successively higher levels of education. While literacy might be appropriately classified as a fundamental human right, a degree in business administration cannot. For many people and many fields of study, education at the upper-secondary and post-secondary levels may continue to be something that is valued in part for its own sake. But for most students at these levels the economic aspects are the most important by far, and most of what follows should be taken as relating primarily to education at these higher levels. It is at these levels that the potential for rationalization and resource savings are the greatest, and more restrictive policies might be appropriate. The amount of public resources being spent on education at the *primary* level in Pakistan is probably too small; at that level, the priorities should be to make better use of existing resources, and to provide enough funds to ensure universal access.

The rest of my presentation is organized into two main sections, focusing on the supply and demand sides of the market for educated labour. In the first section, I briefly review the human-capital approach to higher education. I then discuss the rationale and the basic line of reasoning in models where the basic function of education is seen as that of providing information concerning pre-existing individual characteristics, rather than creation of productive skills. I also consider some implications of these different approaches for issues in education policy, such as the financing of higher education. On the demand side, I review the analysis and implications of models that have postulated exogenously specified sticky wages; these include models in the rent-seeking spirit with open unemployment of graduates, and the "credentialism" or "fairness-in-hiring" models, in which the sticky wages in jobs for different types of educated labour compel graduates to take jobs for which they are overqualified. Finally, I briefly discuss some developments in the recent work on wages and unemployment which focuses on issues such as firm-specific human capital, asymmetric information, and transaction costs, and consider the possible

relevance of this work to markets for educated labour in LDCs. In a short conclud-
ing section, I summarize what I see as the main message of my survey, and the
implications for future analysis of educational policy in LDCs.

I. THE SUPPLY OF EDUCATED LABOUR

The Human-Capital Approach

As Mark Blaug [9] has documented, the economics of education, and especial-
ly the role of education in growth and development, became prominent topics during
the early years of the 1960s. There were a number of reasons for this. For one
thing, the empirical work on the structure of economic growth by Kuznets [23],
Solow [39], and Denison [16] showed that physical capital accumulation, which
until then had been treated as the central factor in most of the analytical work on
growth issues, appeared to account for only a relatively limited share of observed real
growth.[1]   At the same time, the critical role of certain types of high-level skilled
manpower in the administration of a modern state had been thrown sharply into
focus as a number of former colonies became independent nations and high-level
expatriate manpower was withdrawn.

But, in addition to the new empirical information and the political develop-
ments, there was another factor which contributed substantially to the upswing in
the interest in the economics of education. At the University of Chicago, a talented
and innovative group of scholars working under the leadership of T.W. Schultz and
including Gary Becker, was having great success in applying the new human-capital
framework to the study of education and other activities that had until then been
considered somewhat outside the mainstream of economic analysis.[2]   Education
would probably have been an important issue for development planners and inter-
national agencies in any event, but it seems likely that by putting educational policy
firmly within the realm of mainstream economics, the human-capital approach
contributed to the policy shift toward a greater emphasis on education as a way of
stimulating economic development.

The essential idea of the human-capital approach is familiar.   The use of
resources to produce things like formal education, health care, job search, migration,
and training on the job, is seen as analogous to the use of resources for produc-
ing machines, buildings, and roads. In either case, what is taking place is *investment*,
since the resources are being used to increase the capacity of the firm or an individual
to produce future consumption goods and utility, not for producing consumption
goods and utility now.

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[1] See Solow [39], Denison [16]; and Kuznets [23, especially Chapter 10].

[2] Important early works include Mincer [28], Schultz [35; 36], and Becker [2]. For a
recent survey of attempts at estimating the contribution of education to economic growth,
see Psacharopoulos [30].

In itself, this view is perhaps not all that startling. As Mark Blaug points out in his survey [9, p. 829], human-capital theory is, after all, nothing but "an application of standard capital theory to certain economic phenomena", and the prediction that the private demand for something like education should be responsive to its expected future payoff should not come as a surprise. Paradoxically, however, the human-capital approach may have had the greatest impact in those countries where higher education was largely financed and organized by the public sector. In those countries, the argument that the benefits from education could be measured as a rate of return on investment, as in the case of physical capital formation, may have increased the willingness of the government to spend money on education even if it meant reducing investment in physical capital. On the other hand, in those countries where privately financed education retained a significant role, the theory could be regarded as broadly consistent with a hands-off approach, since it implied that the actions of rational individuals would tend to produce the equalization of the returns to investment in human and non-human capital that is necessary for an efficient allocation of investable funds.

In fact, this argument could be taken further, and could be used in support of "privatizing" higher education in those countries where the system was largely publicly funded, or at least for giving a major role to the private sector in the expansion of the education system that was taking place in many LDCs. However, while private education was allowed a continuing role in some countries (India, the Philippines and several nations in Latin America), the prevailing view in the LDCs was that expansion of higher education should largely take place in the public sector. With highly imperfect capital-markets, especially for long-term investments and for such investments as those in human-capital where the issue of collateral creates difficulties, it was felt that the private market could not be relied upon to bring about an efficient rate of human-capital investment.[3] Moreover, the capital-market imperfections would give an unfair advantage to the children of rich families who did not have to rely on borrowed funds for their education, so that private funding was also seen as inconsistent with equity in access to education.

The Issue of Ability versus Schooling

During the 1960s and '70s much of the empirical work in the field of education focused on estimating rates of return to incremental amounts of education, since rate-of-return estimates were needed to help in making decisions regarding public-sector spending on education.[4] The usual starting point for this kind of work was collection of information on income levels of individuals with different amounts of education. Since there is a systematic tendency for individual incomes to vary with

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[3] See Musgrave [29] for a summary statement of this line of argument.

[4] See, for example, Psacharopoulos [32].

age as well as with schooling, the information was often summarized in the form of earnings functions, that is, estimates of projected time-paths of earnings for individuals with different levels of schooling. The predicted income differentials could then be compared with estimates of the incremental costs of schooling to obtain rate-of-return estimates.[5]

In interpreting this type of empirical work, there is one important complication that must be considered. Individuals differ in many other ways as well, not just in age and years of schooling, and these other differences may also influence their earnings. This may create problems for empirical work. A moment's introspection suggests that a number of innate individual characteristics that are likely to be valuable to an employer are also characteristics that are likely to make an individual successful in school: basic intelligence, persistence, organizational ability, and so on. Thus, individuals with these characteristics are likely *both* to acquire many years of schooling *and* to earn high incomes, and this introduces a spurious element in any schooling — earnings correlation. Secondly, characteristics such as basic intelligence or organizational ability can only be measured very imperfectly. Therefore, the prospects of getting more precise estimates of the separate education — earnings link do not seem very promising, and attempts along these lines in work in the mid-1970s yielded ambiguous results.[6]

The uncertain message from the empirical work added to the general skepticism concerning the simple human-capital approach that began to appear in the mid-1970s. At a more maundane level, another contributing factor was the observation that, apart from specialized fields such as engineering, law, or medicine, what most students learn in institutions of higher education turns out in the end not to be very directly related to the work they subsequently do.

The Signalling/Screening Approach

But if the function of higher education is not primarily to impart specific productive skills, just what *is* its function? The answer suggested by Arrow, Spence, and others in the mid-1970s was that a primary function of higher education is to act as a *screen* or *signalling device*.[7] It helps employers to identify those individuals who have characteristics that are likely to make them productive workers; or, equivalently, it enables workers to make this known to employers. In this framework, the

[5] For an elementary exposition of the principles involved in this type of calculation, see Psacharopoulos and Woodhall [33, Chapter 3].

[6] For a careful review of the empirical work on these issues, see Blaug [9, section V]. Blaug's conclusion at that time was the "After ten years of work on earnings functions, all we have is a dim light at the end of the tunnel ... the problem has proved to be more complicated than was originally imagined."

[7] See Arrow [1]; Spence [40]; Stiglitz [42]. Spence [41] contains a very readable and concise summary of several versions of the signalling/screening hypothesis.

reason why educated workers earn more than those with less schooling is not that they have acquired specific productive skills, but that they are more productive to begin with: their educational qualifications simply serve as a signal telling employers that they have these characteristics.

At first glance, the signalling hypothesis has a plausible ring to it. Part of the reason is that it gives a central role to the grading and evaluation function of higher education. (In contrast, the human-capital approach downplays this function by emphasizing the amount of time spent in getting educated, rather than a student's grades or diploma, as the main predictor of earnings.) But it is also important to recognize that the validity of the signalling approach rests on one very critical assumption: that employers cannot just hire workers, observe their performance, and then adjust their subsequent salary offers to correspond to the workers' observed productivity. If that could be done, there would be no reason for individuals with productive characteristics to signal prospective employers through education. Thus, an explicit or implicit assumption of "costly monitoring", reinforced perhaps by a high cost of labour turnover, is necessary for the screening/signalling approach to make sense, and it becomes a relevant question whether we can empirically demonstrate the importance of monitoring and turnover costs.

In one sense, the signalling approach is not inconsistent with the human-capital approach. Even if individuals use education merely as a device for identifying themselves as having superior productivity, the cost of education can still be thought of as an investment which is undertaken in order to raise the individual's subsequent income. In another sense, however, the approaches are very different: they imply very different views concerning the social productivity of education.

Consider, for example, the simple case that has become known as the "pure signalling model". In this model, all individuals are supposed to supply the same *kind* of labour. (Equivalently, the assumption suggests that worker productivity is determined by a single relevant characteristic.) However, individuals differ in the sense that they have been born with different ability: different individuals can be thought of as having different amounts of efficiency units of labour. To make matters really simple, suppose there are only two kinds of people, the "bright" (B) and the "slow" (S), with the Bs being more productive than the Ss in whatever job they do and whether or not they have received an advanced education (say, a college degree). Suppose further (consistent with the fundamental assumption underlying the signalling approach) that employers cannot directly observe whether a person belongs to the Bs or the Ss, and that it is difficult and costly to tell which is which, even after a person has been employed.

If we assume first that no individuals get educated, employers will not know whether a job applicant is a B or an S, so they will have to offer the same wage to everyone. If we formalize this reasoning into a model and work it out, we will find

that in equilibrium, everybody will be paid a wage that corresponds to the *average* productivity of the Bs and Ss, which implies that the Bs are paid less than their marginal productivity, while the Ss are paid more than theirs.[8]

Suppose now that we open up the possibility for individuals to invest time, effort, and money in getting some type of formal qualification, say, a secondary-school certificate or a college degree. It is then possible that it might pay a B-type person to get a secondary-school certificate, if possession of this qualification convinces employers that the individual belongs to the B group. He can then demand and obtain a higher wage offer.[9]

Now consider a "screening equilibrium" in which resources are being used on an educational system that performs this type of signalling function, and contrast this with the case where education produces skills which increase the productivity of the individuals being educated. In the latter case, education is socially productive: the resources being spent on it will raise aggregate consumption and potential social welfare in the future. In the signalling equilibrium, on the other hand, the expenditure on education represents a complete waste from a social point of view. Even though those who get, say, a college degree will earn a higher income, they will earn it at the expense of those without a degree, whose incomes will fall. From the viewpoint of society as a whole, there is no payoff; society would be better off if the education system were closed down.[10]

An interesting observation here is that it is possible to interpret the waste that is inherent in this signalling activity as yet another case of unproductive rent seeking, a concept that has figured prominently in the development literature recently.[11] The higher productivity of talented individuals can be interpreted as a pure rent on their

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[8]Let b be the (lifetime) productivity of a B-type individual, and $s < b$ the productivity of an S-type person; let the share of B-type persons in the population be p. Then the expected productivity w^e of a randomly selected person is

$$w^e = p \times b + (1 - p) \times s.$$

Competition among employers would force them to pay w^e to all workers, since (by assumption) they can't distinguish between B- and S-type workers. We have, by construction, $b > w^e > s$.

[9]Let e be the cost to a B-type worker of getting educated, and suppose $b - s > e > b - w^e$. In this case we have two possible equilibria, one in which all B-workers get educated, and B and S workers are paid b and s, respectively, and one equilibrium in which no one gets educated, with everybody being paid the wage w^e.

[10]Note that output per capita in this case is w^e whether or not anybody gets educated. In the equilibrium where all B-persons get educated, consumption is reduced because some of society's output is spent on education.

[11]See, for example, Krueger [22]; Bhagwati and Srinivasan [7]; Bhagwati [4]; Mohammad and Whalley [28]; Blomqvist and Mohammad [13]. For a collection of essays on the use of the rent-seeking concept in other contexts, see Buchanan, Tullock, and Tollison [14].

differential ability. However, without educational qualifications to signal their high ability, these individuals will not be able to collect the rents for themselves; the rents will accrue to society at large. But if they *do* spend resources on signalling, they will be able to collect the rents.

Variations on the Signalling Theme

The implications, for educational policy, of accepting the pure signalling/screening view of education are dramatic, as you might expect. Before discussing these implications, however, it is worth noting that in some variations on the screening theme, models have been constructed in which it remains true that the function of education is to provide information about individuals (rather than to impart valuable skills), but in which this information is valuable to society as well as to the individual. As an example, suppose individuals are different in terms of more than one characteristic (not just in terms of cognitive skills, for example, but in terms of things like persistence, ability to work with others, and so on). If the relative importance of these characteristics is different in different jobs, then social productivity will be increased if there is an appropriate matching of workers and jobs. But if it is now assumed, just as in the pure signalling model, that it is difficult and costly to evaluate individual characteristics by monitoring workers' performance on the job, then it may be in the interest of individuals with a valuable set of characteristics to use education as a device to signal to employers that they have these characteristics. In this case, however, provision of this information has positive social benefits as well, because it helps in allocating individuals to jobs for which they have comparative advantage.[12]

While this version of the signalling/screening hypothesis implies that education is not pure waste (because it helps to match workers and jobs), it does not follow that the productivity gains from better matching are large enough to justify the resource cost of the education. Intuitively, if there are large productivity differentials between individuals (regardless of what job they perform) but only small differences in the productivity of a *given* individual in different jobs, then the outcome might be close to the waste implied by the pure signalling model.[13] In any case, the estimation of a social rate of return to education becomes a very complicated matter and cannot easily be done on the basis of observed income differentials.

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[12] Stiglitz [42] analyses this potential benefit from screening in detail. See also Spence [41] and MacDonald [25].

[13] On the other hand, as Blaug has pointed out, "... not a single piece of evidence has been produced to show that the educational system is not an efficient sorter of students..." Specification of conditions under which an educational system provides a socially efficient amount of "sorting" would appear to be a challenging theoretical task, and a prerequisite for meaningful interpretation of evidence on this issue.

Finally, suppose one takes a sensible intermediate position and suggests that education is not *only* human-capital formation, or *only* signalling, but a little bit of both. In that case, one might think that the effect of adding a signalling motive to the human-capital model would produce a tendency for too much education to be produced. If individuals benefit from education both because they learn productive skills *and* because a certificate or degree suggests to employers that they have a large amount of innate ability, would that not lead them to acquire more education than would be justified on the basis of the productivity gains alone?

Unfortunately, it turns out that the answer is not that simple and that a rigorous analysis of these intermediate cases may become very complicated.[14] On the one hand, the outcome just suggested *may* occur, especially if individuals with relatively low ability try to acquire educational qualifications as a way of getting jobs where they are paid as much as educated individuals with more ability. On the other hand, however, it is possible to construct plausible-looking models with an equilibrium in which the difficulty in monitoring individuals job performance leads to *underinvestment* in education, even though education in part may serve as a signal of high ability. It is interesting to note that this outcome has been observed in a model[15] in which consideration was given to the information contained in students' grades (as opposed to the information conveyed simply by successful completion of a particular degree programme). The intuition here seems to be that bright students who succeed in identifying themselves as such by earning high grades at an early stage in their education do not then have a sufficient incentive to acquire more education even though it would be socially productive for them to do so.

Evidence and Implications for LDC Education Policy

Against the background of the preceding sketch of the principal elements of the signalling/information approaches, I would now like to step back briefly and consider what can be said about their significance for the study of the economics of education. Ten years ago, Mark Blaug predicted that "the human capital research programme... will gradually fade away to be swallowed up by the new theory of signalling... [The] screening hypothesis will be seen to have marked a turning point in the human investment revolution in economic thought...." [9, p. 850]. Was he right?

If we judge these approaches by the interest that they have generated among those who specialize in analytical work on labour market problems (and indeed, micro-economics in general), they have certainly had a substantial impact. The study of the problems that arise when information is asymmetrically available to economic

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[14] See, for example, Spence [41]; Weiss [43].
[15] Weiss [43].

agents and monitoring of individuals' behaviour is costly has been one of the most active research areas in micro-economics for some time, and much of the work has been motivated by, or applicable to, educational issues.

There has also been some empirical work on the problem of discriminating between the human capital and the signalling/information approaches, both in industrialized countries and, more recently, in LDCs.[16]   Here, the record of the signalling/information approaches is mixed.   While there is agreement that educational qualifications are traditionally used by employers for screening newly employed workers, there is also evidence that subsequent monitoring of individuals on the job substantially increases employers' ability to measure actual worker productivity.[17]   Clearly, this tendency would reduce the private profitability of education if its sole purpose was signalling rather than acquisition of productive skills. Furthermore, recent studies of self-employed farmers in LDCs indicate that those who had had some primary education were substantially more productive than those who had not.[18]   Since screening is not a relevant consideration for a self-employed worker, this provides evidence in favour of the human-capital approach and against the view of education as pure signalling.   Thus, it is fair to say that the empirical studies have not so far provided enough support for the signalling/information approach to make it supplant the human-capital view as the principal framework for the analysis of LDC education policy.

In my view, however, the issue should not yet be regarded as settled. Firstly, the evidence from observations of the productivity of self-employed farmers relates to *primary* education. On intuitive grounds, I do not find that evidence surprising. It makes sense that basic literacy and some elementary exposure to analytical thinking should be helpful in making farming decisions, especially in a setting where traditional cultivation patterns and techniques are rapidly being replaced with new technology. *A priori*, I would expect similar productivity-enhancing effects from primary education in urban-sector jobs as well.[19]

But while I am quite prepared to believe that the human-capital model captures what is most important about primary education, I think the case of higher education is quite different, and that the signalling/information models may have much greater applicability there. As I will argue in more detail below, the widespread evidence of "credentialism" (that is, the practice of selecting among job applicants on the basis of educational qualifications, even if these qualifications are

[16]For an early discussion, see Layard and Psacharopoulos [24]. For recent surveys, see Psacharopoulos and Woodhall [33] and Whitehead [44].

[17]See Psacharopoulos [31].

[18]Jamison and Lau [21]; see also Psacharopoulos and Woodhall [33, pp. 45–50] for further references.

[19]Berry [3] provides a review of empirical studies on the education-productivity link in urban jobs.

unrelated to the job applied for) is too strong to ignore. And even if it is possible for employers to accurately monitor workers' performance *after* they have been on the job for some time, they may sometimes fail to do so because they do not have sufficient incentive. This may be particularly relevant in the public sector. Government employees in many countries tend to be locked into pay scales that leave little room for adjusting earnings to productivity, even in activities where productivity *could* conceivably be measured with reasonable accuracy. But if there are important subsectors in the market for educated labour where there is little or no on-the-job performance evaluation, the case in favour of the signalling/information approaches is strengthened.

Thus, it is my belief that the phenomena described in the signalling/information models may well play a significant role in the markets for educated labour (at least beyond the primary level) in many countries and in LDCs in particular. For this reason, I believe that more attention should be paid to these approaches in empirical and analytical work on education policy; at the policy level, the human-capital approach has so far been the most dominating one by far.

Given the radical differences between the human-capital and signalling approaches, at least in their pure forms, it should not come as a surprise that the policy recommendations that flow from them may be quite different. One example might be the question of internal quality standards in the education system. Under the human-capital model, it is natural to assess quality on the basis of students' performance in terms of achieving an understanding of the subject-matter being taught, development of general cognitive skills, and so on. Factors which affect these variables, such as the quality of textbooks, qualifications of teachers, student-teacher ratios, and the effectiveness of various teaching techniques, come to the fore.[20] It is also inherent in the human-capital approach that considerable attention must be paid to the allocation of resources between different specific *kinds* of human-capital formation.

On the other hand, if the formal-education system is seen primarily as a system which carries out sorting or screening of individuals according to exogenously given ability, the criteria for internal efficiency become quite different. The system should then not be assessed primarily with reference to what the students learn, but, instead, with reference to the precision with which their different abilities are indentified and measured, and to the cost of doing so. Thus, the emphasis should be on the development of efficient testing methods, and the design of course-material that will facilitate subsequent testing, rather than on material that would improve the average performance of the students.

[20] A review of research on quality issues is contained in Psacharopoulos and Woodhall [33, Ch. 8].

In other respects, however, the policy recommendations would differ less dramatically between the two approaches. Consider, for example, the issue of *financing* post-secondary education.

If one accepts the human-capital model, the benefits from education can be seen as largely accruing to those individuals whose human capital is increased by it. In spite of this, governments in most countries have opted for educational systems that are largely tax-financed. The reasoning has been that with uncertainty and imperfect capital markets, a system relying on substantial user-fees (in the form of tuition) would imply an unacceptable degree of discrimination against students from poor families. But, over time it has become increasingly clear that tax financing may have unintended side effects. In the long run, it is politically difficult for governments to resist the pressure to increase the number of places in the post-secondary system, as the private demand for education rises in response to the subsidy. As a result, there is an expansion of the post-secondary system, which in turn leads to an increase in the supply of human capital. This increased supply then tends to drive the social return on human capital below that on physical capital, implying a certain amount of social waste.[21]

The solution recommended by many, who see the process in this light, is to reduce the private demand by relying to a larger extent on user fees in the system (perhaps complemented by some form of a guaranteed-loan scheme, to deal with the equity issue). The gains to society from such a policy would come in the form of reallocation of its capital resources from human capital (with a low social return) to higher-return physical capital. The extent of the gain would depend, among other things, on the elasticity of the private demand for education, which in turn would reflect the elasticity of substitution in production between human capital and other factors.

Consider now the question of education-financing in the context of the signalling/information models. Again, the benefits of education accrue to those who acquire the certificates or degrees, because they are able to convert them into higher incomes. Since the private profitability of using education as a signal depends on the cost of education, when education is subsidized it may become profitable for individuals with less ability (who would otherwise find acquiring a degree too difficult and costly) to spend more time in the educational system. But in order for individuals with more ability to identify themselves, they would now have to go on to acquire qualifications at a higher level than before. The end result may be a situation in which individuals at all levels of ability seek more education than before, since signalling at all levels of ability has become less costly because of the subsidy. If one believes the signalling/information models, there is likely to be social wastes in the

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[21] This process and its implications for the effects of educational policy are briefly discussed in Blomqvist [12].

educational system even without a subsidy (except for any productivity increases that result from better matching of workers and jobs). The result of introducing a subsidy and causing an expansion of the educational system will simply be to exacerbate this waste.[22]

Again, the extent to which efficiency gains could be realized by decreasing the subsidy would depend on the elasticity of the private demand for education. In the signalling/information case, however, this elasticity does not depend primarily on production conditions. Instead, it now depends on a complex set of factors, which includes the rate at which the private costs of education (including subjective costs) rise with more education, for individuals of different ability, and the extent to which employers would reduce their on-the-job monitoring of worker performance when prior screening of workers by the formal-education system becomes more thorough. These relationships have not been worked out in much detail in the existing literature, I believe there are useful insights to be gained by undertaking such work.

II. THE DEMAND SIDE

The upshot of what I have been saying so far is that I think there is much in the signalling/information approach that is of relevance to education policy in LDCs, even though the formal work on this approach has not so far been directed specifically at LDC problems. I would like to turn now to a distinct but somewhat related set of questions that I also think deserve more emphasis in work on LDC education policy, namely, questions that relate primarily to the *demand* side of the markets for skilled labour, and to the causes and consequences of wage rigidities in these markets.

Toward the end of the 1960s, it became more and more difficult to disregard a new phenomenon that tended to cast doubt on the wisdom of continuing expansion of the higher education system in many countries: unemployment of secondary-school leavers and university graduates was becoming a major problem.[23] In conventional micro-economic analysis, open unemployment of a factor of production will arise only when, for some reason, the market price of the factor is sticky and fails to adjust itself to an excess supply. What the evidence in the late 1960s and early 1970s was suggesting, therefore, was that there were strong rigidities in the markets for educated labour in LDCs. It is important to note that this problem had nothing to do with the question whether education is best interpreted as a form of capital formation or as a signalling/information device. In either case, stickiness in the wages of educated labour would create unemployment.

[22] As already noted, in the pure signalling model higher education is analogous to socially unproductive rent-seeking. A subsidy to the private cost of education can thus be thought of as a subsidy to rent-seeking. The efficiency effects of this kind of subsidy, in a somewhat different context, are discussed in Blomqvist and Mohammad [13].

[23] An early analysis of this phenomenon, for the case of India, is contained in Blaug, Layard, and Woodhall [10].

I would like to comment briefly on two lines of inquiry that have involved the problem of wage rigidity, and their implications for policy. One approach accepts the rigid wages as exogenously given, and analyses the consequences for the economy as a whole; there is also the consideration of second-best policies in the presence of wage inflexibility. The other line of approach is a branch of the literature in labour economics that deals with the structure of labour contracts under imperfect information, risk aversion, and transaction costs. While this work has so far not been directly concerned with markets for educated labour in LDCs, I think it has potential relevance to the issues that arise in these markets.

Sticky Wages and Unemployment of Graduates

The literature that has dealt with the effects of exogenously given wage rigidities has typically used general equilibrium methods, and has generally postulated that education corresponds to simple human-capital accumulation; issues of differential ability and asymmetric information have not been dealt with explicitly. In one set of models, it has been assumed that the effects of the rigidity in the wage of educated labour is to generate open unemployment of graduates: the implicit assumption is that graduates do not compete with uneducated workers in the market for unskilled jobs. The equilibria postulated in these models are similar to that in the famous Harris-Todaro [20] model of rural-urban migration: students will continue to be attracted to the education system as long as the *expected* earnings of educated workers (taking into account the probability of unemployment) are high enough to justify the cost of becoming educated.[24]

The range of policy issues that can be investigated in these models is limited, given their exceedingly simple structure: only one type of educated labour, a single predetermined education production function, a perfect capital market, no risk aversion, and so on. Attention is focused principally on two simple issues: subsidies to the private cost of education, and effects of a policy of deliberate job-creation for graduates.

With an institutionally fixed wage for educated labour and a resulting equilibrium with unemployment of graduates, it might seem that the question of the effects of a subsidy to education should have an easy answer. Since a subsidy lowers the private cost of education, in the new equilibrium the expected earnings of educated labour will be lower than before, and (with the wage of *employed* graduates being fixed) the decline should come about through increased graduate unemployment. But if the new graduates do not add to national income, while their education requires resources, the policy conclusion ought to be that education should not be subsidized; in fact, it would seem more sensible to *tax* education, not subsidize it.

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[24] Models of this kind have been used by Chaudhuri and Khan [15]; Blomqvist [11]; and (in a somewhat different context) Bhagwati and Hamada [5].

As often happens, the results of the analytical models that have been used to look at these issues are ambiguous in general. While they show that under certain conditions on the values of the model parameters, the effects of subsidies are consistent with the preceding intuition, they also show that there are other conditions (which on the face of them do not look wildly implausible) under which subsidies will have unexpected paradoxical effects.[25] Further analytical and empirical work designed to discover the degree to which these paradoxical results have practical policy relevance would seem to be an important research priority.

When it comes to the effects of a policy of deliberate job creation for graduates, the intuition is a little less immediate than in the subsidy case. At first blush, the existence of unemployment of graduates suggests that job creation should be a good idea, since there is a pool of unemployed graduates whose time has zero opportunity cost. However, in analytically similar case of rural-urban migration, the results from the Harris-Todaro model tell us that we must be careful. In that model, if the government creates jobs for the urban unemployed, it creates a disequilibrium since there is an increase in the average income of all urban workers taken together. In response to this disequilibrium, there will be migration of agricultural workers to the cities until the average urban earnings have once more fallen to the level of the rural wage rate. In the new equilibrium, we will have more urban unemployment than we had to start with , and there will have been a decrease in rural output. In a limiting case of the Harris-Todaro model, the decrease in the value of rural output may be as high as the value of the output of the newly employed urban workers so that job creation is not efficient.[26]

The logic in the case of unemployment of graduates is similar. Job creation for unemployed graduates will raise the expected earnings of graduates, and this will

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[25] For example, Chaudhuri and Khan [15] find that in their model, it is possible for an *increase* in the subsidy to education to *decrease* the equilibrium unemployment of graduates. Part of the reason for the ambiguity appears to be related to the different relationships of substitutability and complementarity that may exist among the three factors of production that are assumed in these models (unskilled labour, educated labour, and capital). Blomqvist [11] also encountered this problem in his model.

[26] The migration equilibrium condition in the Harris-Todaro model can be written as

$$w^m (E/U) - w^r = 0$$

where w^m is the fixed urban (manufacturing) wage, w^r is the rural wage, E is the number of employed urban workers, and U is the *total* number of urban workers (employed and unemployed).

Suppose now that one urban job is created; this increases output by w^m, the marginal product of an urban worker. If w^r stays constant as agricultural workers migrate to the city in response to the urban job creation, equilibrium will be re-established only after (U/E) rural workers have moved to the city (so that the ratio of employed to total labour in the city is the same as before). But this implies that rural output has decreased by $w^r \times (U/E)$. By the equilibrium condition, this is equal to w^m, so that the net change in output is zero.

raise the number of people seeking education. In the new equilibrium, the cost of educating the additional students in the system may rise by enough to offset the value of the output in the newly created jobs. Furthermore, there is an interesting twist in the case of education. If education is highly subsidized, it is the *private* cost of education that must equal the expected earnings of graduates in equilibrium. However, the opportunity cost of increased education, from the viewpoint of society as a whole, is *greater* than the private cost when there is a subsidy. This raises the possibility that in the new equilibrium after the government job creation, the cost of the additional resources devoted to education may be substantially higher than the value of the output in the newly created jobs. If that happens, a policy of deliberate job creation for unemployed graduates might end up being very expensive indeed.

Sticky Wages and Credentialism

In an equilibrium where wages are rigid and there is unemployment of educated labour, part of the earnings of employed educated workers is a rent: the wage is higher than the private opportunity cost of being educated. Thus, one can think of it as a rent-seeking equilibrium, where the unemployed are regarded as engaged in competing for the rent-bearing jobs. As I have discussed in another context, however, the characterization of equilibrium in rent-seeking models is very sensitive to the way it is assumed (explicitly or implicitly) that the rent-bearing assets or jobs are allocated.[27] In models with a rigid wage *combined with* unemployment, one can think of the rents as being equally shared by all graduates who are considered as taking turns being unemployed or holding the rent-bearing jobs, respectively.

There is, however, another version of the rigid-wage model in which rent-seekers are not unemployed, but instead work in jobs for which they are overqualified. This is the "job-ladder" or "bumping" model, somewhat different versions of which were independently developed by Gary Fields [19] and Bhagwati and Srinivasan [6]. These models can be extended to analyse the much discussed phenomenon that goes under the name of "credentialism".[28]

Looked at from the viewpoint of the rent-seeking literature, the essential feature of these models is that even though there is rent-seeking because the wage rates are above the private opportunity cost of acquiring the necessary educational qualifications, there is no unemployment. Those who are unsuccessful in obtaining a job for which they are qualified, instead, end up working in a job that could be filled by somebody less qualified. However, the equilibrium conditions imposed to close the models are similar in spirit to those in the models discussed earlier. In equilibrium, the educational activity expands until the average earnings of all educated

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[27] See Blomqvist and Mohammad [13].

[28] A careful and provocative discussion of the credentialism phenomenon from a non-economist's point of view is contained in the book by Dore [17].

people (including those working in jobs for which they are overqualified) are just high enough to offset the private opportunity cost of becoming educated.

The extension of this model to incorporate the phenomenon of credentialism can be accomplished by adding to it what Bhagwati and Srinivasan [6] refer to as the "fairness in hiring" principle. Credentialism refers to a situation in which there are several levels of jobs with rigid wages, and several levels of education, and in which preference for hiring in a particular job is always given to the applicant with the higher educational qualification. As the educational system expands, and provided the wages remain rigid, this leads to a gradual process in which workers with increasingly sophisticated educational qualifications crowd out those with less advanced credentials in successively less complex and less well-paid jobs.

The analysis of the effects on economic efficiency, and of possible policies to reduce the waste inherent in this type of credentialism, is similar to that in the simpler rent-seeking models with unemployment of the educated. In particular, it is again possible to show that the waste of resources involved in rent-seeking which manifests itself in credentialism, may be greatly aggravated if the private cost of education is subsidized. Thus, the case for making students shoulder a larger part of the financial burden of higher education through increased user-charges appears strong in this case as well, just as it did in the context of the open-unemployment case, or in the signalling/information models. Furthermore, the depressing logic of the Harris-Todaro model continues to hold. To put it simply, if you have taxi-drivers with MA degrees in mathematical statistics, creating more jobs for MAs in mathematical statistics will not do any good, because the educational system will quickly expand to produce new statistician/taxi-drivers.

Uncertainty, Implicit Contracts and Costly Monitoring

Just as in the case of the signalling/information models, there is much that sounds plausible in the analysis and conclusions of the models that are based on labour-market rigidities and rent-seeking. However, one somewhat unsatisfactory aspect is that there is usually no explanation why these rigidities exist. This issue is of particular interest since in the recent literature on labour markets in industrialized countries, increasing attention has been paid to the possibility that what used to be considered non-competitive inefficient rigidities are in fact efficient contractual devices (implicit or explicit) that arise in response to factors such as uncertainty and risk aversion, transaction costs, and high costs of monitoring workers' performance.[29] The reason why some of these approaches are important is that they force a reassessment of some of the traditional analysis of efficiency losses from apparent wage rigidities.

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[29] For a survey of the literature, see Rosen [34].

A key insight from this literature is that these types of long-term contracts may tend to involve less fluctuation in wages than one would expect in an auction market in which random fluctuations in supply and demand conditions would produce large fluctuations in wages. Similarly, depending on the preferences of workers and firms, the best contract *ex ante* may be one in which wages remain stable, but workers agree (implicitly or explicitly) to temporary lay-offs (rather than wage cuts) in periods of low labour-demand, with the contract giving the firm the obligation to rehire its laid-off workers when demand improves. We might thus observe a market with stable wages and spells of unemployment. But it would be wrong to interpret this unemployment as being due to an involuntary excess supply of labour; instead, it should be interpreted as a pattern that results *ex post* from a contract that represents the best way to share the costs associated with uncertainty and fluctuations in demand for the firm's products. Note also an important policy implication. Trying to reduce unemployment by eliminating labour-market rigidities is not in this case an efficient policy. This is because what appear to be rigid wages in this case should more accurately be interpreted as *stable* wages, consistent with an efficient division of risk between employers and workers.

How relevant are these considerations to the case of rigidities in the markets for educated labour in LDCs? I would argue that they are relevant to a substantial extent. They can be used to explain why wages for educated workers (both in government and in private firms) remain stable or rise according to well-defined schedules of pay increments, once a worker has been employed in a particular job. It is clearly not realistic to expect governments or firms in LDCs to react to the unemployment problem of recent graduates by allowing wages of already employed educated workers to vary from month to month in accordance with fluctuating supply/demand conditions in the overall market for educated labour.

But, while the implicit contract theory is consistent with stable wages among *already employed* workers, it is less easy to reconcile with sticky wages for recent entrants to the market for educated labour, and the type of widespread unemployment among graduates that is such a prominent feature of the labour markets in many LDCs.

An approach that may be more promising in explaining persistent unemployment of this kind is one that has been discussed in a recent paper by Shapiro and Stiglitz [38]; it relies on the same concept of costly monitoring of worker performance that underlies the signalling approach that I discussed earlier. Shapiro and Stiglitz argue that in a competitive labour market where anybody can find a job "at the going wage" without difficulty, a worker who is fired because he has performed poorly, does not suffer much of a penalty if he was paid the same going wage as everyone else to begin with: he can (by assumption) quickly find a new job at the same wage. Therefore, workers will not have a strong incentive to perform well,

especially if employers do not closely monitor worker performance because it is costly to do so.

In these circumstances, it may pay a firm to offer a wage somewhat *above* the going market wage, so as to raise the expected penalty of underperforming ("shirking", in the Shapiro-Stiglitz terminology). However, if it pays one firm to offer a higher wage for this reason, it will pay all firms to do so. In equilibrium, the wage may be too high to be consistent with full employment, but there may be no tendency for it to be bid down, since firms that pay lower wages run the risk that their employees will underperform. Shapiro and Stiglitz refer to their model as one in which unemployment serves as a "worker discipline device". Alternatively, one can think of it as resulting from employers' desire to give an implicit performance incentive to their employees, without having to closely monitor individual performance.

These ideas of wage rigidity as resulting from some form of implicit contract, or unemployment serving as an indirect performance incentive, complicate the discussion of appropriate policy responses. When unemployment of graduates is thought of as being due primarily to monopoly power exercised by labour unions, or minimum-wage legislation imposed by governments, the issue is at least conceptually simple. The unemployment represents waste, and eliminating the source of the rigidity is the right policy; if that cannot be done, there are second-best policies that can be used to reduce the extent of waste. On the other hand, when wage stability is efficient and unemployment serves an economic function, trying to remove the rigidities and reduce unemployment may have perverse effects and *reduce* efficiency. Unfortunately, the conclusion is the familiar one: we need more research in order to better understand the way labour markets function if we want to have a better basis for policy decisions.

CONCLUDING COMMENTS

I will now try to sum up what I think are the most important implications of all this for policy, and for future research on the economics of education in LDCs. Since I have already touched on policy implications at several points, my comments can be fairly brief.

One somewhat discouraging conclusion has to do with the *complexity* of the subject of education and educational policy. In comparison with someone working in the field two decades ago, those working on the economics of education today almost appear to know *less* about what to say to the policy-makers. We have learned that in addition to producing simple human capital in the form of specific productive skills, education can sometimes also be an unproductive competition for the rents on individuals' innate ability; or a sorting device that is productive in improving the way individuals are matched with jobs; or, worst of all, a little bit of all three. We have

also learned that the apparent inflexibility of wages for educated manpower should not necessarily be interpreted as simple manifestations of the monopoly power of labour unions, or misguided minimum-wage legislation: stable wages can also be interpreted as efficient institutional devices for redistributing the burden of risk and uncertainty, and for encouraging the formation of firm-specific human capital that comes about when workers remain in the same job for long periods of time. And if we believe Shapiro and Stiglitz, we shouldn't even necessarily consider unemployment or underemployment of educated manpower purely as a sign of inefficient wage rigidity: to some extent, they may serve as a second-best mechanism for generating performance incentives in jobs where direct monitoring of job performance is difficult and costly.

On the whole, life was simpler when we thought that all that was needed for policy was improved rate-of-return estimates on human-capital formation, and government intervention to curb the monopoly power of trade unions.

In this new era of uncertainty, what are the priorities for research? In considering this question, I would like to stress again the distinction between primary education and higher education. As I said before, the role of primary education corresponds much more closely to the human-capital view, and the labour market for workers with only a primary education has a simpler structure than that for workers with more education. Let me also repeat that, in my view, the equity objective should play a relatively more prominent part in primary education. In the primary field, therefore, traditional issues such as the internal efficiency of the system in meeting specific learning objectives, and calculations of the rate of return on incremental investments in education, should continue to be high priorities.

For higher education, however, I think it is inevitable that research and policymaking will gradually come to be more influenced by the signalling/information approaches. If the system of post-secondary education to a large extent serves as a sorting mechanism, this must be recognized and the concept of cost-effectiveness in higher education modified to reflect this. If the system serves both a sorting function and a skill-producing function, one important question for research is how to quantify the relative importance of these roles.

With respect to the functioning of labour markets, the only way I can see of sorting out the issue of non-competitive wage rigidities versus efficient contracts would involve micro-level studies of labour markets. The phenomenon of credentialism seems to me to need more study: everybody seems to think they know that it is widespread, but I am not aware of many systematic studies. All of this, it seems to me, requires work at the micro-level (such as the tracer-studies of cohorts of school leavers that are now being undertaken in some countries).[30] and perhaps a somewhat

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[30] Psacharopoulos and Woodhall [33, Ch. 4] refer to a number of such studies in Colombia, Tanzania, Malaysia, Chile, Egypt, and Swaziland.

more eclectic approach than economists have been used to. (One of the most important works on the economics of education in the 1970s, I would argue, was Ronald Dore's book on credentialism; that book involves virtually no formal economic analysis.)

Most of what I want to say about policy implications, I have already said. Let me repeat again that one of the policy conclusions that seems to remain remarkably robust, in the sense that it remains the same in different analytical frameworks, is the conclusion that it might well be efficient to make the users bear a larger share of the burden of financing the system of higher education in many countries. One way of indirectly accomplishing this is to put strict limits on the size of the publicly financed component of the system, and let privately financed higher education expand and take up the slack.[31]

As already noted above, a policy of reduced subsidization of education is often resisted in LDCs on the grounds that it would be inequitable. It is claimed that a policy of making students and their families bear a larger share of the financial burden of education would worsen the distribution of income because it would implicitly discriminate in favour of children from well-to-do families.

In my view, however, a concern for equity does not necessarily imply that one must reject a policy of reduced subsidization of the private costs of education. Firstly it is possible to design systems of scholarships and guaranteed loans (perhaps with conditional repayment) which would ensure that talented children from poor families would not be denied access to higher education. Secondly, it is far from clear that the present systems of subsidization in fact benefit children from poor families. Children from relatively well-to-do families tend to make up a disproportionately large percentage of those enrolled in higher education even in subsidized systems. Hence the main effect of educational subsidies may be to transfer income to well-to-do families, rather than to increase the participation rate of children from poor families.[32]   Thirdly, it should be emphasized again that the recommendation of reduced subsidization refers mainly to post-secondary education. A policy of reduced subsidization at the post-secondary level may even make it easier for the authorities to increase expenditures for primary and secondary education so as to improve quality and move closer to universal access at these levels. It seems to me that such a reallocation of expenditures on balance would improve, not worsen, equity.

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[31] There may be problems with the quality of education in private institutions. But if these institutions serve primarily a sorting function in the first place, it is not clear precisely what the criteria for quality should be.

[32] The relationship between educational expenditures and equity has been a topic of intense research in recent years. Useful survey papers are Blaug [8] ; Fields [18] ; and Mingat and Tan [27]. For further references, see Psacharopoulos and Woodhall [33, Ch. 9].

On the demand side, one conclusion that appears robust in the same sense is that a policy of job creation to solve the problem of unemployment of the educated will be both expensive and self-defeating. When it comes to the issues of wage flexibility and unemployment of the educated, one important point to bear in mind is the much greater role of the government as employer of educated manpower in LDCs than in industrialized countries. But the dynamics of labour relations and the process of wage formation in the public sector tends to be different from that in private firms. In the private sector, the financial interest of the owners of the firms that employ educated labour, and competition among them, will constitute an effective counterpressure against the emerging power of labour unions, for example. Furthermore, in competitive private firms, provisions for employment security in labour contracts, or relatively high wages as an indirect incentive to good performance, will be used only in so far as these measures represent the least costly method of acquiring and monitoring labour. In the public sector, in contrast, there is no competition from other firms, and the pressure from taxpayers (who are the ones whose interests are hurt when inefficient wage and employment policies are pursued) may be ineffective in counteracting pressures from public-sector unions, or the desires of senior civil servants and politicians to avoid various kinds of labour trouble.

In a market where the government is the leading employer, therefore, we cannot have as much confidence in competition as a producer of an efficient structure of wages and employment contracts; whether it likes to or not, the government must recognize that it bears a major responsibility for wages and employment conditions in these markets, and the price of pursuing the wrong policies may be high.

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Comments on
"Higher Education and the Markets for Educated Labour in LDCs: Theoretical Approaches and Implications"

Prof. Blomqvist's paper is cast in the mould of economic analysis of educational issues in LDCs. It highlights some policy issues like the need for universalization of primary education. Incidentally, Strumulin's work on economic significance of education was done in Russia in 1924 which showed that workers in factories with five years of schooling were more productive than those who did not have any eudcation. Prof. Blomqvist has emphasized a rational use of resources at upper-secondary and post-secondary levels, and removal of subsidies in higher education, with which I agree. He emphasizes the need for empirical work to arrive at meaningful policy prescriptions. His paper refers to "The Human Capital" approach to education by T. W. Schultz, a Nobel Laureate, and the Chicago School of Education and Economics. The empirical work done on the structure of economic growth by Kuznets, Solow, and Denison of Brookings highlights the importance of education in growth and development. There is little doubt that the seminal work done by the economists helped to create new knowledge now christened 'Economics of Education'. This helped to contribute to the willingness of governments in LDCs as well as internatioanl agencies like the World Bank and UNESCO to channel resources toward the education sector.

Further work done by many others in this field has cast a shadow on the simplistic approach of Human Capital Formation. Problems have arisen relating to the estimation of social rates of return in LDCs where higher education is subsidized. Also, there is the problem of divergence between social rates of return and private rates of return. Prof. Blomqvist makes a pointed reference to this. Problems of poor quality of education and unemployment of the educated have arisen because of indiscriminate expansion of education and the pell-mell growth of secondary, post-secondary and higher education. The problem of wasted element in the form of high drop-outs at lower levels and of poor quality at all levels, under-utilization of physical assets and internal problems of poor administrative management of education have bedevilled attempts at reform. Here the economist must enlist the support of professional educationists and other practitioners of the art to arrive at a meaningful policy package.

As an old teacher and a former education administrator, I have had the opportunity of observing the internal working of the education sector in Pakistan. I

would like to present to you, Prof. Blomqvist and my friends in this meeting, some of the issues for your consideration.

I am very pleased that the PIDE has, as a matter of policy, started giving renewed emphasis to social sectors in its research programme. The paper on Priorities and Efficiency of Pakistan s Public Sector Educational Expenditure by PIDE researchers like Shahrukh, Naushin and Rehana has appeared in a recent book, *The Quality of Life in Pakistan,* which you might like to read. It is edited by Ijaz Nabi, published by Vanguard in 1986, and is a useful study in Social Sector Economics. I agree with you that we need more research if we want to have a better basis for policy decisions.

Pakistan's education system is in dire straits. We have neglected education in our priorities of national development, spent too little on it, talked too much about it, and wasted too much time on non-issues. This has retarded our society and undermined our future prospects as a nation. With a literacy rate of 26 percent, which in fact is much lower if you use the proper definition of literacy, we have effectively debarred the majority of our people from acquiring human dignity and discovering their identity as human beings, from acquiring skills to contribute to productivity and from participating in national reconstruction. We have denied them equality of opportunity, thereby widening inequality in income distribution. Our biggest resource is our people who live in the area of darkness. They are thereby reduced to the status of what Fanon described as the 'The Wretched of the Earth'.

The task ahead is tremendous because of the past neglect of the education sector. Since the time is short, I shall only list some policy issues which require urgent consideration.

Firstly, education has a long gestation period. Therefore, we need a long-term education policy. For that, we need political will, patience and dedicated voluntary workers.

Secondly, we need a larger allocation for education even if it means spending less on defence because educated and aware people are the best guarantee of national security. *To invest in education is costly and not to invest is costlier* because we lose the great potential for increased productivity for modernization and for progress in science and technology.

Thirdly, we need to eliminate waste by improving the quality of education at all levels. This is more easily said than done because it requires programming for effective teaching and learning and for curriculum reform. We need to give up our cavalier disregard for teachers who are treated as second-class citizens by our elites.

My policy prescriptions are:

1. larger allocations;
2. universalization of primary eudcation in less than two decades;
3. vocationalization of secondary education;

4. qualitative improvement of education at all levels; and
5. restoration of respect for teachers who alone can ensure effective teaching and learning.

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Comments on
"Higher Education and the Markets for Educated Labour in LDCs: Theoretical Approaches and Implications"

The paper presents a most comprehensive survey of the subject of Education Economics. In fact, Prof. Blomqvist leaves little to discuss or disagree with. Having been required to come up with some discussion, nevertheless, I pick a point somewhat tangential to the problem addressed by Prof. Blomqvist.

The question I would like to raise relates to the applicability of usual economic considerations to the entirety of higher education in the underdeveloped countries. More specifically, the questions is whether the standard method of counting costs applies to scientific education at the highest level.

The problem is that on the one hand we know that among nations it is the star-gazers who have progressed and the ground-grubbers who have lagged behind, and on the other hand, at any time the cost of supporting the star-gazers always seem more than the returns can possibly be. Why should this difference occur? After all, a dynamic analysis is used in Education Economics. How, then, can the subsequent benefits that are known to exist not appear in the analysis?

I believe that the problem is one of time-scales Any dynamic analysis works with some particular time-horizon. It is often claimed that the optimization is over an infinite time-horizon, but this claim must be taken with a pinch of salt. Any such claim is based on the assumption that the model remains valid over long time-periods in which major changes take place. In fact, any such modelling can not expect to extend over more than a few decades at most. However, the time-scale relevant for nations is of centuries. It is by no means clear that the same formulation which works for the fine time-scale dictated by dealing with individual human beings is relevant for the broad time-scale relevant for nations. Such an extrapolation is based on the assumption that the system under consideration is linear. The scale which 'sees' the system as linear for individual human beings does not 'see' it as linear for nations. For the scale which 'sees' the system as linear for nations the smaller scale gives a static picture.

Once it is admitted that humans as part of an evolving society are very different from humans dealt with as separate economic units, it becomes necessary to re-assess the relevance of the short-time analysis for making decisions about very long-term national goals.

It is not necessary to conclude that there is nothing that can be done about the time-scale problem and hence it should be ignored. To incorporate the very long-term need we can regard it as an "insurance" for the future. In other words, we undertake a present cost which bears no returns in the planning period because of a perceived future need. Even there, in the case of life-insurance for example, the cost-bearer does not receive the returns but the purpose is that his heirs should. The analogy clearly holds good for rational long-term planning.

To return, then, to the comment on the paper, I would argue that it is necessary to subsidize higher education in those areas which do not bring immediate returns to graduates, in terms of higher wages, but which are perceived to be necessary for future national needs. Since the present market has no place for the graduates in such fields, it will be necessary to provide jobs for these graduates which use their fields of specialization. In any short-run analysis such a policy will be expensive and bear no or little returns. As such any decision-making based on such an analysis will rule out development of highly qualified scientists in the under-developed countries. However, it is clearly imperative that high-calibre scientists be produced for a nation to have any hope of taking the lead in any technology and thus taking a proper place in the economies of the world.

Another point that needs explicit discussion is that there can be a critical point beyond which a breakthrough in technological development can occur. Thus, where as no fundamental development may occur with some small amount of job creation, as soon as we cross the critical point a sudden change of character can come about, leading to high returns on the investment made from there on. The mathematical description of such a phenomenon would be similar to what happens when we boil water. Till a certain stage the only consequence of heating the water is to raise its temperature. Then at some stage there is a phase transition and the water starts to boil. The phenomenon of phase transitions is typical of systems whose evolution is governed by non-linear differential equations.

To conclude, let me say that in my opinion a subsidized higher-education policy for technical subjects, with a corresponding creation of job opportunities, is our "life insurance policy" for the sake of the coming generations. There may well be a "phase transition" occurring in this case.

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