## EDUCATION AND INCOME IN BRAZIL:

A SUMMARY OF RESEARCH

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A. INTRODUCTION. Brazil is one of the most important of the so-called "developing nations". With 145 million people, it is the world's sixth most populous nation. Its national territory is the fifth largest, behind the USSR, China, Ganada, and the United States. Its economy is the world's eighth largest. While at present its people are suffering because of problems with its internal economy and its polity; nonetheless, its exports are large, hovering around \$18 billion per year. So its future looks good. Its size, robustness, and prospects make it a model for other developing nations. Indeed it seems to be one of the nations most likely to take a place among the "developed" nations in future decades. Whether this will happen, we think, will depend in part on the education of its people. Today, advances in technology make it possible for their possessors to extract more from nature, on a per capita basis, than was ever before possible. To invent --- and even to use -- advanced technology on a wide scale requires a large body of well-informed people, perhap, even that the whole adult population be well-educated. And to live peacefully and happily, the people of large, populous and demographically diverse nations must have the capacity to understand each other, which requires considerable education. While in general knowledge and analytical skill, Brazil's best are probably the equal of the best everywhere, their numbers are small in proportion to the total population. And the educational level of the general population is low, not only by Northern EuroAmerican standards, but also by comparison with, say, Japan and Korea: the average number of school grades completed is far less than even elementary school completion in all major regions, even the most developed.

The reasons for this are unclear. In part it may be because influential Brazilians doubt the importance of popular education. Or perhaps many of them are a raid that an educated populous would be dissatisfied. Or perhaps the costs of educating the population are seen as too great to be feasible. Perhaps all of these, and more, are factors.

It must also be remembered that the question of the relevancy of education for developing societies is by no means restricted to Brazil. It is a matter of concern to development policy agencies everywhere. Widely debated are questions regarding both individual and societal benefits and costs of education, as well as questions regarding whom to educate - the non- or barely-literate or the future elites. This Project is concerned with one specific kind of individual benefit to education - the impact of one's schooling on one's income. It is concerned with 1 by that impact varies according to the level of development of Brazil of its major regions and with the relationship of gender to this impact. It is especially concerned with explaining as well as present data and theory permit, the how and why of the impact of education on income in this important developing nation. The Project appears to have yielded new theoretic insights concerning these impacts, as well as new practical descriptive information regarding them. The results no doubt will be, and indeed are even now, being used by policy makers in their deliberations concerning education and development, and hot only in Brazil.

Unfortunately, policy is often made and executed on the basis of untested and sometimes false premises. This appears to be true of education for developing countries. Perhaps the most widely circulated belief today is that the greatest benefits result from investment at the lower end of the educational spectrum. Of course, the word "benefits" can cover a number of possibilities: individual-or family benefits, societal benefits, fulfillment through knowledge, more effective popular government, etc. We can speak only to one of these, the apparent impact of education on the income of adults. To get ahead of the story, in this regard, the prevailing wisdom may be wrong. In Brazil, on the whole, the more years of education a person gains, the more each additional year of education brings -- which is precisely the opposite of what seems generally to be believed.

With that example of an unexpected finding, let us turn to the objectives of the Project.

B. OBJECTIVES. Originally, the Project was intended, first, to develop a model of education and its offect in income and to compare the behavior of the model between sexes under different conditions of temporal (1970-1985) and regional development; second, to mark temporal variations in the effect of education on income; and third, to estimate the incremental gain in income produced by each additional year of education at all grades ("years") of the educational system.

As the Project progressed, some of the original objectives were specified, others were added, and one was dropped. Each of these is indicated in this section.

Final Main Objectives. As conceived at the end of the Project, the main original objectives are as follows.

Objective 1. To estimate the effects of education on income in Brazil by gender, macroregion and period.

Objective 2. To determine the degree to which the income increments to an additional school grade vary by the number of school grades already completed. Objective 3. To levelop a sociological model, along the lines of current research on status allocaton, of the processes by which education and its effect on income are determined, including the mechanisms by which education is expressed income.

Added Final Objectives. A special technical objective was included to aid in understanding the meaning and impact of regional development variations as these might have been affected by changes in Brazilian society over the 1970s. From 1970 throughout most of 1981, Brazil's economy boomed. By late 1981 major societ 11 changes were going on. The internal economy went into a severe recession from which it has not yet recovered despite the vigor of its export economy. The military government was relinguishing power and democratic reforms were discussed. These need not be discussed here, however. In general, we can consider the period 1973 to 1982 to have been one of rapid development.

An earlier publication (Haller, 1982) had identified five distinctly different socioeconomic macroregions, the smaller ones about the size of the American west coast states combined, the largest (Amazonia) just under half the size of the 48 American contiguous states. The fourth objective was added to learn whether the macroregions' contours had changed significantly over the 1970's boom decad.

Objective 4. To remeasure the socioeconomic development of the populations of the smaller official areal units of Brazil and, if needed, to redefine the nation's macroregies.

The smaller units consist of 4000 or so municipios or "counties" and 360 official continental macroregions, each composed of a homogenous set of contiguous municipios. Using both 1970 and 1980 aggregate data. This objective is intended to learn where development had been greater or lesser and to determine whether the boundaries of the macroregions had shifted.

Work on the third objective made possible an intriguing observation that with substantial and practical implications, not only for understanding education and income, but also for a better understanding of the operation of Brazilian society. Specifically, we noted that the position of one's father has a much larger effect on one's own education, occupational status and income than research elsewhere leads us to expect. Moreover, exactly contrary to most current speculation, it appeared that the higher the level of development, the greater the impact of father's status on these variables. From this observation came the fifth objective. Objective 5 Separately for each sex, to determine whether and how development in contemporary Brazil influences the effect of one's status origins on one's wn education, occupational status and income, and how development influences the effect of one's education as a factor mediating the income and occupational status effect of one's status origins on one's income.

As research on the income consequences of education proceeded, it became apparent that an analysis of the students' progress from grade to grade was also needed to aid in understanding why so few Brazilians complete more than four to eight or so school grades. It became clear, too, that Brazil's school statistics were based upon false premises and were thus likely to be in error. This led to a sixth objective, carried out by our collaborators in Brasilia, Drs. Phillip Fletcher and Claudio de Moura Castro. <u>Objective 6. To measure the grade-by-grade progress of Brazil's children</u> <u>through the lower grades of school.</u>

Deletions from the Original Objectives. In the beginning of the Project, we intended to use the detailed data samples of the 1970 and 1980 censuses of the Brazilian population, together with those of the nation's immense National Household Sample 'urveys (PNADs: Pesquisas Nacionias por Amostragem Domiciliar) available to the Project to graph changes in each of the key variables. (This would have provided data from 1970, 1973, 1976, 1977, 1982, and 1983.) Such an analysis would have required using data records for over four million people in about one million households. We had been led to believe that a DEC VMS VAX available to the Project would be capable of processing such data. In fact, our tapes overloaded the system. This required moving to a more costly computer system, but one that severed the Project's needs. Also, it turned out that the PNADs of 1973 and 1982, which contained the data from interviews specifically designed to elicit information on education and other aspects of societal stratification, were far more pertinent to the Project than the other data sets were. The combination of soaring costs for, data processing, plus the lesser substantive value of all of the data sets except PNADs 1973 and 1982, and the special relevancy of the latter, led to our decision to concentrate the empirical analyses pertaining to objectives 1, 2, 3, and 5 on the more appropriate PNADs of 1973 and 1982. Yet even the preparation and processing of these two presented formidable tasks, due largely to their sizes --- about 300,000 and 400,000 individual recor s, respectively.

C. FINDINGS. The main esults are listed here in connection with the objective to which they refer. With one exception, the thesis presented to the University of Lisconsin by Camila Rocha, the evidence supporting each finding is detailed in one or another of the papers appended hereto.

Objective 1: To estimate the effects of education on income by gender, macroregion or puriod.

Following extensive analysis, several items of information led us to draw reasonable conclusions about the general impact of school grades completed on the income of male and female labor force participants, age 15-65, though it proved impossible to provide a specific number to summarize these effects. <u>1.1. The overall impact of education on income.</u> Two classes of parameters are available for this purpose. One consists of the effects of education net of the variables in the model specified under Objective 3. The second consists of certain path coefficients in the model. Data are available for males and females, by macroregion, for 1973 and for 1982. The percentage income increments to the avolage additional year of school completed were calculated by means of multiple regression controlling all variables in the basic model (see Objective 3). This underestimates the total effect of education because part of it is expressed through job-related variables --occupational status, class and labor market segment. The path analyses provide a rough idea of how much of the education's total income effort is expressed indirectly through these job-related factors. In point of fact, occupational status is the only one of these variables that has a noteworthy "transmission" effect. The upshot is that practically all of the income impact of education is expressed in one of two ways, both of which are important to know about. First, education selects individuals into different statul levels of the occupational structure. Second, even within a given occupational status level, education has a strong effect on income. 1.1.1 The overall effect. We conclude that each year of additional education must add an average of about 12 percent or more to the income of Brazilian workers. (This figure disregards variations due to time period, macroregion, gender, and prior years of schooling.)

1.1.2 <u>The gender effect.</u> Under these controlled conditions it appears that women may tend to gain slightly less in percentage terms from each additional year than men do. However, women's income per grade is much lower than that of men (Appendix C, Figure 1, page 50). So in absolute terms, men evidently gain more money per year of schooling than do women.

1.1.3 <u>The effect of time period.</u> Again, the evidence is mixed, but it appears that the income effect of each additional school grade completed may have been slight! lower in 1982 than in 1973, especially among men in the less developed regions of the nation. But this seeming difference should not be overemphasized. The estimate of 12 percent more money per year of additional is probably quite close to the true figure in each year, 1973 and 1982.

1.1.4 <u>The effect of socioeconomic development macroregions</u>. As before, the evidence is not completely consistent, yet on the whole the income returns to each year of additional education appear to be higher in the more developed regions than in those that are less developed.

In other words, we infer that in the economically dynamic regions, the demand for more educated workers outruns the supply of them, though the opposite occurs in the more impoverished regions. In the latter, even the meager numbers of educated workers who live there are too many for the local economy to absort. Yet despite all, the income value of education may be declining ever so slowly as, with the passage of time, the nation becomes more highly developed.

1.1.5 <u>Conclusions regarding the general influence of each grade of education</u> on income. The average overall impact of each additional school grade completed appears to be rather high, around 12 percent for each additional grade completed, though it varies slightly by gender, time period and development macroregion. The impact of education on income appears to be a little greater among men than among women, in 1973 (early in the boom period) than in 1982 (when the nation was indeed more highly developed) and in the more developed regions.

Practically, this seems to imply that raising the number of grades an individual completes might increase the person's income, especially among men in the more developed regions, although the advantage of additional education may be decreasing slightly over time. Theoretically, the <u>findings\_regarding</u> temporal and regional differences in development appear interesting. Educational gains pay off better in the more developed regions, where Brazil's generally scarce educational resources are most abundant. This seems to mean that the economic system's demand for education exceeds its supply more in the developed regions than in the less developed areas. Yet the payoff increment for education was apparently a little lower in 1982, when Brazil was more developed, than it was in poorer days of 1973, when education was scarcer. This seeming contradiction demands an explanation. But as yet we do not have one.

Practically speaking, the regional difference is the more important for now. About four-fifths of Brazil's 145 million people live in the developed South and the impoverished Northeast. Clearly, the results imply that the South should attract the better educated away from the Northeast. The truth of this was shown in an earlier analysis (Haller, et al, 1981). Of the eleven thousand men in a probability sample of Northeasterners of non-farm origins, 24 percent had migrated to the South. Their schooling averaged 5.2 years as compared to the 4.1 years of those who stayed in the Northeast. The earnings of those who went to the urban South were 70 percent higher than those who stayed in the urban Northeast. On the other hand, hardly anybody moved from the South to the Northeast. Could development be encouraged in the Northeast if it were to attract businesses that would employ its best educated natives rather than those that draw upon its cheapest, less educated labor? Objective 2. To letermine the degree to which the income increments to an additional school grade vary by the number of school grades already completed. These concluctions are based on an analysis of grade-by-grade income differences for each sex, using regression methods without controls on other variables.

In general, each additional grade completed adds to one's income (with the puzzling exception, of grades eight to nine where those who complete only nine grades actually earn a little less than those who complete only eight.) Next, it would appear that percentage increments to income induced by each additional year o schooling vary sharply over the educational spectrum (Appendix A, Figure 2, page 52). But these fluctuations are not random. Those who complet. one year of schooling earn about 25 percent more than those who have had none. So do those who complete four years of school, formerly the end of primary school, rather than just three. And men or women who complete eight years gain about 35 percent more than those who completed only seven. Completin, high school also pays. So does completing a university degree --, about 40 percent more than completing all but the last year. Each of these sharp increases stands at a crucial point in grade hierarchy -- any schooling vs. none, four grades rather than three, eight rather than seven, eleven rather than ten, university graduation rather than one year less.

So, first, the greater the number of years of schooling completed, the greater the percentage increment to income, and, second, completing a definite series of grades pays especially well.

This has several related implications of great importance. First, percentage increments can be deceptive; ten percent of \$200, \$20, is much smaller than ten percent of \$500, \$50. So, if percentage increments of income icrease we go up the education scale, the absolute increments to income must be increasing much more. The consequences of this may be seen by looking at Figure 1 of Appendix 1, page 50): income increases accelerate as education rises. Second, the widespread belief that a given increment of education pays off best among the pourly educated are simply not true for individual income. The more highly educated one already is, the more one stands to gain by further schooling. Third; "impleting a series (finishing at least one year, finishing the critical fourth grade, finishing the full eight years of elementary school, or finishing high school or college) is especially rewarding.

We are reluctant to draw policy implications regarding the acceleration of income benefits to a year's additional education. But it is clear that more education pays at all levels. So the provision of additional educational opportunities might be expected to increase individual income to some degree, especially in the more developed regions. Also, offering a diploma for completing four grades of school (as was done in former years) might encourage some to stay in school who would otherwise drop out with only two or three years. This apparently would enhance their income.

Objective 3. To develop a sociological model, along the lines of current research on status attainment, of the processes by which education and its effects on income are determined, including the mechanisms by which education is expressed in income.

A version of the currently conventional models of income generation was specified and estimated. It combines variables from four supposedly competing -- but actually complementary -- conceptions of the processes by which income differences are generated. One is the human capital line of thought. Another is the segmented labor market line. A third is Marxian class analysis. The fourth is the so-, alled "functionalist" line of sociological thought.

<u>Education</u> is employed in both human capital and sociological functionalist thinking. The <u>occupational status</u> of the individual and of his or her father is routinely used in sociological functionalist approaches. It is a measure of status origins. Participation in a <u>protected labor market</u> comes from segmented labor market thinking. <u>Rural/Urban sector</u> is also consistent with such thinking. Age is highly correlated with years of experience, serving as an effective proxy for the latter. It is thus consistent with human capital thought. <u>Class</u>, a dichotomy of owner-employers versus other workers, is a straightforward representation of the capitalist-worker variable suggested by Marx. <u>Age squar(1)</u> is also included, not because it fits any present theory, but because research (Haller and Spenner, 1977) has shown that the age-income curve plateaus at around 45-50 years of age and then declines - a factor which has not been predicted by anything so far as we know.

Path analyses of this model show that it is appropriate for men and for women in each year and in each development region. Ordinary multiple regression analyses, by sex in each of the five regions and at each time, 20 in all, illustrate the overall power of these variables:  $R^2$  ranges from a low of  $R^2 = .208$  among men in the least developed region (the Middle North) in 1973 to a high of  $R^2 = .640$  among men in the poor but unevenly developed Northeast in 1982. Indeed, for Brazil as a whole, among men and among women at both times (1973 and 1982) the  $R^2$  values were all over  $R^2 = .52$ . Thus, this set of variables provides a powerful explanation of income differences.

In general, the path analyses showed that age, education and occupational status have large direct effects on income. Education also has impressive indirect effects on education, operating through occupational status. Father's occupational status also has a large impact on education, as does rural/urban sector.

The only unexpected result is the size of the coefficients of father's occupational status on education. It is much larger than research in the developed world would lead us to expect. This suggests that status origins are especially import( it determinants of education and of income in Brazil (a matte. to which we shall return.) Practically speaking, these findings confirm the belief that the rural sectors are educationally depressed, even by Brazil's low standards, and that - because higher status families tend to monopolize educational opportunities - raising educational levels may be especially difficult among Brazil's massive lower status population.

Objective 4. To remeasure the socioeconomic development (SED) of the populatons of the smaller official areal units of Brazil and, if needed, to redefine the nation's macroregions.

This analysis (Rocha, 1987) was carried out along lines published earlier (Haller, 1982). However, it used slightly different indices of socioeconomic development. They wele calculated for four different compilations of the small areal units. There were 3,971 municipios in 1970 and 3991 in 1980. These the Brazilian government reclassifies into 360 homogenous microregions consisting of six or so to 12 or 10 contiguous <u>municipios</u>. Comparable socioeconomic development scores were calculated for each municipio and again for each microregion in 1970 and in 1980. Socioeconomic items pertaining to the lives of individuals almost identical to those used and earlier (Haller, 1982) were obtained from the data files of the Brazilian government for both years on a per capita basis.

After appropriate factor analyses, comparable SED scores were calculated for each small unit. The results are these. 1. The 1970 x 1980 SED correlations among microregions and among <u>municipios</u> are r = 1.000, indicating no change in the relative SED standing of the small areal units. 2. The SED score: for all macroregions and for over 99 percent of the <u>municipios</u> rose from 1970 to 1980. This indicates that the socioeconomic development level of the people practically every small areal unit improved over the decade. 3. The higher a small unit's SED score in 1970 the more it rose between 1970 and 1980. This means that the regional inequalities in the SED of the population increased over the decade: As usual, development increased inequality. 4. In general, there appears to be no reason to challenge the earlier macroregionalization, which used 1970 data only. We are thus confident that the macroregonal division used in these analyses was appropriate for both 1973 and 1982.

Objective 5. Separately for each sex, to determine whether and how development in contemporary Brazil influences the effect of one's status origins on one's own education, occupational status and income, and how development influences the effect of one's education as a factor mediating the income and occupational status effects of one's status origins.

As indicated above, the apparent impact of father's occupational status on one's own education 1, occupational status, and income has been found to be especially high in Brazil. We have also noticed that socioeconomic development tends to increase the apparent impact of education on income. It thus seemed essential to disentangle the relationship between development, status origin, education, occupational status and income. The results are presented in Appendix A, atlached.

The main results are as follows: 1. The higher the level of development, regional or temporal, the greater the already powerful influence of status origins on education, occupational status and income. 2. The educational, occupational and income statuses of women are even more completely determined by their status origins than are those of men. 3. As development rose all over the nation from 1973 to 1982, the higher the regional development level the greater the increase in the effect of status origins on the education, occupational status, find income of men and of women.

Reflection on these results led to what we ae calling the "educational monopoly hypothesis" (EMH) which runs flatly counter to most current thinking

on the relation of status origins to education and of education to occupational stal is and income. For many years, leading sociologists have believed that as development proceeds, the influence of status origins wanes and that of elucation increases. We may call this latter the "educational equalization hypothesis" (EEH). Like the EEH, the educational monopoly hypothesis holds that development increases the relevancy of education to performance in society. Here the two hypotheses part company. The EMH goes on to suppose that, as a result, the perceived importance of education rises in all sectors of the society, alerting parents of all strata of the need to obtain more education for their offspring, either to secure a satisfactory position for them, in the case of those who ae not well off, or to maintain or enhance the position that the parents have enjoyed in the case of those who are "at the higher reaches pf the stratification order. The EMH goes on to note that, by definition, the children of those in higher positions have more access to educational opportunities --- to schools, to the best schools, etc. -- and more time to devote to education, than do the children of lower status families, and that the higher status parents gain a near-monopoly of educational opportunity which they then use for the benefit of their own children. Having said all that, it appears obvious, not only for Brazil but for all the world. The EMH now appears obvious. But it has certainly not been obvious to most writers. And maybe it is not even true outside Brazil, though we suspect that it is.

Basically, then, the EMH holds that higher the level of development, the more likely it is that the influence of status origins on occupational status and income will be mediated by education. On the whole, the data support the educational monopoly hypotheris; though there are some discrepancies which we shall ignore here. As indicated, we suppose that this may be a world-wide phenomena, applying to the more developed nations as well as the less. Here, we do not need to go into detail regarding its general ramifications, except to comment that rise of science-based and other effective technologies for extracting ever more per capita benefits from nature has increased the status relevancy of formal education. So education is becoming the main mechanism by which the statuses of former generations are passed on to their descendants. In any case, the EMH appears to hold in Brazil. It implies that it may be easier to expand educational opportunities from the top down than from the bottom up.

4. For each sex, the higher the overall (temporal and regional) level of development, the reater the mediation effect of education on the impact of status origins on occupational status and income. 5. Among women, the mediational effect of education on the impact of status origins on occupational status and income is greater than it is among men. Objective 6. To measure the grade-by-grade progress of Brazil's children through the lower grades of school. This objective was accomplished by our collaborators in Brazil, Dr. Claudio de Moura Castro, then of the Brazilian government, and Dr. Phillip Fletcher, an American employee of the International Labor Office on loan to the Brazilian government. These researchers used the 1982 national household sample survey as basic data. They found the following: 1. Access to some sort of primary school is available to all children in Brazil. 2. Children's movement through the grades is very slow, with a high percentage of "failure" at each grade. 3. Part of the "failure" rate is due to migration and part due to the teacher's attempts to show that they hold the students to high standards. 4. The social status of the parents has a substantial impact on the students' rate of progress and eventual educational attainment. 5. Dropout rates from all

levels of primary school are noteworthy (mostly three to eight percent), but that the dropout ate from grade four to grade five is exceptionally high. As noted, earlier completion of the fourth grade was the formal end of primary school; today it is grade eight. Many schools still offer only four grades. 6. The quality of teachers and of school facilities was said to be very low in most primary schools.

D. GENERAL CONCLUSIONS. Presented here is an analysis of relationships between development, educational attainment and income in a front-ranked developing nation, Brazil, a nation with wide regional development differences and substantial status inequalities among families. In a few words, it has been found that educational levels, income and the effects of education on income rise with level of development. The role of education as a "transmission belt" mediating the large effects of status origins on income also increases with development. Such effects are generally stronger among women than among men. The income of employed women is much lower than that of men, though the gap decreased a bit over time. For both genders and everywhere, education pays; and the more education one already has the better an additional amount of education pays. Education pays best in the more developed regions. Few people obtain more than four to eight years of schooling, and the conditions in which most attend school are not conducive to learning much. The grip of higher status families hold on educatonal opportunity is firm, and the country does not have much money to invest. it may be difficult to improve general access to improved educational opportunities. If this can be done, however, it would seem that personal income could rise substantially.

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