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Gary S. Fields

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EDUCATION AND ECONOMIC MOBILITY IN COLOMBIA

Gary S. Fields

In recent years, there has been a great deal of debate concerning the role of the educational systems of less developed countries in promoting economic and social mobility, and the possibility of affecting the distribution of income and reducing poverty by means of human resources strategy.¹ In Colombia, as in many other less developed countries, the groups align themselves rather neatly along disciplinary lines. One group, principally economists, have argued that education is very important in promoting intergenerational mobility.² Others, in general sociologists and political scientists, sustain the opposite position: that education as a factor producing social mobility is little more than a myth.³ The object of this paper is to analyze the role played by education in determining an individual's economic status in Colombia, with a view toward testing among these alternative viewpoints.

The plan of the paper is as follows. Section 1 provides an introduction to the issues surrounding the debate on education and economic mobility. In Section 2, we shall attempt to assess the importance of education in determining one's income and to gauge the profitability of such investments. Then in Section 3, we will examine who gains access to the educational system, with the object of understanding the extent to which education

¹Among the most recent works which merit attention in this field are those of Blaug (1973) and Harbison (1973).

²The most prominent exponent of this view in Colombia is the Director of National Planning, Miguel Urrutia. See Urrutia (1974) and Berry and Urrutia (1975, Chapter 9).

³This position is advanced and defended by Parra (1973).

serves as a means of transmitting economic status from one generation to another. Section 4 seeks to formalize the extreme notions of an educational system with completely "open" access versus a system which is entirely "closed"; the actual patterns in urban Colombia will then be compared to these two polar cases to ascertain which description more accurately conforms to the observed data. The paper concludes in Section 5 with consideration of the implications of these results for educational policy.

1. The Issues Surrounding Colombia's Educational System

Colombia's educational system is a mixed public-private system. The formal educational system consists of five years of primary education; six years of secondary education; teacher training colleges; vocational, commercial, agricultural, and nursing schools with courses of varying duration; and a five or six year university course. Enrollments in 1960 and 1968 in thousands and the percentage importance of public versus private schools at each level are shown in Table 1.

Table 1

EDUCATIONAL ENROLLMENTS IN COLOMBIA, PUBLIC AND
PRIVATE SECTOR, 1960 AND 1968

Level of Education	Enrollment in 1960 (thousands)	Enrollment in 1968 (thousands)	Percentage 1968
PrePrimary			
Public	1.9	16.3	14.8%
Private	40.5	94.2	85.2
Primary			
Public	1,432.2	2,213.4	81.0%
Private	258.1	520.0	19.0
Secondary: Total			
Public	100.3	272.8	46.4%
Private	153.5	313.9	53.6
Teacher Training			
Public	18.2	38.6	71.2%
Private	9.8	15.6	28.8
Others			
Public	31.3	56.7	44.7%
Private	54.1	70.1	55.3
Higher Education			
Public	13.2	35.6	52.7%
Private	9.4	31.9	47.3

Source: Jallade (1974, p. 15)

For purposes of this paper, probably the two most important characteristics of Colombia's educational system are its recent growth and the continued scarcity of spaces. That the "educational pyramid" is very steep can be seen from the following figures provided by the National Planning Department:¹

"Of 1,000 children of school age (7 years):

230 will never attend school
770 will enter first grade.

"Of the 770 who begin school:

505 will begin second grade
357 will begin third grade
263 will begin fourth grade
216 will begin fifth grade.

"Of these 216 who complete primary education:

119 will enroll in the first year of secondary education
86 in the second year
74 in the third year
60 in the fourth year
40 in the fifth year
37 will complete secondary education.

"Of these 37 who complete secondary education:

35 will begin university study
15 will arrive at the third year of university
11 will complete university (5th or 6th year)."

For some writers, this fact alone signifies the impossibility of education as a factor promoting socio-economic mobility. Taking a strong position on this issue, Parra (1973, pp. 64-65) concludes:

¹Departamento Nacional de Planeación (1970).

"The Colombian educational structure can be seen as an obstacle to social mobility, owing not only to the fact that it excludes a large proportion of the population, which implies a great loss of human capital and serious faults at the distributional level, but also with respect to the effects which it induces in those groups which achieve a certain degree of education... In other words, even when the population has access to a level of schooling which can overcome illiteracy...one finds discrimination against the lower strata given that...the amount of education they receive is not sufficient to promote their social mobility."

A problem with a definition of social mobility of this sort is that it cannot distinguish between (a) an institution which advances the socio-economic mobility of those who are able to participate in it, but which is small in size, and (b) an institution which is open only to members of the favored group, thus perpetuating existing positions between one generation and the next. Size alone is an unsatisfactory criterion for classifying an institution's contribution, or lack of contribution, to socio-economic mobility.

Given these considerations, it might be better to say that (a) an institution has the potential for promoting socio-economic mobility if those who take part in the institution have a better chance of attaining an advanced socio-economic position as a result, and (b) it actually promotes mobility if the beneficiaries include "substantial" numbers of persons from lower strata. Obviously, what one means by "substantial" is a subjective question. It is reasonable to take as our standards of comparison the two polar ideas of a completely stratified system as versus a totally open one.

In Section 4, we shall try to operationalize these notions and examine the extent to which Colombia's educational system in fact approaches or differs from either of these extremes.

Actually, the terminology one adopts and the specific definitions of social or economic mobility one employs are quite unimportant in and of themselves. Regardless of what we call these things, what matters is the actual performance of the educational system, which we seek to determine in the following sections.

2. The Importance of Education as a Determinant of Individual Income

It is by now well-known that education is a very important determinant of individual incomes in Colombia. The simple relationships between educational level and incomes found in some recent studies are reported in Table 2.

TABLE 2. RELATIONSHIP BETWEEN EDUCATION AND INCOME IN COLOMBIA.

<u>Data Source and Educational Level</u>	<u>Mean Income</u>
<u>Employment and Unemployment Surveys,</u> <u>Bogotá, 1963-66^a</u>	
Illiterates	1.95 pesos per hour
One year primary	2.45
Two or three years primary	2.78
Primary graduate	4.12
One or two years secondary	5.05
Three or four years secondary	8.26
Secondary graduate	16.18
One or two years university	14.46
Three or four years university	21.22
Five or six years university	25.48
<u>Survey of Family Budgets and Expenditures,</u> <u>Four Cities, 1967-68 (PRESFAM)^b</u>	
None	4,022 pesos quarterly
Primary (some or all)	5,257
Secondary (some or all)	11,163
University (some or all)	27,299

Sources: a) Selowsky (1969) b) Calvo and Fields (1975)

Is education a profitable investment? It is interesting to observe in Table 2 that income rises by ever-increasing percentages as one moves up the educational scale. We might suppose, therefore, that the private returns to educational investment would follow a similar pattern. In fact, however, the reverse is found (see Table 3, Column 1). The explanation lies in the fact that costs (Column 2) rise even faster than salary (Column 3). Nevertheless, it is clear that the private profitability of all but the highest educational levels (which include only a very small part of the Colombian labor force) is very great indeed.

TABLE 3. RATE OF RETURN, COSTS, AND SALARIES FOR MALES IN BOGOTA, IN 1965 PESOS.

Educational Level	(1) Private rate of return based on weekly earnings	(2) Direct plus opportunity costs (mean), annual	(3) Mean Hourly Salary Men, Aged 35-44
None			1.75
Primary ^a	20.5%	755	3.02
Secondary ^b	33.2%	1,988	10.33
University ^c	4.1%	7,069	19.41
Vocational ^b	49.4%	6,101	4.24

a) Rate of return as compared with no education

b) Rate of return as compared with primary education

c) Rate of return as compared with secondary education

Source: Schultz (1968)

How important is education in determining income in comparison with other characteristics of workers or of their employment? We see in Table 4 that incomes vary more according to educational level than according to the other variables with the possible exception of occupation. But since education is closely related with occupation, presumably causally, (see Table 5), its importance in determining income is all the greater.

TABLE 4. MEAN FAMILY INCOME CLASSIFIED BY VARIOUS FAMILY CHARACTERISTICS, FOUR URBAN AREAS, 1967-68, IN PESOS QUARTERLY.

<u>Characteristic</u>	<u>Mean Family Income</u>
<u>Education of Head</u>	
None	4,022
Primary	5,257
Secondary	11,163
University	27,299
<u>Age of Head</u>	
Less than 35	7,131
35-49	8,434
50-64	9,848
65 +	11,094
<u>Family Size</u>	
1-2	5,369
3-4	7,114
5-7	8,782
8 +	9,563
<u>Occupation</u>	
Professionals	21,674
Vendors, commercial	8,806
Artisans, craftsmen, and operatives	5,694
Other employees	6,730

Source: Calvo and Fields (1975).

TABLE 5. RELATIONSHIP BETWEEN EDUCATIONAL ATTAINMENT AND OCCUPATIONAL POSITION, BOGOTA, 1967.

	Professionals and Managers	Vendors and Proprietors	Operatives	Other	Without Information	TOTAL
None	2 (4.3%)	8 (17.0%)	16 (34.0%)	14 (29.7%)	7 (14.9%)	47
Primary	46 (12.6%)	47 (12.8%)	151 (41.3%)	99 (27.0%)	23 (6.3%)	366
Secondary	103 (41.5%)	46 (18.5%)	53 (21.3%)	25 (10.0%)	21 (8.5%)	248
University	108 (81.5%)	9 (6.7%)	3 (2.2%)	10 (7.4%)	5 (3.7%)	135
Total	259 (32.5%)	110 (13.8%)	225 (28.0%)	158 (19.8%)	56 (7.0%)	796 (100.0%)

Note: percentages sum to 100%.

Source: Unpublished data, Survey of Family Budgets and Expenditures (PRESFAM)
CEDE, Universidad de Los Andes, 1967-68.

In order to ascertain the extent to which education and other economically-relevant characteristics of persons or their jobs can explain their incomes, several studies have used microeconomic survey data to construct income (or earnings) functions by means of multiple regression analysis. The main results of each of these surveys are summarized in Table 6.

It is clear that the geographical coverages of these surveys, the populations sampled, and the types of variables included vary widely from one study to another. Nevertheless, we observe considerable agreement among these studies in a number of respects. First of all, education is always found to have an important positive effect on income. Second, age or experience are also found to be related significantly positively to income.¹ Third, other variables, although statistically significant determinants of income, are not very important. Finally, these studies typically explain between forty and fifty percent of the variance in individual incomes.²

In light of the focus of this paper on the role of education in promoting economic mobility, it is particularly interesting to ask whether

¹The one exception to this generalization is the study by Urrutia (1974), in which the experience variable has the wrong sign as often as not. This is probably due to the unusual definition of experience which he employed: number of years the individual reports having worked (in all occupations) divided by age.

²Schultz (1968) reports a notably lower R^2 than the others. This may perhaps be due to the small number of variables included, or to the fact that his study, being the earliest, is based on one of the first surveys in Colombia, with the possibility of correspondingly greater errors in measurement.

TABLE 6. PRINCIPAL RESULTS OF STUDIES USING MICROECONOMIC SURVEY DATA TO CONSTRUCT INCOME FUNCTIONS IN COLOMBIA

<u>AUTHOR</u>	<u>YEAR OF DATA AND SOURCE</u>	<u>GEOGRAPHICAL COVERAGE</u>	<u>SAMPLE SIZE</u>	<u>DEPENDENT VARIABLE</u>	<u>STATISTICALLY SIGNIFICANT INDEPENDENT VARIABLES</u>	<u>R²</u>
Schultz (1968)	1965 Survey of Employment and Unemployment (CEDE)	Bogotá	1,000 individuals both sexes	Logarithm of wage adjusted for a 48 hour work week	Educational level, age, other family income (women only)	.17 - .24
González (1971)	1967-68 Survey of Family Bud- gets and Expenditures (CEDE)	Bogotá	918 individuals both sexes	Income	Educational level, age, income source (capital, independent work, mixed or salaried), sex	.38
Musgrove (1974)	1967-68, Survey of Family Bud- gets and Expenditures (CEDE)	Bogotá, Barranquilla, Cali, Medellín	2,949 families	Logarithm of imputed "relative long term income" of family	Interactive variables involving educational level and age of family head, head's marital and family status, presence of capital income, number of workers in family, city	.49
Urrutia (1974)	1967, Survey of Occupational and Geograph- ical Mobility (CEDE)	Bogotá, Bucaramanga, Manizales, Medellín	331 individuals both sexes	Income	Educational level, age, sex	Approx- imately .45

6. PRINCIPAL RESULTS OF STUDIES USING MICROECONOMIC SURVEY DATA TO CONSTRUCT INCOME FUNCTIONS
IN COLOMBIA (Continued)

	<u>YEAR OF DATA AND SOURCE</u>	<u>GEOGRAPHICAL COVERAGE</u>	<u>SAMPLE SIZE</u>	<u>DEPENDENT VARIABLE</u>	<u>STATISTICALLY SIGNIFICANT INDEPENDENT VARIABLES</u>	<u>R²</u>
(1975)	1970 National Household Survey (DANE)	National	607 individuals, both sexes	Logarithm of income	Educational level of individual, experience of individual, logarithm of income of parents	.50

an individual's own characteristics (education, experience, etc.) are more important than his socio-economic background (as measured by the income, occupational status, or educational attainment of his parents). In this context, the recent study by Kugler (1975) is both pathbreaking and insightful. We may observe in Table 6 that Kugler found three variables---the individual's education, his experience¹, and (the logarithm of) his father's income---to be statistically significant determinants of income. The magnitudes of the various coefficients and standard errors and supplementary regressions in Kugler's study suggest that the individual's characteristics are more important than his socio-economic origin. Kugler's own conclusion is: "The results obtained indicate that contemporaneous variables, especially education, as well as socio-economic antecedents are important direct determinants of labor incomes, perhaps with more weight to the former than to the latter." (p. 30).

There is some room for doubt about the general applicability of Kugler's conclusion owing to the nature of his sample. The data are taken from a national household survey, including data for each person living in the household. Since the respondents were not asked about their socio-economic origins, Kugler was limited to those households in which at least two generations of income earners were living together. The probable effect

¹ A frequently-used proxy for actual experience is the individual's age, minus the number of years of schooling he has attained, minus the age at which schooling begins. Such a measure was first employed by Hanoch (1967) in the United States. Kugler's experience variable, and the one I also utilize below, is age minus schooling minus seven.

of such a sampling procedure is to include disproportionately large numbers of young workers. This might tend to bias the results in favor of factors which determine short-run economic success (for instance, education to the extent that employers use it as a screening device to determine whom to hire for the best paying entry-level jobs, economic origin to the extent that family connections are particularly important when one initially enters the labor market) and away from factors that determine one's long-run economic position (for example, experience, individual cleverness or conscientiousness, and luck).

Given these possible biases, it is worth examining whether the results can be extended to a sample of workers at all stages of their working lives. The data for such an exercise are taken from a survey of occupational and geographic mobility conducted by the Centro de Estudios Sobre Desarrollo Economico (CEDE) of the Universidad de Los Andes in four urban areas of Colombia (Bogotá, Medellín, Manizales, and Bucaramanga) in 1967, including 331 workers.¹ While parents' income was not asked in the CEDE survey, parents' education and occupation were included. These variables may be related to the individual's own characteristics to see if they have an independent effect and, if so, how important that effect is.

¹A general description of the data may be found in Fields and Jaramillo (1975). For additional details and basic results, see Garcia (1968). These data provide the basis for the recent paper by Urrutia (1974). I wish to express my gratitude to CEDE, to Dr. Urrutia, and to his assistant, Lia Guterman, for kindly making these data available to me.

The dependent variable is the logarithm of the individual's income (LNY). As in many other studies¹, the logarithmic form is justified on two grounds: that it probably provides a more accurate fit to the data, and that the coefficients on the explanatory variables can be interpreted as the percentage effect on income of a unit change in that variable.

The independent variables are of two general types: those that pertain to the individual and those that pertain to his parents. In the first group, we have: the individual's education (EDUC), measured in terms of number of years completed; the number of years of vocational education completed (VOCEDUC); the individual's experience, defined as age minus schooling minus seven, entered both linearly (EXP) and quadratically (EXPSQ)²; two dummy variables for the individual's occupation, according to whether the person is in a white-collar occupation or not (OCCUP1), or a commercial occupation or not (OCCUP2);³ a dummy variable for the person's sex (MALE), taking on the value one for men and zero for women; a dummy variable taking on the value one if the individual is a "mature age" migrant (MIG) to the urban area in which he now resides, i.e., if he was

¹For an excellent introduction to this whole area, with the latest results for the United States and other countries, see Mincer (1974).

²The quadratic formulation allows for the possibility that income might rise at a diminishing rate as a worker attains more experience, or that income might actually fall beyond some point as the worker ages.

³Specifically, OCCUP1 = 1 if the person is in one of the following occupational groups---professionals, technical personnel, and persons in related occupations; managers, administrators, and directors; and office-workers and persons in related occupations---and zero otherwise. OCCUP2 is equal to one for proprietors, vendors, or clerks in commercial enterprises (including the self-employed) and zero otherwise. The omitted categories are various blue-collar workers such as operatives, artisans, transport and service workers, and general unskilled workers.

born someplace else but moved after the age of twelve), zero otherwise; and three dummy variables identifying the city of residence: MED if Medellín, zero otherwise; MAN if Manizales, zero if otherwise; and BUC if Bucaramanga, zero otherwise.¹ The variables pertaining to the individual's economic origin include: his parents' education (PAREduc), equal to the mean of the father's and mother's education; two dummy variables for father's occupation (PAOCCUP1 and PAOCCUP2), defined in the same way as the individual's occupation; and a dummy variable for mother's labor force participation status (MALFP), equal to one if the mother is a member of the labor force and zero otherwise.

Regarding the individual's own characteristics, the hypotheses are that LNY is positively related to EDUC, EDUCVOC, EXP, OCCUP1, OCCUP2, and MALE and negatively related to EXPSQ, MIG, MED, MAN, and BUC. With regard to parents' characteristics, we would expect LNY to be a positive function of PAREduc, PAOCCUP1, PAOCCUP2, and MALFP. If both parents' characteristics and the individual's characteristics are important independent determinants of income, we would expect variables of both types to be significant in a regression that includes both sets.

Considering first the relationship between LNY and the individual's own characteristics, we see in equation (1) of Table 7 that most of the

¹With these definitions, Bogotá is the omitted city.

variables behave as hypothesized.¹ EDUC, EXP, EXPSQ, OCCUP1, OCCUP2, and MAN all have the expected sign and are highly statistically significant. Most of the other variables (VOCEDUC, MIG, and BUC) have the right sign but are not significantly different from zero. Only MED has the incorrect sign, but it is not significantly different from zero either. Together, these variables are found to explain 56% of the variance, which surpasses the coefficient of determination found in earlier studies (see Table 6).

Turning now to the relationship between LNY and the education and occupation of one's parents, we find that the results generally conform with the hypotheses (see equation (2) of Table 7), but they are much weaker. Parents' education is the only variable which both has the right sign and is highly statistically significant. The variables for father's occupation are both positively related to LNY but fail to pass significance tests at ordinary confidence levels. Interestingly, contrary to hypothesis, mother's labor force participation (MALFP) is found to be negatively related to LNY. One possibility is that the mother's presence in the home is an important determinant of the educational attainment and other job-relevant attributes of her children ("home-produced human capital"), so children whose mothers

¹In Section 3, we will seek to explain the individual's educational attainment. The assumed structural relationships are:

$$(i) \text{ EDUC} = f^1(X^1),$$

$$(ii) \text{ LNY} = f^2(\text{EDUC}, X^1, X^2)$$

where X^1 is a vector of variables pertaining to socio-economic origin and X^2 is a vector of other characteristics. This system is recursive rather than simultaneous, for although antecedent variables enter both equations, no contemporary variables enter the first equation. As is well-known (see, for instance, Johnston (1972)), recursive systems are efficiently estimated by ordinary least squares (OLS). Equations (1) - (4) of Table 7 and the regression result of Table 10 are the OLS estimates.

TABLE 7. FACTORS EXPLAINING INCOME, CEDE SURVEY OF OCCUPATIONAL AND GEOGRAPHIC MOBILITY, 1967

Dependent Variable - Logarithm of Income (LNY)

Independent Variables	(1)	(2)	(3)	(4)
EDUC	.13023 (.01251)		.12511 (.01425)	.13106 (.01192)
VOCEDUC	.00186 (.04136)		.00737 (.04185)	
EXP	.04143 (.00973)		.04282 (.00992)	.03959 (.00948)
EXPSQ	-.00060 (.00019)		-.00062 (.00019)	-.00058 (.00019)
OCCUP1	.40538 (.13653)		.38136 (.13918)	.40130 (.13320)
OCCUP2	.33840 (.08024)		.32777 (.08304)	.32997 (.07912)
MALE	.58359 (.07069)		.58343 (.07180)	.59075 (.06965)
MIG	-.05126 (.06779)		-.04899 (.06906)	
MED	.02771 (.08344)		.02013 (.08463)	
MAN	-.31866 (.09984)		-.32414 (.10112)	-.30890 (.09343)
BUC	-.05004 (.08930)		-.05173 (.08996)	
PAREduc		.09413 (.01771)	.00490 (.01689)	
PAOCCUP1		.32778 (.21076)	.15181 (.15712)	
PAOCCUP2		.17125 (.11293)	.04782 (.08869)	
MALFP		-.14068 (.10687)	.00245 (.07968)	
CONSTANT	4.87066	6.20003	4.84986	4.85506
R ²	.563	.162	.565	.562

were in the labor force presumably lost out on this extra training. Another possibility is that mother's labor force participation is strongly related (inversely) with income through the secondary worker effect, so that without being able to include income directly, we are picking up its effect through mother's labor force participation.

It may be noted that the explanatory power of the regression involving only parental characteristics ($R^2 = .16$) is considerably lower than the earlier one based on individual's characteristics. This suggests that in a multiple regression involving both types of variables, socio-economic origin would be relatively less important than the personal attributes of the individual.

In fact, this is just what we find (see equation (3)). None of the parental variables--not even parents' education (PAREDUC), which was a highly significant determinant of an individual's income in the regression based on parental characteristics--are found to have statistically significant effects in the presence of the individual's own characteristics.¹ Furthermore, the coefficients of determination in equations (1) and (3) are identical to two decimal places. These results strongly suggest that incomes are determined by the economically-relevant characteristics of

¹Recall that the survey of occupational and geographic mobility did not include data on father's income, which was the only significant antecedent variable in Kugler's study. Kugler also had data on parents' education and occupational position. As in the present study, these variables did not appear to be statistically significant once the individual's own characteristics were taken into account.

workers, not of their parents, and that parental background makes no significant additional direct contribution to the explanatory power of the model.¹ This finding has important implications for educational policy, which we shall examine in Section 5.

Finally, in equation (4) of Table 7, we present a final regression which includes only the statistically significant variables of regression (3). We observe that each of these variables retains its statistical significance and the explanatory power of the regression is virtually unchanged.

In summary, the findings of this section may be summarized by the following propositions:

(1) Education is a very important determinant of an individual's income.

(2) Education is a highly-profitable personal investment, except perhaps at the very highest levels which include a very small percentage of the Colombian labor force.

(3) Education, experience, and other characteristics of individuals and of their employment can explain a very considerable part of the variance in individual incomes.

(4) In comparison with an individual's own characteristics, his socio-economic origin is of secondary importance in determining income.

The primary conclusion to be drawn from this section is that education does produce economic mobility for those who receive it. The next step is to

¹This does not exclude the possibility that parental background may have important indirect effects, for example, in determining the educational characteristics of workers. We take this up in Section 3.

ascertain the socio-economic status of the recipients and the determinants of educational attainments. This is the task of Section 3.

3. The Importance of Socio-economic Status of Parents as a Determinant of the Education of their Children

Previous studies in Colombia have demonstrated the strong relationship between socio-economic background of parents and the socio-economic status of their children.¹ It has also been shown that parental background is an important determinant of children's education, and that socio-economic origin is of increasing importance as one moves up the educational ladder.²

In Panel A of Table 8, data from CEDE's survey of occupational and geographical mobility are presented on the relationship between an individual's education and two measures of his socio-economic background, his parents' education (PAREduc) and occupational status (PAOCCUP1 and PAOCCUP2). It is apparent that the children of better-educated parents and parents with higher occupational status receive more education, at least in the bivariate correlations. In Panel B, we observe the parental background of university students in Colombia. Once again, we see the strong relation between parents' education and that of their children.

It is interesting to examine the extent to which parental background, along with the personal characteristics of an individual, can explain his

¹See Garcia (1968), Lemoine and Pereira (1975), and Kugler (1975).

²See Rama (1969), Urrutia and Sandoval (1971), Parra (1973), Urrutia (1974), and Kugler (1975).

TABLE 8. EDUCATIONAL ATTAINMENT AND PARENTAL BACKGROUND IN COLOMBIA

A. MATRIX OF SIMPLE CORRELATION COEFFICIENTS BETWEEN AN INDIVIDUAL'S EDUCATION AND THE EDUCATION AND OCCUPATION OF HIS PARENTS, SURVEY OF OCCUPATIONAL AND GEOGRAPHIC MOBILITY, FOUR CITIES, 1967.

	EDUC	PAREduc	PAOCCUP1	PAOCCUP2
EDUC	1.00000	0.68693	0.28583	0.32051
PAREduc		1.00000	0.41083	0.29801
OCCUP1			1.00000	-0.14081
OCCUP2				1.00000

B. EDUCATION OF FATHERS OF UNIVERSITY STUDENTS AND THE MALE POPULATION, 40-59

Level of Instruction	<u>YEARS OF AGE</u>				Men, 40-59 years old, a) 1964 Census
	Universidad Nacional 1967	Universidad de Los Andes, 1964	Universidad Javeriana	Five Univer- sities	
Primary or less	35.4%	11.2%	11.0%	23.0%	89.4%
Secondary	45.8	44.7	51.0	42.0	9.0
University, incomplete	6.1	9.8	6.0	8.0	0.3
University, complete	12.7	32.7	32.0	24.0	1.4

a) Survey of the Universidad Nacional, Andes, Javeriana, Libre, and Cauca.

[Source: Rama (1969)]

or her educational attainment. The work of Kugler again provides a basis for the present study. Kugler hypothesized that an individual's educational attainment is related positively to father's income and occupational position, parents' education, and accessibility to education during one's youth, and negatively related to mother's labor force participation, sex (if female), and migratory status (if a migrant from the rural sector). The results, reported in Table 9, are noticeably mixed.

Probably the key variables are those relating to the income, education, and occupation of one's parents. Father's income, mother's labor force participation, and parents' education are seen to perform as expected. Father's occupation causes some difficulty however. Although white-collar parents appear to educate their children more than skilled blue-collar parents, whose children in turn receive more education than those of unskilled workers, the children of professionals do not receive significantly more education than those of unskilled workers, surely a surprising result.

Turning to the other variables, the results are also mixed. Migrants from rural areas have significantly less education than life-long urban residents, as would have been supposed. However, contrary to hypothesis: (i) women were found to have significantly more education than men, ceteris paribus, and (ii) the greater the index of accessibility to education, the lower one's educational attainment.

To see if these surprising results are sustained using another base, and to determine whether the problems in sample coverage noted in the last section have an important effect on the results, we may refer again to CEDE's survey of occupational and geographic mobility. In terms of the

TABLE 9. FACTORS EXPLAINING EDUCATIONAL ATTAINMENTS, DANE HOUSEHOLD SURVEY, 1970.

Dependent Variable - Years of Education completed

<u>Independent Variable</u>	<u>Regression Coefficient</u>	<u>t Statistic</u>
Logarithm of father's income	.63	4.13
Father's occupation		
(1) Skilled blue-collar worker	.80	2.91
(2) White-collar clerk or office worker	1.48	3.97
(3) Professional, executives, or proprietor	N.S.	-.61
[Omitted category = unskilled worker]		
Mother's labor force participation	-.53	-2.27
Father's education	.22	4.79
Mother's education	.40	7.65
Migrant from rural sector	-1.40	-5.53
Female	.27	2.86
Accessibility to education in department of residence at time of school age	-.04	-5.58

$R^2 = .55$

N.S. = Variable not statistically different from zero

Note: Constant not reported.

[Source: Kugler (1975, p. 17)]

variables defined in the last section, the hypotheses are that years of education completed (EDUC) is a positive function of father's occupational position (PAOCCUP1, PAOCCUP2), parents' education (PAREduc), and sex (MALE), a negative function of migratory status (MIG) and an ambiguous function of mother's labor force participation (MALFP).¹ The regression results are given in Table 10.

The results here are similarly mixed, as in Kugler's study. Parents' education (PAREduc) is strongly significant, and in fact accounts for nearly all of the explained variance.² In contrast to the importance of PAREduc, none of the other variables has an effect significantly different from zero at conventional confidence levels. Thus, neither Kugler's anticipated results relating to parents' occupation and to the individual's migratory status nor his unexpected finding of a positive relationship between femaleness and education are confirmed by this other body of data.³

¹Recall once again that the CEDE survey did not ask father's income. The non-prediction regarding mother's labor force participation reflects the ambiguities of interpretation relating to the statistically significant negative effect of MALFP on income, reported in Table 7 of Section 2. No attempt was made to include an index of accessibility to education.

²In Panel A of Table 8, we observed a simple correlation coefficient between EDUC and PAREduc of + .68693. This implies that in a simple regression, PAREduc would explain 47% of the variance in EDUC. Only an additional 2% is explained using five additional variables.

³It is interesting to note that the difficulty with father's occupation reappears. Prior notions suggest that the coefficient on PAOCCUP1 (which includes professionals, office workers, and other white-collar workers) would be greater than that of PAOCCUP2 (proprietors, vendors, and clerks in commercial enterprises). However, the estimated coefficients have just the opposite relation with one another.

TABLE 10. FACTORS EXPLAINING EDUCATIONAL ATTAINMENTS, CEDE SURVEY OF OCCUPATIONAL AND GEOGRAPHICAL MOBILITY, 1967.

Dependent Variable - Years of Education Completed

<u>Independent Variable</u>	<u>Regression Coefficient</u>	<u>Standard Error</u>
PAREduc	.81457	.06174
PAOCCUP1	.70027	.72959
PAOCCUP2	1.30174	.39508
MALFP	-.64314	.36905
MALE	.28446	.32354
MIG	.04037	.31053
CONSTANT	2.43295	

$$R^2 = .49$$

The finding of a highly significant and quantitatively important relationship between the education of parents and that of their children implies that education is an important means of transmitting economic status from one generation to another. However, our inability to explain an individual's education attainment in a consistent fashion with variables other than parents' education (and apparently parents' income) suggests that Colombia's educational system may be a bit more open than we might have thought from other studies. We examine this question in Section 4.

4. How Stratified is Colombia's Educational System?

In the last section, we observed a strong correlation between an individual's education and that of his parents, and found further that about half the variance in educational attainments can be explained by one's socio-economic origin. Data of this sort are sometimes cited as evidence that an educational system like Colombia's is very closed and does not offer much opportunity for economic or social mobility.

This argument would appear deficient for the following reasons. Given the conclusions of Section 2-- that education is a profitable investment and an important determinant of income for those who receive it--we would expect that, as with all other economic goods, those families with greater ability to pay for education would consume more of it. High income parents would then *ceteris paribus* demand more education for their children.¹

¹I first heard this argument advanced by Gary Becker in his now famous lecture; see Becker (1967).

Since one cause of the parents' higher incomes is apt to be the fact that they themselves had more education, economic theory would lead us to expect a positive relationship between the education of parents and that of their children. Given this observation, from an economic perspective, an educational system can be biased only if, after standardizing for willingness and ability to pay for education, the children of the relatively well-to-do still have preferential access. None of the evidence cited above makes any attempt to perform such a standardization.

As an alternative procedure, we may instead formulate the problem in terms of two alternative extreme hypotheses--one saying that access to the educational system is purely random with respect to parental background, the other that access is limited to those children whose parents were most advantageously situated to begin with--which we may term the "open" and "closed" educational system models respectively. The task of this section is to ascertain which of the two provides a more accurate characterization of Colombia's actual experience.

The microeconomic data from the survey of occupational and geographic mobility may be cross-classified in order to show the relation between an individual's education and that of his parents. These data are shown in Panel A of Table 11.

The data clearly show a strong positive relationship between one generation's education and that of the other. We observe, for example, that 75% of the children with no education (12 out of 16) came from families where the parents had no education either, but parents with no education comprised only 16% of the total sample. Similarly, nearly all of the

TABLE 11. EDUCATION OF PARENTS AND OF THEIR CHILDREN, FOUR COLOMBIAN CITIES, SURVEY OF OCCUPATIONAL AND GEOGRAPHIC MOBILITY, 1967.

A. Actual Data

Education of Child	Education of Parents (mean)						Total
	0	1-3	3-5	5-8	8-11	11 or more	
0	3.6% (12)	0.9% (3)	0.3% (1)	0.0% (0)	0.0% (0)	0.0% (0)	4.8% (16)
1-3	7.5% (25)	10.0% (33)	4.5% (15)	0.9% (3)	0.0% (0)	0.0% (0)	23.0% (76)
3-5	3.6% (12)	11.5% (38)	13.0% (43)	1.5% (5)	0.6% (2)	0.0% (0)	30.2% (100)
5-8	0.9% (3)	4.5% (15)	8.2% (27)	3.0% (10)	0.9% (3)	0.1% (0)	17.5% (58)
8-11	0.3% (1)	2.7% (9)	5.4% (18)	3.9% (13)	2.4% (8)	0.6% (2)	15.4% (51)
11 or more	0.0% (0)	0.3% (1)	2.1% (7)	2.7% (9)	2.7% (9)	1.2% (4)	9.1% (30)
Total	16.0% (53)	29.9% (99)	33.5% (111)	12.1% (40)	6.6% (22)	1.8% (6)	100.0% (331)

Calculated $\chi^2 = 194.39$

Critical value of $\chi^2 = 42.98$ (99% confidence level)

TABLE 11. EDUCATION OF PARENTS AND OF THEIR CHILDREN, FOUR COLOMBIAN CITIES,
SURVEY OF OCCUPATIONAL AND GEOGRAPHIC MOBILITY, 1967. (Continued)

B. Predicted values if Education of Parents and Education of Children are
Independent.

Education of Child	Education of Parents (mean)						Total
	0	1-3	3-5	5-8	8-11	11 or more	
0	0.8%*	1.4%	1.6%	0.6%	0.3%	0.1%	4.8%
1-3	3.7%*	6.9%*	7.7%	2.8%	1.5%	0.4%	23.0%
3-5	4.8%	9.0 %*	10.1%*	3.7%	2.0%	0.5%	30.1%
5-8	2.8%	5.2%	5.9%*	2.1%*	1.2%	0.3%	17.5%
8-11	2.5%	4.6%	5.2%*	1.9%*	1.0%*	0.3%*	15.5%
11 or more	1.7%	2.7%	3.0%	1.1%*	0.6%*	0.2%*	9.3%
Total	16.3%	29.8%	33.5%	12.2%	6.6%	1.8%	100.2%

* = Actual value > predicted value

TABLE 11. EDUCATION OF PARENTS AND OF THEIR CHILDREN, FOUR COLOMBIAN CITIES,
SURVEY OF OCCUPATIONAL AND GEOGRAPHIC MOBILITY, 1967.

C. Predicted Values if Perfect Stratification

Education of Child	Education of Parents (mean)						Total
	0	1-3	3-5	5-8	8-11	11 or more	
0	4.8%** (16)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	4.8% (16)
1-3	11.2% (37)	11.8%** (39)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	23.0% (76)
3-5	0.0% (0)	18.1%** (60)	12.1% (40)	0.0% (0)	0.0% (0)	0.0% (0)	30.2% (100)
5-8	0.0% (0)	0.0% (0)	17.5% (58)**	0.0% (0)	0.0% (0)	0.0% (0)	17.5% (58)
8-11	0.0% (0)	0.0% (0)	3.9% (13)	11.5%** (38)	0.0% (0)	0.0% (0)	15.4% (51)
11 or more	0.0% (0)	0.0% (0)	0.0% (0)	0.6% (2)	6.6%** (22)	1.8%** (6)	9.1% (30)
	16.0% (53)	29.9% (99)	33.5% (111)	12.1% (40)	6.6% (22)	1.8% (6)	100.0% (331)

** = Actual value < predicted value

parents with 8 or more years of schooling had children who were educated at least as far (23 out of 28). The calculated chi-square statistic exceeds all tabulated values, indicating that the observed pattern is quite different from randomness at all levels of statistical confidence.

Despite this statistically significant positive correlation, we may also observe that the correlation is far from perfect. Of the children with 11 or more years of education, for instance, the majority came from families where the parents had less than 8 years of schooling. Nor is parental education sufficient to insure the education of their children, as may be seen by noting that at every educational level of the parents, there are non-trivial numbers of children who failed to attain that same level.

We may conclude that Colombia's educational system is neither completely "closed", as some writers have implied, nor completely "open" either. The question then is: to which of these two models does the actual pattern in Colombia more closely conform?

We may operationalize the two models as follows. In a completely "open" system, the education received by the children would be independent of the education (or other socio-economic characteristics) of their parents. From elementary probability theory, the probability of the joint occurrence of two independent events is the product of the probabilities of their individual occurrences. Thus, for example, given that 16.0% of the parents had no education and 4.8% of the children also had no education, if parents' and children's education were in fact independent of one another, then 0.8% ($= 16.0\% \times 4.8\%$) of the cases in the sample would be expected to be children

with no education whose parents had no education either. This number appears as the predicted frequency in the upper left hand corner of Panel B of Table 11. The other figures in Panel B are calculated in a similar fashion, under the assumption of a completely "open" educational system.

Likewise, we may characterize a completely "closed" educational system as one where the children of the most well-to-do receive all of the benefits. In an educational system of constant size, this implies a perfect one-to-one correspondence between parents' and children's education, with all observations lying along the principal diagonal. In a growing educational system, however, the analog is that all newly-created spaces are filled by the children of parents from the class immediately below. For example, we find in the sample data that there were spaces for 30 of the children at levels beyond secondary education (11 years). In a perfectly closed system, 6 of these spaces would have been filled by the children of the 6 parents who had attained that level of schooling, 22 by the children whose parents had completed between 8 and 11 years of schooling, and the remaining 2 by children whose parents had achieved between 5 and 8 years of education. Similarly, of the 51 children who had completed 8 to 11 years of schooling, 38 would have come from families where the parents had achieved between 5 and 8 years of schooling, and 13 from families with parents in the 3-5 category. These and analogous figures are given in Panel C of Table 11, which presents a hypothetical pattern predicted from a completely "closed" educational system.

In comparing the actual data with the two sets of predicted values, we see that there are systematic discrepancies, namely, (a) that the

"open system" model underpredicts the number of cases along the principal diagonal, where parents' and children's educations are equal, and (b) the "closed system" model underpredicts these cases. In both models, the discrepancies are rather substantial.

The most sensible and straightforward way to gauge the relative distance of the actual pattern from the alternative extreme models is to compare the deviations of the actual values from the patterns predicted by the two models. Using absolute and squared deviations, the results are:

	<u>Actual pattern compared with the predictions of:</u>	
	<u>Completely "open" educational system model</u>	<u>Completely "closed" educational system model</u>
Sum of absolute deviations	180	230
Sum of squared deviations	1,150	3,482

Colombia's educational system is thus seen to fall roughly in the middle of the two polar cases, but relatively closer to the "open" end. Clearly, the system is far from perfectly stratified, as many previous studies have implied. We turn now to a consideration of the implications of this and the other major findings of this paper for educational policy.

3. Conclusions and Policy Implications

This paper has examined the relationship between education and economic mobility in light of the considerable debate over the possibilities of affecting the distribution of income and reducing poverty in less developed countries by educational means. The empirical research on Colombia suggests the following principal conclusions:

(1) Education is a very important determinant of an individual's income, and is generally a highly profitable investment for those who receive it.

(2) Access to education is limited, and is received disproportionately by the relatively well-to-do. Parents with high socio-economic status are more likely to educate their children to higher levels than lower class parents. This is perhaps the most important way in which economic status is transmitted from one generation to another in Colombia.

(3) Despite the relation between parents' socio-economic status and that of their children, Colombia's educational system more closely approximates an "open" educational system model than a "closed" system model.

In summary, this paper has established that education is a factor promoting social mobility, but only for a small fraction of the population. The general implication of these findings is that a reformed set of educational policies may be able to overcome parental background in improving income distribution and reducing poverty. Writers of such widely differing perspectives as Schultz (1968), Selowsky (1969), Parra (1973), and Berry and Urrutia (1975) are in agreement both on the general advisability of expansion of the educational system and on the desirability of primary school expansion in specific. While their respective arguments may be correct, the evidence is less than fully-convincing.

One frequently hears the argument that since education has in the past been received disproportionately by the relatively well-to-do, and education is good for those who get it, the provision of universal education at whatever level would on the other hand tend to favor disproportionately those from the relatively lower strata, who had been excluded from the

benefits of education in the past. Suppose, for instance, that the government were to make available universal primary education (up to five years of schooling). The background of those whose educational levels would be raised could be approximated for urban areas from Panel A of Table 11 as follows:

<u>Parents' Education</u>	<u>No. of Children</u>	<u>%</u>
0	49	26%
1-3	74	38
3-5	59	31
5-8	8	4
8 or more	<u>2</u>	<u>1</u>
	192	100%

Apart from the values of universal primary education as a socially-desirable merit good, it is argued that such a policy would benefit those from lower economic levels, thus according with the present government's policy at directing economic development in general and fiscal spending in particular at the poorest segments of the population.

While it is clear that the poor would be the main beneficiaries of universal primary education in terms of access, it is not at all clear that the economic rewards would be all that great. The usual argument is that since the estimated social rate of return to investment in education is very high for primary education in Colombia, more basic education would have major efficiency effects on the economy.¹ The validity of this line

¹See Schultz (1968), Selowsky (1969), and Urrutia (1974).

of reasoning depends on three assumptions about the labor market: that the differences in incomes between those persons with primary education and those persons without it reflect "embodied human capital" created by the educational process, that jobs utilizing the new skills (and paying the higher wages) are readily available, and that the structure of relationships between wages and education would not be altered significantly by a massive educational campaign. I am unaware of any evidence demonstrating the applicability of these assumptions in the Colombian context.

To the contrary, there now exists a substantial literature built around an alternative paradigm: that education is used as a means of selecting the potentially most productive workers in economies where high-paying jobs are relatively scarce and wages are often set according to the job rather than in relation to the personal characteristics of the workers hired.¹ The implication of preferential hiring of this sort is that the actual productivity gains (i.e., social benefits) of educating additional persons on the margin may be substantially less than the observed average difference between persons with and without a given level of education. This implies that the marginal social rate of return (relating the present value of extra production to the present value of costs) may be much lower than the average social rate of return as conventionally calculated.² This has also been observed in at least one empirical case

¹Various versions of this type of model have been termed "bumping", "screening," "filtering," and "job competition." See Arrow (1973), Fields (1972; 1974), Spence (1973), Stiglitz (1975), and Thurow (1972).

²For an elaboration of these arguments in the context of labor surplus economies (which presumably include Colombia), see Fields (1972).

where the author concluded?

"In the case of Greece, investment priorities with respect to investment in skills estimated on the basis of observed labour earnings would have suggested a change in the wrong direction of the educational output." ¹
(Emphasis added)

In the course of the above discussion, we have raised three lines of argument for more education: that more education would increase the level of income by producing a more efficient and productive economy; that more primary education would improve the distribution of income by uplifting the poorest groups in the population; and that education, at least up to some level, is a merit good and more is needed to assure social justice. The empirical evidence presented in this paper sheds some light on each of these points. Let us consider them in reverse order.

With respect to the social justice argument, many people would share the view that a system in which the relatively disadvantaged have greater opportunity for upward mobility is a more just one. Critics of Colombia's educational system have argued that the system is unjust, precisely for lack of opportunity for mobility. As we have seen in this paper, the relatively well-off benefit disproportionately, as many writers have observed. However, we have noted the often overlooked point that the relatively disadvantaged have benefited substantially too, and that they would be likely to benefit disproportionately from educational expansion, particularly at the lower levels.

Turning now to considerations of the distribution of income and its level, the poor would benefit from access to an enlarged educational system

¹See Psacharopoulos (1970).

to the extent that the individual's own characteristics succeed in overcoming disadvantaged socio-economic backgrounds and that changed characteristics are rewarded in the labor market. One of the major empirical findings of this paper is that an individual's own characteristics are far more important in determining his (or her) income than the socio-economic characteristics of one's parents. Thus, it would appear that socio-economic background can be overcome. However, whether or not changed personal characteristics, in particular more education, would be rewarded in the labor market is something of an open question. One can assume that the rewards in the future would be very much like the average rewards at present, and indeed many writers have made exactly this assumption. It would seem better, though, to attempt to determine how the structure of rewards to education has or has not changed in the recent past, during which time Colombia, like other less developed countries, has experienced a rapidly growing educational system, steady changes in the educational composition of the labor force, and changing labor market conditions. Research on this question merits high priority.

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