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THE PRIVATE DEMAND FOR EDUCATION IN RELATION TO LABOR MARKET CONDITIONS IN LESS DEVELOPED COUNTRIES*

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A common situation in developing countries in the past two decades was a shortage of educated manpower relative to the expressed needs of the economy. Many development planners felt that this skilled manpower shortage was seriously retarding the development process, and considerable resources were devoted to tooling up the educational system to produce more graduates in the shortest possible time. In recent years, however, many less developed countries have suddenly and apparently to their surprise found themselves with too many (relative to the absorptive capacities of their economies) rather than too few workers with intermediate educational attainments. Forecasts of impending surpluses of even university graduates are becoming increasingly frequent. Despite this, the people continue to demand education; by "demand for education", we shall mean the number of persons who would like (or whose parents wish them) to be enrolled in school under existing conditions and who are able to pay the direct schooling costs.

This paper has two purposes: (1) To investigate how the demand for education depends on the number of educated persons in the labor force and their allocation between different labor markets, and (2) To explain the persistence of a strong demand for education under a number of alternative specifications of the workings of the labor market with respect to educated workers.[1]

The plan of the paper is as follows. We first review the available evidence on private rates of return to investment in schooling in less developed countries and then formulate a model of the demand for education as a function of the expected private return. We then construct four alternative models of labor market behavior

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[1] In general, economists concerned with education have not made explicit the linkage between the demand for education and the demand for educated people. A notable exception is Blaug (1966).

and derive demand for education schedules in these four models. We shall see that in three of the models, the private returns to education and hence the demand for education would be expected to remain constant or even increase with the size of the educated surplus. These possibilities, taken together with other factors that might cause the demand for education to be inelastic with respect to the supply, may provide an economic explanation for the sustained high demand for education in less developed countries despite educated unemployment and underemployment.

Before going on, it may be useful to remark on a feature of the models formulated in this paper which may seem unconventional to readers familiar with labor markets in such advanced countries as the U.S. In most accounts of labor markets in the developed countries, wages are regarded as adjusting rapidly in response to a gap between supply and demand for labor and workers or employers as moving less rapidly; hence, wage changes are taken to be the primary equilibrating force.[1] However, when one turns to the less developed countries, there is a growing body of evidence that wage rates in those countries adjust only slowly, not fast enough to bring about equilibrium between labor markets, with unemployment as the consequence. Wage stickiness may occur for either of two sets of reasons. One school of thought points to institutional factors which affect the bulk of the labor force, including the widespread effects of minimum wage legislation, the impact of government wage scales throughout the modern sector of the economy, and wage gains negotiated by labor unions.[2] A second (and not necessarily competing) argument is that non-institutional circumstances -- the reduction of hiring and training costs and gains in worker

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[1] A recent exception may be found in Hall (1972).

[2] On these points, see Berg (1966), Reynolds (1969), Frank (1971), and Johnson (1972).

efficiency as wages are raised -- could cause a rural-urban wage differential and consequent urban unemployment in equilibrium.[1] As a stylized version of wage stickiness, a number of writers including Harris and Todaro (1970) and Bhagwati and Srinivasan (1973) have constructed models in which wages are taken as given and the number of workers in various labor markets adjusts in order to determine an equilibrium in terms of expected (lifetime) earnings on the supply side of the labor market. The labor market models below are formulated in this spirit of quantity rather than price adjustment.

1. The Demand for Education and Private Returns

Education is desired by different groups for different reasons: by private individuals who for job-related or other reasons want their children educated; by firms and governmental bodies who wish to employ educated persons; by policy-makers who feel that a well-educated populace is necessary for national development; and by teachers who are employed by the school system. The private demand by families who would like their children educated up to a particular level is our central concern in this paper. This demand is not expressed in textbook fashion whereb citizens demand different quantities in a marketplace at different prices. Rather, the private demand for education is minifested through the political process as citizens bring pressure to bear on government officials to increase the number of schooling spaces, not only at the given level but at prerequisite levels as well. The concerns of employers, development planners, and teachers in turn determine the willingness of the educational planners to adjust the supply of educational opportunities in response to the private demand and the speed of adjustment.

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[1] These circumstances are analyzed thoroughly in Stiglitz (1972 and 1973).

It appears that the primary factor motivating citizens to demand education is not the economic or social development of the society as a whole but rather the enhancement of their own personal economic and social status.[1] The demand for a given level of education may therefore be presumed to depend on the size of the expected private return to that level of schooling.[2] The cross-country evidence collected by Psacharopoulos (1973, p. 62) shows that private rates of return to investment in education are very high; of three levels of education for each of eleven[3] less developed countries for which data were available, only one is less than ten percent and most are above twenty percent.[4] With few constraints imposed by the necessity of financing educational investment by recourse to a capital market,[5] the very high private rates of return are readily translated into a very high private demand for education.

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[1]Even as ardent a supporter of the mass demand for education as Bereday (1969) writes that "perhaps men should not want quite so much education quite so badly, since so many want it for the wrong reasons" but, he continues, "whatever his motives, an individual's desire for education cannot be ignored."

[2]This is not to imply that citizens actually compute such returns, but rather, following Friedman (1953), they behave as if they do. Nor is it meant to imply that the size of the private return is the only determinant of the demand for education. The status, power, and prestige of being educated may be of equal or greater importance than monetary considerations. We may view these non-pecuniary factors as determining a minimum value of the demand for education and high private returns as raising demand above the base.

[3]These are Puerto Rico, Mexico, Venezuela, Colombia, Brazil, India, Philippines, Thailand, Nigeria, Ghana, and Kenya.

[4]In most less developed countries, schooling costs are heavily and often entirely subsidized. So that the out-of-pocket costs of schooling are small. However, the high private rates of return are probably better explained on the benefit side. Percentage wage differentials between different skill levels in less developed countries, particularly those in Africa, are much greater than in the "advanced" countries.

[5]This is another effect of large subsidies to education.

2. A Model of Educational Demand

Let us consider a person's decision of whether or not to demand education. Suppose for simplicity that we may distinguish between two groups of workers: those who have received at least a given level of education, and those who have received less: we call these groups the"educated"and "uneducated" respectively. Let us also suppose that there are two types of jobs: jobs which can be filled only by educated persons[1] and jobs in which education may be a desirable but not essential qualification; we call these "skilled" and "unskilled" jobs respectively. We consider two types of unskilled jobs: jobs in the modern urban sector, which we will call "urban unskilled" or simply "unskilled," and jobs in agriculture. Full participation in the labor force is assumed.

The decision to demand education depends on three sets of factors: the pecuniary costs of education in relation to the individual's expectation of the financial benefits he will receive, the non-pecuniary (or psychic) costs to him of going to school in relation to the non-pecuniary benefits of being an educated person, and the ability of the individual (or his family) to incur the direct costs today in order to receive future benefits.

If an individual is to take into account the future benefits of education in his demand decision, he must have some notion of what future labor market conditions will be. Let us suppose that on some basis or other, which need not conform to objective reality, he forms a subjective expectation of future events. If he is educated and enters the skilled labor market, his assessment (denoted by superscript i)

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[1]This formulation is consistent with either (1) a neoclassical production function such that the marginal product of an uneducated worker in a skilled job is always less than the wage he must be paid, or (2) a production function with fixed coefficients.

of his expected income at each point in time is equal to the wage he expects to receive in the skilled labor market if he is employed ($W_S^i(t)$) multiplied by his assessment of the likelihood that he will be employed in the skilled market if he is educated ($\phi_{ES}^i(t)$). Making allowance for discounting of future benefits (at rate r) and dying or otherwise permanently dropping out of the labor force (at rate δ), the present discounted value of anticipated earnings for individual i if he is educated and decides to enter the skilled labor market is

$$(1) \quad V_{ES}^i = \int_0^T W_S^i(t) \quad \phi_{ES}^i(t) \quad e^{-(r+\delta)t} \, dt.$$

We shall denote the present value of i's expected lifetime income if he is educated and enters the labor market for unskilled jobs by V_{EU}^i . Similarly, V_{UU}^i and V_{UA}^i are respectively the present values of expected lifetime income if he is uneducated and enters the unskilled (U) or agricultural (A) labor market. Expressions for V_{EU}^i , V_{UU}^i , and V_{UA}^i may be constructed in a directly analogous manner to (1).

Let V_E^i and V_U^i be respectively the present value of i's expected earnings if he enters what he thinks is the highest-paying labor market open to him with alternative educational qualifications. Then

$$(2) \quad V_E^i = \max (V_{ES}^i , V_{EU}^i)$$

and $$(3) \quad V_U^i = \max (V_{UU}^i , V_{UA}^i).$$

For expositional ease, let us assume that it takes one period to acquire an education and the direct out-of-pocket costs are some amount C. The income foregone during this period is the current unskilled wage (W_U^i) times the probability of being employed in that period (ϕ_U^i). The sum of these is the private cost of education.

Since education takes one period and the benefits do not begin until the following period, we must subtract from the earnings streams V_E^i and V_U^i expected earnings in the current period. We therefore have the present value of expected incremental benefits of education equal to $(V_E^i - W_S^i\phi_S^i) - (V_U^i - W_U^i\phi_U^i)$. Taking the difference between expected benefits and costs, we find that the expected present value of investment in education for individual i (PV^i) is

$$(4) \quad PV^i = V_E^i - V_U^i - W_S^i\phi_S^i - C.$$

When deciding whether or not to demand education, in addition to financial considerations, each person also considers the non-pecuniary costs to him of going to school[1] and the non-pecuniary benefits of being an educated person. If the sum of the expected net pecuniary and non-pecuniary benefits is positive, he will wish to be educated. This wish to be educated will be translated into effective demand for education if the potential student is able to pay the direct costs of schooling. However, if the sum of total net benefits is negative or if the student cannot pay the school fees, education will not be demanded. Let the present value of the expected net non-pecuniary benefit for the i'th individual be denoted by N^i and let θ^i represent a dichotomous variable having the value one if the i'th family can obtain financing for direct schooling costs and zero otherwise. Then the individual demand for education function is

$$(5) \quad D^i = 1 \text{ if } \theta^i (PV^i + N^i) > 0,$$

$$D^i = 0 \text{ otherwise,}$$

and the aggregate demand for education is

$$(6) \quad D = \sum_i D^i.$$

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[1] These non-pecuniary costs may be negative, i.e., the student may enjoy going to school more than working.

We have said nothing so far about how subjective expectations are formed. Supposing that they bear some (not necessarily perfect) relation to labor market reality, the simplest labor market assumptions consistent with this supposition are that individuals regard today's wage rates and probabilities of becoming employed, being fired, and dying as prevailing forever. Interpersonal differences in either non-pecuniary preferences for education or access to capital would cause the total demand for education to vary directly with the "objective" private present value of educational investment, i.e.,

$$(8) \quad D = f(PV), \; f' > 0,$$[1]

where $$(9) \quad PV = V_E - V_U - W_S\phi_S - C.$$

The specific values underlying these expressions depend both on the size of the educated labor force and on the allocation of the labor force between the various labor markets. The specific labor market outcome depends on the behavior of educated workers and their employers. In the next section, four models of labor market behavior are presented.

3. Four Models of Labor Market Behavior

The literature concerning the labor market behavior of workers and employers in the less developed countries with respect to education offers two general conclusions. First, educated people do as a rule accept lower-level jobs, presumably when it is to their personal advantage to do so.[2] Second, employers in many countries

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[1] See quadrant (iii) in Figures 1-3 below.

[2] Figures collected by the OECD (1969) for 53 countries show that while the highly-educated are much more apt to be in the professional or managerial occupations than persons with less education, a high degree of educational attainment is neither necessary nor sufficient for entry into the most lucrative and prestigious occupations.

appear to be using educational attainment as a criterion for hiring and selecting the better-educated in preference to those with less education.[1] This suggests that the bumping model (to be described below) may be a better general description of labor market behavior in the less developed countries than the other models. However, since the available evidence in no way rules out the applicability of the other models in other countries, we shall analyze them as well.

A. The Bumping Model

In the bumping model, we assume that workers are income maximizers and enter that labor force which offers the highest expected income. Furthermore, we suppose that employers prefer to hire persons with more education at the prevailing constant wage rate. Preferential hiring may take place because the educated are (or are believed to be) more productive than the uneducated, because employers prefer for non-economic reasons to associate with the better-educated,[2] or (some argue) because the educated elite seek to legitimize their own positions at the top of the pecking order by using an "objective" criterion like educational attainment to exclude others.[3]

If it is profitable (in an expected value sense), we would expect that some surplus educated persons would move to the front of the queue for the unskilled jobs and be hired first at the unskilled wage rate, "bumping" a less-educated person from a job. Uneducated workers in unskilled jobs might be fired and replaced immediately, or instead displaced over time as uneducated retirees are replaced by the educated. For simplicity, we will assume zero frictional unemployment of educated persons in the unskilled labor force.

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[1] Preferential hiring by educational level is documented in studies of India by Blaug, Layard, and Woodhall (1969), of Turkey by Krueger (1971), and of Kenya by Singer and Jolly (1973), in a symposium of manpower and education experts (see Skorov (1968)), and in a report of the activities of the World Employment Programme of the ILO (see Emmerij (1973)).

[2] Such a utility-maximizing model is considered in Johnson (1970).

[3] See for instance Carnoy (1971).

Following our earlier distinction, the uneducated may choose between the urban unskilled and agricultural labor forces, but they are excluded from the skilled labor force due to lack of educational qualification. In this and the following two models, the uneducated are presumed always to choose between these alternatives in order to maximize the expected value of their incomes.

In the bumping model, educated workers are hired first. This means that uneducated workers are left with whatever unskilled jobs the educated workers do not take. Thus, education may be demanded in order to receive the advantage of a better relative chance of being hired for an unskilled job. It is of course conceivable that after a point there may be so many educated persons that the uneducated are effectively excluded from obtaining modern sector employment and the relative advantage is very great indeed.

We shall now give a formal statement of the bumping model. Let us first consider the advantageousness of the various labor market options open to educated workers. If there are fewer educated persons (L_E) than skilled jobs (E_S), each educated person can expect to be fully-employed and earn the skilled wage W_S. Over their lifetimes, they would expect to earn

$$(10) \quad V_S = \int_0^T W_S e^{-(r+\delta)t}\, dt = \frac{W_S}{r+\delta}, \; L_E \leq E_S$$

for large T.

Once the educated labor force exceeds the number of skilled jobs, the expected wage becomes relevant. We suppose that each worker of a given educational type is like any other worker of that type. Hence, the probability of finding a job is the ratio of hires to job seekers. Unlike other multi-sector models, we assume that workers in one labor market have a finite chance of securing a job in some other

labor market. The labor market for skilled jobs is assumed to operate like a lottery in which each educated person in the skilled labor force has one ticket and each educated person in the unskilled labor force has a j'th of a ticket. Similarly, the labor market for urban unskilled jobs assumedly operates like a lottery in which each person in the urban unskilled labor force has one ticket and each new entrant in agriculture has an n'th of a ticket.

Let H_S be skilled job hiring and J_S be the number of skilled job-seeker equivalents, defined as follows. J_S is the total number of previously educated persons in the skilled labor force (L_{ES}) plus the number of persons in the newly-educated cohort who decide to enter the skilled labor force (C_{ES}) plus j times the number of newly-educated persons who decide to enter the unskilled labor force (C_{EU}) less the number employed (E_S):

$$(11) \quad J_S = L_{ES} + C_{ES} + jC_{EU} - E_S.$$

The probability that an educated worker will move from unemployment into employment is the ratio of hires to job seekers:

$$(12) \quad P_S = \frac{H_S}{J_S}$$

H_S, the number of skilled jobs for which hiring is taking place, will be regarded as a constant. Let the probability that an employed skilled worker will become unemployed be a constant value ψ_S. Then, taking the current values of P_S and ψ_S and projecting them into the future, the worker's expectation of the probability that he will be employed at some future time t has been shown by Johnson (1971) to be

$$(13) \quad \phi_S = \frac{P_S}{P_S + \psi_S} (1 - e^{-(P_S + \psi_S)t} .$$

As a result of this assumed expectation formation, the present value of lifetime income expected by an educated person in the skilled labor force (V_{ES}) is

$$(14) \quad V_{ES} = \int_0^T W_S \phi_S e^{-(r + \delta)t} dt = \frac{W_S}{r + \delta} \frac{P_S}{r + \delta + P_S + \psi_S}$$

The present value of expected lifetime income for an educated person in the unskilled labor force (V_{EU}) may similarly be shown to be

$$(15) \quad V_{EU} = \frac{W_S}{r + \delta} \frac{P_S}{r + \delta + P_S + \psi_S} jP_S + \frac{W_U}{r + \delta} (1 - jP_S)$$

provided the educated workers have not filled all the unskilled jobs.

Educated workers are assumed to allocate themselves between the two labor markets so that the equilibrium condition

$$(16) \quad V_{ES} \geq V_{EU}$$

is satisfied. This is not expressed as a strict equality, because there may not be enough educated people to create a volume of unemployment in the skilled sector sufficient to reduce V_{ES} to a level which strictly satisfies an equality condition. In other words, for a small surplus of educated workers and a large skilled-unskilled wage differential, the present value of expected income would be higher in the skilled labor market than in the unskilled market even if all the surplus educated were to be unemployed.

The labor markets for the uneducated may be formulated in a similar manner. Uneducated persons may choose between the urban unskilled and agricultural labor forces. By assumption of the bumping model, educated persons are hired first for

unskilled jobs. Therefore, the number of unskilled jobs available to uneducated workers is the total hiring for unskilled jobs (H_U, which we take as constant) minus the number of persons in the newly-educated cohort hired for unskilled jobs (C_{EU}).

The number of uneducated job-seeker equivalents for unskilled jobs is

$$(17) \quad J_U = L_{UU} + C_{UU} + nC_{UA} - E_U$$

where n, the rural-urban relative job-search parameter, is the relative chance of finding an urban unskilled job for an uneducated person in the agricultural labor force as compared to a person in the urban labor force. Today's probability of an uneducated urban worker finding unskilled employment is therefore

$$(18) \quad P_U = \frac{H_U - C_{EU}}{J_U} \quad \text{and}$$

the present value of expected lifetime income of an uneducated worker in the unskilled urban sector is

$$(19) \quad V_{UU} = \frac{W_U}{r + \delta} \frac{P_U}{r + \delta + P_U + \psi_U} .$$

Similarly, for an uneducated worker in agriculture,

$$(20) \quad V_{UA} = \frac{W_U}{r + \delta} \frac{P_U}{r + \delta + P_U + \psi_U} nP_U + \frac{W_A}{r + \delta} (1 - nP_U),$$

assuming that agricultural jobs are available at wage W_A. By the assumption that uneducated workers are income maximizers, they will allocate themselves between the rural and urban labor markets so that the present values of expected income in each are equal, i.e.,

$$(21) \quad V_{UU} = V_{UA}.$$

In the less developed countries the modern sector is small relative to agriculture and only a small fraction of the population is educated. It is therefore reasonable to expect that there would always be enough uneducated persons to fill the available unskilled jobs and (21) is always satisfied by a strict equality.

B. The Labor Market Stratification Model

(1) Labor Market Stratification on the Supply Side

In contrast to the bumping model just described, education in less developed countries has sometimes been criticized for inculcating the few fortunate students with the feeling that they are superior to the masses (see Myrdal (1968)). Carried to its logical conclusion, the implication is that the educated would always seek high-level, high-status jobs and never seek or accept low-level jobs which would "dirty their hands," even if they could earn more by doing so. In such an economy, any surplus educated persons would always be in the labor force for skilled jobs and never consider employment in unskilled jobs. In such circumstances, labor markets are stratified by considerations of status and prestige.

(2) Labor Market Stratification on the Demand Side

Suppose that educated persons are willing to work in unskilled jobs but employers refuse to hire the educated, because they believe that the educated are more apt to have low morale, resulting in lower productivity while on the job, greater absenteeism, and more frequent quits. The labor market is also stratified in this case, because it is fruitful for the educated to search only for the skilled jobs. As in the previous case, any extra educated persons will be unemployed in the skilled labor force and never underemployed in an unskilled job.

These two cases, although causally distinct, are analytically equivalent and will be treated so subsequently.

Formally, the labor market stratification model is identical with the bumping model except that the educated workers do not allocate themselves between the different labor markets according to (16) and $L_{EU} = \mathcal{C}_{EU} = 0$.

C. The Pooling Model

The bumping model assumes that educated workers are favored by employers and hired in preference to the less educated for unskilled jobs. The labor market stratification model (demand side version) assumes just the opposite. The pooling model embodies the third possibility: that education is neither a help nor a hindrance in one's search for an unskilled job. In the pooling model, we still regard education as necessary for the skilled jobs, We have, however, a large pool of workers searching for the unskilled jobs, these workers being undifferentiated by educatinnal attainment. In the pooling model, the unskilled jobs are divided between the educated and uneducated according to some random process.[1]

Equations (10) - (14) continue to hold in the pooling model. However, educated workers are no longer favored for unskilled jobs. Since they may be unemployed in the unskilled labor force, they cannot expect to earn W_U if they are unsuccessful in obtaining a skilled job. Rather, in each period, they would expect to earn $W_U\phi_U$, where ϕ_U is the probability of being employed in the unskilled sector. By analogy with (15) the present value of expected lifetime income of an educated worker who enters the unskilled labor force is now

$$(15') \qquad V_{EU} = \frac{W_S}{r+\delta} \frac{P_S}{r+\delta+P_S+\psi_S} jP_S + \frac{W_U}{r+\delta} \frac{P_U}{r+\delta+P_U+\psi_U}(1-jP_S).$$

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[1]The educated may have better contacts and therefore better chances of being hired. However, we neglect this possibility.

Unlike the bumping model, educated workers are not hired preferentially for unskilled jobs, so (18) is replaced by

$$(18') \quad P_U = \frac{H_U}{J_U}$$

and J_U is now the original unskilled pool plus the new entrants to the unskilled labor force plus n times the number of new entrants to the agricultural labor force minus those employed:

$$(17') \quad J_U = L_{UU} + L_{EU} + C_{EU} + C_{UU} + nC_{UA} - E_U.$$

The present values of expected income of uneducated workers in the urban and rural sectors are as before (19) and (20). The other relations, including the equilibrium conditions (16) and (21), are unchanged.

D. The Bright Lights of the City Model

The bright lights of the city model embodies the view held by some[1] that the city exerts an overwhelmingly strong pull on those who come in contact with it. This model postulates that as a consequence of the "bright lights of the city" no workers, whether educated or uneducated, once in the city would ever return to the farm. We shall, however, assume that educated workers are expected income maximizers and will, if it is profitable to do so, bump the less educated out of unskilled jobs.

The bright lights of the city model is formally identical to the bumping model except that we must add the additional constraint

$$(22) \quad \Delta L_{UA} \leq 0.$$

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[1] See for instance Little (1965).

4. Demand for Education Schedules Under Alternative Labor Market Conditions

In order to explain the persistence of a strong demand for education despite educated unemployment, we wish to analyze the effects of a larger number of educated workers in each of our labor market models. This involves deriving demand for education schedules as a function of the size of the educated labor force.[1] A general expression for the change in the demand for education if the educated labor force is enlarged may be found by differentiating (8) and (9) with respect to L_E:

$$(23) \quad \frac{\partial D}{\partial L_E} = f' \left[\frac{\partial PV}{\partial L_E}\right] = f' \left[\frac{\partial V_E}{\partial L_E} - \frac{\partial V_U}{\partial L_E} - W_S \frac{\partial \phi_S}{\partial L_E}\right].$$

Let us now see what these schedules look like in each case.

A. The Case of Labor Market Stratification[2]

Consider first the labor market stratification model. For a sufficiently small educational system, at the existing wage level, educated persons might be in short supply. In this range, each educated person can expect to be fully employed. This does not change if the size of the educated labor force were to increase, provided there continues to be a shortage. Since $\phi_S = 1$, it follows that $\frac{\partial \phi_S}{\partial L_E} = 0$ and $\frac{\partial V_E}{\partial L_E} = 0$. Furthermore, by choosing between the rural and urban unskilled labor forces in order to maximize their expected incomes, uneducated persons will reallocate themselves so that the probability of obtaining an unskilled job is unchanged in equilibrium, which implies $\frac{\partial V_U}{\partial L_E} = 0$. Any other reallocation would cause there to be a

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[1] The decision by the educational authorities concerning the size of the school system might be made on the basis of a manpower plan, estimates of the social costs and benefits of educating another person, or political or social considerations. Some observations in this regard may be found in a companion paper dealing with the allocation of resources to education in less developed countries (Fields 1973)).

[2] The order of presentation of the four models has been changed for expositional purposes only.

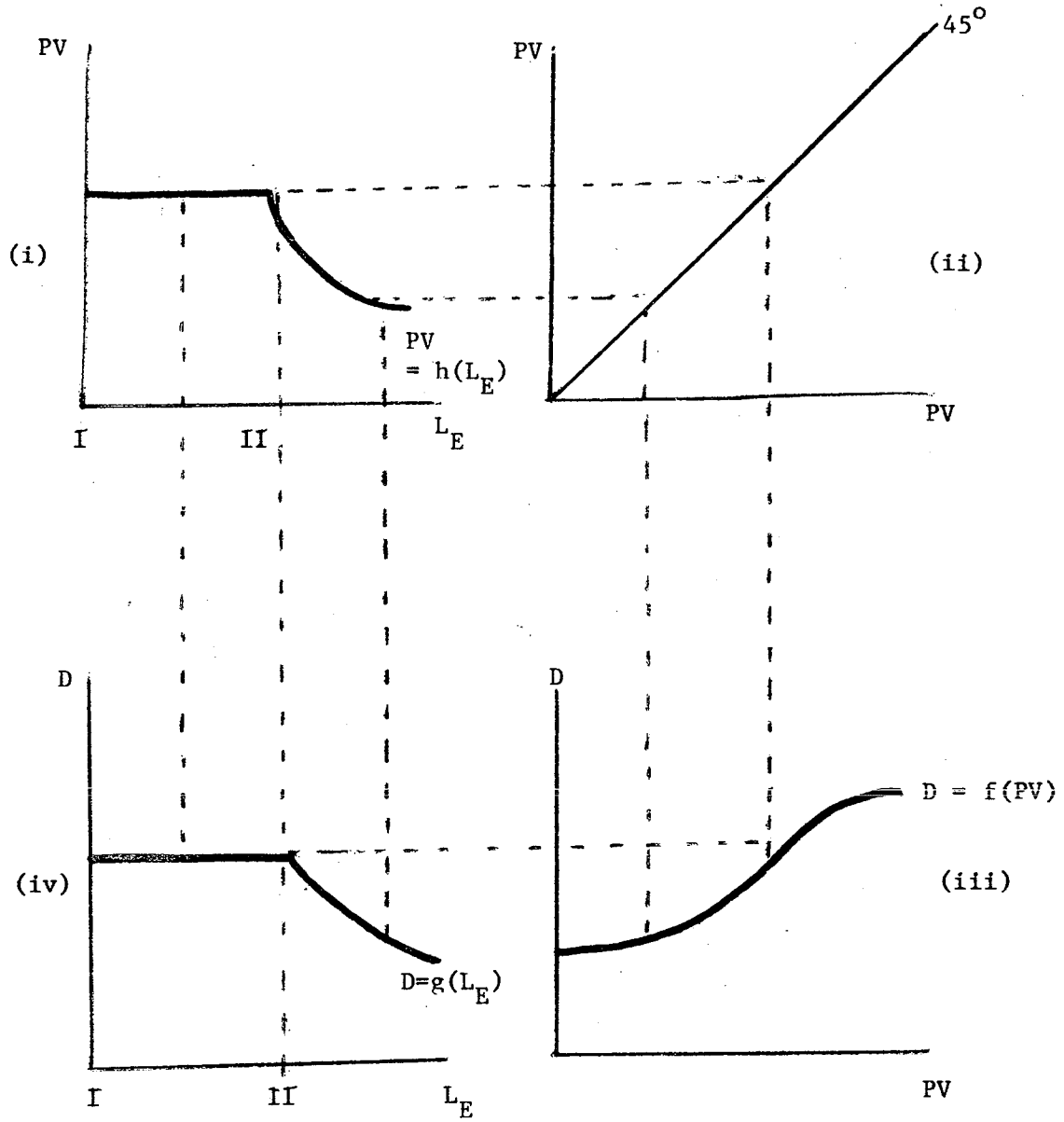
higher expected income in one labor market as compared to the other and would not be an equilibrium since income-maximizing workers would migrate in order to erode any such temporary differential. Substituting the above into (23), we have $\frac{\partial D}{\partial L_E} = \frac{\partial PV}{\partial L_E} = 0$. We therefore find that when there is a shortage of educated workers the present value of investing in education and the demand for education will remain unchanged if another person is educated.

Once the educational system has produced more than enough educated workers to fill all the skilled jobs for which hiring is taking place, each educated person must expect to be unemployed part of the time. The greater the number of educated persons, the more skilled job seekers there are, so the lower will be the probability of finding a skilled job, and in turn the lower the present value of becoming educated. Hence, $\frac{\partial D}{\partial L_E} < 0$, and our model implies that when there is a surplus of educated workers in the case of labor market stratification the demand for education will decline as the educated labor force increases.

These results are illustrated graphically in Figure 1. Zones I and II correspond respectively to shortages and surpluses of educated workers. In quadrant (i), we see that the present value (PV) is constant while there is a shortage of educated workers and declines monotonically thereafter. Taking an illustrative $D = f(PV)$ function in quadrant (iii), we derive the demand for education as a function of the educated labor force, shown as $D = g(L_E)$ in quadrant (iv). We see that if labor markets are stratified, after a point the larger the size of the educated surplus in a country all other things equal the smaller the demand for education.

B. The Case of Bumping

In the bumping case, there are four distinct zones depending on the number of educated workers relative to the number of jobs. For ease of reference, these four zones are summarized in Table 1.



(Note: Roman numerals indicate the beginning of the respective zones)

Figure 1. The Demand for Education in the Case of Labor Market Stratification

Table 1

Labor Market Zones in the Bumping Model

Zone I.	Fewer educated workers than skilled jobs
Zone II.	Surplus of educated workers, all enter skilled labor force and are unemployed
Zone III.	Bumping occurs, i.e., some educated workers enter the unskilled labor force and are hired preferentially
Zone IV.	All modern sector job vacancies are filled by educated persons

The first zone is defined by a shortage of educated workers relative to skilled jobs. Since the skilled wage is higher than the unskilled wage, all educated workers would enter the labor force for skilled jobs and be fully employed.

A second zone begins when there first occurs a surplus of educated persons relative to skilled job hiring. For some small surplus of educated workers, there would be sufficiently little educated unemployment and a sufficiently high probability of being employed that the present value of expected lifetime income of an educated worker in the skilled labor force (V_{ES}) would continue to be greater than the present value of expected income of an educated worker in the unskilled labor force (V_{EU}). This being the case, income-maximizing employees would choose partial employment/partial unemployment in the skilled labor force in preference to full-time employment at a lower wage in the unskilled sector.

Zones I and II in the bumping model are formally equivalent to the labor market stratification case just described. Therefore, the pattern of the demand for education as a function of the educated labor force (constant over Zone I and falling over Zone II) also holds in the bumping model.

After some point, there would be sufficient unemployment that V_{ES} would be driven down and equal to V_{EU}. This point marks the beginning of a third zone, in which it would be profitable for educated workers to bump uneducated workers out of unskilled jobs. Once Zone III begins and employment in the unskilled labor force becomes profitable, the demand for education no longer declines monotonically with the number of educated persons. Rather, we find that

> When bumping is taking place, educated and uneducated workers, each choosing between the various labor market alternatives open to them in order to maximize their expected incomes, will allocate themselves so that the private rate of return and the demand for education will remain constant as more persons are educated and the educated labor force gets larger.

When bumping is taking place, educated workers are choosing between the skilled and unskilled labor markets so that the present values of expected lifetime income in each (V_{ES} and V_{EU}) are equal. If the markets are in such an equilibrium and another person is educated, the equilibrium will initially be disturbed. If the additional educated worker enters the skilled labor market, his presence causes the probability of finding a skilled job to fall and thereby lowers the present value of expected income of an educated worker in the skilled labor market below what he could earn in the unskilled labor market. This would induce other educated workers to leave the skilled market and enter the unskilled market, which raises the probability of finding a skilled job. Equilibrium is restored when there has been sufficient shifting to raise the probability of employment in a skilled job (ϕ_S) and the expected skilled income (V_{ES}) back up to their original levels. The same adjustment process and resultant equilibrium follow if the additional educated workers were to have initially entered the unskilled labor force.

Turning now to the markets for unskilled workers, the presence of additional educated persons in the unskilled labor market reduces the number of jobs available

to uneducated workers and thereby lowers their probability of employment. The urban unskilled labor market is now less attractive than agriculture and income-maximizing uneducated workers find it to their advantage to return to or remain on the farm. As they do this, the probability of an uneducated worker finding an urban unskilled job increases and V_{UU} rises relative to V_{UA}. After sufficient out-migration of unskilled workers from the urban sector, the unskilled labor markets will equilibrate with the probability of obtaining an urban unskilled job and the present value of expected income of an uneducated person unchanged from their original levels.

We have therefore shown that when bumping is occurring and another person is educated, the reallocation of the labor force between the various labor markets will leave unchanged the present values of expected incomes for workers in each labor market. Hence the present value of investing in education and the demand for education will also remain the same in the zone where bumping is taking place.

Bumping could continue until educated workers are hired to fill all unskilled job vacancies. After that point, a final zone would begin with educated workers competing amongst themselves for both skilled and unskilled jobs and uneducated workers effectively excluded from breaking into the modern sector.[1] If society were to decide to educate another person this would add to the number of seekers for skilled jobs, which would lower the probability of an educated worker finding a skilled job and lower the expected income if one is educated. The expected income of an uneducated worker, which is the lifetime agricultural wage, would remain the same. Therefore, the present value of investing in education and the demand for education would decline the larger the educated surplus in Zone IV.

The demand for education for alternative supplies of educated labor in the case of bumping is summarized in Figure 2.

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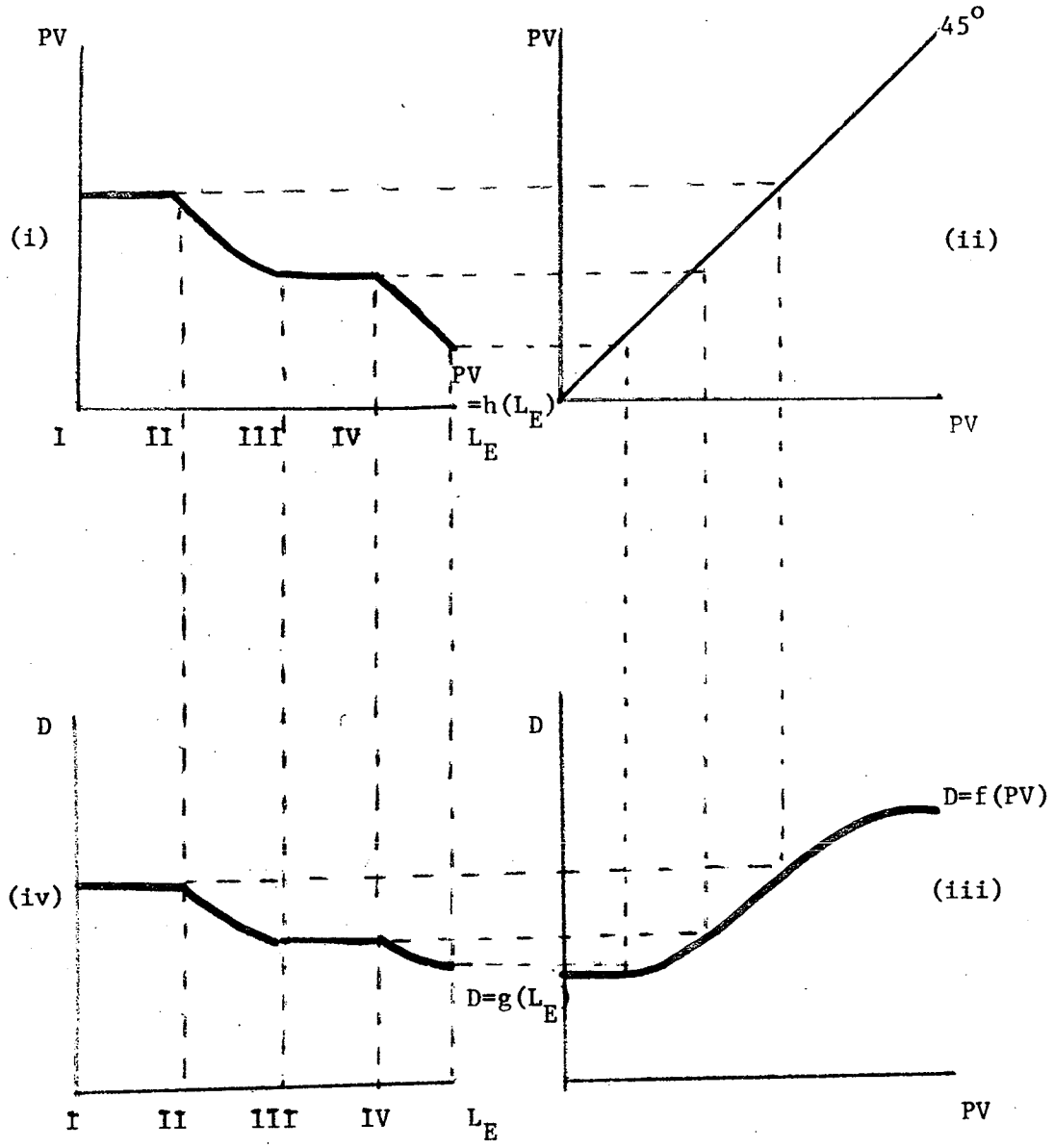
[1] Due to seniority provisions and other reasons for job fixity, uneducated workers already employed in unskilled jobs are (except for normal turnover) retained.



(Note: Roman numerals indicate the beginning of the respective zones)

Figure 2. The Demand for Education in the Cases of Bumping and Pooling.

C. The Case of Pooling

In the pooling model, there are four distinct zones. The first two are identical with those of the bumping model. After there is sufficient unemployment to reduce V_{ES} to V_{EU}, there begins a third zone in which some surplus educated workers enter the pool of workers for unskilled jobs but unlike the bumping model are not hired preferentially. After a point, there begins a fourth zone in which uneducated workers do not find it profitable to enter the urban unskilled labor force and that market contains only educated workers. These zones are summarized in Table 2.

Table 2

Labor Market Zones in the Pooling Model

Zone I.	Fewer educated workers than skilled jobs
Zone II.	Surplus of educated workers, all enter skilled labor force and are unemployed
Zone III.	Educated workers enter the unskilled labor force but are not hired preferentially
Zone IV.	Uneducated workers have vacated the unskilled labor force

We shall show that the pattern of the demand for education as a function of the educated labor force shown in Figure 2 also holds in the pooling model. In the pooling model, the allocation of the labor force as another person is educated in Zones I and II is the same as in the bumping model since the two are analytically equivalent. Thus, the demand for education is constant in Zone I and falls in Zone II. There is one important difference between the bumping and pooling models, however, and that is that Zone III in the pooling model begins later. This is easily understood

economically. In the bumping model, an educated worker who chooses to enter the unskilled labor force earns the unskilled wage W_U and is fully-employed. In the pooling model, he is only partially employed, so the present value of his expected income is lower. Consequently, the opportunity cost of being unemployed in the skilled labor force when there is pooling is less than when there is bumping. Workers would therefore be expected to tolerate more unemployment in the pooling case than in the bumping case.

Once Zone III is reached and educated workers begin to enter the unskilled labor force, the pooling model predicts a pattern which the reader may find surprising: although educated and uneducated workers in the urban unskilled labor market are paid the same wage and have the same probabilities of employment, if another person is educated, educated workers would replace uneducated ones in the unskilled urban labor market. Viewed in terms of job search opportunities, this makes good economic sense. By being in the cities, educated workers have a better chance of obtaining high-paying skilled employment than if they were on the farm. The movement of uneducated workers between the urban unskilled and agricultural labor markets assures that the present values of expected income are equal. This means that educated workers can earn the same wage in the city as on the farm and yet while in the city have a better chance at a skilled job. Thus, we would expect that educated workers would settle in the cities. As they do, this adds to the pool of seekers for unskilled jobs, lowering the probability of finding one, reducing the present value of expected income in the city below the present value in agriculture, and driving uneducated workers (who have the least to lose) back to the farm until the present values are again equal. Thus, the demand for education would be constant for alternative educational supplies in Zone III.

Note that if educated workers did not have this improved job search opportunity, the only change when another person is educated would be that there would be one more person in the urban unskilled labor market with education rather than without, but there would be no migration into (or back to) agriculture.

Finally, in Zone IV, $V_{UU} < V_{UA}$ and uneducated workers have vacated the urban sector. Except for starting with a larger educated surplus, this zone is formally equivalent to Zone IV in the bumping model and all previous results obtain.

D. The Bright Lights of the City Case[1]

The bright lights of the city model is a variant of the bumping model. Rather than behaving in a pure expected income-maximizing manner, workers are assumed to maximize income subject to the behavioral constraint that no one living in the city would move back to the farm even if he could expect to earn more there.

This behavioral limitation has no effect on the outcomes in Zones I and II, since there is migration of both educated and uneducated workers into the cities. However, once bumping begins, the bumping model requires there to be migration back to the rural areas in order to preserve equilibrium between the labor markets for uneducated workers. Since this is not allowed in the bright lights of the city model, the uneducated labor markets would be in disequilibrium. This raises an intriguing possibility:

> When bumping is taking place in the bright lights of the city model, the labor force allocation will be such that the private rate of return and the demand for education would be expected to increase if more persons are educated and the educated labor force gets larger.

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[1]This model was first suggested in my "Private and Social Returns to Education in Labour Surplus Economies," Institute for Development Studies, University of Nairobi, Discussion Paper No. 104, April, 1971, a revised version of which is published as Fields (1972a). In neither version, however, was the prohibition against out-migration from urban areas made explicit.

Why might this be expected? If another person is educated, the large number of educated workers will choose between the skilled and unskilled labor forces so as to leave the present value of expected incomes in the two markets equal to one another and unchanged from their original levels. This requires that at least[1] one educated worker enter the urban unskilled labor force. There is now one less urban unskilled job available for the remaining uneducated workers. As a result, the probability of an uneducated worker obtaining an urban unskilled job falls, and this lowers the expected urban income for an uneducated worker below what he could earn in agriculture. However, by assumption of the bright lights of the city model uneducated workers would not leave the city, so the disequilibrium is not eroded as in the bumping model. The present value of expected income of an uneducated worker therefore falls. The combined effect of a constant expected income for the educated worker and a lower expected income for the uneducated is, of course, to raise the present value and hence the demand for education.

Finally, Zone IV begins when there is such a large surplus of educated workers that uneducated workers have no chance of being hired for unskilled jobs and there will be unemployment of the educated in both the skilled and the unskilled labor markets. If another person is educated, the more educated persons there are seeking a given number of jobs and so the lower the probability of any given educated worker being employed. This lowers the expected value of being educated, which in turn lowers the demand for education.

The demand for education schedule in the bright lights of the city case is shown graphically in Figure 3. For ease of comparison, the demand for education schedules derived for the four labor market models are shown together in Figure 4.

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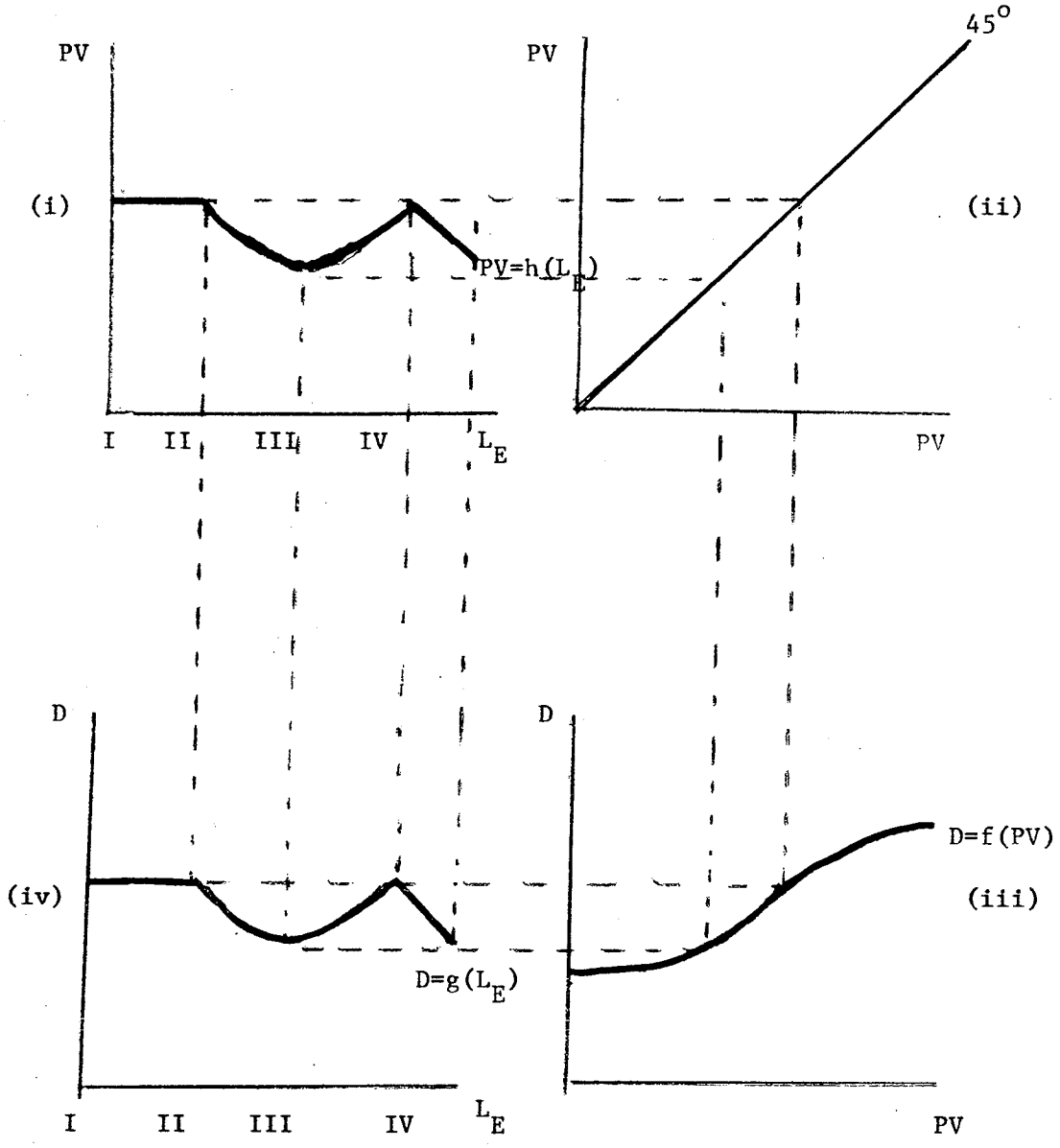
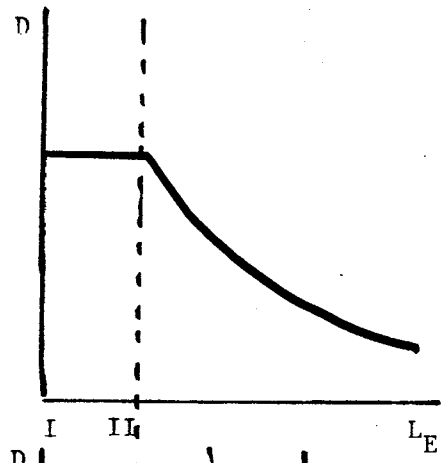
[1]There will be only one if educated workers employed in unskilled jobs have no chance of obtaining a skilled job, more than one otherwise.



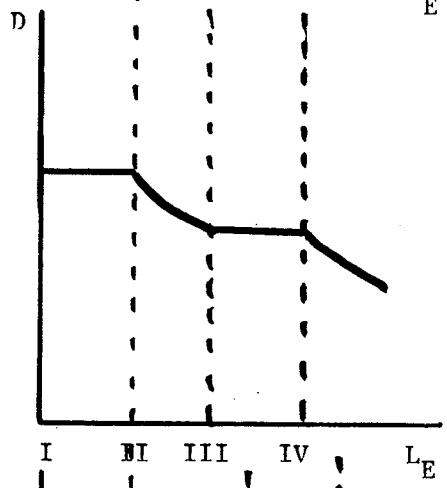
(Note: Roman numerals indicate the beginning of the respective zones)

Figure 3. The Demand for Education in the Bright Lights of the City Model

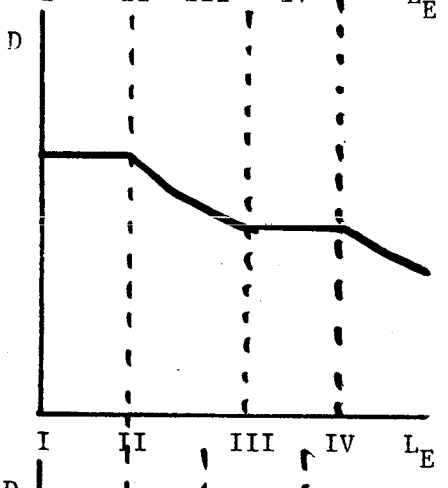
The Labor Market Stratification Case



The Bumping Case



The Pooling Case



The Bright Lights of the City Case

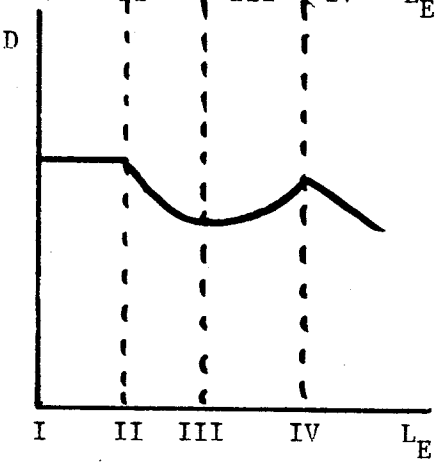


Figure 4. Demand for Education Schedules in Four Labor Market Models.

5. Concluding Remarks

We have described several alternative accounts of possible labor market behavior by workers and employers in less developed countries. Our analysis, as summarized in Figures 1 - 4, suggests three possible explanations for the persistence of a high demand for education despite unemployment and underemployment of substantial numbers of educated persons.

One possibility is that the scenario described by the bright lights of the city model -- a range during which the demand rises as the size of the educated labor force is increased -- essentially describes the particular labor market circumstances and particular stages of development of at least some less developed countries today. However, the validity of the bright lights of the city model has not been established by rural-urban migration studies to date.[1]

A second possibility is that the demand for education may be relatively inelastic with respect to private returns. This may be because education is demanded primarily for the consumption or non-pecuniary investment benefits it confers and not for those financial returns which are measured by present values. Alternatively, it may be because the present value is already so large that education is obviously a sound personal financial investment and virtually everyone wants it. The available evidence is fully consistent with the latter position.[2]

A third possible explanation for the persistence of a high demand for education is that the present value of investing in education may be relatively inelastic with respect to the supply of educated workers. To my knowledge, this hypothesis has not as yet been subjected to empirical test.

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[1] This is the conclusion reached by Frank (1971) after a thorough review of the rural-urban migration literature.

[2] See Psacharopoulos (1973) and Section 1.

It should be remarked that these three possibiliites are in no way mutually exclusive. Rather, they reinforce each other and,to the extent each is correct, they provide sound economic reasons for expecting the private demand for education to remain strong despite the existence of a large and growing surplus of educated workers in the labor market. This prediction challenges the view that the sustained demand for education results from over-optimistic labor market expectations compared to reality.

This conclusion suggests an important policy implication for educational planning. Suppose that in light of a surplus of highly-educated workers and upon the advice of experts in the area, the government of a less developed country were to decide to reallocate its educationsl budget away from secondary and higher education and toward primary education. In the short run, the government could simply adjust supply in the desired manner. However, in the absence of complementary measures to reduce the demand for secondary and higher education, the people would continue to push for more high-level educational facilities. Not only might the political pressures on officials tend to subvert the reallocation program but the people might also (as they did in Kenya)join together to construct their own private or community secondary schools, which would result in an even larger surplus of educated workers. Thus, in order for a governmental program to reallocate educational resources to be effective, steps must be taken to reduce the private present value of investing in education.

We have seen that the private returns to investing in education depend on the earnings and employment probabilities of educated workers relative to the uneducated and the private costs of acquiring an education. This points to the areas where leverage might be exerted. One possible means of reducing the size of the private

present value is to introduce an incomes policy, either by narrowing nominal skilled-unskilled wage differentials or by making the tax structure more progressive. Another is to cause employers to question whether preferential hiring by educational level is really necessary.[1] Yet another is to charge students a larger share or perhaps even the full cost of their schooling; students who receive higher education could be charged full costs, to be repaid over their working lives.[2]

None of the proposed changes would be easy to implement, given the political power of the groups whose interests would be adversely affected. But when one considers the deleterious effect on the economic and social development of a country of continuing to spend scarce public funds to produce a well-educated and unemployed few while many others could be made literate, there is cause for concern.

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[1]On this point, see Blaug, Layard, and Woodhall (1969).

[2]Alternative loan schemes are considered in detail in Fields (1972b).

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