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PLANNING EDUCATIONAL INVESTMENT

Presented by Martin Carnoy

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Martin Carnoy*

The development of the resource called youth in Latin America faces a typical dilemma: while there is almost universal agreement that increasing human resources is a key to the over-all development of an economy, and while agreement even extends to affirming that formal schooling plays the most important role in this increase, little has been done to convert accord into decisive, planned action. The assumption of this paper is that the lack of action is the direct result of lack of data: besides pronouncing a few rules of thumb, little has been done in the developing countries to find the most effective means of investing in youth. Education is lauded as a "good thing", but few know how good it is or what kinds of education are "better" than others. Planning is often conducted on the basis of broad guidelines (such as those drawn up at Punta del Este in 1961) which take almost no account of a country's particular needs.1/

In order to formulate a plan with substance, the planner needs to know what types of skills are in short supply today and what types will be necessary as the economy develops. His responsibility is to foresee, several years in advance, any bottlenecks that might develop in the labour market. In addition, he must weigh these purely economic criteria for educational investment against the possible conflicting socio-political constraints imposed by non-economic considerations. On what basis is the decision to allocate funds to education, to different levels of education, and to different kinds of education to be made? Assuming that as a first estimate, purely economic variables are to be used, public investment should be allocated among various sectors so as to cause the most rapid growth possible in the economy, and, in turn, investment in educating youth should be allocated within the educational sector to achieve the same end. There are many separate methods to achieve these goals intelligently. Without entering

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1/ It may be, of course, that no matter how expenditures are made on education, the economy benefits so greatly that detailed studies for allocating expenditures are hardly more than intellectual exercises. The best counter-example to any such hypothesis is the case of India, which put heavy emphasis on higher education and tended to ignore primary schooling. Largely as a result of this policy, India now faces difficulties.

/allocated within

allocated within the educational sector to achieve the same end. There are many separate methods to achieve these goals intelligently. Without entering into a discussion of their relative merits and faults, this paper applies one of these methodologies to the Mexican economy. The methodology chosen yields particular insights into the economic effects of education.

Mexico has made an intense educational effort in the last twenty-five years, especially in the last six or seven years of this period. At the same time, there has been a rapid increase in physical capital, so that it is not at all clear that the supply of skills has kept up with the demand. To try to determine the contribution that education was making to current growth and to estimate benefits to investment in various levels of schooling, a sample of 4 000 wage-earners was taken in the summer of 1963 from the labour force in the three Mexican cities of Distrito Federal (Mexico City) Monterrey, and Puebla. The wage-earners were asked the questions shown on the next page. Their answers provided the data for the study.

Using straightforward regression analysis, earnings by age were calculated for each of seven educational levels, covering 0-2 years of primary schooling to completed university (Figure 1). These lifetime income streams are interpreted as the annual income a wage-earner with a given education could expect to earn in urban areas if he entered the labor market today. There can be little doubt that incomes rise with increased schooling: in both relative and absolute terms, the differences in incomes between the schooling categories are quite large, indicating that even small increases in the amount of schooling do raise per capita incomes considerably. Figure 2 shows income streams "corrected for a number of variables including father's occupation, city, and industry worked in". Each correction requires holding the distribution of the variable in each schooling category equal to the distribution of the variable in the entire sample.

We could expect, for example, that the average amount of schooling of those with more educated (and therefore more wealthy) parents is higher than those with less influential families. This is true in the Mexican case: the mean schooling of wage-earners in the sample with unskilled fathers is 5 years; of those with employee, or white-collar worker fathers, 9 years; and those with professional fathers, 11 years. On the other hand, holding father's occupation constant in the sample changed income streams little at all schooling categories. The result has some significance: it tells us that once an individual completes a given level of schooling, his income is hardly affected by his father's position. Father's influence in the market for skills seems not to be very important. It is crucial to note that the unimportant effect of father's occupation relates only to an individual who has finished a given level of schooling.

The largest change in incomes made by correcting for "other" variables is in the income of the 1 (0-2) relative to the 4 (3-5) years of schooling categories, mainly from correcting for the type of industry worked in. The choice of occupation after completing those years of schooling does have an effect on the return of the investment in that schooling at the lower grades.

1. _____ hombre _____ mujer

2. Cuál es su sueldo mensual?

$ _____ por mes

3. Cuál es su edad?

_____ menos que 8	_____ 17 - 19	_____ 35 - 44
_____ 8 - 11	_____ 20 - 24	_____ 45 - 54
_____ 12 - 14	_____ 25 - 29	_____ 55 o más
_____ 15 - 16	_____ 30 - 34	

4. Cuántos años de escuela cumplió usted?

_____ 0 - 2	_____ 9 (secundaria completa)
_____ 3 - 5	_____ 10 - 12 (preparatoria o normal)
_____ 6 (primaria completa)	_____ 13 o más (universidad)
_____ 7 - 8 (secundaria)	_____ universidad completa

5. Tiene usted trabajo (ingreso) fuera de este establecimiento?

_____ sí _____ no

6. Si la respuesta a la pregunta 5 es "sí", indique usted un promedio de ingreso que usted puede esperar por mes de este trabajo. Por favor, no indique ingreso de propiedad, como renta de casas, etc.

$ _____ por mes

7. Cuál es (era) la ocupación de su padre?

8. Si usted completó unos años de universidad, en qué facultad estuvo usted?

9. Está usted estudiando a este momento?

_____ sí _____ no

En cuál año?

/Figure 1

choice of occupation after completing those years of schooling does have an effect on the return of the investment in that schooling at the lower grades.

Although the monetary benefits to increasing the number of educated people in an economy may be great, education is not a free good even when it is taken at home from well-informed parents. 2/ The benefits of increasing educational levels must therefore be weighed against the costs of education. The total cost of education in Mexico in 1962 was 9.5 billion pesos, or more than 7 per cent of the national income in that year (see Table 1). If the cost of schooling can be called an investment in a producer durable, then this cost in Mexico represents an investment equal to 42 per cent of gross total investment in material capital in 1962. The cost of schooling is much larger than the current expenditures of governments in the educational budget: the current expenditures by the public sector amounted to only 3.3 billion pesos in 1962, slightly more than one-third of the total cost of schooling in that year. Income foregone, the earnings that students forego while attending school come to 4.5 billion pesos, and the remaining 1.7 billion pesos is in the form of direct expenditures of the student or his family on school supplies, tuition, and other expenses involved in attending school. Public outlay for education is extensively treated in almost every report on the cost of schooling in Latin America; private cost, however, representing 65 per cent of the cost of education in Mexico, for example, has been almost completely neglected, especially the earnings foregone by students. The omission of this cost has, I believe, led to a misconcepcion of the role of the cost of education in determining school attendance and the taking of additional schooling.

The paradox of less developed countries is that the private cost of schooling, or the part of the cost borne by students and their families, is much higher at the primary level than in developed countries. This is due to the earnings that students in less-developed countries forego at 8, 9, 10 and 11 years old. In Mexico, an urban 10-year-old can earn about 125 pesos per month working full time. While the total income foregone is only one-half of this figure because of half-day school at the primary level, and income is earned only nine months of the year, total yearly earnings foregone still come to about 560 pesos for a 10-year-old attending primary school. Public cost for the fourth year of schooling, which would correspond to the student age of 10 years old, is 415 pesos; income foregone alone is larger than the public outlay on this year. When 150 pesos are added to private cost to account for school supplies, private cost amounts to more than 60 per cent of the total cost of the fourth year.

2/ Parents must spend time to teach children, and that time has value. It can be said, alternatively, that part of the cost of parent's education can be imputed to the training they give their children.

/Table 1

Table 1

TOTAL COSTS OF PRIMARY, SECONDARY, AND UNIVERSITY EDUCATION IN MEXICO, 1940-62, IN CURRENT PRICES a/

(Millions of pesos)

Year	Primary (1)	Lower Secondary (2)	Higher Secondary (3)	University (4)	Total (5)
1940	158	44	32	47	281
1945	376	127	66	87	656
1950	784	303	138	154	1 379
1953	1 216	467	193	252	2 128
1955	1 751	688	272	388	3 099
1956	2 024	833	312	452	3 621
1957	2 283	1 025	351	519	4 178
1958	2 663	1 181	417	600	4 861
1959	3 194	1 433	522	737	5 886
1960	3 922	1 719	635	883	7 159
1961	4 329	2 000	771	1 012	8 112
1962	4 981	2 439	905	1 162	9 487

Source: Martin Carnoy "The Rate of Return to Schooling in Mexico", unpublished Ph.D. dissertation, University of Chicago, 1963 Table 13.

a/ Total costs include public expenditures, income foregone by students while attending school, and private costs other than income foregone.

At earlier years of schooling, the burden of support shifts to the public sector, since income foregone declines for nine and eight-year-olds and is effectively zero for the first and second years of schooling, while it can be assumed that public cost for these years remains more or less constant. After the fourth year, both private and public expenditures per student per year rise in such a way that income foregone is about 60 per cent of total cost at all higher levels and income foregone plus school supplies represent between 60 and 70 per cent of total cost in these higher years.

The third and fourth years of primary school in Latin America are crucial ones in that they are the years of heaviest dropout in urban schools. The attrition at this level is clearly the result of economic

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forces. As long as there is a well developed market for the services of children, it will be difficult to prevent truancy and dropouts without providing an opposite pecuniary incentive to stay in school.

In order to compare benefits to costs, the internal rate of return 3/ to the cost of providing additional education was estimated for each level of schooling used in the study. The internal rate is simply a means of relating the net additional income received from taking additional schooling to the expenditures that must be made to get the schooling. It ranks the relative contributions of different amounts of education per dollar of investment (see Table 2). The rates of return are divided into "private" and "social" rates. The private rates show the relative return net of taxes to expenditures by students and their families, while social rates apply to the total cost of schooling, both private and public. From the standpoint of the planner, who is searching for allocative guidelines, it is the social rate which is the relevant one.

The rates of return to schooling in Mexico, both private and social, are high by international standards of return on investment. What do these rates really mean? To the individual Mexican family that has a child in the fourth grade the immediate decision is whether to keep the child in school for an additional two years until he completes the primary grades, or to make him work for the market wage for 10 to 11-year-olds. If the family knows that the return on the investment of income foregone plus school supplies averages 49 per cent per annum, they would probably invest in that schooling, even if they had to borrow the funds at 25 or 30 or even 40 per cent interest. At each level of schooling, the rate of return changes, and therefore the basis for the decision to go on to take more schooling is altered. The key point is that as far as the family decision is concerned, the private rate of return, based on expected returns at the time they make the decision, is the variable that should affect the individual's choice. The family maximizes the probability that it will optimally allocate its resources by using this criterion. Although the family's behaviour may not maximize social return in the long-run, any policy that has a goal of increasing the number of children in school by voluntary means must deal with increasing the private rate of return. Since the average Mexican cannot borrow the necessary funds for the four or five years that would be required to pay them back, the simplest way to achieve higher private rates is to make education funds available to families through low cost loans or subsidies.

3/ The formal definition of the internal rate of return is that it is the rate of interest (discount rate) which equates the stream of costs over time to the stream of benefits over time.

Table 2

PRIVATE AND SOCIAL RATES OF RETURN BY YEAR OF SCHOOLING, URBAN MALES, MEXICO, 1963

(Per cent)

Year of Schooling	Private Rate [a]		Social Rate [a]	
	A	B	A	B
2-4 [b]	21.2	5.2	17.3	4.6
5-6	48.6	32.1	37.5	26.8
7-8	36.5	24.0	23.4	17.1
9-11	17.4	16.8	14.2	13.2
12-13	15.8	22.4	12.4	16.7
14-16	36.7	34.6	29.5	27.9

a/ Column A represents rates derived from incomes in Figure 1; Column B rates derived from incomes in Figure 2.

b/ The rates of return as shown represent the average marginal rate to the years shown. For example, 21.1 per cent is the average annal rate of return per year of investment for the second, third, and fourth years of primary schools. 48.6 per cent is the average rate for each of the final two years of primary school. The rates are in no way cumulative. They are marginal for each group of years; that is, they tell us what the rate of return is to investing in the designated bundle of years of schooling.

The educational planner, however, must be concerned with more than the rate of return at a point in time. Because the over-all development plan almost certainly calls for large changes in the structure of the labour force, it can be surmised that great changes will take place in the wage structure. This is less true in 1963 for Mexico, which had already undergone important shifts in the composition of its production, than for many less developed countries. Nevertheless, even the most developed countries are constantly involved in changes of this kind as they develop: some types of education become obsolete, other types become acutely necessary. Levels of schooling also become obsolete as terminal points, though perhaps not as rapidly.

This process of obsolescence and bottlenecks is costly for an economy, and it is the function of educational planning to smooth out the adjustment by foreseeing it. In order to perform his function, the planner must know (a) the rates of return to various investment alternatives at time to, which tells him the starting point, tells him where he is at the beginning of the

plan, and (b) the path of the rates in the future. The greatest investments should be made at the level and type of schooling where the rates of return are high and will tend to remain high. This is an indication that the demand for the skills connected with these types of education will increase as fast or faster than the supply of skills. On the other hand, levels of skills to which rates of return fall rapidly in the future with increased investment are those levels where demand for skills will not be growing as fast as supply.

Ideally, the data available to the planner would be paths of rates over time. These would give him a clear picture of the changes taking place in the economy with respect to the demand and supply of various types of labour. Such paths of rates will not be available, however, for many years to come, since it is only now that data on incomes is becoming detailed enough that rates can be estimated. In lieu of paths, approximation can be made of the future tendency of rates by estimates of projected manpower demand (based on wages at time to) relative to projected output of the educational system with the current investment rate.4/ If the difference between the projected demand and the projected supply of a skill (educational level) is positive, then the rate of return estimated at time to will rise, while if the difference is negative, the rate will fall. This type of calculation indicates to the planner whether he should increase, decrease, or hold constant the amount invested in a particular type of education.

It is important to remember that the projected manpower demand is not a target to be met, but merely approximates needs for various skills at a future date with current labour markets in mind. This is where estimating rates of return at the initial time period to is so crucial. The target that should be met is some sort of equalization of the rates of return to various kinds and levels of schooling and the equalization of rates of return to schooling with rates to other investments, both public and private. 5/ The equalization process probably requires exceeding future demand for certain skills and falling short of projected demand for other skills. In fact, it would be rather suprising if the optimal investment pattern called for meeting demand projections exactly. The variable that "gives" in exceeding or falling short of demand projections is wages. It should be

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4/ Much of the following is derived from ideas developed in discussions with Thomas Ribich of The Brookings Institution.

5/ Observed rates of return to levels of schooling may not be equal at to for many reasons: non-pecuniary returns may differ between levels, adjustment to shifts in demand and supply may be lagging, or there may be imperfections in the market for skills.

/noted that

noted that exceeding projected manpower needs does not imply that wages for that type of skill fall; rather, those wages do not rise as rapidly as other wages - they fall relative to other wages, which is exactly what is desired by the planner in order to decrease the rate of return paid to investment in a particular level of schooling or even education as a whole.

In a sense, the method also provides the planner with guidelines to estimate the absolute magnitude of the investment to be made: since budget constraints prevent rapid changes in the amount of public funds allocated to a particular sector, rates of return can be estimated every two or three years to determine what changes are being effected in the rates given the allocation of expenditures in the previous period. Given changes of rates with changes of expenditures as well as differences between projected supply and demand pinpoints more accurately the magnitudes of educational investment which will achieve optimum resource allocation.

The clearest examples for this methodology that can be drawn from the study of rates of return in Mexico are the cases of investing in the final two years of primary school and the last years of university. The high social rates there imply that it is more profitable, from the economy's standpoint, to invest in those levels than any other levels, perhaps even than in any other form of capital. Assuming that current or even planned output of students who have completed primary school and university is equal to the projected demand for labour needing those respective quantities of schooling, and that targets are met at all other levels of schooling, relative wages will remain the same, and the pattern of rates of return will not change. 6/ In that case, the optimum allocation of resources, which calls for equalization of return at the margin, is not achieved. It still pays for the economy to transfer resources to investment in primary and university completion either from other types of education or from other types of capital investment.

Summary

In conclusion, the analysis of income differentials and the cost of schooling in a given year tell us what the labour situation in the economy is at that point in time. Although the Mexican study cited here concerns itself with number of years of schooling of labour force members, there is no reason why a more detailed study cannot be made in which the benefits and costs of different kinds of schooling, such as vocational and general secondary schooling, or the benefits and costs of educating various professions, or benefits and costs of different qualities of schooling, are analyzed.

6/ Rates of return depend on absolute wage differences, so that even if relative wages remain constant, absolute wage differences could change, hence affecting rates of return. Since wages also enter into the costs of education, it is difficult to predict how rates would change in this situation. They could remain the same.

The good points of the approach used are (1) that the data, in the form of a sample, are obtainable quickly and at a relatively low cost; (2) on the basis of economic variables, the rate of return results clearly indicate the direction of short-run efficient resource allocation; (3) given rate of return results, manpower projections are interpreted as the future demand for skills, and are not targets to be necessarily met, but rather to be systematically missed. Only by combining manpower projections with rates of return is it possible to know how to miss the targets to achieve optimal long-run resource allocation. It should be noted that the combination of rate of return and manpower approaches is an expedient; a temporary substitute for a series of rates of return to various levels of skill over time. Such a series describes secular changes in the demand for and supply of these skills and tells the planner how much to invest at different levels of schooling to reach optimal allocation.

The principal drawbacks of the methodology are (1) that it does not treat benefits which are: a) "external" to the sum of individual benefits, such as the decrease in the cost of educating children who have educated parents, and the increase in productivity of uneducated workers caused by the presence of educated workers; (2) that it does not include non-pecuniary benefits in the estimates of the rate of return. As a result, rates of return based on income differences alone may underestimate (if the non-pecuniary benefits are positive) or overestimate (if the non-pecuniary benefits are negative) the "true" rates of return to schooling. (3) The approach does not separate the effects of ability differences on income from the effects of schooling differences on income. If average ability levels are higher in those who take more schooling than in those who take less, the rates of return to increased education as presented in the Mexican study are overestimated. It is important to realize that the first two of these drawbacks apply to all methodologies that deal with youth as producer durables (labour inputs into the production process). 7/ It is one of the defects of estimating the returns to education that we cannot measure non-pecuniary benefits of human dignity and better self-understanding. Although such benefits are undoubtedly important, it is unclear that the large weight given them in most educational plans is justified. Given that a country has limited resources, is it good development planning to

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7/ It is one of the real advantages of manpower projections that they take account of non-pecuniary private benefits; that is, those benefits that have entered into work choices of individuals. Manpower projections based on historical labour force structure do not account at all for social non-pecuniary benefits, external to the private decision.

/concentrate on

concentrate on universal primary schooling of two or three years? It is certainly desirable to eliminate illiteracy, but the choice is not simply having 100 per cent literacy versus 25 per cent illiteracy. Rather, there are a number of alternatives, since funds not used to build more primary schoolrooms could be used to improve the quality of teachers, to provide scholarships to students who might otherwise drop out of the primary school before completion, or to build more secondary schoolrooms or universities.

Every decision in allocating funds to education should be analyzed in terms of alternatives. If the decision is based on economic goals, the methodology outlined in this paper serves well to present the alternatives in terms of optimizing long-run returns to investment. If the decision is a political one, the optimum economic allocation of the given resources serves as a measure of the opportunity cost of such a decision.

Figure 1
Gráfico 1

INCOME AND AGE BY YEARS OF SCHOOLING, URBAN WAGE-EARNERS, MEXICO, 1963

INGRESOS Y EDAD DE ASALARIADOS URBANOS SEGUN AÑOS DE ESCOLARIDAD (MEXICO, 1963)

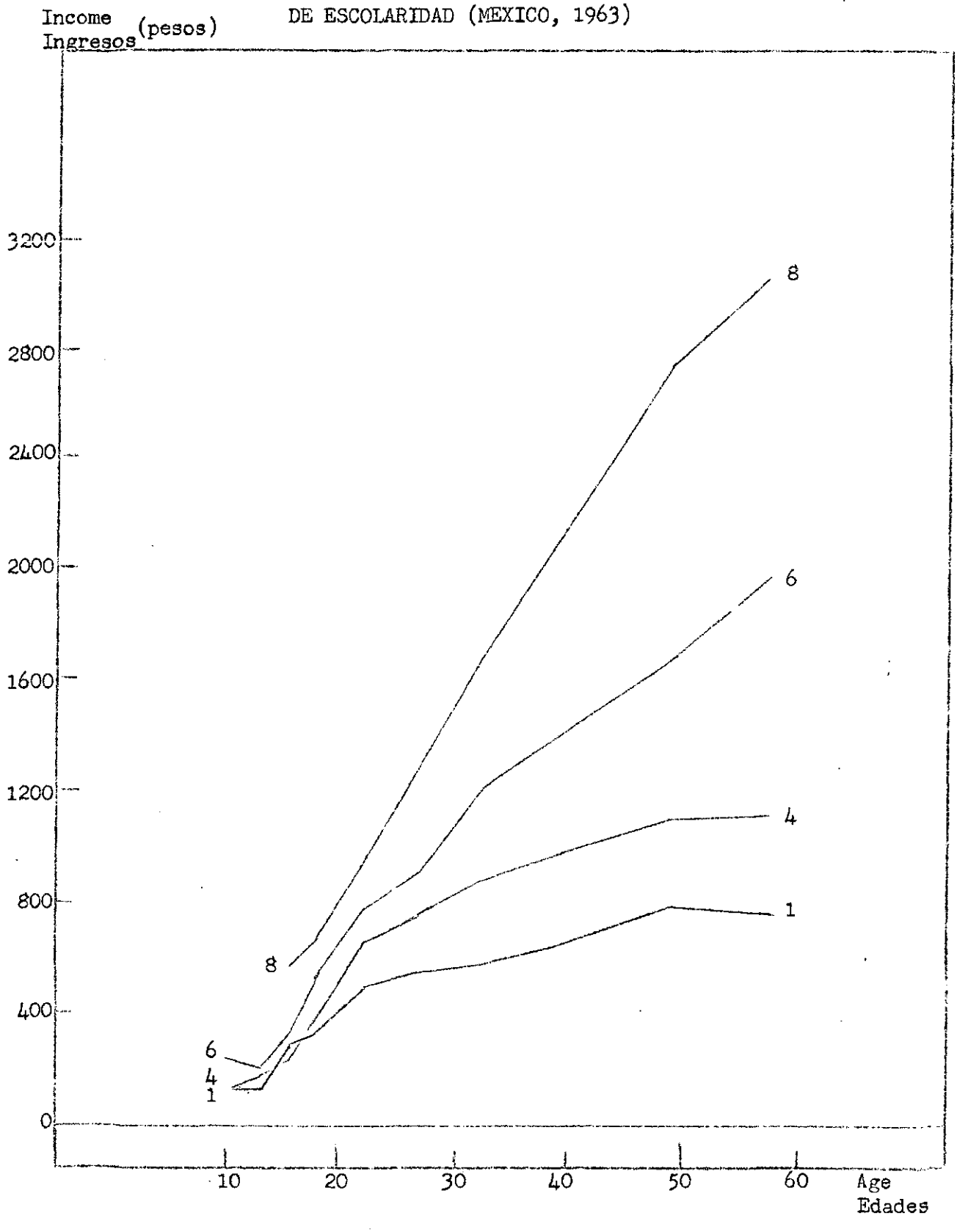

Figure 1 – Continued
Gráfico 1 – Continuación

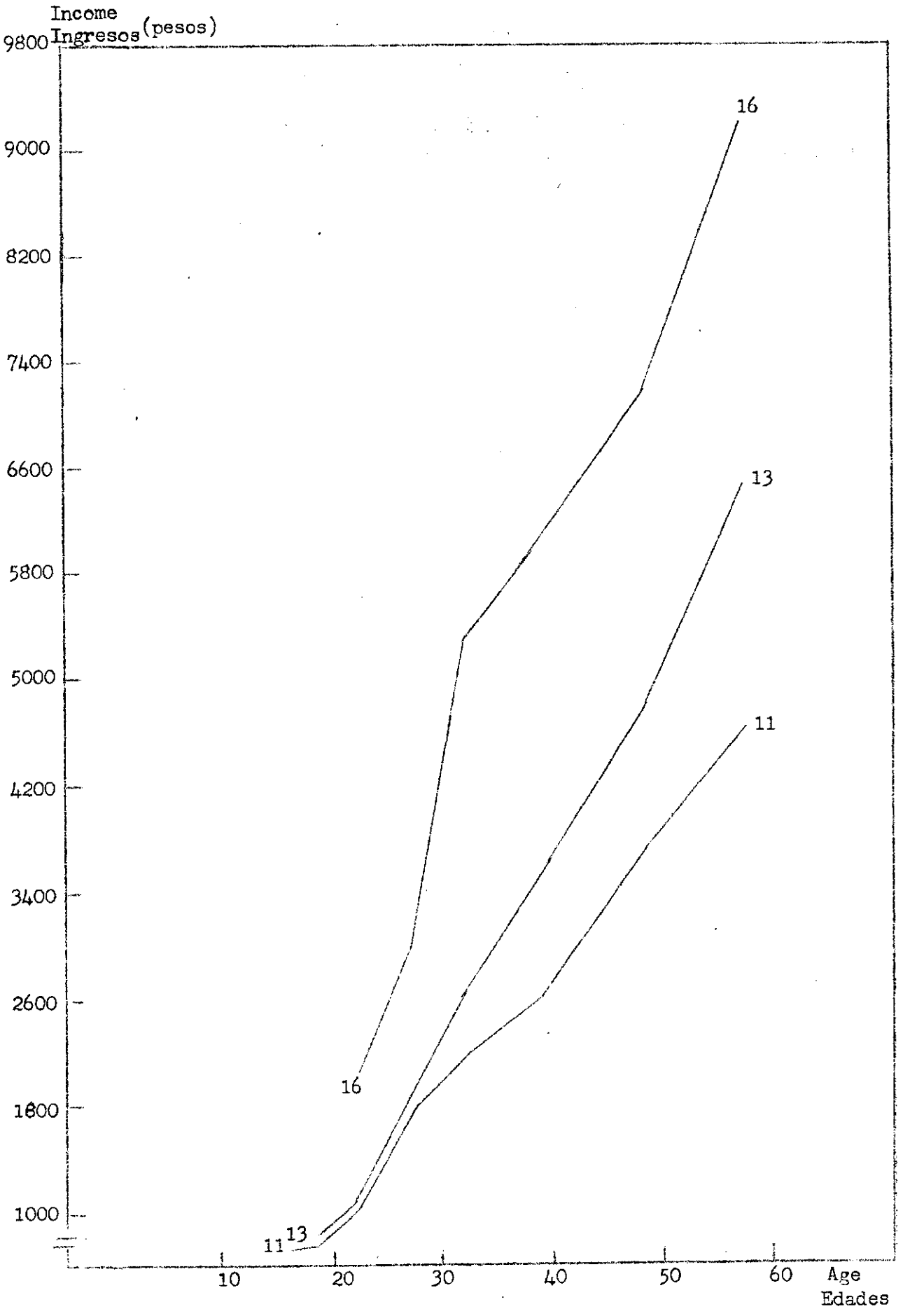

Figure 2
Gráfico 2

INCOME, BY LEVEL OF SCHOOLING AND AGE, ALL OTHER VARIABLES CONSTANT, URBAN WAGE-EARNERS, MEXICO, 1963

INGRESOS DE ASALARIADOS URBANOS SEGUN NIVEL DE ESCOLARIDAD Y EDAD, PERMANECIENDO CONSTANTES TODAS LAS DEMAS VARIABLES (MEXICO, 1963)

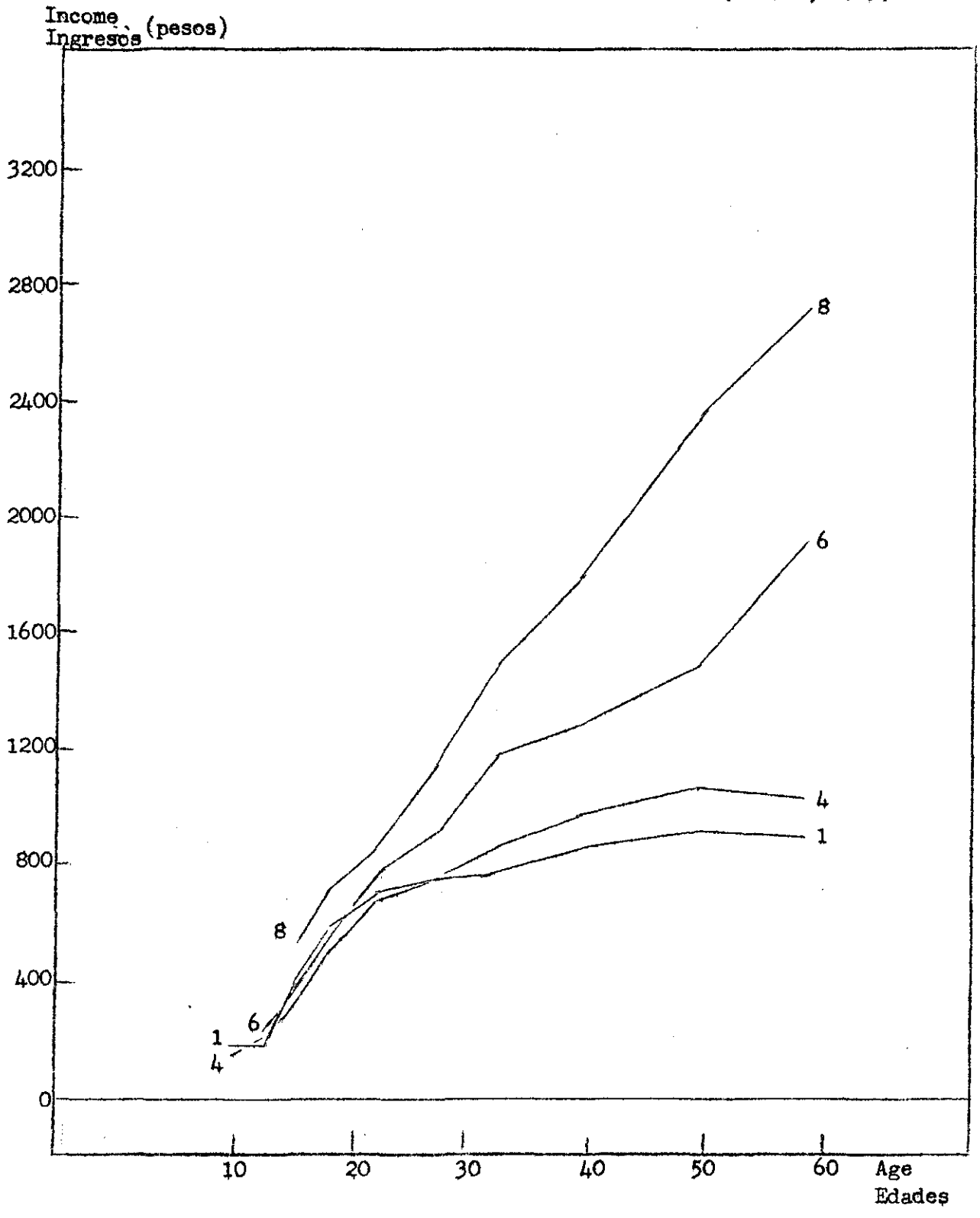

Figure 2 - Continued
Gráfico 2 - Continuación