IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

SOCIAL MOBILITY IN BRAZIL: 1973-82
THE ROLE OF EDUCATION IN STATUS DETERMINATION

José Pastore
Hélio Zylberstajn

documento 01

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

Rio de Janeiro - 24-27 mar. 1991

SUMÁRIO

MOB-1.DOC Draft 12/07/90

SOCIAL MOBILITY IN BRAZIL 1973-82

THE ROLE OF EDUCATION IN STATUS DETERMINATION(*)

José Pastore and Helio Zylberstajn
University of São Paulo

1. Social Mobility and Structural Change

This essay analyses the situation of social mobility in Brazil on the basis of 1982 PNAD data as comparaed to 1973 and pays a special attention on the role of education in status determination in Brazil. The first study on the theme was done with the 1973 PNAD data. Therefore, this is an evaluation of the phenomenon after 10 years, practically.

Social mobility is one of the central topics of the sociology of development. Its proper identification helps to understand the nature of the dynamics and flexibility of a particular social structure. A society without mobility tends to be a staganant society which simply reproduces its social structure ceaselessly. Mobility and, specifically, vertical mobility, reflects the amount of opportunities for individuals and groups to progress from one social level to another.

(*) This project is part of the World Bank Research on Human Capital Accumulation, Growth and Inequality in Brazil.

What are the repercussions of social mobility upon the idividual and upon the society? When an individual moves from an occupation of low status to another occupation of a higher status - of middle class status, for example - such movement tends to be accompanied by various benefits in terms of economic, educational, and social opportunities, as well as by changes in values, attitudes, and cultural horizon. The individual and his descendents feel these repercussions over short and long runs. In these cases, upward mobility functions as a mechanism of social advancement. This can be attained also by individuals who remain in the same position through an elevation in the material and cultural benefits of his life.

However, in modern societies, the systems of stratification are formed (as history progresses) on the basis of inequalities, within which different gratifications are associetaed with different social positions. Under these conditions, to improve one's life, for the great majority of the people, depends on climbing the social ladder. More precisely, to improve one's life depends upon change of occupational status.

Mobility is effect and condition for economic development. The process of development, to the extent that it advances, provokes the social differentiation which is a necessary condition for mobility. This occurs through the

transformation of the economic sectors and especially through the shrinking of the agricultural labor market and the increase in new occupational opportunities in the sectors of industry, commerce and services.

On the other hand, mobility in itself constitutes a stimulus to economic development. Modern societies depend upon mental plasticity to innovate and to accept innovation which, for their part, go hand in hand with individual progress in the educational and professional spheres.

Mobility is associatated with relative deprivation which, in turn, affects political changes. Individual satisfaction or frustration depends upon how they relate to their peer groups, upon what happens in these groups in terms of mobility, and upon the discrepancies between aspirations and the mobility actually achieved. When social mobility begins to accelerate, both satisfactions and dissatisfactions tend to arise.

Under certain conditions, mobility reduces tensions, elevates the level of satisfaction and contributes to a harmony of personal interests; under other conditions, it creates new tensions, it accentuates the feelings of relative deprivation and contributes to the polarization of personal interests - creating a counterforce against

conformity and inducing the organization of political and social movements.

The study of vertical mobility relates the individual's present social position to that of their own past and the past of their fathers. In addition, the study attempts to identify the net effect of social inheritance, individual resources, and economic opportunities in determining vertical mobility. As a result, one can reach systematic comparisons of the social structures in different periods of time.

In the study of social mobility, social status is a key concept. In the sociological literature, social status is conventionally defined as the position occupied by a person in a social hierarchy of a given system of social stratification. In the most dynamic and industrialized societies, social status tends to be based upon achieved criteria - that is, upon characteristics that the individual can acquire throughout his career, such as education, occupation, and information.

In the more static and less industrialized societies social status tends to be tied to to ascribed criteria, such as heritage, race, religion and political affiliation. But even in the highly industrialized societies, the ascribed criteria are present - although

their weight tend to be insigficant. Occupation, job rank and education, however, are the key factors in determining one's income and social status.

This study evaluates the role of individual and labor market variables - particularly the ascribed and achieved elements, among the individual factors, placing a very special attention on the net effect of education in the determination of status attainment and social mobility in Brazil. More specifically, it attempts to answer the following questions on the basis of the 1982 PNAD data - compared with the 1973: (1) Is the Brazilian social structure opening up or becoming more restricted as a result of social mobility. (2) Who has risen in the social structure, and why? (3) Who has descended, and why? (4) Why is that some have not moved at all? (5) What is the net effect of the economic and individual factors in determining these phenomena, in particular, what is the role of education in promoting one's mobility?

MOB-2.DOC

This essay will focus on the amount of mobility as well as on the types of mobility which is taking place in Brazil using the 1982 PNAD data. The analysis will be carried out by region and by age cohort. The regional disagregation will permit the identification of the impact of labor market variables in different levels of development. The age cohort analysis will provide a longitudinal view of the phenomenon through time and covering the evolution of social mobility in Brazil, practically, during the whole 20th century. In this respect, it repeates the methdology used in the 1973 study.

The 1973 study provided the following general results: (1) Brazil has gone through a vaste process of inter and intra-generational upward mobility during the 20th century; (2) however, most of the population climbed few steps in the social ladder whereas a few groups climbed several steps; (3) as a net result, the Brazilian social pyramid was "streched" upwardly which explained the coicidence of high mobility and high inequality.

Analysing the types of mobility, the study concluded that: (1) most of the population enjoyed "structural mobility" - based on labor market transformations that have taken place between the times of

their fathers or the begining of their own careers and, in particular, from the shrinkage of the agricultural market and the creation of new and better jobs in the urban zones, (2) conversely, a smaller proportion of the population enjoyed "circular mobility" - based on exchanges and substitutions among existing jobs, professional experience, and educational background; (3) although structural mobility prevails in Brazil, data showed that circular mobility was beginning to increase in recent times.

What were the role of the individual factors? In the 1973 study, five variables were used to detect these effects: father's status, initial status (status of the individual at first job), his age, education and migratory status (used as a dummy variable). Most impressive was the fact of the Brazilian heads of families had a meager average of only 3.3 years of school.

In spite of that, when the above set of individual variables is considered separatelly, education became an important factor in determing one's status in Brazil. Specifically, the model of individual variables permitted to reach the following conclusions: (1) each year of school in Brazil added 1.3 points to social status; (2) age, added less than 0.5; (3) status at first job, about 0,3; (4) father's status, less than 0.1; (5) migration, -0.1 aproximatelly. In other words, the background factors

(father's status, status at first job and migratory status) had little importance, while the individual resources (age and education) made a higher contribution to status determination and mobility - suggesting a movement from ascribed to achieved criteria. This movement seems to be gradual since the path analysis applied to that model revealed that education was still strongly determined by father's status.

In short. According to the 1973 study, the greatest part of social mobility in Brazil has been propeled by structural factors connected with labor market opportunities and the smallest part by individual variables. Among the later, it is true, education, although precarious, stands out as an important factor. Puttting it in another way: Brazilians moved upwardly in the social structure, primarily, as a result of new job opportunities and, secondarily, as a result of a good professional preparation. The 3.3 years of school is is an extremelly low mean for the amount of upward mobility which took place in the country along the 20th century.

What is the picture with the 1982 data? How much mobility is still going on? In what direction? What is the weight of structural variables in the determination of social statuses? And the individual factors? Is education becoming more crucial?

MOB-3.DOC

This section presents the data regarding inter-generational mobility for 1982. Table 1.1 is a standard mobility matrix relating the status of the father (at the time the son began to work) to that of the son in 1982. It provides several informations on changes in the social structures, the amount and the direction of mobility.

Table 1.1

Occupational Matrix of Intergenerational Mobility(%) (1982)

Father's Status	Individual Status in 1982							Total for Fath-ers
	1	2	3	4	5	6	Total	
1. Upper	32.2	27.1	22.2	11.7	5.7	1.1	100.0	2.0
2. Upper middle	14.1	30.1	27.7	19.3	7.2	1.6	100.0	5.0
3. Middle middle	4.2	9.4	37.1	24.8	16.1	8.5	100.0	41.9
4. Lower middle	4.2	13.0	20.3	44.3	16.3	1.9	100.0	13.3
5. Upper lower	3.3	10.7	19.8	38.1	24.4	2.6	100.0	7.7
6. Lower lower	0.6	3.2	23.1	28.3	21.5	23.3	100.0	31.1
Total for Individuals	4.1	9.5	28.5	28.9	17.7	11.2	100.0	100.0

N = 57.716

Let us begin with the analysis of the marginals. The percentages in the totals for rows and columns represent the shifts from social class origin to social class destination. Although they do not reflect precisely isolated cohorts, this type of data permit to detect - as a proxy - changes between the structure of different generations through time. They reveal that both social pyramids are very unequal; they have a relatively large basis and a narrow top. They also show, however, some signs of continuity and change. For example, Table 1.2 provides some comparisons among the fathers and sons' social structures in 1973 and 1982. They reflect the continuity of the unequal character of Brazilian social structure and the tendency toward the formation of middle class strata. In other words, the Brazilian social structure of recent times are very unequal but one cannot say that they are more unequal than the ones in the remote past.

Table 1.2

Changes in the Brazilian Social Structure (%)

Classes and Social Strata	Fathers Positions(*) 1973	1982	Sons Positions 1973	1982
Upper Class	2.0	2.0	3.5	4.1
Upper Stratum	2.0	2.0	3.5	4.1
Middle Class	26.2	50.2	48.5	66.9
Upper-middle	3.1	5.0	6.3	9.5
Middle-middle	13.8	41.9	18.4	28.5
Lower-middle	9.3	13.3	23.8	28.9
Lower Class	71.8	37.8	48.0	28.9
Upper-lower	6.9	7.7	16.0	17.7
Lower-lower	64.9	30.1	32.0	11.2
Total	100.0	100.0	100.0	100.0
N =	44.307	44.307	57.716	57.716

(*) The dates refer to the year of data gathering and not the year the person has entered the labor market.

Results for 1973 come from, Pastore, José, "Inequality and Social Mobility in Brazil", Madison: University of Wisconsin Press, 1982.

The 1982 data continues to show a significant increase of middle-class strata. The size of middle class for the two fathers cohorts jumped from 26.2% to 50.2% and for their sons, from 48.5 to 66.9%. Of course, this is a comparison of Brazilian social structures among themselves. It does not permit to say that Brazil is forming a middle

class that has the level of living and cultural horizon of the U.S., Italian or French middle classes. The data provide, simply, the basis to say that the more recent Brazil has a much larger middle class than before.

Table 1.2 shows that the two structures present several signs of changes. Between the two studies, fathers middle class practically doubled and lower strata was roughly cut in half: from 71.6% in 1973 to 37.8% in 1982. For the sons, the phenomenon went in the same direction - but less dramatically. On the other hand, in the sons' social structure, the upper class increased from 3.5% to 4.1% whereas for the fathers, it remained the same.

All these evidences reveal that upward mobility is a continuing force in Brazil. It does not mean, of course, that every individual in relation to his father went upwardly. As a matter of fact, there is an important difference revealed by the 1982 data. Table 1.3 shows that the proportion of downwards increased substantially while the upwards decreased in the 1973 comparison. The amount of immobile people decreased from 41.6% in 1973 to 32.4% in 1982; a large proportion of the mobile people continued to move upwardly (39.9%). But almost 30% os the heads of families went downwardly - which is a new phenomenon in Brazil. In 1973, the proportion of downwards was 11.3% whereas in 1982 it increaded to 27.6%.

Table 1.3

General Patterns of Intergenerational Mobility (%)

Types of Mobility	1973	1982
Upward	47.1	39.9
Immobility	41.6	32.4
Downward	11.3	27.6

How can we consolidate this increase in downward movements with the upward stretching of the sons social structure exhibited in Table 1.2?

The two sets of data of Table 1.3 reveal, in fact, that the proportion of upward sons is smaller in 1982 than in 1973. Could the increase in the downward mobility be attributed entirelly to the decrease of good jobs during the 1981-82 recession? Apparently not. This change seems to be a result of internal transformations in the occupational matrices which has to be analysed in more detail.

For this purpose, let us go back to Table 1.1. The diagonal of the matrix reveals the amount of immobility. It shows, that most of the individuals are, indeed, mobile in relation to their fathers. It shows also, that the largest

proportion of immoblie individuals is found in the mid-middle class: 44.3% of the individuals are sons of mid-middle class fathers. In all other cases, the immobility is less than 40%.

Table 1.4 comes from the 1973 study and shows higher rates of immobility in the lower strata such as among lower-lower (45%) and lower-middle strata (46%). In other words, immobility in the recent past is located in higher levels of the social structure as compared to the immobility of the remote past.

Table 1.4

Occupational Matrix of Intergenerational Mobility(%) (1973)

Father's Status	Individual Status in 1973							Total for Fathers
	1	2	3	4	5	6	Total	
1. Upper	29.8	22.5	27.1	12.5	5.0	3.1	100.0	2.0
2. Upper middle	15.2	28.7	28.7	15.5	6.1	5.8	100.0	3.1
3. Middle middle	8.6	14.3	36.2	18.9	10.5	11.5	100.0	13.8
4. Lower middle	3.8	8.7	21.6	46.3	14.9	4.7	100.0	9.3
5. Upper lower	3.2	7.4	20.7	35.4	23.8	9.5	100.0	6.9
6. Lower lower	1.0	2.5	13.1	21.1	17.4	44.9	100.0	64.9
Total for Individuals	3.5	6.3	18.4	23.8	16.0	32.0	100.0	100.0

N = 44.307

What this phenomenon has to do with the relative increase of downwards in 1982? When one considers, for example, that the proportion of fathers of mid-middle class jumped from 13.8% to 41.9% during the period, this imply that the individuals studied in 1982 began their inter-generational mobility career on a much higher basis than those studied in 1973. As a consequence, they had less space to move upwardly and a higher probability to descend in the social ladder. Moreover, to move up in the higher levels of

the social structure is more difficult than in the lower ones since it implies much longer social distances.

Table 1.5 shows, in fact, that, among the mobile individuals, 59.1% of the sons in the 1982 study were upwards whereas, in the 1973 sample, this proportion went up to 80.6%. Starting from, practically, zero, in 1973, most people had a higher chance to move up.

Table 1.5

Types of Mobility for Mobile Individuals (%)

Types of Mobility	1973	1982
Upward	80.6	59.1
Downward	19.4	40.9

The vertical mobility of the fathers was basically a movement from lower strata to middle class ones. Middle-class fathers in 1982 amounted to 41.9% whereas in 1973 they were 26.2%. Lower class fathers decreased from 71.8% in 1973 to 37.8% in 1982 and the upper class remained the same size (2.0%). The vertical mobility of the sons was basically a movement in the higher levels of the middle-class and, also, in the upper class.

What was behind this accelerated vertical mobility of the fathers? The 1973 study concluded that most of the social mobility in Brazil was "structural mobility", resulting of taking good advantage of new job opportunities rather than "circular mobility" in which competence, capability and competition are the key factors to dislocate one individual down in order to open the space for another individual to move up in the social ladder. The mean of years of schooling for the heads of the households in 1973 was 3.3 only. For their fathers, certainly, was much smaller than that.

In order to visualize the transformation of the fathers social structure, let us take the following typical case: the individuals studied in 1973 were, in average, 40 years old. Their fathers were, in average, 60 years old - regardless, they were dead or alive in that year. Therefore, they had accomplished the greatest part of their professional careers between 20 and 40 years of age, namely, between 1930-50.

The fathers of the individuals studied in 1982, by the same token, had accomplished the greatest part of their professional career during the period of 1940-60. Labor opportunities and occupational differentiation were very intense in this second period when urbanization,

industrialization, trade and public administration became dominant in Brazil.

The weight of agriculture in the Brazilian labor market descreased considerably during this second period. In fact, the proportion of fathers in the lower-lower class (mainly rural occupations) decreased from 64.9 in 1973 to 30.1% in 1982 and for the sons it falled from 32.0% to 11.2%. Brazil became more urban, more industrialized and more differentiated in terms of occupations in the labor market.

The analysis within the middle class strata reveals that, in addition to the growth of the mid-middle class, the upper middle stratum enlarged substantially both for the fathers and their sons. The upper-middle class in 1982 (9.5%) was almost two times bigger than in 1973 (9.5%). The same has happened with their fathers who jumped from 3.1% to 5.0% (See Table 1.2)

In 1973, most of the upward mobility was connected to the rural-urban migration. Table 1.6 shows that 55.1% of lower-lower class origin went upwardly. For 1982, Table 1.7 shows an even greater proportion, 67.8%. At this time most of the lower-rural class sons had already moved out from that position.

Table 1.6

Intergerenartional Mobility by Social Strata (1973)

Types of Mobility	Social Strata						
	Upper	Upper middle	Middle middle	Lower middle	Upper lower	Lower lower	Total
Upward	---	15.2	22.9	34.1	66.7	55.1	47.1
Immobility	29.8	28.7	36.2	46.3	23.8	44.9	41.6
Downward	70.2	56.1	40.9	19.6	9.5	---	11.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

On the other hand, in 1973, 56.1% of the upper-middle class sons went downwardly whereas in 1982, this proportion increased to 61.5%. For upper class origin, the proportion of downwards went from 70.2% in 1973 to 76.7% in 1982. The same pattern is observed for downward sons of mid--middle class origin: they went from 40.9% in 1973 to 42.1% in 1982.

Table 1.7

Intergenerational Mobility by Social Strata (1982)

Types of Mobility	Social Strata						
	Upper	Upper middle	Middle middle	Lower middle	Upper lower	Lower lower	Total
Upward	---	14.1	13.6	44.6	66.1	67.8	38.9
Immobility	23.3	24.4	44.3	37.1	30.1	32.2	32.4
Downward	76.7	61.5	42.1	18.3	3.8	---	29.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

In short, intergenerational upward mobility became more difficult in 1982 as compared to 1973. Downward mobility became more frequent. But, what is the picture for the intragenerational social mobility in 1982 as compared to 1973? Table 1.8 provides the evidence.

Table 1.8

Occupational Matrix of Intragenerational Mobility(%) (1982)

Beginning Status	Individual Status in 1982 1	2	3	4	5	6	Total	Total for Fathers
1. Upper	60.4	16.7	9.2	6.7	6.2	0.8	100.0	1.0
2. Upper middle	26.7	48.0	14.6	6.8	3.2	0.5	100.0	1.2
3. Middle middle	15.6	25.0	37.9	13.2	7.5	0.8	100.0	8.4
4. Lower middle	5.4	12.6	15.4	54.3	11.2	1.0	100.0	10.4
5. Upper lower	4.3	13.4	23.6	34.3	22.3	2.2	100.0	27.8
6. Lower lower	0.5	3.7	31.6	25.5	19.6	19.0	100.0	51.3
Total for Individuals	4.2	9.8	27.6	29.5	18.1	10.6	100.0	100.0

N = 66,083

Generally, the status change matrix indicates that 26.1% of the individuals remained immobile and 73.9% were in positions different from those at the beginning of their careers. Intragenerational mobility, therefore, was greater than intergenerational mobility (67.5%). There is one new phenomenon, however, which is dramatically different between the two types of mobility. The upward mobility in the case

of intragenerational movements was very high. 69 4% and downward mobility was limited to 4.5%.

Table 1.9 provides the comparison between the two mobilities for 1973-82. In 1973, the amount of mobility was pratically identical in both cases. In 1982, it was much bigger.

Table 1.9

Inter and Intragenerational Mobility in 1973-82 (%)

Type of Mobility	1973		1982	
	Inter	Intra	Inter	Intra
Upward	47.1	54.2	39.9	69.4
Immobility	41.6	41.9	32.4	26.1
Downward	11.3	3.9	27.6	4.5

Intragenerational mobility also depends upon time. Normally, the time involved in intragenerational mobility is less than the time involved in intergenerational mobility. One must recall, however, that both surveys are based on data which asked for the father's occupation at the time at which the respondent began to work. Theferore, the father's status and the son's initial status refer to the same time. For example, a person who was 25 years old in 1973 and who

began to work at 15, entered the labor market, approximatelly, in 1963. His initial status is refering to 1963 as well as the status of his father. In both cases, mobility covers 10 years although, in the case of the fathers, their careers were basically established in 1963 whereas the sons trajectory was just beginning. Moreover, the majority of sons were young and had a long road to travel. This is true also for 1982 data.

Intragenerational mobility depends also upon the point of departure. The lower the beginning, the greater the potential space to be covered in the social ladder. In Brazil, due to the early entry in the labor market, the sons tend to begin in occupations of lower status what generates some advantage for upward mobility.

To understand the meaning of upward and downward movements, therefore, the first thing to do is to examine the starting points of fathers and sons. Table 1.10 presents the fathers and the sons status for 1973-82.

Table 1.10

Evolution of the Social Structures 1973-82

	1973			1982		
Social Strata	Fathers Status	Sons Start	Sons 1973	Fathers Status	Sons Start	Sons 1973
Upper	2.0	0.6	3.4	2.0	1.0	4.2
Upper-mid	3.1	0.7	6.5	5.0	1.2	9.8
Mid-Middle	13.8	6.9	18.7	41.9	8.4	27.8
Lower-Mid	9.3	7.3	24.7	13.3	10.4	29.5
Up-Lower	6.9	25.2	16.7	7.7	27.8	18.1
Low-Lower	64.9	59.8	30.0	31.1	51.3	10.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

So far, we conclude that, in relation to 1973, Brazil had a larger proportion of intergenerational downwards and a larger proportion of intragenerational upwards in 1982. In others words, in relation to their fathers, many sons went down in the social ladder; in relation to the beginning of their own career they went up.

This reinforces the hypothesis the increase of intergenerational dowm movements in 1982 was due to a higher position of fathers as compared to 1973. On the other hand, the starting points of the sons were practically the same in

both data sets. In 1973, 59.8% of the sons began in the lower-lower status; in 1982, 51.3%. In 1973, 25.% started in the upper-lower occupations; in 1982, this proportion was 27.8%. Few changes can be observed from this point up. Lower-middle class starters, in 1973, amounted to 7.3% whereas in 1982 went up to 10.4%; mid-middle starters were 6.9% in 1973 and 8,4% in 1982. The two other status practically doubbled, although the percentages remained low.

In short, many sons went downward because their fathers were at a higher position in 1982. But, most sons went upward because they had a low starting point in 1982. Therefore, occupational opportunities seem to have remained quite open for both periods. The shrinking of labor opportunities due to the 1981-82 recession is not reflected in the 1982 mobility data.

MOB-4.DOC

So far, we have seen that the Brazilian population remained very mobile in the light of the 1982 data and, at the same time, became more downward. The next paragraphs will identify the prevailing types of social mobility in 1982 and examine the balance between structural and circular mobility. Data refer to intergeneratinal mobility only.

In the beginning stages of the development process, structural mobility tends to prevail. In these early stages, economic growth promotes the opening of new and more diversified occupational positions. Recruitment for these positions has to be made regardless the level of capability of the available incumbents. This is the case in commerce, administration, personal services, and even in the industrial, health, and educational sectors.

As new job opportunities are created, the open positions have to be filled with the existing labor force. Often, the growth of new job opportunities tends to move faster than the betherring of shcooling. A lot of improvisation takes place in the labor market. Structural mobility is a result of this forced filling of new job positions.

Mobility tends to shift from structural to circular type when society has already attained a reasonable level of development. The labor markets become more sophisticated; production is associated with higher level technology and labor productivity. Under these circumstances, professional capability becomes a key factor for status attainment and also for social mobility. Professional capability, in turn, can be acquired through in-service-training, formal education or both.

In the highly industrialized societies, more than 75% of total mobility is due to circular mobility and 25% to structural mobility. In the Brazilian case, structural mobility has been responsible for much more than 25%. In fact, it reached 56.2% in 1973 and 47.7% in 1982. (Table 1.11)

The comparison between 1973 and 1982 data reveals, however, a slight shift toward circular mobility. Table 1.11 shows an increase of 8.5 percentage points in circular mobility during the 1973-82 period.

Table 1.11

Types of Social Mobility

(1973-1982)

Types of Mobility	1973	1982	In Relative Terms (%) 1973	1982
Total Mobility	58.5	67.5	100.0	100.0
Structural Mobility	32.9	32.2	56.2	47.7
Circular Mobility	25.6	35.3	43.8	52.3

The role of competence and professional capability in the determination of social status must have increased in 1982 - as compared to 1973. This may be associated with on-the-job training, education or both. On the job training data are not available. But, regression analyses will detect the net effect of formal education on status attainment in the next section.

Two considerations can be advanced at this stage, however. First, the average years of schooling (4.4), although higher than in 1973 (3.3), remained very low in 1982 - when one considers that this sub-sample refers to the heads of the households. Therefore, one may suspect that the role of formal education on the aggregate social mobility rates is still modest. Second, the process of job creation due to the expansion of the economy remained vigorous during

the 60's and the 70's - which is the period in which most of the status attainement and vertical (mobility covered by the 1982 data)took place. The reduction of employment due to the 1981-83 recession had no time to affect 1982 mobility rates.

This is to say that the increase of circular mobility should neither dramatized nor ignored. It is important to explore and to locate the main focus of this new phenomenon. In this respect, Table 1.12 reveals that circular mobility is more frequent among the younger people. It seems to be a very recent phenomenon. In fact, for the 20-30 and, particularly, the 31-40 age cohorts, most of the mobility is due to circular mobility; this proportion is smaller for the 40-50 and 51-64 cohorts.

Table 1.12

Types of Mobility by Age Groups (%)

(1982)

Types of Mobility	Age Groups (51-64)	(41-50)	(31-40)	(20-30)
Total Mobility	62.9	68.2	69.3	67.7
Structural Mobility	30.1	34.0	10.8	29.0
Circular Mobility	32.8	34.2	58.5	38.7

Table 1.13 shows that changes in mobility rates varied substantially by region. The highest change in rate of total mobility was found in the Northeast which jumped from 42.3% in 1973 to 62.8% in 1982. At the same time, the largest change in the rate of downward mobility was also found in the Northeast which passed from 8.8% in 1973 to 35.8% in 1982. In the Northeast, immobility decreased substantially; downward mobility increased; and upward mobility remained practically stable. In short, vertical mobility in the Northeast was increasingly depressing in the 1973-82 period.

Table 1.13

Types of Mobility by Regions (%)

(1982)

Tyoes of Mobility		Regions					
		Rio	S.Paulo	East	South	N-east	Brasilia
Total	82	73.3	75.7	65.0	63.9	62.8	80.0
	73	72.2	69.2	49.1	49.7	42.3	81.0
Upward	82	45.4	49.6	44.1	30.6	37.0	43.6
	73	54.6	57.6	38.3	40.6	33.5	68.1
Immob.	82	26.7	24.3	34.9	36.2	37.2	19.9
	73	27.8	30.8	50.9	50.3	57.7	19.0
Downw.	82	27.9	26.1	21.0	33.2	35.8	36.5
	73	17.6	11.6	10.8	9.1	8.8	12.9
Struct.	82	27.4	40.7	28.6	33.9	27.3	44.9
	73	38.3	38.7	25.3	28.5	23.9	51.6
Circul.	82	45.9	35.0	36.4	30.0	35.5	35.1
	73	40.9	30.5	23.8	21.1	18.4	29.4

São Paulo and the South presented, with different proportions, the same trend: an increase in total mobility, a decrease in immobility and upward mobility, and an increase in downward mobility.

The East region followed a slightly different pattern. As in the previous cases, total mobility increased and immobility decreased. However, contrary to those regions, both upward and downward mobility increased - although the latter was much more pronounced than the former.

Rio and Brasilia presented a stable rate of vertical mobility and immobility; however, Brasilia showed a much higher change in the rate of downward mobility and a substantial reduction in the rate of upward mobility as compared to Rio.

In other words, downward mobility increased in all regions with a stronger impact in the Northeast, Brasilia, and South; immobility decreased in all regions and became stable in Rio and Brasilia; upward mobility decreased in all regions, except the East.

In general, the proportion of structural mobility decreased and of the circular mobility increased slightly between 1973 and 1982. The percentages in Table 1.13,

however, have to be analysed with some caution since the proportion of total mobility varies from region to region. What counts, in this case, are the relative percentages.

Using these percentages, one concludes that the circular mobility increased very significantly in Rio - jumping from 47.0% in 1973 to 62.6% in 1982; the next increase was recorded, surprisingly, in the Northeast - from 43.5% to 56.5%. All the other regions presented very modest changes in the proportion of circular mobility.

In spite of these changes, the structural mobility continues to be the main source of social mobility in the more sophisticated labor markets and the most developed regions - Sao Paulo, South and Brasilia. In this respect, one may conclude that the 1982 Brazil has not changed the prevailing mobility types very much as compared to the 1973 Brazil. Social mobility is still very dependent on the creation of new job opportunities; formal education remained poor; the skill demand seems to have been resolved more by improvisation than by formal training.

What is the future of this tendency? This question gains significance when one takes into account the large amount of downward mobility revealed by the 1982 data. As we have seen, the reversal of this tendency was due, basically, to the rapid upward mobility achieved by the fathers of the

heads of families. This means, that the space for upward mobility is decreasing in Brazil. The "easy years" for upward mobility are gone. Rural urban migration has been decelerated. The respondents' fathers today are in much higher positions than the respondents' fathers 2-3 decades ago.

How can this picture be reversed again? There seem to be two alternatives. The first would require a re-acceleration of economic growth and the creation of gigantic proportion of good jobs in the secondary and terciary sectors - as it happened in mid-60's and 70's. The second would require a substantial increase in the proportion of well trained people for the newcoming occupations.

The perspective for a booming economic growth seems to be very deemed for the next 10 years and education is deteriorating rather than improving. The average number of years of the Brazilian heads of family - which is the "cream" in the labor market - is still very low (4.4). Under these circumstances, labor productivity cannot advance much further.

In sum. If education does not improve more rapidly and new job opportunities are not created in large scale, the Brazilian population may very well experience a few decades of downward mobility with severe social and

political consequences which are usually associated with the discontent. Mobility, as we have seen, has a double effect for the upward people: it materializes some aspirations and creates others. But for downward people, the efeect is only one: it accentuates the feeling of relative deprivation.

2. Social Status Attainment

In this section, an attempt is made to evaluate the rôle of several variables for social status attainment. Structural and individual variables are included and the effects are estimated in two ways: First, coefficients of a linear regression model are estimated, and second, path analysis coefficients are examined. In both cases, comparisons are made with correspondent results obtained in the 1973 study.

The Linear Regression Model.

The regression model includes individual variables already examined in late sections, such as father's status, initial status; education and age. Structural variables were added to account for the rôle of regional labor market characteristics. For each PNAD region and from the PNAD-82 data, three labor market indicators were developped: a) occupational differentiation, b) proportion of industrial employment, and c) unemployment rate.

Occupational differentiation was defined as the proportion of workers whose job title was among the 15 most frequent occupations. A high proportion would indicate that the labor market of the corresponding region is not very

developed, and consequentely, would not be very favorable to social mobility. The proportion of industrial employment was computed by dividing industrial employment by total employment, for each PNAD region. A high proportion of industrial employment would indicate more favorable conditions for social mobility. The unemployment rate was also computed from the PNAD-82 data, since regional series are not available. A high regional unemployment rate would indicate less favorable conditions for social mobility. The computed values for the three structural variables are indicated in Table 2.1.

Table 2.1: Structural labor market variables included in the 1982 regression model, by region and by age (%)

Region	Occupational Differentiation	Proportion of Industrial Employment	Unemployment Rate
Rio	36.3	15.6	6.4
S. Paulo	38.6	26.9	4.7
East	49.5	10.4	4.4
South	52.8	13.4	2.7
Nth East	59.3	8.7	3.1
Brasilia	42.1	5.4	4.2

The regression model addopted in this study was essentialy the same as the used in the 1973 study, with two modifications: In this study, it was not included the dummy

variable for migration status, and the three structural variables above mentioned were added.

The variable used to indicate social status in both studies was the index developed by Silva (1973). The adjustments in occupation titles necessary to use Silva's index are indicated in the Methodology and Data Basis section (See Appendix). In this study, education was measured by years of schooling. Since this information is not readly available in PNAD surveys, a computation was developed to get this variable, and it is also indicated in the Methodology and Data Basis section. In this study, education reflects exactly the number of school years. In the 1973 study, however, this variable was computed in a distinct way, and, as a result, it grouped head of households in 2-years-of-school groups. Thus, in this respect, comparisons betwee 1973-82 studies must be made with qualifications.

The regression model used in this study is (the simbols + or - indicate the hipothesized direction for the impact of the corresponding variable):

$$STA = CTE + \underset{(+)}{A\ EDC} + \underset{(+)}{B\ STI} + \underset{(+)}{C\ IDD} + \underset{(-)}{D\ IDQ} + \underset{(+)}{E\ STP} + \underset{(-)}{F\ DIF} +$$

$$\underset{(+)}{G\ IND} + \underset{(-)}{H\ DES} + (\text{Error Term})$$

Where:

CTE = constant term (intercept);
EDC = household's head schooling;
STI = initial social status index of the household's head;
IDD = household's head age;
IDQ = squared age;
STP = social status index of the father of household's head
DIF = regional occupational differentiation;
IND = regional proportion of industrial employment;
DES = regional unemployment rate.

Mean values of the variables are presented in Table 2.2 for the 1982 model, and in Table 2.3 for the 1973 one. The usual Brazilian regional differences may be realized through the examination of such variables as education (higher in the most developed areas - São Paulo, Rio de Janeiro and Brasilia), as well as the structural variables in Table 2.1.

Tables 2.2 and 2.3 indicate some progrees in average schooling (which increased from 3.3 years in 1973 to 4.4 years in 1982 - a 33% increase), and in social status (whose average index increased from 10.6 to 14.2 a 34% increase). The growth of the fathers' social status was the largest among all the variables: the index raised from 8.1 in 1973 to 12.7 in 1982, a 57% increase.

Table 2.2: Mean Value of the Variables of the Regression Model, by Region and by Age Group - 1982

Region and Age Group	STA	EDC	STI	IDD	IDQ	STP	DIF	IND	DES	N
Total	14.2	4.36	6.40	38.8	1630	12.7	49.7	13.3	3.94	48678
Region										
Rio	15.1	5.85	7.72	39.6	1680	12.9	----	----	----	4225
São Paulo	14.3	5.15	6.64	38.5	1590	11.7	----	----	----	8204
East	15.1	4.92	6.31	38.3	1580	14.9	----	----	----	10417
South	13.5	4.19	5.95	39.0	1640	11.1	----	----	----	7531
North-East	13.0	2.79	5.79	39.6	1690	11.8	----	----	----	15422
Brasilia	17.1	6.74	8.53	36.6	1440	15.6	----	----	----	2879
Age group										
20-30	12.7	5.08	6.59	26.2	694	12.3	49.5	13.2	3.94	13120
31-40	14.9	4.83	6.79	35.3	1250	12.8	49.5	13.3	3.95	15583
41-50	14.6	3.85	6.15	45.2	2050	12.8	49.6	13.4	3.95	11409
51-64	14.7	3.07	5.71	56.3	3180	13.0	50.4	13.1	3.89	8566

Obs: STA = present status index; EDC = schooling (years), STI = initial status index; IDD = age; IDQ = squared age; STP = father's status index; DIF = occupational differentiation; IND = industrial employment; DES = unemployment rate; N = number of observations.

Table 2.3: Mean Value of the Variables of the Regression Model, by Region and by Age Group - 1973

Region and Age Group	STA	EDC	STI	IDD	STP	N
Total	10.6	3.3	5.9	39.6	8.1	4.418
Region						
Rio	12.5	4.4	7.5	40.1	10.4	508
São Paulo	11.5	3.9	6.3	39.8	8.2	751
East	9.9	2.9	5.3	40.0	7.6	718
South	9.4	3.2	4.9	39.5	7.2	628
North-East	8.3	1.8	4.8	39.9	6.5	1.101
Brasilia	14.4	5.3	7.9	38.2	10.9	447
Age group						
20-30	10.0	3.7	6.2	----	8.0	1.063
31-40	11.2	3.6	6.1	----	8.5	1.415
41-50	11.3	3.3	5.9	----	8.1	1.116
51-64	9.1	2.4	5.2	----	7.6	824

Obs: STA = present status index; EDC = schooling (years); STI = initial status index; IDD = age; STP = father's status index; N = number of observations.

The estimated coefficients for 1982, and the corresponding results for the 1973 study are presented in Tables 2.4 and 2.5, respectively Table 2.4 also presents the estimated coefficients for the 1973 model with 1982 data. The variance explained by the model is relatively high, considering other social status attainment studies. Squared-R is 0.424 for the regression with all observations, and ranges from 0.312 to 0.549 in the regional and age-groups regressions. Almost all coefficients are significant at very high levels of significance. Only a few were non-significant, and those will be referred to along the present analysis.

Accordingly to the hipothesis, the sign for the estimated schooling coefficient was positive. Like in the 1973 study, here too this was the coefficient with the largest magnitude. Keeping all other variables constant, one additional year of schooling increases the social status index by 1.32 points. Considered absolutely, it is not a very large effect, but in relative terms, the impact is appreciable: 1.32 is about 10% of the sample average social status index. The coefficient is smaller than the estimated in the 1973 study (which was 1.45). However, since the variable schooling is not fully comparable among the two studies, it is not possible to conclude that the educational effect on status attainment in 1982 is precisely 0.13 smaller than in 1973.

Table 2.4: Estimated Regression Coeficients, by Region and by Age Goup - 1982

Region and Age group	CTE	EDC	STI	IDD	IDQ	STP	DIF	IND	DES	R²
Total										
82 model	-16.7	1.32	.402	.448	-.004	.129	.156	.043	.235	.424
73 model	-6.95	1.26	.408	.433	-.034	.132	----	----	----	.418
Region										
Rio	-9.53	1.48	.419	.382	-.003	.144	----	----	----	.474
S. Paulo	-14.6	1.51	.410	.744	-.007	.105	----	----	----	.492
East	-9.48	1.39	.360	.540	-.005	.141	----	----	----	.391
South	-10.0	1.44	.386	.518	-.004	.160	----	----	----	.446
Nth-East	-.267	.953	.375	.220	-.001	.123	----	----	----	.312
Brasilia	-12.3	1.63	.469	.552	-.004	.038	----	----	----	.549
Age group										
20-30	-7.10	1.01	.451	-.32*	-.013	.126	.155	.032	.453	.383
31-40	-31.4	1.42	.405	1.36	-.017	.135	.138	.051	.06*	.460
41-50	-5.88	1.43	.381	....	-.014	.116	.140	.051	.14*	.419
51-64	-14.3	1.46	.320	.21*	-.01*	.136	.204	.03*	.356	.399

Obs: CTE = intercept; STA = present status index; EDC = schooling (years); STI = initial status index; IDD = age; STP = father's status index.

*non significant coefficients

Table 2.5: Estimated Regression Coeficients, by Region and by Age Group - 1973

Region and Age group	CTE	EDC	STI	IDD	IDQ	STP	MIG	R_e
Total	-6.25	1.45	.344	.443	-.004	.064	-.079	.427
Region								
Rio	-2.30	2.02	.058	.178	-.001	.013	- 017	.439
S. Paulo	-6.06	1.36	.349	.490	- .005	.030	-.077	.359
East	-6.53	1.67	.240	.437	-.004	.164	-.559	.474
South	-13.2	1.82	.119	.708	-.007	.156	-.782	.408
Nth-East	-4.38	1.27	.472	.414	-.004	.059	-.532	.375
Brasilia	-11.6	1.10	.571	.320	-.003	.051	+3.72	.498

Obs: CTE = intercept; STA = present status index; EDC = schoolling (years); STI = initial status index; IDD = age; STP = father's status index; MIG = migration status.

Schooling seems to play a more important rôle in social status attainment in the most developed areas. Brasilia has the largest estimated coefficient (1.63), followed by São Paulo (1,51) and Rio de Janeiro (1.48). The smallest coefficient is observed in the less developed Brazilian regions, the North East (0.953). The magnitude of the schooling coefficient increases with the household head's age: it ranges from 1.01 (for the 20-30 age group) to 1.46 (for the 51-64 one).

Regarding the impact of education on social status attainment, thus, the results are essentially the same as those obtained in the 1973 study. Although this is the largest coefficient among all the variables included, the regression model does not provide empirical evidence to conclude that the rôle of education has increased dramatically in the period. But it does show that schooling tends to be more important in more developed regional labor markets. This result suggests that schooling will be increasingly important, as the Brazilian labor market become more and more complex.

The second largest impact on household head's social status is the one produced by his age. The hipothesized positive sign was confirmed, and each year of age adds 0.448 points in the social status index (keeping all other variables constant). The effect varies very much among the

regions: From 0.744 in São Paulo, to 0.220 in the North East. This again suggests that the effect of this variable depends uppon the degree of labor market development

The effect of this variable was non significant among three of the four age groups. The only significant coefficient was observed for the 30-40 group. This suggests a tipiccaly human-capital behavior for social status attainment. During the first years (20-30), time seems to be used to invest on human capital (through either school or on-the-job training), and age does not impact on social status attainment. In the next years, however, returns to investment show up: from 30 t0 40, each year of age adds 1.36 points to social status. After 40, age does not contribute anymore to social status attainment (coefficients for 41-50 and 51-64 groups are non significant).

One additional point on the household head's initial social status (social status index at the first job) increases by 0.402 points hes present social status (all other variables kept unchanged). The positive hipothesis for this variable was confirmed, and Brasilia, Rio de Janeiro and São Paulo have the largest coefficient. This again suggests a positive correlation with regional labor market development.

The coefficients of the household head father's social status are also all positive, confirming the initial hipothesis. The magnitude is not very large: One additional point on the father's social status index adds only 0.129 points to the household head's index. However, the correlation with labor market development is negative. The lower magnitudes for this coeeficient are observed in the most developed areas (São Paulo and Brasilia).

The structural variables -- occupational differentiation, industrial employment, and unemployment rate -- did not add very much to the variation explained by the model, but the magnitude of their coefficients are appreciable, when compared to the magnitudes of the above examined coefficients. The coefficients are all positive, and the magnitudes are, respectivelly: 0.156, 0.043, and 0.235. The positive sign for two coefficients (occupational differentiation and unemployment rate) did not confirm the initial hipothesis. These results mean that social status increases when occupational differentiation is not large (the proportion of people in the 15 more frequent occupations is large), and when unemployment rate is large. For both variables, the coefficients are larger for the younger (20-30) and older (51-64), indicating that those are more sensitive groups to effect of the variables. Because of the positive sign of the coeffitients, this is surprising

and puzzling. Further exploration with harder data on structural variables is needed.

For the individual variables, the regression equation estimated in this study provided evidence about the rôle played by achieved as well as atributed individual characteristics. The results showed that all the achieved factors affect positively social status attainment, and are positively correlated with regional labor market development. The only atributed individual characteristic included in the model -- father' status -- although also positively associated with social status attainment, is negatively correlated with regional labor market development. This suggests that, with economic development, achieved factors (education, experience, initial status) will tend to play a more relevant rôle in social status attainment.

However, one must regard this conclusion as tentative, because educational opportunities are still somewhat restricted in Brasil. Realisticcaly, it can not be ignored that the father's social position is relevant for either education and first job status. In order to clarify the effect of the father's social status on the present social status of the household head, a path analysis model was estimated. In the 1973 study, a path analysis model was also estimated, and both results are presented below.

The recursive model is depicted in Figure 1. Four paths are prescribed for the impact of father's status on present status:

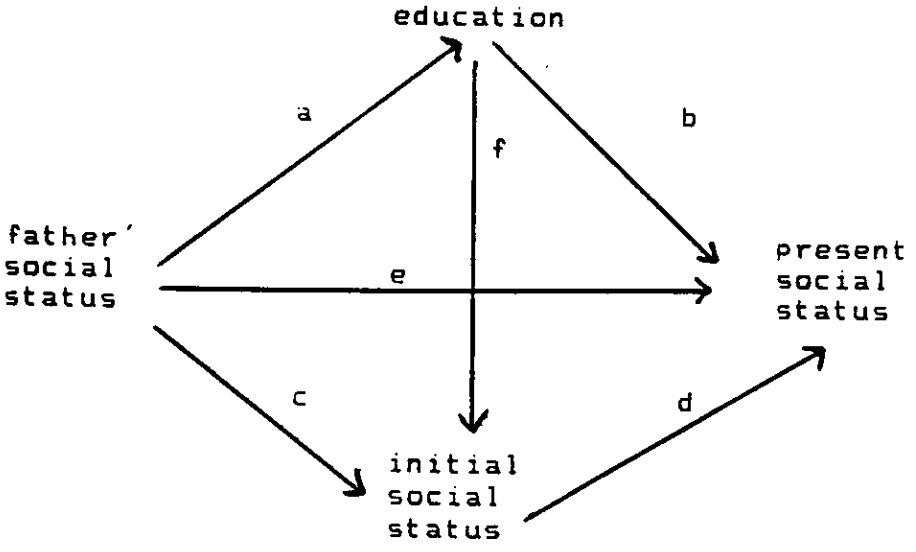
i) direct (coefficient "e");

ii) indirect, through ecucation (coefficient "a" x "b");

iii) indirect, through initial status (coefficient "c" x "d");

iv) indirect, through education and initial status (coefficient "a" x "f" x "d")

Figure 1: Recursive Model for Social Status Attainment



The recursive model estimated in the 1973 study did not include the path through education and initial status. In

that study, the correlation between education and initial status was considered too small, and for this reason this path was not considered. However, since the 1982 PNAD data indicated a 0.5 correlation between those two variables, the corresponding path could not be ignored.

Results of both estimations are depicted in Tables 2.6 and 2.7. All the 1982 path coefficients are significant at very high levels of significance. Although not completely comparable, the results indicate a remarcable increase in the impact of father's status on present status. In the 1973 study, the total impact was 0.397, and in the last one, it raised to 0.733. The largest contribution for this increase came from the direct impact, which raised from 0.080 in 1973 to 0.255 in 1982.

Table 2.6: Estimated Path Coefficients of Fathers's Social Status on Household Head's Social Status, by Region and by Age Group - 1982

Region and Age Group	Impact of Fathers' Social Status Index					
	Total	Direct	Indirect	Through Education	Through Initial Status	Through In. Status and Educat
Total	.733	.255	.478	.310	.071	.097
(%)	(100.0)	(34.8)	(65.2)	(42.3)	(9.7)	(13.2)
Region						
Rio	.724	.159	.565	.405	.051	.109
(%)	(100.0)	(22.0)	(78.0)	(55.9)	(7.0)	(15.1)
S. Paulo	.721	.155	.566	.411	.059	.096
(%)	(100,0)	(21.5)	(78.5)	(57.0)	(8.2)	(13.3)
East	.754	.251	.483	.354	.043	.086
(%)	(100.0)	(35.9)	(64.1)	(46.9)	(5.7)	(11.4)
South	.733	.232	.501	.345	.069	.087
(%)	(100.0)	(31.7)	(68.3)	(47.1)	(9.4)	(11.9)
Nth-East	.734	.360	.374	.156	.121	.097
(%)	(100.0)	(49.0)	(51.0)	(21.3)	(16.5)	(13.2)
Brasilia	.711	.072	.639	.458	.062	.119
(%)	(100.0)	(10.1)	(89.9)	(64.4)	(8.7)	(16.7)
Age group						
20-30	.729	.204	.525	.326	.074	.125
(%)	(100.0)	(28.0)	(72.0)	(44.7)	(10.2)	(17.1)
31-40	.732	.212	.520	.365	.062	.093
(%)	(100.0)	(29.0)	(71.0)	(49.9)	(8.5)	(12.7)
41-50	.729	.260	.469	.311	.069	.089
(%)	(100.0)	(35.7)	(64.3)	(42.7)	(9.5)	(12.2)
51-64	.752	.344	.408	.249	.081	.078
(%)	(100.0)	(45.7)	(54.3)	(33.1)	(10.8)	(10.4)

Table 2.7: Estimated Path Coefficients of Fathers's Social Status on Household Head's Social Status, by Region and by Age Group - 1973

Region and Age Group	Impact of Fathers' Social Status Index				
	Total	Direct	Indirect	Through Education	Through Initial Status
Total	.397	.080	.317	.240	.077
(%)	(100.0)	(20.0)	(80.0)	(60.0)	(20.0)
Region					
Rio	.325	.002	.303	.291	.012
(%)	(100.0)	(7.0)	(93.0)	(89.5)	(3.5)
São Paulo	.330	.029	.301	.226	.075
(%)	(100.0)	(9.0)	(91.0)	(68.5)	(22.5)
East	.457	.149	.308	.252	.056
(%)	(100.0)	(32.6)	(67.4)	(55.0)	(12.4)
South	.389	.106	.283	.281	.002
(%)	(100.0)	(27.3)	(72.7)	(72.2)	(.5)
Nth-East	.393	.050	.340	.236	.104
(%)	(100.0)	(13.5)	(86.5)	(60.0)	(26.5)
Brasilia	.423	.005	.368	.227	.141
(%)	(100.0)	(13.0)	(87.0)	(53.8)	(33.4)
Age group					
20-30	.385	.030	.355	.216	.139
(%)	(100.0)	(7.8)	(92.2)	(56.0)	(36.0)
31-40	.382	.074	.355	.216	.139
(%)	(100.0)	(19.4)	(80.6)	(46.8)	(33.8)
41-50	.452	.066	.386	.328	.056
(%)	(100.0)	(14.6)	(85.4)	(72.8)	(12.6)
51-64	.312	-.016	.328	.285	.043
(%)	(100.0)	(-5.1)	(105.0)	(91.0)	(14.0)

Total impact does not vary substantially across regions and age groups. The same is not true, however, for direct and indirect impacts. Direct impact tend to be smaller in more developed regional labor markets, where indirect impact are larger. Direct impact seem to be more important for older goups than for younger ones.

A possible interpretation for these results could be that, although the father' social status impact is still very important for all regions and age groups, it tends to be more direct in less developed labor markets and it was more direct in the past. In more recent periods, and in more developed regional labor markets, father' social status acts in a more indirect way, through education and first job status.

APPENDIX: METHODOLOGY AND DATA BASIS

The basic source of data for this study is PNAD-82. PNAD (Pesquisa Nacional por Amostra de Domicilios) is the Brazilian annual population survey, conducted by IBGE. In 1982, the PNAD sample size was 131.958 households. Since the focus of this study is social mobility, a sub-file with data on heads of household was produced, from the initial file. Male heads of households less then 20 year-old and more than 64 year-old were excluded. Were also excluded female heads of households. Finally, were excluded all households of two regions, North and Center-West, because in those regions, the sample was made of only of urban households. The same procedure was adopted in another study on mobility, with a PNAD data source (Pastore, 1973). Produced from a similar data basis, results of this study can be compared with those obtained by Pastore in the 1973 study, in order to search for possible changes in Brazilian social mobility patterns.

Crucial Variables

1. Occupation. Similarly to the one conducted in 1973, the 1982 PNAD instrument had a supplement with questions on mobility, that provided information about occupational status of individuals in two moments: occupation in the week the survey was conducted (variable 503), and occupation in

the first job (variable 6,604). In addition, there was one question about the occupation of the father when the interviewed person entered the labor market (variable 6607).

In order to allow for comparisons with the 1973 study, the same occupational classification had to be used. This implied in some adjustments in the 1982 list of occupations. The two classifications were basiccaly the same, but the 1982 one was more detailed for some occupations. For those cases, occupations were re-grouped, in such a way that the same list of occupations was finally obtained. The two lists are provided in Table A-2.

2. Education. A key variable, education is measured in this study by years of schooling (variable 318). The 1982 survey for this variable aggregates those with 9 to 11 years of school, and those with 12 or more years of school. Those two groups correspond to high school and to college levels, respectivelly. To desaggregate the two groups, information on years of schol and degree completed had to be used (variables 312 and 314 for those that are still at school, and variables 315 and 317, for those that are not at school anymore). A conversion matrix was developed to transform year-degree into years of schooling (Table A-1).

3. Social status. In this study, it was used the social status scale developped by Silva (1973). In the 1973 study,

the same scale was used. This scale is a combined computation that takes into account educational attainement (a income-education computation) and labor market experience (occupation). The procedure Silva used to compute a individual social status may be summarized as follows:

a) for each year of schooling, the average income of all individuals is computed;
b) for each occupation, the average of the averages of incomes (as computed in b) is computed;
c) the estimates obtained in b) are standardized and the result is a list of social status associated to the occupations;
d) the social status of each individual in given by the social status of his/her occupation.

Silva's (1973) scale was associated to each occupation in this study, according to the adjustments referred to in item 1 above. All heads of households were classified into six groups of social status: High; Middle-high; Middle-middle; Middle-low; Low-high; Low-low. This procedure allowed the authors to deal with appropriate and workable mobility tables, and was also addopted in Pastore's (1973) study.

Silva (1985) updated his social status scale, for some of the 1982 PNAD occupations. For most of the occupations,

however, the new Silva scale is exactely the same as the 1973 one. For this reason, the authors decided not to use the 1982 scale. It seemed to be a safer strategy to group the 1982 desagregated occupational groups into the 1973 original groups, and to use the same scale to compare mobility patterns across time. Another possible strategy could have been to built a entirely new scale for 1982. This path, however, would demand time and resources that were beyond the limits of this study.

The authors are aware, however, that a bias may be introduced because of the use of a social status scale built with data from the 1970 Census in study with data from a 1982 survey. It is quite possible that some occupations moved into the scale (upward or downward). If the period covered was just the 12 years that separates the two studies, risks would be minimized. But the study also includes social status of the head of the household's father at the time the head of the household entered the labor market. This means, that, in some cases, social status defined in 1970, is being attributed to individuals 30 or 40 years before. This is a tipical problem in social mobility studies. The authors, first, develop the study without taking it into account. At the end, an attempt is made to qualitatively evaluate the impact of this possible bias.

Table A-1: Transformation of Year-Degree (variables 312, 314, 315, and 317) into Years of Schooling

Variable 314/317 (Degre)	Variable 312/315 (Year at School)					
	1	2	3	4	5	6
high school	9	10	11	-	-	-
college	12	13	14	15	16	17

Table 2-A: Occupations and Social Status Index
1973/1982

CODE 82	GROUPS AND OCCUPATIONS - 1982	IS - 73
	GROUP 1	
303	agricultural tractor operator	6,11
919	gardeners (not involved in crops)	5,55
321	hunters	4,84
322	fishermen	4,2
331	lumberjacks	4,4
332	sawmill workers	4,4
333	charcoal makers	4,28
334	rubber tappers and collectors	4,21
335	herb gatherers	4,61
336	vegetable pickers	2,5
341	miners	6,48
345	stonecutters and rock drillers	5,38
371	prospectors	4,9
304	other agricultural and livestock workers	3,59
381	saltworks workers	6,48
351	operators of mineral extractions machinery	6,48
	GROUP 2	
441	textile carders and combers	6,41
442	textile rovers and spoolers	5,83
443	textile spinners	5,83
445	loom setters	6,78
446	ropemakers	4,4
447	weavers	6,65
450	textile bleachers and dyers	7,73
452	textile finishers	6,49
461	leather goods makers and saddle and harness m	6,81
462	tanners	6,37
470	tailors and seamstresses	7,19
476	gatmakers	6,19
477	shoemakers	6,69
479	purse and belt makers	6,11
472	pantsmakers and shirtmakers	7,19
473	pattern makers and cutters	7,19
471	sewing assistant	7,19
478	shoe factory workers	6,69
531	sausage makers	7,28
532	jerkeumakers	6,13
533	butchers (slaughterhouses)	5,98
534	occupations in the milk and milk products ind	6,1
535	candymakers and confectioners	7,32

536	pastamakers	6,57
537	bakers	6,36
538	grain millers	5,24
539	employed in the sugar industry	5,8
540	employed in the beverage industry	6,75
541	employed in the coffee industry	6,55
542	employed in the jishing industry	5,16
543	employed in the tea industry, etc.	6,55
544	employed in the vegetable oil industry	5,8
545	employed in the food industry	6,29
444	lacemakers	2,49
449	net makers	2,88
474	embroiderers and fabric reweavers	4,41
475	straw hatmakers	1,81
562	ceramists and china makers	5,86
563	ceramics painters	5,96
564	potters	4,5
575	vulcanizers and tire repairmen	7,6
576	firecracker makers	4,61
490	basketmaders and mat weavers	3,17
577	broommakers	4,9
580	cigar and cigarette makers	4,77
583	firers	7,65
584	shipping crate workers	6,38
55	dispatchers	6,38
911	apprentices	3,31
921	lubricators	7,61
574	rubber workers	7,6
579	tobacco preparation workers	4,77
586	employed in rubber products industry	7,6
485	sawers	5,82
513	hodcarriers	4,82
727	small boat operators	6,1
753	teamsters (oxen, horses, etc.)	4,61
925	road construction workers	5,83
920	garbagemen	5,56
924	manual laborers	5,3
805	domestic servants	3,33
825	laundresses	3,68
812	hotel maids	3,33
752	fare collectors	6,42
813	cooks	6,32
814	waiters	6,31
824	manicurists and pedicurists	7,47
826	shoe-shiners	3,76
841	doormen	7,31
843	watchmen	7,31
844	janitorial staff	7,31
611	seller at open-air market	7,39
612	water seller or distributor	7,39
613	confectioners, etc. (who sell their product)	7,39
614	greengrocers and street vegetable and fruit v	7,39
615	seller of animal entrails	7,39
616	lottery ticket vendors	7,39

617	employed in other street vending occupations	7,39
912	variou ticket sellers	7,39
163	masseurs (medical)	7,47
815	bartenders	7,31
823	make-up persons, etc.	7,47
859	private security officers	7,31
916	street paking watchmen	7,31
845	office-boy	7,31
621	magazine and newspapper vendors	8,84
602	sales persons	7,39
605	product demonstrators	7,39

GROUP 3

414	molders	9,95
412	metal pressors and cutters	8,96
413	wiredrawers	8,96
416	tool grinders and shaperners	10,1
419	stamping machine operators	8,65
421	metal planing and punch operators	11,58
422	machine-tool operators	10,82
424	mechanic - vehicles	9,44
425	mechanics	11,15
415	galvanizers	9,09
426	welders	9,1
428	coppersmiths	9,85
429	blacksmiths and locksmiths	8,11
431	auto body workers	9,67
427	riveters	10,3
430	tinsmiths	9,71
411	oven tender in metallurgical industry	8,64
418	toolmakers	11,15
448	tapestry and carpet weavers	9,17
451	textile printers	8,05
552	typographers	11,25
554	printing press operators	10,62
556	bookbindery workers	7,84
557	other occupations in the graphics industry	10,3
561	glassworkers and ampule makers	7,94
572	jewelers and watchmakers	10,58
573	gem cutters and polishers	8,88
578	marble workers	8,43
417	stone buffers and polishers	8,55
581	spray painters	8,89
272	craftsman	10,63
589	employed in other transformation industry job	9,56
405	technician in electrical energy	11,43
491	eletrical equipment assembly workers	11,43
492	electronic equipment assembly workers	11,43
496	electrical installation worker	11,43
497	telecommunication equipment installation and	11,43
498	electric wiring installation and repair worke	11,43
499	operator of electrical energy installation	11,43
493	equipment repairment	12,99

494	radio and tv assenbly workers	12,99
495	radio and tv repairmen	12,99
585	employed in the paper industry	9,56
587	employed in cement products industry	9,56
722	boatswains	10,27
724	ship firer	11,94
725	merchant marine sailors	9,45
726	ship stewards	10,45
731	port to ship crane operators	11,35
732	stevedores and longshoremen	8,77
743	locomotive engineers	11,84
744	trin firemen	10,46
745	railroad brakemen or flagmen	10,14
746	switchmen and signal men	10,2
751	drivers (public transportation and trucking)	10,83
762	railroad construction workers	7,78
774	telephone operators	10,03
775	mail carriers	10,9
776	telephone and telegraph linemen	11,59
511	reinforced concreters	7,83
512	bricklayers or masons	6,94
514	painters and whitewashers	7,78
515	stucco masons	8,37
516	tilers and parquetry wokers	8,94
517	plumbers and pipefitters	8,87
518	glaziers	8,27
519	sidewalk and street paving workers	6,48
520	flooring fitters and caulkers	6,38
521	operators of civil construction machinery	6,65
913	firemen (not in public employment)	8,87
481	cabinet makers and joiners	8,44
482	carpenters	7,39
483	coopers, hoopers and barrelmakers	8,56
487	upholsterers and vehicle upholsterers	8,65
488	mattressmakers	6,18
489	wood polishers	7,41
484	operators of joinery machinery	8,44
486	plywood preparers	8,44
166	midwives	9,9
162	nurses (no diploma)	11,01
822	barbers	9
821	gairdressers	9
856	policemen	10,45
857	jailkeeper, etc.	12,08
842	elevator operators	8,79
914	foemen, overseers	10,75
917	sanitary inspectors (gov't service)	9,76
57	teletype operator	9,12
58	operator of automatic processing machines	9,12
61	operators of copying machines	9,12
420	press operator	9,12
423	assembly adjusters	9,12

582	forklift operators	9,12
915	pest control workers	9,76
922	water treatment workers	9,76
923	machine operators outside of agriculture	9,12
926	other poorly dejined occupations	9,96

GROUP 4

30	ranch or farm administrator	9,77
103	surveyors	18,61
302	agricultural and livestock technicians	17,99
361	gas and petroleum extraction workers	18,57
391	gas well sounder	18,57
10	merchant	16,95
11	hotelkeeper or boarding house owner	17,87
811	hotel keeper and boarding house proprietor	17,87
1	farmer	17,96
301	self-employed agricultural and livestock prod	17,96
601	self-employed businessmen	16,95
53	cashiers, bursars, tellers, pursers	16,8
291	librarians	22,97
111	draftsmen	22,51
167	prosthetist	16,17
132	non-certified pharmacists	15
242	legal scribes and clerks	22,09
271	sculptors and painters	18,58
275	musicians/composers	12,62
276	television, movie and legitimate stage actors	18,5
278	announcers/commentators	15,92
273	decorator/scene designer	20,45
280	cinematographers, etc.	15,14
274	photographers	12,6
551	lineotypists	17,23
553	printing engravers	13,05
555	proofreaders, graphics industry	18,05
631	salespersons (travelling and with set territo	20,94
645	other agents and brokers	23,13
646	buyers	23,22
712	stewardes and stewardesses	22,81
723	ship machinist	15,08
741	railway station agents	14,42
742	train conductors	13,58
761	transportation inspectors and dispatchers	13,6
771	postal and telegraph agents	15,26
772	postal clerks	19,32
773	telegraphers and radio telegraphers	17,91
855	police detectives	21,17
858	finger print specialist	19,06
918	inspectors (gov't service)	17,18
165	operators of medical equipment	18,61
168	technicians in clinical analysis	16,32
62	file clerks	22,97

243	process server	22,09
244	other auxiliary occupation in the justice sys	22,09
277	circus entertainers	18,5
279	producers and directors of shows	18,5
281	operators of sound and lighting equipment	15,14
282	other radio and tv operators	15,14
283	movie projector operators	15,14
293	other occupations	12,68
588	security supervisers	17,18
603	cash register operators	16,8
571	quality control inspector	17,18
215	elementary school teacher (1st - 4th grade)	13,81
219	teacher	21,87
222	school proctors	13,11
216	elementary school teacher (1st - 8th)	13,81
217	nursery school teacher and kindergarten teach	21,87
218	vocational teacher	21,87
54	stockroom and warehouse clerks	12,79
56	typists	12,83
65	office clerk	13,93
60	accounting aide (or clerk)	13,93
63	receptionists	13,93
59	secretaries	13,93
604	stock clerks	12,79
404	foremen in civil construction	16,44
401	technicians in mineral extraction enterprises	16,98
402	technicians in transformation industry	16,98
403	masters (chiefs and skilled) in textile indus	16,98
406	other masters/foremen	16,98
831	soccer player	12,21
832	wrestler/athlete	12,21
851	officer in the armed forces	16,42
852	enlisted men in armed forces	16,42
853	officer in the fire corps	13,36

GROUP 5

2	cattle rancher	26,49
3	poultry farmer	38,57
4	other livestock ranchers	38,57
13	other proprietors	35,07
5	non-specified agricultural and livestock owne	35,07
6	employed in vegetation extration or fisching	35,07
7	employed in mineral extraction	35,07
8	employed in transformation industry	35,07
9	employed in civil construction	35,07
12	transportation contractor	35,07
801	proprietors	35,07
39	employee in charge of administrative matters	32,33
31	administrator in vegetation extraction and fi	32,33
32	administrator in mineral extraction	32,33

33	administratior in transformation industry	32,33
34	administrator in civil construction	32,33
35	administrator in trade and merchandizing	32,33
36	administrator of hotels	32,33
37	administrator in financial institutions	32,33
183	administrative technicians	27,59
191	accounting technicians	27,5
193	computer programmers	35,33
153	registered nurses	38,56
171	mathematicians	37,03
172	statisticians	37,03
213	secondary teacher	32,15
221	teaching orientator	26,82
241	notary publics	29,56
251	clergy	24,87
204	social workers	33,07
632	commercial representatives	26,33
633	publicity agents	27,8
641	insurance agents	30,92
642	real estate agents	24,94
643	stock brokers	31,87
721	merchant marine officer	29,62
833	sports referees	24,72
834	coaches	24,72
40	revenue agents	27,59
50	labor and social security inspectors (gov't s	32,54
.52	administrative assistants	27,59
64	administrative aide (or clerk)	27,59
112	construction technician	30,32
113	other engineering occupations	30,32
125	other chemistry and physics occupations	30,32
131	chemicat technicians	30,32
173	systems anlysts	35,33
192	statistical technicians	30,32
214	middle school teacher (5th - 8th grade)	32,15
644	appraisers and auctioneers	31,87
133	metereological technicians	26,18
142	biologists	38,18

GROUP 6

38	other administratiors	42,21
21	directors and consultants	41,83
101	engineer	84,57
102	architects	77,97
121	chemists	58,17
122	pharmacists	44,51
123	physicists	58,17
124	mineral geologists	63
141	agronomists	52,52
144	veterinarians	50,26
151	physicians	85,98

152	dentists	47,41
181	economists	62,21
182	accountants	45,41
201	sociologists, etc	42,17
212	university professor	63,99
231	judges	88,75
232	attorneys (gov't service), etc	76,53
233	lawyers, etc.	75,63
261	writers and journalists	40,06
711	civilian aircraft pilots	48,18
854	police chief or head	42,48
20	ministers of state, etc	88,75
104	cartographers	42,17
143	pharmacologists	59,51
154	other health-related occupations	59,51
161	interns	85,98
164	orthoptists and opticians	59,51
202	psychologists	42,17
203	geographers	42,17
205	other social scientists	42,17
211	professor-researcher	63,99
292	museum curators and arvhivists	42,17
927	no response	
	under 10 years of age	

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

EDUCATIONAL EXPANSION AND THE INEQUALITY OF PAY IN BRAZIL AND KOREA

Young Bum Park
David R. Ross
Richard Sabot

documento 02

EDUCATIONAL EXPANSION AND THE INEQUALITY OF PAY IN BRAZIL AND KOREA*

by

Young-Bum Park
David R. Ross
Richard Sabot

International Food Policy Research Institute

February 1991

*Park, Korea Labor Institute; Ross and Sabot, IFPRI and Williams College. We are grateful to Mark Radin and William Savedoff for able research assistance and to the World Bank and the Mellon Foundation for financial support. The views presented here are those of the authors and should not be interpreted as reflecting the views of IFPRI, the Mellon Foundation, or the World Bank.

Educational policy in Brazil has resulted in levels of educational attainment that are lower than those achieved by other middle income countries. For example, Brazil lies well below the line that describes the cross-country relationship between per capita income and the secondary enrollment ratio. By contrast, the Republic of Korea, which has a similar per capita income, lies well above the line (Knight and Sabot 1990). To what extent does the relatively smaller stock of human capital in Brazil contribute to the marked difference between the two countries in income inequality? In this paper, we apply to Brazilian and Korean data a method successfully used in other countries[1] to examine the distributional consequences of educational expansion.

It has been long assumed that rapid economic growth, at least in its early phase, is likely to be associated with high levels of inequality. Two explanations are given. On the one hand, it is claimed that, to generate the high aggregate savings rate that is a prerequisite of rapid growth, income must be concentrated in the hands of the relatively rich whose marginal propensities to save are greater than those with relatively low incomes. On the other hand, there is the demonstration by Kuznets (1955) that as the labor force gradually shifts from a low productivity, low income sector to a high productivity, high income sector aggregate inequality initially increases substantially and only later decreases.

The experience of the rapidly growing countries of East Asia has called into question whether a tradeoff between growth and inequality is an essential feature of the development process. Table 1 compares Asian and Latin American countries with respect to economic

---

[1]See Knight and Sabot (1983) for East Africa; Mohan and Sabot (1988) for Colombia.

Table 1 -- Inequality, Education Enrollment Rates and Growth

Country	GNP per capita growth, per annum (1960-81)	Income Share of Bottom 20%	Top 10%	Ratio Top 10 Bottom	Enrollment Rates Primary 1965	Primary 1985	Secondary 1965	Secondary 1985	Tertiary 1965	Tertiary 1985
ASIA										
Fast growers:										
Korea (1975)	6.9	5.7	45.3	7.95	101	95	35	94	6	32
Hong Kong (1960)	6.9	5.4	47.0	8.70	103	105	29	69	5	13
Japan (1973)	6.3	8.7	37.5	4.31	100	102	88	96	13	30
Taiwan (1975)	6.6	9.5	35.0	3.68						
Unweighted Average	6.7	7.3	41.2	5.64	101.3	101	48.7	85.3	8	15
Slower growers:										
Indonesia (1976)	4.1	6.6	49.4	7.48	72	118	12	39	1	7
The Philippines (1985)	2.8	5.2	52.5	10.10	113	106	41	65	19	38
Thailand (1975-76)	4.6	5.6	49.8	8.89	78	97	14	30	2	20
Malaysia (1973)	4.3	3.5	56.1	16.03	90	99	28	53	2	6
Unweighted Average	4.0	5.2	52.0	10.00	88.3	105	23.8	45.8	6	17.8
LATIN AMERICA										
El Salvador (1976-77)	1.5	5.5	47.3	8.60	82	70	17	24	2	14
Peru (1972)	1.0	1.9	61.0	32.11	99	122	25	65	8	24
Costa Rica (1971)	3.0	3.3	54.8	16.61	106	101	24	41	6	23
Brazil (1972)	5.1	2.0	66.6	33.30	108	104	16	35	2	11
Mexico (1977)	3.8	2.9	57.7	19.90	92	115	17	55	4	16
Panama (1973)	3.1	2.0	61.8	30.90	102	105	34	59	7	26
Argentina (1970)	1.9	4.4	50.3	11.43	101	108	28	70	14	36
Venezuela (1970)	2.4	3.0	54.0	18.00	94	108	27	45	7	26
Unweighted Average	2.7	3.1	56.7	18.29	98	104.1	23.5	49.3	6.3	22

Source: Data on growth rates and inequality are cited from Williamson (1988); Enrolment Rates are compiled from World Development Reports.

growth over the period 1960-81 and a crude measure of the distribution of income. On average, the Asian countries have grown faster and had a substantially more equal distribution of income. Moreover, when the Asian countries are disaggregated into a fast growing group and a slow growing group it is apparent that the distribution of income is, again, substantially more equal in the fast growing group. Brazil and Korea fit the general pattern. While Brazil has been the fastest growing country in Latin America, its growth rate has lagged behind that of Korea. Moreover, inequality is markedly greater in Brazil. As the table indicates the ratio of the income share of the top 20 percent to the bottom 20 percent is 7.95 in Korea and 33.3 in Brazil.

Differences in the stock of human capital are one possible explanation for the association of high growth and low inequality: educational expansion has been shown to enhance economic growth and reduce inequality. As Fishlow (1972, p. 395) said in his seminal piece on Brazilian income distribution,

> Past illiteracy and present poverty are strongly associated. But so are present poverty, future illiteracy, and probably future poverty. For this reason, the tradeoff between redistribution and growth is generally exaggerated. There are possibilities of achieving both simultaneously by improved quality of human resources.

Table 1 also presents primary, secondary and tertiary enrollment ratios for Asia and Latin America. With the exception of El Salvador, all of the countries appear to have achieved universal primary education. Nor is there much difference among the fast growing Asian countries, the slow growing Asian countries and the Latin American countries at the tertiary level. There are, however, marked differences at the secondary level. In 1965 nearly half of the children in the relevant age group attended secondary school in the rapidly growing Asian economies, while in the slow growing Asian economies and in Latin America less than a quarter were in attendance. Though secondary enrollment rates increased substantially in all of the

countries over the two decades, in 1985 the gap between the rapidly growing Asian economies and the others had actually widened.

A comparison of enrollment rates in Brazil and Korea corroborates the general picture, but reveals more striking differences at the secondary and tertiary levels. Between 1965 and 1985 the secondary enrollment rate increased from 16 to 35 percent in Brazil and from 35 to 94 percent in Korea. The tertiary enrollment rate was low in both countries in 1965 (2 and 6 percents for Brazil and Korea respectively). In 1985 it rose to 32 percent in Korea but only to 11 percent in Brazil. The gap has widened.

The impact of human capital accumulation on inequality is theoretically ambiguous. Educational expansion results in a change in the educational composition of the labor force. The growth of the educated, relatively high productivity portion of the labor force can have an effect on the inequality of pay similar to that described by Kuznets. Initially the change in composition will tend to increase inequality. However, in this case there is, potentially, a countervailing tendency for educational expansion to compress the educational structure of wages. The scarcity rents earned by the more educated erode if the supply of educated workers increases relative to demand.

More formally whether the change in the educational composition of the labor force raises or lowers inequality, ceteris paribus, depends on the relative sizes of the different educational categories, their relative mean wages, and their relative wage dispersions. In a two-group model, a transfer of workers from the low- to the high-education (and wage) group can be shown to raise the variance (or log variance) until the high-education group reaches a certain proportion of the total, the precise proportion depending on the difference in the means and the variances of the two groups. Let μ_j be mean earnings for workers in the jth group--j = 1 (educated) or 2 (uneducated), p_j be the proportion of workers, σ_j be the variance of

earnings, and σ be the variance of earnings in the population. Robinson (1976, p.438) has shown that inequality (as measured by σ) rises to a maximum where p_1 is equal to p_1^*:

$$(1) \qquad p_1^* = (\sigma_1^2 - \sigma_2^2)/2(\mu_1 - \mu_2) + 1/2.$$

This implies that p_1^* will be greater than, less than, or equal to ½ as σ_1^2 is greater than, less than, or equal to σ_2^2. If the variance of wages of the educated group exceeds that of the uneducated ($\sigma_1^2 > \sigma_2^2$), inequality reaches a peak after more than one-half the labor force have become educated. The condition $\sigma_1^2 > \sigma_2^2$ also implies that p_1^* is larger the smaller the difference in mean wages, that is, inequality peaks later in the process of educational expansion the lower is the premium on education. However, if the variance is higher for the uneducated group, this result is reversed.

This was the basis of Simon Kuznets' hypothesis: the transfer of people between sectors at different income levels initially raises inequality as more people acquire high income, but eventually lowers it as fewer low-income people remain; if the expanding sector has more inequality, the peaking of aggregate inequality is delayed.

Kuznets concentrated on the "composition effect" and did not incorporate any resulting changes in the structure of wages. Indeed, he suggested (p.8) that urban-rural income differentials (with which he was concerned) were likely to increase with economic development. However, from the competitive market prediction that the returns to a factor decrease as its relative supply increases, we expect the coefficient on education in an earnings function to decline as education expands relative to other factors. That is, we expect the premium on education to fall as supply increases relative to demand. The narrowing of the educational

structure of wages should, ceteris paribus, reduce inequality. For Robinson's example, this result can be formalized by differentiation of the well-known identity

$$(2) \qquad \sigma^2 = p_1\sigma_1^2 + (1 - p_1)\sigma_2^2 + p_1(1 - p_1)(\mu_1 - \mu_2)$$

to derive:

$$(3) \qquad \partial\sigma^2/\partial p_1 = (\sigma_1^2 - \sigma_2^2) + (1-2p_1)(\mu_1 - \mu_2)^2 + 2p_1(1-p_1)(\mu_1 - \mu_2)(\partial\mu_1/\partial p_1 - \partial\mu_2/\partial p_1).$$

The third term captures the effect of educational expansion on the wage structure. Since one expects $\partial\mu_1/\partial p_1 < 0$ and $\partial\mu_2/\partial p_1 > 0$, this term will be negative.[2] The effect of educational expansion on inequality is therefore the net outcome of two potentially countervailing tendencies, and no a priori prediction can be made about its sign.

Whether the composition effect or the wage structure effect dominates is, therefore, an empirical matter. The compression effect of educational expansion on the wage structure was shown to outweigh the disequalizing consequences of the composition effect by Knight and Sabot (1983) in East Africa and by Mohan and Sabot (1988) in Colombia. In both settings the net effect of educational expansion was to reduce the inequality of pay markedly.

Our aim in this study, then, is to compare Brazil and Korea with respect to the influence of educational expansion on the structure of earnings and the inequality of pay. Our expectation is that the markedly greater abundance in Korea than in Brazil of workers with secondary (and tertiary) education has resulted in substantially more compression of the structure of wages and

[2]If the demand for educated workers rises faster than the supply, then the wage premium to the educated will not fall and the sign of the third term will be ambiguous.

a greater reduction of inequality. Indeed, it is conceivable that in Brazil scarcity rents reaped by the educated have actually increased. Because of the small initial stock of educated workers, the relatively slow pace of educational expansion and the rapid growth of demand for educated labor, the educational structure of wages in Brazil may have widened. In this case, the initial tendency for the composition effect to increase inequality would be reinforced.[3]

To measure the effect of educational expansion on the inequality of pay,[4] and the relative contributions of the compression and wage structure effects, we begin by estimating a standard earnings function

$$(4) \qquad Y = X\beta + \epsilon,$$

where Y = the natural logarithm of individual earnings and X may be decomposed into a matrix of dummy variables representing different educational categories (E) and a matrix of other explanatory variables (Z), such as experience and controls for region, occupation, and industry, measured as deviations from the mean. The variance of Y (S_Y^2, the log variance of wages) is the sum of the variance predicted by the regression S_P^2 and the variance of the residuals S_e^2, where, if k is the number of parameters estimated,

$$S_P^2 = [\beta'(X'X)\beta - Y'Y]/(N-1), \text{ and}$$

[3]Morely (1982) contends that in Brazil in the 1960s increases in the relative demand for educated workers exceeded increases in relative supply.

[4]The simulation approach presented here follows that presented in Behrman, Knight, and Sabot (1983).

$$S_e^2 = [Y'Y - \beta'X'Y]/(N-k).$$

The moment matrix consists of four submatrices:

$$X'X = \begin{pmatrix} E'E & E'Z \\ Z'E & Z'Z \end{pmatrix}$$

To simulate the composition effect of expanding educational attainment from some base year (B) to the comparison year (C), we replace $E_B'E_B$ with $E_C'E_C$, weighted by $(N_B/N_C)^2$ to control for the different number of observations in the two samples;[5] and adjust Y'Y to reflect the change in predicted wages. To simulate the wage structure effect we replace those base year coefficients related to education with the corresponding comparison year coefficients. By combining the two effects in a single simulation and comparing the resulting measure with the level of inequality observed in the comparison year, we are able to estimate that portion of the change in inequality between the base and comparison years attributable to educational expansion.

The Korean data are taken from the Occupational Wage Survey (OWS) conducted by Korea's Ministry of Labor in 1976 and 1986. The OWS covers a stratified random sample of establishments with ten or more regular workers. Workers in government, public education, and

[5]One has to make an assumption about how E'Z would have changed between B and C holding Z constant. Here we assume no change, i.e., we use $E_B'Z_B$. Knight and Sabot (1983) and Mohan and Sabot (1988) rebuild E'Z on the assumption that observations on Z associated with educational category j be given the comparison year sample weight. Alternatively, one could use the suitably weighted $E_C'Z_C$ matrix. The results reported below are qualitatively insensitive to this assumption.

most establishments in agriculture, forestry, and fishing are excluded. The wage variable used is monthly earnings (including overtime payments) plus one-twelfth of the annual bonus.[6]

The Brazilian data come from the household survey (the Pesquisa Nacional Amustra de Domicilios) conducted by the Instituto Brasileira de Geografia e Estatistica (IBGE) in 1976 and 1985. The survey covers some 100,000 households using a stratified sample which is selected according to standard procedures and based on the decennial censuses. Weights were provided by the IBGE to correct for variation in sampling ratios across geographical areas. The PNAD data do not include the rural areas of the north region, but are otherwise consistent with the coverage of the decennial censuses. The sample used in this study includes individuals who were 10 years and older at the time of the survey, reported positive earnings, and were classified as employees by the IBGE.[7]

In discussing our results, we focus first on Korea. Reflecting the rapid increases in post-primary enrollment ratios seen in Table 1, our two samples show marked increases in the educational attainment of the wage labor force (Table 2). The proportion of high school graduates in the wage labor force increased from 32.2 to 43.5 percent while the proportion of workers with post- secondary education nearly doubled from 17.7 percent to 33.6 percent. It is remarkable that by 1986 the proportion of workers with elementary school or less had declined from 19.6 to only 7.5 percent.

---

[6]The parameter estimates reported below are not sensitive to the inclusion of overtime and bonuses in the dependent variable.

[7]The results reported in the text do not differ qualitatively from those estimated on broader and narrower samples of workers. The first exands the sample to include self-employed workers. The second includes only employees with signed work cards. Holding a work card is an indication of a formal employment relationship, entitling employees to a variety of government-legislated benefits (even if not followed in practice). Work card status is also associated with larger firms.

Table 2

Educational Composition of the Male Wage Labor Force

Brazil			Korea		
	1976	1985		1976	1986
Uneducated	25.6	20.5	Elementary & Below	19.6	7.5
Primary (Lower)	45.5	40.8	Middle	30.5	25.4
Primary (Upper)	17.8	21.6	High School	32.2	43.5
Secondary	6.7	11.1	Junior College	2.6	4.8
University	4.4	6.0	University	15.1	18.8

The competitive market prediction is that the returns to a factor decrease if its relative supply increases in relation to relative demand. This raises the possibility that the increase in relative supply has been offset in its effect on the educational structure of wages by an increase in the skill intensity of labor demand. Table 3 presents a (crude) occupational composition of

TABLE 3

Occupational Composition of the Male Wage Labor Force
By Level of Education
Korea 1976 - 1986

	Elementary		Middle		High School		Junior Col. & University		Total	
	1976	1986	1976	1986	1976	1986	1976	1986	1976	1986
Prof. & Admin.	1.4	0.9	2.9	1.3	13.2	10.2	58.1	51.7	15.7	16.9
Clerical, Sales & Service	11.0	9.8	10.8	9.2	33.8	29.3	35.7	44.8	35.7	26.3
Laborer	87.7	89.4	86.3	89.6	53.0	60.5	6.2	3.5	61.6	56.8

the labor force (in total and by level of education) for 1976 and 1986. The decline in the proportion of workers employed as laborers suggests an increase in the skill intensity of labor demand, but the change appears to be slight.[8] The table also shows substantial filtering down over time of workers with middle and higher education into lower level occupations. For example, the proportion of high school leavers working as laborers increased from 53.0 to 60.5 percent. Similarly, the proportion of junior college and university leavers in clerical, sales and service occupations rose from 35.7 to 44.8 percent. This movement into lower level occupations by the more educated, when combined with little movement among the least educated, is suggestive of a compression in the educational structure of wages.

To measure the extent of this compression, we estimate equation (4) for Korea, where E is a matrix of dummy variables signifying levels of educational attainment, with primary education as the base;[9] Z is a matrix of other explanatory variables comprised of experience and experience squared (Exp, Exp^2), and dummy variables controlling for region, occupation, and industry. Because supply of post-middle leavers appears to be growing more rapidly than demand, we would expect the educational structure of wages to change so that the coefficients for the top two educational categories would be lower in the equation estimated for 1986 than for 1976.

Table 4 presents the estimated equations excluding the conditioning dummy variables. The change in the constant reflects the increase in mean nominal wages over the ten-year period. Predicted nominal wages at the sample means have risen for each education group. However,

---

[8]The crude level of aggregation precludes precision in the assessment of the change in skill intensity. There may, for example, have been an increase in the skills required within the laborer category.

[9]E_{K1} = middle school; E_{K2} = high school; E_{K3} = junior college and university.

Table 4

Male Wage Structure

	Brazil			Korea	
	1976	1985		1976	1986
E_{B1}	0.488	0.449	E_{K1}	0.176	0.092
	(55.68)	(67.23)		(19.66)	(7.54)
E_{B2}	0.958	0.886	E_{K2}	0.473	0.296
	(85.70)	(110.53)		(48.19)	(23.40)
E_{B3}	1.593	1.508	E_{K3}	0.969	0.655
	(100.22)	(127.40)		(71.48)	(42.06)
Exp	0.045	0.048	Exp	0.067	0.078
	(64.97)	(83.91)		(61.90)	(69.61)
Exp^2	-0.0006	-0.0007	Exp^2	-0.001	-0.001
	(61.41)	(79.27)		(39.13)	(50.27)
Constant	1.149	7.043	Constant	10.231	11.779
$\bar{R}^2$	.546	.562	$\bar{R}^2$	.532	0.449
N	85,106	118,000		23,838	24,486
Mean ln W	1.864	8.095		11.363	12.895

Dummy variables were included to control for region, occupation, industry, head of household (Brazil only); t-statistics appear in parentheses.

the premium earned by workers with high school education declined by more than one third (from .47 to .30) between 1976 and 1986. Similarly, the premium earned by workers with post-secondary education declined by more than one fourth. As predicted the increase in the relative supply of high school and university graduates was associated with a compression in the educational structure of wages.

The mean wages of workers with post-middle school education are in the top half of the distribution of pay; the mean wages of workers with primary education are in the bottom half. Ceteris paribus, the compression of the educational structure of wages would contribute to a

reduction in the inequality of pay. We estimate the inequality of pay in Korea in 1976, as proxied by the log variance of earnings, to be 0.442.

Table 5 and the accompanying figure present the results of our simulations. Had Korea in 1976 exhibited the educational wage structure observed in 1986, the log variance of pay, at .333, would have been 25 percent lower. As predicted, the increase in the relative supply of

TABLE 5

Log Variances of Pay: Intertemporal Simulations

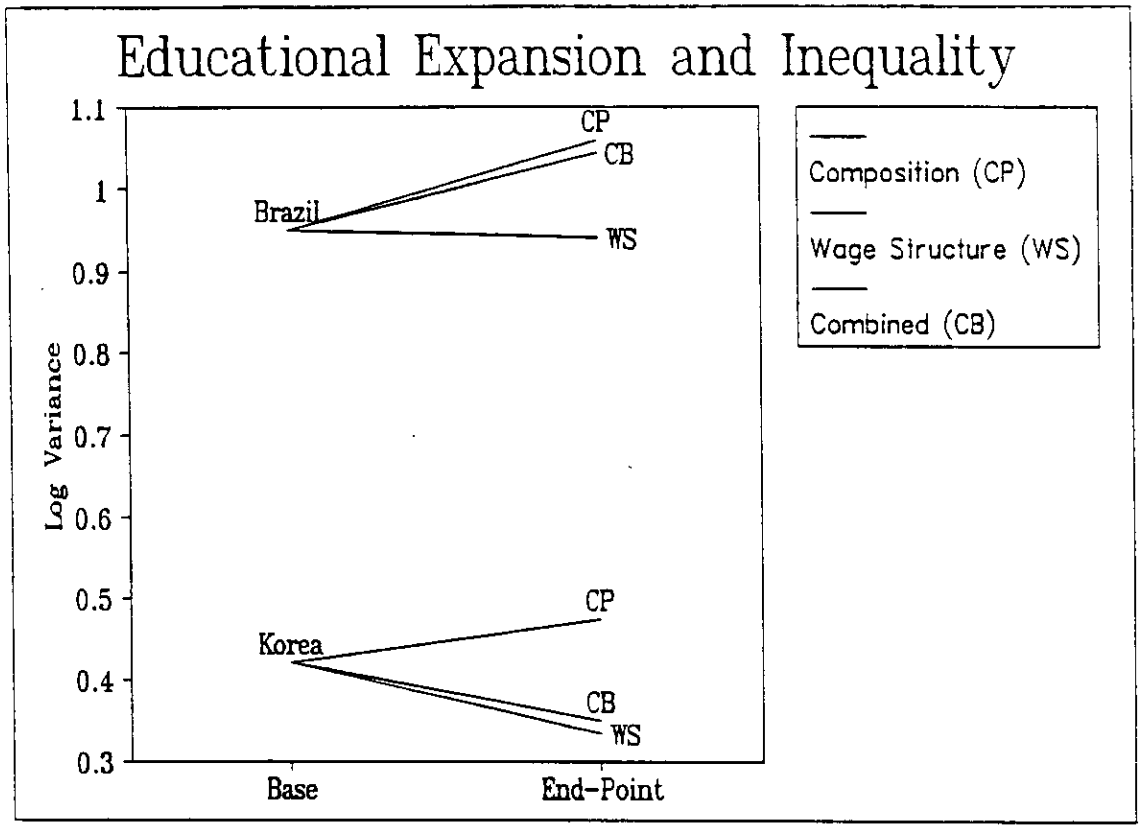
Brazil 1976 – Brazil 1985			Korea 1976 -- Korea 1986		
	(1)	(2)		(1)	(2)
1976	.518	.950	1976	.235	.442
Wage Structure Effect	.499	.931	Wage Structure Effect	.126	.333
Composition Effect	.596	1.027	Composition Effect	.641	.471
Combined Effect	.568	.991	Combined Effect	.139	.346
1985	.576	1.024	1986	.152	.338

(1) Explained variance of ln W.
(2) Explained + unexplained variance of ln W.

workers with education at the high school level and beyond not only compressed the educational structure of wages, but exercised an equalizing influence on the distribution of wages. By contrast, had Korea in 1976 exhibited the educational composition of the wage labor force observed in 1986, the log variance of pay would have been, at .471, only 6.6 percent higher.

When we combine these two effects by simulating for Korea in 1976 both the educational structure of wages and the educational composition of the labor force in 1986, we find a net effect that is strongly equalizing. Had Korea in 1976 achieved the educational attainment of the

Figure 1



labor force observed in 1986, the log variance of pay would have been, at .346, 22 percent lower. Thus, the wage structure effect (WS in the figure) dominates the composition effect (CP) to produce an equalizing combined effect (CB). In aggregate, the log variance of pay declined over the subsequent decade by a total of 24 percent to .338 in 1986. Our simulations, therefore, imply that educational expansion accounted for over 90 percent of the marked improvement in the distribution of wages that occurred over the decade.

The story in Brazil is markedly different. Table 1 indicates that the educational attainment of the labor force is much lower in Brazil than in Korea. In 1985, only 17 percent of the Brazilian labor force had secondary or higher education as compared to 67 percent of the

Korean sample. Correspondingly, 61 percent of the Brazilian labor force was either uneducated or had lower primary schooling as compared to only 7 percent of the Korean sample.

Between 1976 and 1985 the rise in the share of secondary and university graduates in the labor force was actually more rapid in Brazil than in Korea, but the increase was from a very small base. Hence the absolute increment to the labor force of relatively well educated workers was quite small in Brazil. It would not take much of an increase in the skill intensity of labor demand to offset the tendency for an increase in the supply of educated labor to result in a compression in the educational structure of wages.

A comparison of human capital endowments and of the occupational composition of the wage labor force in Brazil and Korea suggests a second prediction. Table 6 presents the

Table 6

Occupational Composition of the Male Wage Labor Force
By Level of Education
Brazil 1985

	Primary (Lower)	Primary (Upper)	Second.	Univer.	Total
Prof. & Admin.	4.1	10.2	27.7	65.7	14.9
Cler., Sales & Service	33.5	44.5	51.7	29.3	39.3
Laborer	62.4	45.3	20.6	5.0	45.8

occupational composition by level of education for Brazil in 1985 comparable to those provided for Korea in Table 3. These crude data do not suggest greater skill intensity in Korea than in Brazil. On the contrary, if anything they indicate that the skill intensity of labor demand is

at higher in Brazil. Given the scarcity of human capital in Brazil relative to Korea and ilarity in the skill intensity of labor demand, we would expect workers with secondary :r education to earn larger premia in Brazil than in Korea.

Ve estimate a human capital earnings function for Brazil analogous to those for Korea. E is a matrix of dummy variables signifying levels of education, but in this case the ıted and those with lower primary are the omitted category.[10] The other explanatory :s are the same as for Korea, except for the inclusion of a head-of-household dummy. Table 4 presents the estimated equations, excluding the conditioning dummy variables. .r predictions regarding the educational structure of wages are borne out. A comparison :976 and 1985 regressions indicates that the educational structure of wages has barely l in Brazil despite the rapid rise in supply of workers with secondary and university ɔn. The growth in demand has been sufficient to maintain the scarcity rents earned by cated. For example, the premium earned by university leavers was 1.85 in 1976 and 1985, an insignificant decline.

Although the educational categories and the sample selection criteria are not precisely the : comparison of the Korea and Brazil regressions is nevertheless revealing. In 1976, the m earned by Brazilian university leavers relative to secondary leavers was .67 .18); while in Korea the premium earned by university leavers relative to high school :es was .56 (1.04-.48). Because educational expansion compressed the educational :e of wages in Korea, but not in Brazil, over the ensuing decade, the gap in premia ed. The corresponding premia in the mid-1980s were .65 and .46.

E_{B1} = primary (upper); E_{B2} = secondary; E_{B3} = university.

The scarcity of educated workers and the higher premia they earn in Brazil suggests that the inequality of pay will be greater in Brazil than in Korea. Indeed, as column (2) of Table 5 shows, the 1976 log variance of wages in Brazil was, at .95, more than twice the level in Korea. Moreover, our simulations indicate that, in contrast to Korea, Brazil experienced no significant wage structure effect. Had Brazil in 1976 exhibited the 1985 educational wage structure, the log variance of pay, at .93, would have been only two percent lower (in contrast to the 25 percent reduction that resulted when the comparable simulation was run for Korea).

The impact of changes in educational composition, however, was substantial. Had Brazil in 1976 exhibited the educational composition of the wage labor force observed in 1985, the log variance of pay, at 1.03, would have been 8.1 percent higher. In the absence of a countervailing wage structure effect, the rate of educational expansion in Brazil between 1976 and 1985 has lead to increased inequality in pay. Indeed, when we combine the wage structure and composition effects, our simulations indicate that Brazilian educational policy has resulted in a marginal increase in the log variance of pay between 1976 and 1985 (a 4.3 percent increase to .991 in contrast to the 22 percent decline in log variance observed when the comparable simulation was run for Korea). Over this period, in aggregate, the log variance of pay rose by a total of 7.4 percent (in contrast to the 24 percent drop in log variance experienced by Korea). Thus, more than one-half of this increase in the log variance of payu can be attributed to the increase associated with education.

These results beg an obvious question. What would the inequality of pay in Brazil have been in 1985 had educational policy resulted in educational attainment comparable to that observed in Korea in 1986? To answer this question, we conduct cross-country simulations comparable to our inter-temporal simulations. To simulate the composition effect of expanding educational attainment from the Brazilian 1985 level (B) to the Korean 1986 level (K), we

replace $E_B'E_B$ with $E_K'E_K$, weighted by $(N_B/N_K)^2$ to control for the different number of observations in the two samples; and adjust Y'Y to reflect the change in predicted wages. To simulate the wage structure effect we replace those Brazilian coefficients related to education with the corresponding Korean education coefficients. By combining the two effects in a single simulation and comparing the resulting measure with the level of inequality observed in Brazil for 1985, we are able to assess the impact on inequality of more rapid educational expansion in Brazil.

Table 7 and Figure 2 present the results. Holding the educational composition of the wage labor force constant, had Brazil in 1985 exhibited the educational wage structure observed

---

Table 7

Log Variances* of Pay: Cross-Country Simulations

Brazil 1985	.979	
	Korea 1986	Korea 1976
Wage Structure Effect	.751	.804
Composition Effect	1.352	1.257
Combined Effect	.812	.904

*Explained + unexplained log variance.

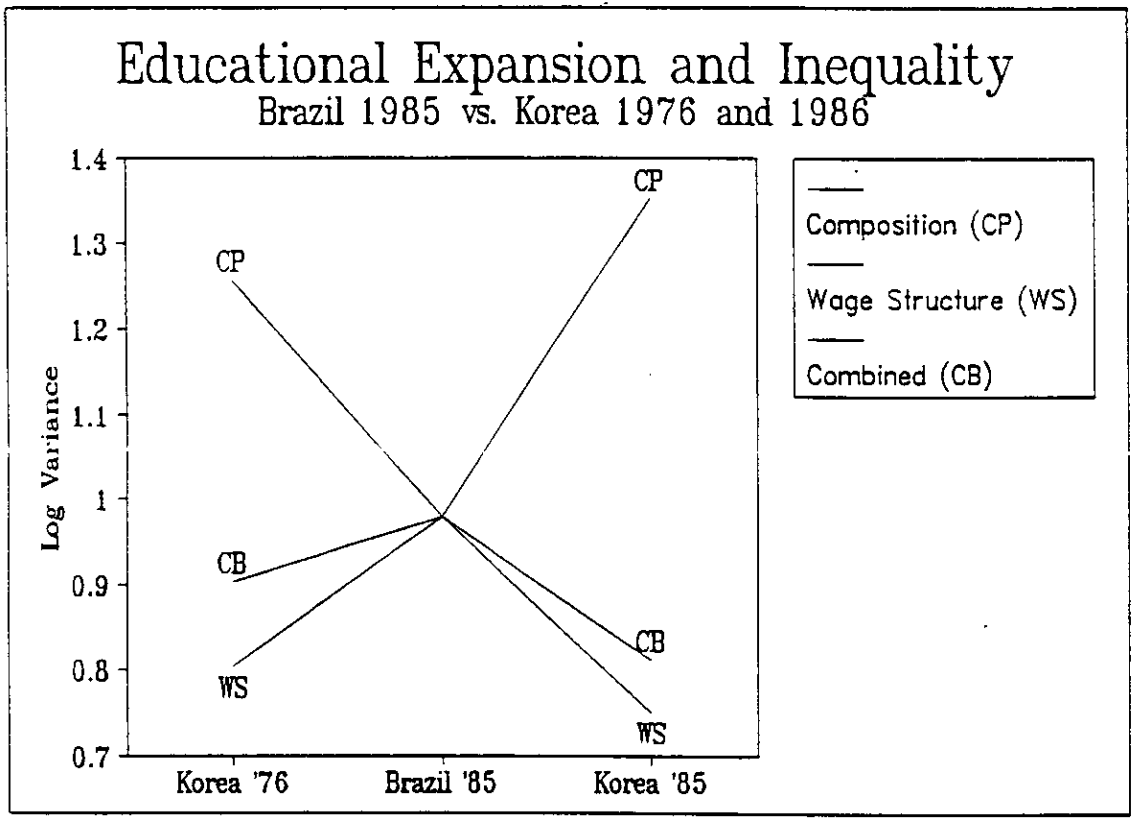
---

in Korea in 1986, the Brazilian log variance of pay, at .751, would have been 23.3 percent lower. By contrast, had Brazil achieved the educational composition of the wage labor force observed in Korea in 1986 without any change in the educational wage structure, the log variance of pay, at 1.352, would have been 38.1 percent higher. Combining the two effects, yields a decline in inequality in Brazil. According to our simulations, the net effect of Brazil

having adopted the Korean educational policy regime would have been a log variance of pay of .812, some 17 percent lower than the log variance actually observed. This 17 percent difference represents over one-fourth of the gap in the log variance of pay observed between Brazil (at .979, from Table 7) and Korea (at .338, from Table 5).

For Brazil to move quickly to the educational composition of the wage labor force observed in Korea in 1986 is unfeasible. This suggests a more realistic counterfactual: What would the inequality of pay in Brazil have been in 1985 had educational policy resulted in educational attainment comparable to that observed in Korea in 1976? The answer is provided

Figure 2



i column of Table 7 and left-hand side of Figure 2. As expected, because the educational attainment are smaller, both the wage structure and composition effects ed when we substitute 1976 rather than 1986 Korean values for the 1985 Brazilian net effect is still strongly equalizing. Had Brazil in 1985 achieved the level of ttainment exhibited by Korea in 1986, the log variance of pay in Brazil would be, t percent lower.

simulations focus on closing the gap in educational attainment between Korea and preserving all other differences. Perhaps the most obvious of these is the impact on the degree of labor market integration: Brazil, which is almost a continent in opulation density of 17 per square kilometer, whereas Korea, with only half a small ula, has a population density of 424. Therefore, we would expect the contribution gaps in productivity and pay to inequality to be large in Brazil and small in Korea. lity of pay in Brazil attributable to education greater or smaller than the inequality utable to regional gaps? To answer this question, we reestimate a parsimonious ur earnings functions for 1976 and 1985, deleting from the right hand side all her than education, experience, and region. We then simulate the impact on f eliminating first all variance in educational attainment, and then all variance in ation.[11] Table 8 presents the results for 1976 and 1985. In both instances, we see ing educational inequality reduces total inequality by more than eliminating regional This result is similar to that obtained by Fishlow (1972) using somewhat different

---

simulations, we eliminate the direct effect of setting $E_B'E_B$ equal to zero. We cannot the indirect effect of education (or region) that arises through the covariance of ith the other explanatory variables. Using a parsimonious earnings function mitigates t effect by attributing to education or region some of the variance that would e attributable to occupation, sector, etc.

data and methods for 1960 in Brazil. Comparing our results for Brazil 1976 with those for Brazil 1985 further suggests that educational inequality has over time grown in importance relative to regional inequality. The direct effect of education accounted for 32 percent--(.949-.649)/.949--of the log variance of pay in 1976; 42 percent in 1985.

In conclusion, we have found that a substantial proportion of the marked difference between Korea and Brazil in inequality of pay appears to be attributable to the difference in their educational policy regime. Brazil's underinvestment in human capital not only has constrained the growth of labor productivity, but has limited progress toward a more equal income distribution.[12] Fishlow reached this conclusion on the basis of his analysis of 1960 data. Our results confirm this using more recent data and go further: They suggest that because educational expansion in Brazil during the 1970s and '80s was inadequate, it was, perversely, disequalizing. Increases in the skill intensity of labor demand neutralized any positive impact on the educational structure of wages of increases in the supply of educated labor. Therefore, the composition effect of educational expansion dominated the usually equalizing wage structure effect. Betweem 1976 and 1985, inequality of pay associated with education actually increased in Brazil.

During the same period, continued educational expansion in Korea resulted in further reductions in the inequality of pay, implying that the difference in educational policy regimes was resulting in a widening of the gap between Korea and Brazil in the inequality of pay. For Brazil to reap the distributional benefits of educational expansion, the pace of expansion will have to be accelerated.

---

[12]A reminder: The results reported above refer to inequality of pay, and not to the inequality of pay. While inequality of pay was less than inequality of income (Fishlow 197), and education is likely to have influenced the inequality of nonwage components of income. This suggests that the story told here would not be much altered by shifting the focus to the inequality of income.

REFERENCES

Ahluwalia, M.S., Carter, N. and Chenery, H. (1979). "Growth and Poverty in Developing Countries", Journal of Development Economics, September, Vol. 6, 299-341.

Behrman, J.R., Knight, J. and Sabot, R. (1983). "A Simulation Alternative to the Comparative R2 Approach to Decomposing Inequality", Oxford Bulletin of Economics and Statistics, August, Vol. 45, 307-12.

Blinder, A.S. (1974). Toward an Economic Theory of Income Distribution, Cambridge MIT Press.

Bourguignon, F. (1980). "The Role of Education in the Urban Labour Market During the Process of Development: The Case of Colombia", VI World Congress of the International Economic Association, Mexico City, August.

Fishlow, A., 1972. "Brazilian Size Distribution of Income", American Economic Review, Papers and Proceedings, May, Vol. 62, 391-408.

Knight, J.B. and Sabot, R. (1983). "Educational Expansion and the Kuznets Effect", American Economic Review, December, Vol. 73, 1132-36.

_____, 1990. Education, Productivity, and Inequality, New York: Oxford University Press, 1990.

Kuznets, S. (1955). "Economic Growth and Income Inequality", American Economic Review, March, Vol. 45, 1-28.

Mohan, R. (1987). Work, Wages and Welfare in a Developing Metropolis: Consequences of Growth in Bogota, Colombia, New York: Oxford University Press.

Mohan, R. and R. Sabot (1988). "Educational Expansion and the Inequality of Pay: Colombia 1973-1978," Oxford Bulletin of Economics and Statistics, vol. 50, 175-182.

Morley, S.A. (1982). Labor Markets and Inequitable Growth, Cambridge: Cambridge University Press.

Phelps Brown, H. (1977). The Inequality of Pay, Oxford: Oxford University Press.

Robinson, S. (1976). "A Note on the U Hypotheses Relating Income Inequality and Economic Development", American Economic Review, June, 66, 437-40.

Saith, A. (1984). "Development and Distribution: A Critique of the Cross Country U-Hypothesis", Journal of Development Economics, Vol. 13, 367-82.

Williamson, J. (1988), "Capital Deepening along the Asian Pacific Rim," paper presented at the conference on Sources of Economic Dynamism in the Asian Pacific Region: A Human Resources Approac, Tokyo, January 8-10.

World Bank, World Development Reports, various issues.

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

INCOME INEQUALITY, INEQUALITY IN EDUCATION, AND THE DEMAND FOR SCHOOLING IN BRAZIL

Ricardo Paes de Barros
David Lam

documento 03

PRELIMINARY DRAFT

Income Inequality, Inequality in Education, and the Demand for Schooling in Brazil

Ricardo Paes de Barros*
and
David Lam**

November 1990

Prepared for the World Bank Project on
Education, Growth, and Inequality in Brazil

*Department of Economics, Yale University, and IPEA, Rio de Janeiro
**Department of Economics and Population Studies Center, University of Michigan

1.2.91

Income Inequality, Inequality in Education, and the Demand for Schooling in Brazil

Ricardo Paes de Barros and David Lam

1. Introduction

Education in Brazil has at least four undesirable features. First, the average educational attainment is remarkably low even when compared to other countries with similar levels of per capita income and development. A better educated population seems to be an essential requirement for further economic growth and improvements in quality of life. For instance, Merrick (1985) has shown that prevailing high level of infant mortality in Brazil is to a great extent a consequence of high prevalence of illiteracy among women. He demonstrated that even small improvements in basic education in Brazil would bring large reductions in infant mortality.

Secondly, the inequality in education is very high. For instance, Lam and Levison (1990) estimated a variance of schooling among males in Brazil that is seventy percent higher than that estimated for males in the United States, even though mean schooling is over twice as high in the United States. A high degree of income inequality and a close link between education and income inequality are well documented features of the Brazilian economy. It is clear that perhaps the most effective policy to reduce income inequality in Brazil is an educational expansion with emphasis on primary education. Such policy would simultaneously increase the level and reduce the inequality in education, with parallel impacts on the distribution of income.

Thirdly, the educational attainment of children and that of their parents and grandparents is highly correlated in Brazil. This is not only an indication of lack of equal opportunity, but also suggests that there are limits on the extent of social mobility in Brazil. A qualitative and quantitative expansion of the public school system, mainly at the primary level, seems to be an essential policy to promote equal opportunity and foster social mobility.

Fourth, regional disparities in children's educational attainment are large, temporally stable, and difficult to explain. They are likely to reflect a very unequal regional allocation of the limited Brazilian investments in education.

In summary, immediate improvements in educational attainment, with special emphasis on primary education, seem to be an evident and important goal in Brazilian society. The objective of this paper is to shed some light on how this goal can be accomplished. We investigate how the schooling attainment of Brazilian children depends on the distribution of income and the distribution of education of their parents.

We have four major goals. First, we want to describe the current level of educational achievement among Brazilian children, how it varies across regions, and the patterns of educational mobility across generations. Secondly, we want to estimate a model which would permit us to disentangle the effect of parents' income from the effect of parents' education. Thirdly, we want to use this model to estimate and compare the impact of changes in the mean with the impact of changes in the degree of inequality in parents' income and parents' education. Finally, using the same model, we want to verify how much of the large regional disparities in Brazil can be explained by regional differences in the distributions of parents' income and parents' education.

2. Universe of Analysis

Data Set: This study is based on the 1982 Brazilian Annual Household Survey (PNAD-82). PNAD surveys are available for all years since 1976. We use the 1982 PNAD primarily because only for this particular year was information collected on the educational attainment of grandparents. As we demonstrate below, information on grandparents' education is of particular value in trying to estimate the effect of parents' attributes on the schooling attainment of children.

Regional Disaggregation: We perform the entire analysis separately for two important geographic areas in Brazil: the relatively poorer and less educated Brazilian Northeast region and the relatively richer and better educated state of São Paulo. The analysis is constrained to urban areas. According to the 1980 Brazilian demographic census, 49 percent of the Brazilian population lives in these two geographic areas; 28 percent in the state of São Paulo and 22 percent in the Northeast region.

Universe of Analysis: The analysis is limited to children who are fourteen years of age. There are two decisions involved here. First, why should we limit the analysis to just one age group? Secondly, why is fourteen years an age group of particular interest? Since the opportunity cost of spending time in school seems to be strongly dependent on the age of the child, the demand for schooling will necessarily be dependent on age. We know very little about the relationship between age and the value of time among Brazilian children. Hence, we believe that by constraining the analysis to one age group we simplify the analysis and avoid one possible extra source of model misspecification. The fact that our data set is very large makes this choice feasible.

The choice of the age of fourteen is motivated by three facts. First, Brazil has mandatory schooling up to the age of fourteen. Since children are expected to enter the first grade when they are seven years old, without any repetition or movements in and out of school, at the age of fourteen they are expected to be attending the eighth grade, the last

grade of elementary school in the Brazilian school system. High school is not mandatory in Brazil. Secondly, Brazilian labor legislation states that only children fourteen or more years old can work without special permission. Starting at age of 12, children can work in special circumstances, but employers are obliged to certify that the children they employ are currently attending school. Thirdly, since this study rely on information from a household survey, only children currently living with their parents can be included in the analysis. The use of older age groups would lead to increasing sample selection, since the probability of children to leave home increases with age.

Unit of Analysis: The demand for schooling is a household decision. Accordingly, we use the household as our unit of analysis. An observation will consist of a fourteen year old child, with variables reflecting the characteristics of his parents and grandparents.

Sample Screening: Given our focus on fourteen year-olds, we keep in our universe of analysis only those households whose heads have at least one fourteen year-old offspring. It is worth mentioning that this screening procedure leaves out of the sample all fourteen year-olds whose father is not the head of the household in which they were residing at the time of the survey. This procedure eliminates 15 percent of the sample in the Northeast and 7 percent in São Paulo (See Table 1). These children were excluded mainly because it is not possible to identify their parents. We exclude this group since the main focus of the study is precisely to investigate the relationship between parents' attributes and their children's schooling attainment. Among the excluded children, parents can be identified only for those living in multi-family households who are offspring of the head of one of the secondary families in the household. As Table 1 indicates, if the excluded children whose parents can be identified were included in the analysis, the coverage of the analysis would increase only by one percentage point.

Table 1. 14 Year-Olds by Relationship with Head of Household or Head of Family
State of São Paulo and Northeast Region, Brazil, 1982
Percentage Distribution by Relationship

Relation to Household Head or Family Head	Northeast	São Paulo
Offspring of Household Head	85	93
Not Offspring of Household Head	15	7
Offspring of Family Head	7	14
Not a Offspring of Family Head	93	86

Notes: Estimated from 1982 PNAD.

Our sample of households with at least one child aged fourteen contains 1,964 households in the Northeast and 1,019 households in São Paulo. Although the overall populations in these two regions is roughly similar, the average sampling proportion for the PNAD was substantially higher in the Northeast (averaging around 1/200) than in São Paulo(averaging around 1/400), leading to our sample being almost twice as large in the Northeast.

Around 20 percent of these households do not have both parents present, and consequently were eliminated from our sample. Of the two parents households 1 percent were eliminated due to missing information about parents education or income of the head. Finally, 15-20 percent of the sample was eliminated due to missing information on grandparents education. (See Table 2.)

Table 2. Sample Screening by Geographic Area
State of São Paulo and Northeast Region, Brazil, 1982

Additional Screening Variable	Northeast		São Paulo	
	Number Accepted	Percent of Previous N	Number Accepted	Percent of Previous N
Households with 14 Years Old	1964		1019	
Both Parents Present	1590	(81%)	849	(83%)
Education of Parents and Income of the Head Known	1575	(99%)	840	(99%)
Education of Grandparents Known	1276	(81%)	713	(85%)

Notes: Estimated from 1982 PNAD.

3. Schooling Gap

In this section we discuss our choice of outcome variable. One possibility would be to investigate the determinants of the probability of school attendance among fourteen year-old children. The rationale behind this choice would presumably be that current school attendance status is a good predictor of current and future school attainment. Table 3 shows the cumulative distribution of years of schooling for children controlling for region and whether the child was in or out of school at the time of the survey. As expected, the distributions indicate that children in school at age fourteen have higher school attainment than those out of school. The distributions also show, however, that among those fourteen year-olds attending school there is a surprisingly high degree of heterogeneity in schooling attainment. In São Paulo, for example, almost 50 percent of fourteen year-olds currently attending school had completed less than 6 years of schooling. In the Northeast 80 percent of the fourteen year-olds enrolled in school had completed less than 6 years of schooling.

Table 3. Frequency Distribution and Cumulative Distribution, Years of Completed Schooling by Current Enrollment Status Fourteen Year Olds, São Paulo and Northeast, 1982

Years Schooling	São Paulo				Northeast			
	Out of School		In School		Out of School		In School	
	Percent	Cum.	Percent	Cum.	Percent	Cum.	Percent	Cum.
0	10.6	10.6	0.3	0.3	42.9	42.9	5.9	5.9
1	3.6	14.2	1.3	1.6	12.7	55.6	9.6	15.5
2	8.8	23.0	4.8	6.4	19.6	75.2	12.5	28.0
3	15.9	38.9	7.5	13.9	11.6	86.7	15.2	43.2
4	32.8	71.7	16.0	29.9	8.9	95.7	21.6	64.9
5	20.7	92.4	22.4	52.3	3.1	98.8	14.6	79.5
6	5.3	97.7	23.4	75.7	1.1	99.8	11.8	91.2
7	1.7	99.4	21.7	97.4	0.0	99.8	7.7	98.9
8	0.6	100.0	2.6	100.0	0.2	100.0	1.1	100.0
Mean Schooling	3.52		5.22		1.46		3.73	
Std. Deviation	1.72		1.57		1.59		1.97	
Summary Statistics for Region:								
Percent In School	79.98				79.45			
Mean Schooling	4.89				3.26			
Std. Deviation	1.74				2.11			
Percent With Less Than:								
4 Years Schooling	18.9				52.2			
6 Years Schooling	60.3				83.5			

Notes: Estimated from 1982 PNAD, using IBGE sample weights.

Out of all fourteen year-olds enrolled in school, only 8 percent in the Northeast and 23 percent in São Paulo were attending the eighth grade. Among those enrolled only 44 percent in São Paulo and 20 percent in the Northeast had completed the sixth grade.

One of the interesting features of Table 3 is that the distribution of years of schooling for fourteen year-olds in school in the Northeast is quite similar to the distribution of years of schooling of those out of school in São Paulo, with those currently enrolled in the Northeast having only .2 years more schooling on average than those out of school in São Paulo. Because of a very high repetition rate and large movements in and out of school in Brazil, it appears that current school attendance is a very imperfect predictor of completed years of schooling. The most remarkable fact in Table 3 is that despite large regional disparities in school attainment – the average number of completed years of schooling in São Paulo is almost two years higher than the average in the Northeast – school attendance rates in the two geographic areas are almost identical. Attendance rates in both regions are just below 80 percent, differing by only half of a percentage

point. Based on these facts, we have chosen to use as our outcome variable the number of completed years of schooling instead of the child's current school attendance status.

4. Children's Distribution of Completed Years of Schooling

The basic characteristics of the distribution of completed years of schooling for fourteen year-olds in São Paulo and in the Northeast are also presented in Table 3. The table reveals three important facts. First, schooling achievement in both regions is very low. Children who have been continuously enrolled from age seven to fourteen, as mandated by law, and who have not repeated a grade, should have completed seven years of schooling. Compared to this target of seven years, there is a gap in mean schooling attainment of fourteen year-olds of 2.1 years in São Paulo, and a gap of 3.7 years in the Northeast.

Secondly, the schooling level in São Paulo is significantly higher than in the Northeast. The mean is 1.6 years higher in São Paulo. The proportion with at least 6 years of schooling is 40 percent in São Paulo, compared to only 27 percent in the Northeast.

Thirdly, the Northeast, in addition to having a lower level of schooling has a more unequal distribution. The standard deviation is .3 years higher, even though the mean is 1.6 years lower. An important question is the extent to which these regional differences are a consequence of differences in the characteristics of parents? To begin to investigate this question we verify in the following section whether the distribution of parents' education in the Northeast has a lower mean and a higher degree of inequality than the distribution of parents' education in São Paulo.

5. Parents' Distribution of Completed Years of Schooling

Table 4 gives summary statistics for the distribution of schooling of the parents of fourteen year-olds in São Paulo and the Northeast. As Table 4 reveals, the levels of educational attainment for both parents are higher in São Paulo than in the Northeast. The size of the regional difference is larger for fathers than for mothers, with fathers in São Paulo having 1.4 years more schooling on average than fathers in the Northeast. In São Paulo the schooling level of fathers tends to be higher than among mothers, while in the Northeast the distribution of education tends to be very similar for fathers and mothers.

Figure 1 shows the cumulative distributions for single years of schooling for mothers and fathers in the two regions. The figure shows that the most important difference between São Paulo and the Northeast is the proportion with very low levels of schooling. As verified in Table 4, the proportion of parents with at least four years or at least six years are relatively similar in the two regions. The proportion with less than 1 year, however, is much higher in the Northeast, around 40 percent for both fathers and mothers.

Table 4. Schooling Distribution for Parents of 14 Year Olds
State of São Paulo and Northeast Region, Brazil, 1982

Characteristic	São Paulo	Northeast	Difference
Father			
Mean (years)	3.96	2.55	1.41
Standard Deviation (years)	3.91	3.21	0.70
Percent with:			
Less than 1 year schooling	21.3	40.5	-19.2
At least 4 years schooling	20.1	18.6	1.5
At least 6 years schooling	17.0	9.4	7.6
Mother			
Mean (years)	3.39	2.61	0.78
Standard Deviation (years)	3.47	2.99	0.48
Percent with:			
Less than 1 year schooling	26.6	37.8	-11.2
At least 4 years schooling	16.4	19.4	- 3.0
At least 6 years schooling	13.0	9.4	3.6

Notes: Estimated from 1982 PNAD using IBGE sample weights.

Comparing Table 3 and 4, it is important to note that the completed schooling level of fourteen year-olds in Brazil is already higher than the average level among both parents, indicating a rapid increase in education attainment in Brazil from the last to the current generation. For example, while the mean schooling for fathers of fourteen year-olds in the Northeast is slightly less than four years, the mean schooling of the fourteen year-olds themselves is 4.9 years. For the Northeast, fourteen year-olds have roughly .7 years more schooling than their fathers.

6. Educational Intergenerational Mobility

The previous discussion demonstrated that children and parents educational levels are positively related across regions. Next we investigate whether this relationship also holds within each region. This hypothesis is strongly confirmed by Figures 2and 3. These figures present the cumulative distribution of single years of schooling among fourteen year-olds conditional on their fathers' education. With a minor exception in the case of 9–11 years for fathers in São Paulo, the figures indicate that increases in the schooling of fathers leads to unambiguous improvements in the distribution of education among children, in the sense of first order stochastic dominance. The cumulative distributions based on mother's education, not shown here, show virtually identical patterns in the two regions.

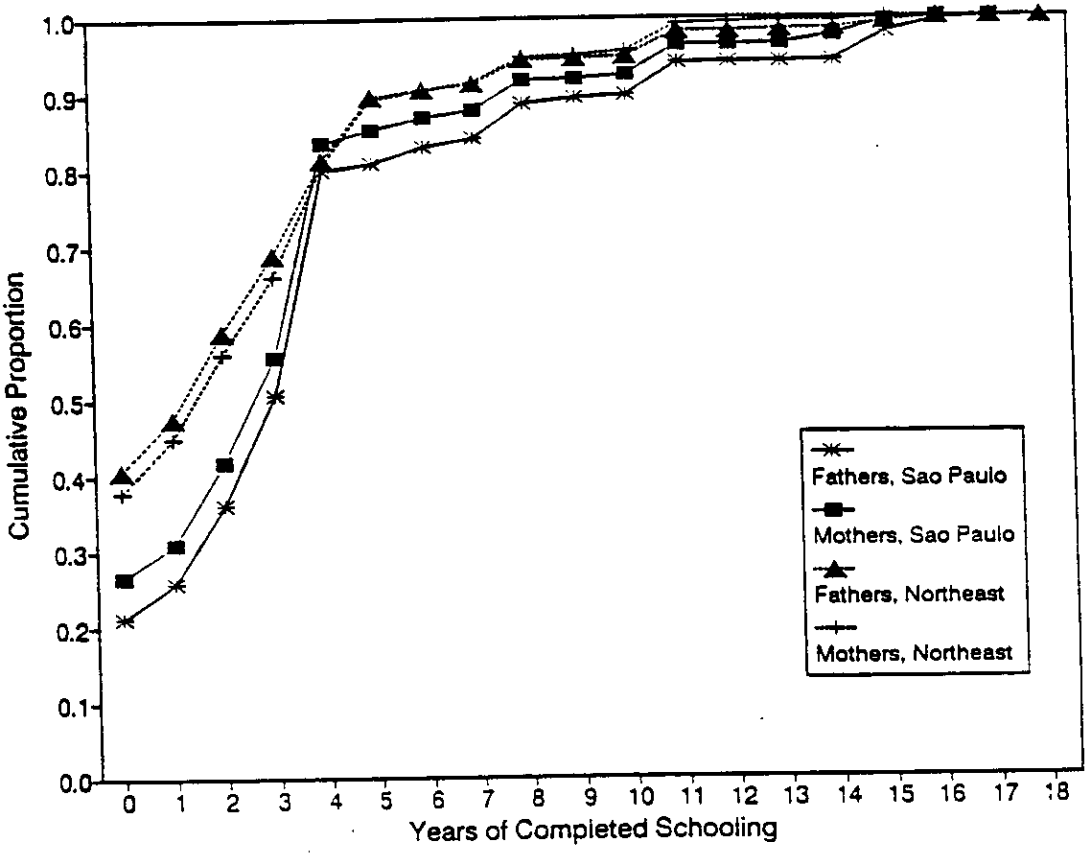


Figure 1. Cumulative Distributions, Years of Completed Schooling
Urban State of São Paulo and Northeast Region, Brazil, 1982
Fathers and Mothers of Fourteen Year-Olds

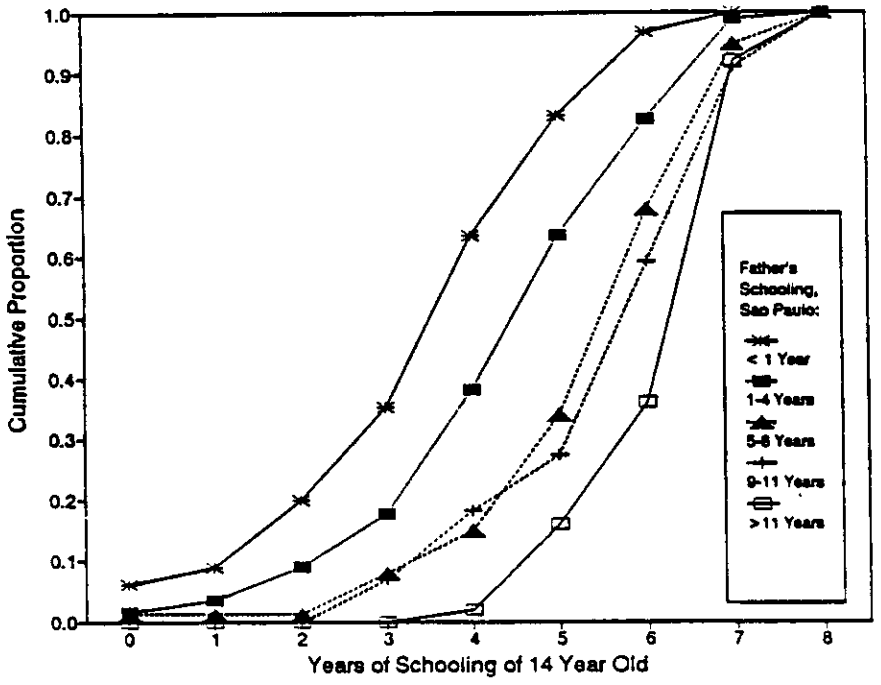


Figure 2. Cumulative Distributions, Years of Completed Schooling
Schooling of Fourteen Year-Olds by Schooling of Father
Urban São Paulo State, Brazil, 1982

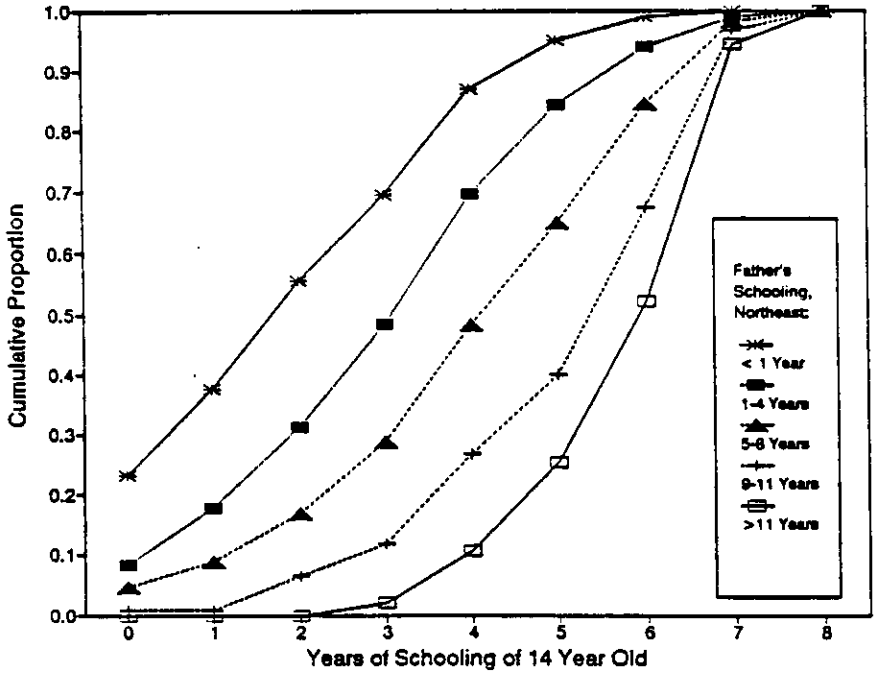


Figure 3. Cumulative Distributions, Years of Completed Schooling
Schooling of Fourteen Year-Olds by Schooling of Father
Urban Northeast Region, Brazil, 1982

Figure 4 presents the mean schooling of fourteen year-olds by single year of schooling of mothers and fathers in the two regions. The points are smoothed as three-year moving averages. The figure reveals a steeper relationship between parents and children's education in the Northeast than in São Paulo, raising the hypothesis that parents education is possibly a more important determinant of children education in the Northeast than in São Paulo. At higher levels of parental education the mean years of schooling attainment among fourteen year-olds shows little variation between the Northeast and São Paulo. There are substantially larger differences at low levels of parental schooling, however. For parents with less than four years of schooling there is roughly a one year advantage in the schooling attainment of fourteen year-olds in São Paulo compared to fourteen year-olds in the Northeast.

7. Causal Model

In this section we develop three alternative models which would permit us to give a causal interpretation to the empirical estimation to be reported in the following section.

Let H be the population of households. For each $h \in H$ let $f_o(h)$ denote the "household education response function" to variations in parents' education and household economic resources. That is, if e_p and y were the levels of parents' education and household economic resources, respectively, then $f_o(e_p, y; h)$ would be the education level of a fourteen year-old child living in household h. The derivative of f with respect to e_p indicates the response of children's education in each household to changes in parents' education, holding household economic resources constant.

In several instances, one may be more interested in the response of children's education to changes in parents' education not holding constant the household economic resources. Hence, for each $h \in H$ let $g_o(h)$ denote the household education response function to variations in parents' education. That is, if e_p were the level of parents' education,' $g_o(e_p; h)$ would be the education level of a fourteen year old child living in household h. The derivative of g with respect to e_p indicates the response of children's education in each household to changes in parents' education not holding household economic resources or other variables constant.

In this paper we consider the investigation of both response functions, f_o and g_o. However, in what follows we concentrate our attention to the further specification and conditions for identification of f_o, the household education response function to variations in parents' education and household economic resources. Analogous results can be obtained for g_o.

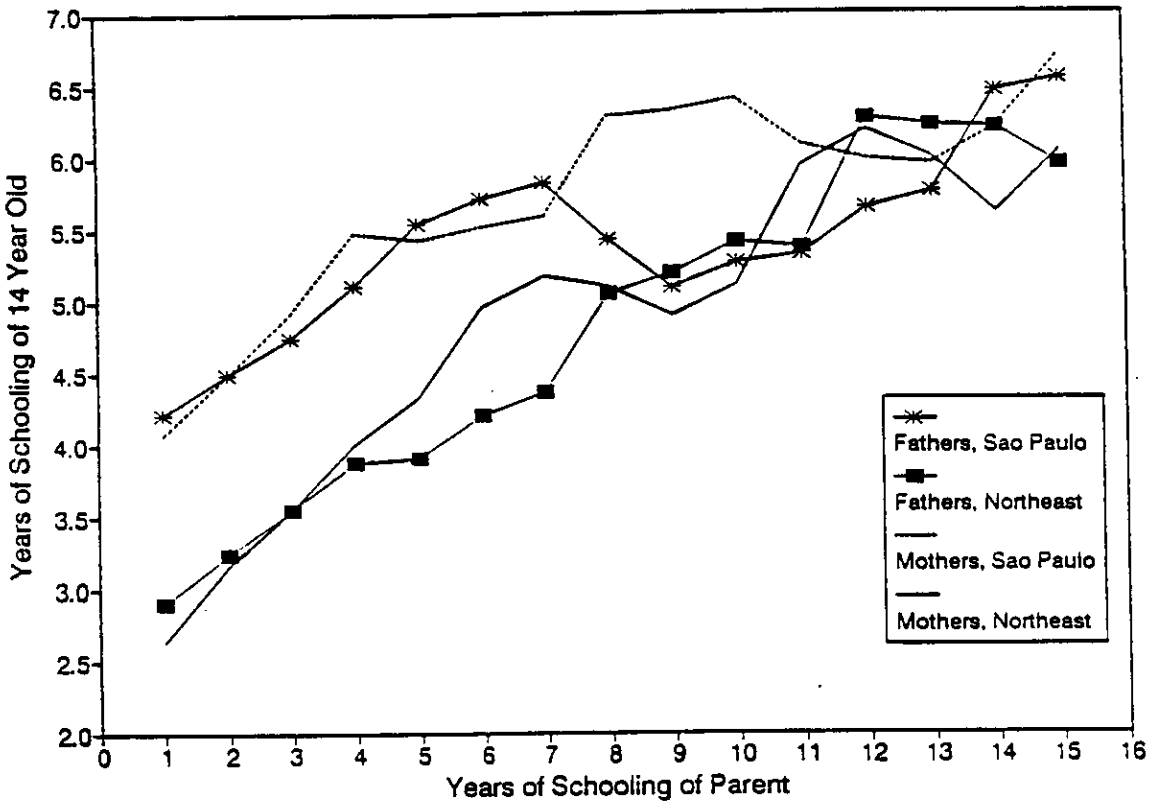


Figure 4. Mean Schooling of Fourteen Year-Olds by Years of Completed Schooling of Parents
Three-Year Moving Averages of Single Years of Schooling of Mother and Father
Urban São Paulo State and Northeast Region, Brazil, 1982

With respect to the population under consideration, let E_c be a random variable denoting a child's education. Further, let E_p be a random vector denoting parents' education. Finally let Y be a random variable denoting household economic resources. Hence,

$$E_c(h) = f_o(E_p(h), Y(h); h)$$

Assumption 1: $f(e_p, y; h) = f_1(e_p, y) + g(h)$.

Notice that, under this separability assumption we can always make $\mathrm{E}[g] = 0$ without any loss of generality. We refer to g as the household shifter and to f_1 as the population response function. Moreover, in this case

$$E_c(h) = f_1(E_p(h), Y(h)) + g(h).$$

and consequently,

$$\mu_{E_c} \equiv \mathrm{E}[E_c] = \mathrm{E}[f_1(E_p, Y)] \equiv \int f_1(e_p, y) dF_{E_p,Y}(e_p, y).$$

Our major goal is to estimate the component f_1 of the response function. Based on this estimated f_1 we would like to simulate what the average education among fourteen year-olds would be if the distribution of (E_p, Y) were $F^*_{E_p,Y}$ instead of $F_{E_p,Y}$. In other words we would like to estimate

$$\mu^*_{E_c} = \mathrm{E}[f_1(E_p, Y)] \equiv \int f_1(e_p, y) dF^*_{E_p,Y}(e_p, y).$$

We are going to consider three alternative sets of assumptions that would permit us to estimate f_1.

7.1 The Random Response Case

Assumption 2: $g \perp (E_p, Y)$, i.e., g and (E_p, Y) are independently distributed.

It follows from A1 and A2 that

$$\mathrm{E}[E_c | E_p, Y] = f_1(E_p, Y)$$

Hence, in this case we could estimate f_1 by regressing children education on parents education and household economic resources.

7.2 The Inherited Shifter Model

Let E_g be a random vector denoting grandparents' education. Assume the household shifter is a random function of grandparents' education in the following sense:

Assumption 3: $g(p) = f_2(E_g(p), g^*(p))$ and $g^* \perp (E_p, Y)|E_p$

Given assumptions A1 and A3,

$$\mathrm{E}[E_c|E_p, Y, E_g] = f_1(E_p, Y) + \mathrm{E}[f_2(E_g, g^*)|E_g] = f_1(E_p, Y) + f_3(E_g)$$

where

$$f_3(E_g) = \mathrm{E}[f_2(E_g, g^*)|E_g].$$

Hence, we could estimate f_1 by regressing child education on parents' and grandparents' education and household economic resources. Notice that our assumptions are not strong enough to recover the "inherited shifter function" f_2 .

7.3 The Non-Inherited Shifter Model

Now assume the shifter is unrelated to grandparents' education, i.e.,

Assumption 4: $g \perp E_g$

In this case, an instrumental variable procedure would estimate the responses of E_c to variations in E_p and Y.

8. Operational Assumptions

We end up estimating a very simple model. However, to understand the simplifying content of each of our operational assumptions, it is essential to introduce them sequentially. First, we assume that f is separable, i.e.,

Assumption 5: $f_1(e_p, y) = f_5(e_p) + f_6(y)$

This assumption has an important simplifying content as far as the simulations are concerned. Notice that if A5 holds,

$$\mu^*_{E_c} \equiv \int f_1(e_p, y) dF^*_{E_p, Y}(e_p, y) = \int f_5(e_p) dF^*_{E_p}(e_p) + \int f_6(y) dF^*_Y(y).$$

and the simulations now depend only on how the marginal distributions of E_p and Y are modified. Under this separability assumption the nature of the dependence among

parents' education and household economic resources has no impact on the average level of schooling among their children.

Next we assume that f is both separable and quadratic

Assumption 6:

(i) $f_5(e_p) = \alpha_0 + \alpha_1 e_p + \alpha_2 e_p^2$

(ii) $f_6(y) = \beta_0 + \beta_1 y + \beta_2 y^2$

Given A5 and A6, the population response function f_1 peaks at

$$e_p^* = -\alpha_1/(2\alpha_2)$$

and

$$y^* = -\beta_1/(2\beta_2)$$

Moreover, children's average completed years of schooling can be obtained via

$$\begin{aligned}\mu_{E_c} &= F(\mu(e), \mu(y), \sigma(e), cv(y)) \\ &= \alpha_0 + \beta_0 + \alpha_1\mu(e) + \alpha_2\mu^2(e) + \alpha_2\sigma^2(e) + \beta_1\mu(y) + \beta_2\mu^2(y)(1 + cv(y)^2), \quad (1)\end{aligned}$$

where $\mu(e) = \mathrm{E}[e_p]$, $\sigma(e)^2 = Var[e_p]$, $\mu(y) = \mathrm{E}[y]$, and $cv(y)^2 = Var[y]/\mathrm{E}[y]^2$.

9. The Impact of Policies and Their Trade-offs

The expression for children's average completed years of schooling in Equation (1) permits us to evaluate the effect of a number of policies. More specifically, four policies aimed to increase the average number of completed years of schooling among fourteen year-olds can be evaluated: (i) the effect of increases in the average education of parents, $\mu(e)$; (ii) the effect of increases in average income, $\mu(y)$; the effect of decreases in the inequality in education among parents, $\sigma(e)$; and the effect of decreases in the degree of income inequality, $cv(y)$. Of particular interest is the relative strength of these policies. Their relative strength can be evaluated by computing the following derivatives:

$$\lambda_{\mu(y,e)} \equiv -\frac{\partial F/\partial_{\mu(e)}}{\partial F/\partial_{\mu(y)}} = -\frac{\alpha_2}{\beta_2}\frac{e_p^* - \mu(e)}{y^* - \mu(y)(1 + cv(y)^2)} * \frac{100}{\mu(y)} \quad (2)$$

$$\lambda_{e(\sigma,\mu)} \equiv -\frac{\partial F/\partial_{\mu(e)}}{\partial F/\partial_{\sigma(e)}} = \frac{e_p^* - \mu(e)}{\sigma(e)} \quad (3)$$

$$\lambda_{y(cv,\mu)} \equiv -\frac{\partial F/\partial_{\mu(y)}}{\partial F/\partial_{cv(y)}} = \frac{y^* - \mu(y)(1+cv(y)^2)}{\mu(y)^2 * cv(y)} \frac{100}{\mu(y)} \tag{4}$$

$$\lambda_{\sigma(y,e)} \equiv -\frac{\partial F/\partial_{\sigma(e)}}{\partial F/\partial_{cv(y)}} = -\frac{\alpha_2}{\beta_2} \frac{\sigma(e)}{\mu(y)^2 * cv(y)} \tag{5}$$

10. Parental Aggregated Educational Input

One input into the population response function, f_1, is an aggregation of parents educational attainment, e_p. How this aggregated input relates to the educational achievement of fathers, e_f, and of mothers, e_m, is considered in this section.

Let e_p be produced from (e_f, e_m) via the technology h, i.e., $e_p = h(e_m, e_f)$. We investigate two polar possibilities for this technology:

$$(PS) : h_T(e_f, e_m; b) \equiv e_f + be_m,$$

$$(NS) : h_M(e_f, e_m; b) \equiv \max[e_f, be_m]$$

where b is a positive number. The first technology, PS, assumes that mother's education and father's education are perfect substitutes. The second technology, NS, which is at the other extreme, assume that there is no possibilities of substitution between mother's education and father's education. The estimation of b is feasible but generates estimators with large standard errors due to the fact that father's and mother's education are so highly correlated. As a consequence, we opted to conduct most of the analysis assuming that $b = 1$, i.e., we consider the following special cases of PS and NS:

$$(PS1) : h_T(e_f, e_m) \equiv h_T(e_f, e_m; 1) = e_f + e_m,$$

$$(NS1) : h_M(e_f, e_m) \equiv h_M(e_f, e_m; 1) = \max[e_f, e_m]$$

11. Empirical Results

In this section we present estimates of the three alternative models, each estimated for the two regions, and each using the two assumptions regarding the aggregation of parental education. Table 5 presents summary statistics for the dependent and independent

Table 5. Descriptive Statistics for Dependent and Independent Variables in Regressions
State of São Paulo and Northeast Region, Brazil, 1982

Variable	São Paulo		Northeast	
	Mean	Std. Deviation	Mean	Std. Deviation
Schooling of 14 Year Old	4.89	1.74	3.26	2.11
Maximum Schooling of Parents	4.59	3.96	3.90	3.60
Total Schooling of Parents	7.34	6.84	5.90	6.04
Income of Head	5.54	8.74	3.20	4.70
Sample Size	840		1575	

Notes: Estimated from 1982 PNAD using IBGE sample weights.

variables used in the regressions, based on the larger sample that does not select on the existence of complete schooling data for grandparents.

Tables 6 and 7 present results using only parental education variables. Tables 8 and 9 add the earnings of the head and earnings squared to all the regressions.

According to the regressions in Columns 1 and 2, an increase of one year in the schooling of the better educated parent (i.e. an increase in the maximum schooling by one year) implies an increase in the schooling of the fourteen year-old by .37 years in São Paulo, and by .43 years in the Northeast, evaluated when the parent begins at zero years of schooling. The derivatives at the bottom of the table show the effects evaluated at the means. Since the effect of parental education is concave, the derivative at the mean is smaller than the derivative at zero. According to columns 1 and 2, a one year increase in the schooling of the better educated parent implies an increase in the schooling of the fourteen year-old by .26 years in São Paulo, and .34 years in the Northeast.

The concavity of the relationship between parental schooling and childrens' schooling also implies that a mean-preserving spread in the schooling of parents (i.e. an increase in the standard deviation of schooling that holds mean schooling constant) would decrease mean schooling of fourteen year-olds. As shown in the derivative $\partial\mu_c/\partial\sigma_p$, an increase of one year in the standard deviation of parental schooling, holding the mean constant, would imply a decrease in the mean schooling of fourteen year-olds of .09 years in São Paulo and .08 years in the Northeast. The final derivative in the table shows the implied tradeoff between mean schooling and schooling inequality in determining the schooling of fourteen year-olds. The results in columns 1 and 2 indicate that if mean schooling of parents were increased by 1 year, the standard deviation could increase by 2.8 years and the mean schooling of fourteen year-olds would remain unchanged. Put another way, it would take a 2.8 year decline in the standard deviation of parental schooling to have the same impact

Table 6. Response of Child's Schooling to Parents' Schooling
Fourteen Year Olds, São Paulo and Northeast, 1982
Parents' Schooling $= \max[e_f, e_m]$

	OLS I		OLS II		OLS III		IV	
	SP	NE	SP	NE	SP	NE	SP	NE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	3.626	2.108	3.594	2.089	3.368	1.955	2.694	1.543
	(0.120)	(0.084)	(0.131)	(0.092)	(0.143)	(0.097)	(0.402)	(0.217)
Parents' Schooling	0.366	0.430	0.369	0.439	0.276	0.371	0.725	0.652
	(0.043)	(0.033)	(0.047)	(0.036)	(0.051)	(0.039)	(0.187)	(0.116)
Parents' Schooling Squared	-0.012	-0.011	-0.011	-0.011	-0.009	-0.011	-0.032	-0.021
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)	(0.009)
$\bar{R}^2$	0.211	0.257	0.225	0.272	0.265	0.292	0.180	0.197
Sample Size	840	1572	713	1276	713	1276	713	1276
F-Test					3.145	3.041		
Peak (Parents' Schooling)	15.82	19.08	16.07	19.19	15.35	16.75	11.50	15.17
	(2.089)	(2.865)	(2.258)	(3.068)	(2.729)	(2.768)	(1.686)	(3.664)
Effect on Child's Schooling:								
$\partial\mu_c/\partial\mu_p$	0.260	0.342	0.263	0.350	0.193	0.285	0.435	0.485
	(0.021)	(0.017)	(0.023)	(0.019)	(0.027)	(0.022)	(0.073)	(0.050)
$\partial\mu_c/\partial\sigma_p$	-0.092	-0.081	-0.091	-0.082	-0.071	-0.080	-0.250	-0.155
	(0.022)	(0.018)	(0.023)	(0.019)	(0.024)	(0.020)	(0.100)	(0.064)
Tradeoff:								
$\partial\sigma_p/\partial\mu_p$	2.837	4.218	2.899	4.249	2.716	3.571	1.744	3.132
	(0.528)	(0.796)	(0.570)	(0.853)	(0.689)	(0.769)	(0.426)	(1.018)

Notes: Standard errors in parentheses. Estimated from 1982 PNAD. Effects and tradeoffs evaluated at the mean and standard deviation for the large sample (see text). OLS I is for entire sample, without exclusion for missing data on grandparents' education. OLS II is OLS for the sample with exclusion of observations with missing data for grandparents' education. OLS III includes dummy variables for categories of grandparents' education in the regression. The F-test reported is for the null hypothesis that all grandparents' education variables have coefficients equal to zero. The IV column reports results for the two-stage least squares regression in which grandparents' education variables are used as instruments.

on the mean schooling of fourteen year-olds as a 1 year increase in the mean schooling of parents. Reducing inequality in parental education thus appears to be a surprisingly weak instrument for improving the mean schooling of children when compared to increasing mean schooling of parents. Standard errors for all of the derivatives are presented in parentheses below the estimates.

The regressions in columns 3 and 4 are identical to those in columns 1 and 2, but use the smaller sample of households for which there is complete data on the schooling

of grandparents. These are presented for direct comparability with the other regressions that use the grandparents' education data. The results based on this smaller sample are substantially the same as the results in the regressions in columns 1 and 2.

The regressions in columns 5 and 6 are OLS regressions that include the variables for the education of the four grandparents in the regression. The coefficients for the grandparents' education variables are not included in the table, but the F-test for the joint significance of these variables is shown. Looking at the derivatives at the bottom of columns 5 and 6, we see that the inclusion of the grandparents' education variables lowers the estimated effects of parental education somewhat. Controlling for grandparents' education, a one year increase in the schooling of the better educated parent implies a .19 year increase in the schooling of fourteen year-olds in São Paulo, and a .28 year increase in the Northeast.

Columns 7 and 8 present two-stage least squares estimates, using the grandparents' schooling variables as instruments. These estimates would be appropriate if the correct causal model is the "non-inherited shifter" model outlined above. Looking at the derivatives at the bottom of the columns, we see that using the grandparents' schooling variables as instruments produces slightly higher estimates of the effects of parental schooling on the schooling attainment of fourteen year-olds.

The tradeoff between mean schooling and schooling inequality in determining child schooling attainment can be seen graphically in Figure 5. The figure shows contours along which the mean schooling of fourteen year-olds is constant. As the mean schooling of parents increases, the standard deviation of parental schooling also increases, with the slope implied by the coefficient estimates in columns 1 and 2 of Table 6. Four contour lines are shown, two implied by the parameters for São Paulo, and two implied by the parameters for the Northeast. The two contours in the middle of the graph generate the actual mean schooling of fourteen year-olds in the two regions using the parameters for the corresponding region. The actual pairs of mean and standard deviation of parental schooling for the two regions are indicated on these two contours.

The two extreme contours on the graph show the combinations of mean and standard deviation of parental schooling that would be necessary to generate one region's mean schooling of fourteen year-olds given the other region's parameters. For example, the contour to the far right in the graph shows that if the standard deviation of parental schooling in the northeast were held at its current value, mean schooling of parents would have to increase to almost nine years in order to generate a mean schooling of fourteen year-olds of 4.88, the level of São Paulo. The contour on the far left shows the combinations of mean and standard deviation of parental schooling that would generate the Northeast's

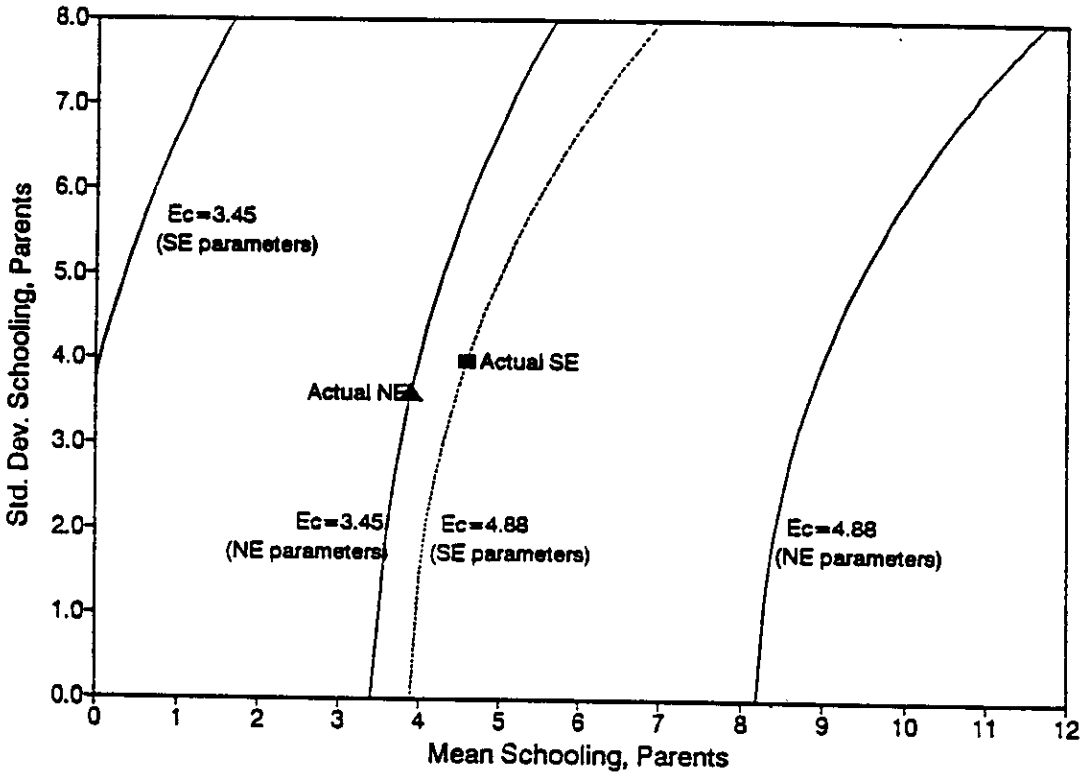


Figure 5. Effect of Parental Schooling on Schooling of Fourteen Year-Olds
Tradeoff Between Mean and Standard Deviation of Parental Schooling of Parents
Isoquants of Constant Mean Schooling of Fourteen Year-Olds
Urban São Paulo State and Northeast Region, Brazil, 1982

level of mean schooling of fourteen year-olds, given São Paulo's parameters. One surprising implication of these contours is that it would require implausibly large changes in the mean and/or standard deviation of parental schooling in the Northeast in order to generate a level of schooling of fourteen year-olds equivalent to that in São Paulo. Actual differences between the Northeast and São Paulo in mean schooling and schooling inequality of parents do not explain a large proportion of the 1.3 year advantage in the schooling attainment of fourteen year-olds in São Paulo.

Another implication of our results that is demonstrated dramatically in the contours in Figure 5 is that schooling inequality among parents has only a very limited effect on the level of schooling of fourteen year-olds, compared to the effect of mean parental schooling. As indicated by the derivatives in the tables, the amount of reduction in the standard deviation of parental schooling that would generate an increase in the schooling of fourteen year-olds as large as that generated by a one year increase in on the order of two or three years, an empirically implausible decrease.

Table 7 presents regressions similar to those in Table 6, the only change being the use of an alternative specification for parental education. In this case the parental education function is assumed to be the sum of the schooling of the mother and father, as would be appropriate if mother's and father's schooling were perfect substitutes.[1] The R^2s for the regressions in Table 7 are generally higher than those in Table 6, suggesting that the perfect substitution assumption is a better fit to the relationship between child schooling and parental schooling. The overall pattern of the regression coefficients does not change significantly, however. A one year increase in the schooling of one parent implies an increase in the schooling attainment of a fourteen year-old of about .17 years in São Paulo. and .23 years in the Northeast, according the OLS regressions in columns 1 through 4. As before, addition of grandparents' schooling reduces these estimates. Using the grandparents' schooling as instruments in the two-stage least squares regressions of columns 7 and 8 increases the estimated effects of one additional year of parental schooling to .23 years in São Paulo, and .27 years in the Northeast, evaluated at sample means.

Tables 8 and 9 add the income of the household head and income squared to all of the regressions. The specifications and samples are in all other respects identical to the regressions in Tables 6 and 7. Estimated effects of parental schooling in these tables refer to effects holding the income of the household head constant. In addition, we present the implied tradeoffs between mean and inequality of parental schooling and mean and inequality of parental income in determining the schooling of fourteen year-olds.

---

[1] This specification is formally equivalent to using the *average* years of schooling of the two parents, except for appropriate re-scaling of the coefficients on parental schooling.

Table 7. Response of Child's Schooling to Parents' Schooling
Fourteen Year Olds, São Paulo and Northeast, 1982
Perfect Substitution: Parents' Schooling $= e_f + e_m$

	OLS I		OLS II		OLS III		IV	
	SP	NE	SP	NE	SP	NE	SP	NE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	3.613	2.126	3.565	2.110	3.375	2.021	3.099	1.905
	(0.105)	(0.076)	(0.113)	(0.083)	(0.128)	(0.090)	(0.271)	(0.159)
Parents' Schooling	0.235	0.288	0.241	0.296	0.201	0.268	0.355	0.346
	(0.022)	(0.019)	(0.024)	(0.021)	(0.027)	(0.023)	(0.077)	(0.055)
Parents' Schooling Squared	-0.005	-0.005	-0.005	-0.005	-0.004	-0.005	-0.008	-0.007
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)
R^2	0.245	0.290	0.265	0.303	0.289	0.313	0.197	0.208
Sample Size	840	1572	713	1276	713	1276	713	1276
F-Test					2.039	1.428		
Peak (Parents' Schooling)	26.00	28.46	25.93	27.83	25.22	26.31	21.18	26.30
	(2.499)	(3.004)	(2.502)	(2.938)	(2.933)	(3.074)	(3.198)	(6.047)
Effect on Child's Schooling:								
$\partial\mu_c/\partial\mu_p$	0.168	0.228	0.173	0.233	0.142	0.208	0.232	0.268
	(0.012)	(0.011)	(0.013)	(0.012)	(0.016)	(0.015)	(0.034)	(0.027)
$\partial\mu_c/\partial\sigma_p$	-0.062	-0.061	-0.064	-0.064	-0.054	-0.062	-0.115	-0.079
	(0.011)	(0.010)	(0.012)	(0.011)	(0.012)	(0.011)	(0.042)	(0.030)
Tradeoff:								
$\partial\sigma_p/\partial\mu_p$	2.728	3.734	2.718	3.628	2.615	3.377	2.024	3.376
	(0.365)	(0.497)	(0.366)	(0.486)	(0.429)	(0.509)	(0.468)	(1.001)

Notes: Standard errors in parentheses. Estimated from 1982 PNAD. Effects and tradeoffs evaluated at the mean and standard deviation for the large sample (see text).

Comparing the the derivatives implied by the regressions in columns 1 and 2 of Table 8with those in Table 6, we see that the implied effects of parental schooling on child schooling are smaller when we hold income constant, as would be expected given the high correlation between schooling and income in Brazil. Evaluated at the mean, a one year increase in the schooling of the better educated parent implies a .22 year increase in the schooling of fourteen year-olds in São Paulo, and a .28 year increase in the schooling of fourteen year olds in the Northeast.

The effects of income we estimate are very modest. The effects are so small, in fact, that we have chosen to express the derivatives for the effects of income on schooling in units

Table 8. Response of Child's Schooling to Parents' Schooling and Income
Fourteen Year Olds, São Paulo and Northeast, 1982
Parents' Schooling = $\max[e_f, e_m]$

	OLS I		OLS II		OLS III		IV	
	SP	NE	SP	NE	SP	NE	SP	NE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	3.485	1.841	3.456	1.840	3.264	1.755	2.687	1.570
	(0.122)	(0.088)	(0.133)	(0.097)	(0.144)	(0.102)	(1.022)	(0.466)
Parents' Schooling	0.345	0.419	0.346	0.429	0.267	0.377	0.350	0.852
	(0.043)	(0.033)	(0.047)	(0.037)	(0.050)	(0.039)	(0.628)	(0.295)
Parents' Schooling Squared	-0.014	-0.017	-0.014	-0.017	-0.011	-0.016	-0.008	-0.038
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.045)	(0.026)
Father's Income	0.066	0.174	0.065	0.164	0.057	0.143	0.245	-0.189
	(0.014)	(0.022)	(0.014)	(0.024)	(0.014)	(0.025)	(0.310)	(0.475)
Father's Income Squared	-0.000	-0.002	-0.000	-0.002	-0.000	-0.002	-0.005	0.008
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.006)	(0.012)
R^2	0.232	0.288	0.248	0.300	0.281	0.312	0.038	0.163
Sample Size	840	1575	713	1276	713	1276	713	1276
F-Test					2.721	1.824		
Peak (Parents' Schooling)	12.30	12.09	12.60	12.28	11.99	11.84	21.77	11.20
	(1.229)	(1.094)	(1.346)	(1.221)	(1.571)	(1.313)	(85.594)	(5.550)
Effect on Child's Schooling:								
$\partial\mu_c/\partial\mu_p$	0.216	0.284	0.220	0.293	0.164	0.253	0.276	0.556
	(0.022)	(0.018)	(0.024)	(0.020)	(0.028)	(0.022)	(0.275)	(0.211)
$\partial\mu_c/\partial\sigma_p$	-0.111	-0.125	-0.109	-0.126	-0.088	-0.115	-0.064	-0.274
	(0.022)	(0.019)	(0.024)	(0.021)	(0.024)	(0.021)	(0.355)	(0.184)
$\partial\mu_c/\partial\ln(\mu_y)$	0.148	0.209	0.145	0.198	0.128	0.173	0.178	-0.049
	(0.031)	(0.025)	(0.032)	(0.028)	(0.032)	(0.029)	(0.459)	(0.437)
$\partial\mu_c/\partial CV_y$	-1.944	-3.742	-1.915	-3.496	-1.690	-3.049	-23.863	12.349
	(0.515)	(0.780)	(0.525)	(0.812)	(0.526)	(0.822)	(27.961)	(19.356)
Tradeoff:								
$\partial\sigma_p/\partial\mu_p$	1.946	2.277	2.021	2.328	1.868	2.208	4.339	2.030
	(0.310)	(0.304)	(0.340)	(0.339)	(0.397)	(0.365)	(21.618)	(1.542)
$\partial CV_y/\partial\ln(\mu_y)$	0.076	0.056	0.076	0.057	0.076	0.057	0.007	0.004
	(0.014)	(0.010)	(0.014)	(0.011)	(0.016)	(0.012)	(0.018)	(0.031)
$\partial\ln(\mu_y)/\partial\mu_p$	-1.462	-1.361	-1.516	-1.481	-1.287	-1.466	-1.546	11.247
	(0.389)	(0.213)	(0.425)	(0.263)	(0.435)	(0.301)	(5.108)	(95.505)
$\partial CV_y/\partial\sigma_p$	-0.057	-0.033	-0.057	-0.036	-0.052	-0.038	-0.003	0.022
	(0.018)	(0.009)	(0.019)	(0.011)	(0.021)	(0.013)	(0.017)	(0.033)

Notes: Standard errors in parentheses. Estimated from 1982 PNAD. Effects and tradeoffs evaluated at the mean and standard deviation for the large sample (see text). Effects of income on schooling are expressed in weeks of schooling of fourteen year-olds.

of *weeks* of schooling of fourteen year-olds for ease of exposition.[2] We express the effects of income as semi-elasticities, i.e. as the number of weeks of child schooling implied by a one percent increase in the income of the head. Continuing to look at the OLS estimates in columns 1 and 2 of Table 8, the derivatives $\partial\mu_c/\partial\ln(\mu_y)$ imply that a ten percent increase in the income of the head implies an increase of only 1.48 *weeks* in the completed schooling of a fourteen year-old child of the head in São Paulo, and 2.09 weeks in the Northeast, holding parental schooling constant. Looking across the other columns of Table 8 we see that this magnitude does not vary dramatically across alternative specifications.

As was the case with parental schooling in the previous regressions, the negative coefficient on the income squared term in the regressions in Tables 8 and 9 indicate a concave relationship between the schooling of fourteen year-olds and the income of the head. This implies that a reduction in income inequality among heads would imply higher mean schooling of fourteen year-olds. The derivative $\partial\mu_c/\partial CV_y$ summarizes the magnitude of this effect at the means, expressed once again in *weeks* of schooling of fourteen year-olds. Using the São Paulo parameters and sample statistics, a decrease in the coefficient of variation of 0.1, i.e. a reduction from the actual value of 1.58 to a value of 1.48 (almost exactly the value for the Northeast) would increase the mean child schooling by 0.19 weeks. The derivative for the Northeast is larger, but still implies small effects. Even a drop in the coefficient of variation of 50%, from 1.5 to 1.0, would only increase mean schooling of fourteen year-olds by less than 2 weeks (0.5*3.7).

The final derivatives presented in Tables 8 and 9 show the implied tradeoffs between changes in the mean and inequality of parental schooling and the mean and inequality of parental income in affecting the schooling attainment of fourteen year-olds. For example, the derivative $\partial CV_y/\partial\ln(\mu_y)$ shows the change in the coefficient of variation of income that would just offset a given proportional change in income. For the case of São Paulo in the specification of column 1, the increase in child schooling resulting from a one percent increase in the head's income would be offset by a simultaneous increase of 0.076 in the coefficient of variation.

The tradeoff between changes in mean income and changes in mean parental schooling are especially striking. The derivative $\partial\ln(\mu_y)/\partial\mu_p$ implies that the effect of a one week increase in the mean schooling of parents would be offset by a 1.5% decrease in the mean income of heads. Put another way, it would require a 76% (52*1.462) increase in mean

---

[2] The choice of units is not important in the derivatives describing the effects of parental schooling, since both the dependent and independent variables represent periods of schooling. They can thus be interpreted as the number of years of child schooling resulting from a one year increase in parental schooling, or, equivalently, as the number of weeks of child schooling resulting from a one week increase in parental schooling.

Table 9. Response of Child's Schooling to Parents' Schooling and Income
Fourteen Year Olds, São Paulo and Northeast, 1982
Perfect Substitution: Parents' Schooling $= e_f + e_m$

	OLS I		OLS II		OLS III		IV	
	SP	NE	SP	NE	SP	NE	SP	NE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	3.525	1.923	3.479	1.915	3.302	1.848	2.895	1.951
	(0.107)	(0.082)	(0.116)	(0.089)	(0.130)	(0.095)	(0.703)	(0.545)
Parents' Schooling	0.219	0.276	0.224	0.285	0.188	0.265	0.218	0.424
	(0.023)	(0.019)	(0.024)	(0.021)	(0.027)	(0.023)	(0.247)	(0.144)
Parents' Schooling Squared	-0.005	-0.007	-0.005	-0.007	-0.004	-0.007	-0.003	-0.011
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.009)	(0.008)
Father's Income	0.049	0.139	0.048	0.132	0.046	0.125	0.200	-0.117
	(0.014)	(0.023)	(0.014)	(0.025)	(0.015)	(0.025)	(0.293)	(0.477)
Father's Income Squared	-0.000	-0.002	-0.000	-0.002	-0.000	-0.002	-0.004	0.006
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.005)	(0.012)
R^2	0.257	0.308	0.276	0.321	0.300	0.327	0.047	0.185
Sample Size	840	1575	713	1276	713	1276	713	1276
F-Test					1.956	1.044		
Peak (Parents' Schooling)	22.30	20.88	22.44	20.63	21.57	20.24	35.73	18.81
	(2.011)	(1.713)	(2.052)	(1.747)	(2.332)	(1.889)	(75.559)	(11.757)
Effect on Child's Schooling:								
$\partial\mu_c/\partial\mu_p$	0.147	0.198	0.151	0.204	0.124	0.188	0.173	0.291
	(0.013)	(0.012)	(0.014)	(0.013)	(0.017)	(0.015)	(0.136)	(0.120)
$\partial\mu_c/\partial\sigma_p$	-0.067	-0.080	-0.068	-0.084	-0.060	-0.079	-0.042	-0.136
	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.129)	(0.103)
$\partial\mu_c/\partial\ln(\mu_y)$	0.111	0.168	0.108	0.162	0.104	0.153	0.116	0.008
	(0.031)	(0.026)	(0.032)	(0.029)	(0.033)	(0.029)	(0.422)	(0.483)
$\partial\mu_c/\partial CV_y$	-1.424	-2.900	-1.389	-2.696	-1.325	-2.549	-20.760	9.450
	(0.510)	(0.780)	(0.520)	(0.814)	(0.522)	(0.820)	(24.884)	(18.322)
Tradeoff:								
$\partial\sigma_p/\partial\mu_p$	2.187	2.478	2.207	2.438	2.081	2.373	4.150	2.136
	(0.294)	(0.283)	(0.300)	(0.289)	(0.341)	(0.313)	(11.046)	(1.946)
$\partial CV_y/\partial\ln(\mu_y)$	0.078	0.058	0.078	0.060	0.079	0.060	0.006	-0.001
	(0.019)	(0.013)	(0.020)	(0.015)	(0.021)	(0.015)	(0.018)	(0.052)
$\partial\ln(\mu_y)/\partial\mu_p$	-1.323	-1.175	-1.399	-1.255	-1.193	-1.230	-1.496	-36.783
	(0.437)	(0.218)	(0.490)	(0.263)	(0.454)	(0.277)	(6.405)	(2258.99)
$\partial CV_y/\partial\sigma_p$	-0.047	-0.028	-0.049	-0.031	-0.045	-0.031	-0.002	0.014
	(0.019)	(0.009)	(0.020)	(0.011)	(0.020)	(0.011)	(0.008)	(0.027)

Notes: Standard errors in parentheses. Estimated from 1982 PNAD. Effects and tradeoffs evaluated at the mean and standard deviation for the large sample (see text). Effects of income on schooling are expressed in weeks of schooling of fourteen year-olds.

parental income in order to have the same impact on schooling of fourteen year-olds as a one year increase in mean parental education. The magnitude for the Northeast is remarkably similar, with a 71% increase in mean income of heads required to produce the same impact as a one year increase in parental schooling.

The results using total parental schooling as the parental schooling variable in Table 9 present very similar results. While the magnitudes of the effects vary somewhat across specifications, the general pattern remains that the effects of changes in either the mean or dispersion of heads' income on the schooling attainment of fourteen year-olds is surprisingly small. If taken literally, the results imply that there would be only very modest improvements in schooling attainment in response to even vary large increases in mean income or very large reductions in income inequality among heads. We also find as a robust result across specifications that very little of the difference in the mean schooling of fourteen year-olds in the two regions can be explained by differences in either mean income or inequality of income of household heads.

References

Almeida dos Reis, José Guilherme and Ricardo Paes de Barros (1989) "Income Inequality and the Distribution of Education: Regional Differences in Inequality," IPEA, Rio de Janeiro, February.

Behrman, Jere R. and Nancy Birdsall (1983) "The Quality of Schooling: Quantity Alone is Misleading," *American Economic Review*, December, 73(5): 926–946.

Behrman, Jere R. and Nancy Birdsall (1985) "The Quality of Schooling: Reply," *American Economic Review*, December, 75(5): 1202–1205.

Behrman, Jere R. and Barbara L. Wolfe (1984) "The Socioeconomic Impact of Schooling in a Developing Country," *Review of Economics and Statistics*, 66(2): 296–303.

Lam, David, and Deborah Levison (1989) "Declining Inequality in Schooling in Brazil and Its Effects on Inequality in Earnings," Population Studies Center, Research Report No. 89–170, University of Michigan.

Lam, David, and Deborah Levison (1990) "Age, Experience, and Schooling: Decomposing Earnings Inequality in the U.S. and Brazil," forthcoming, *Pesquisa e Planejamento Econômico*.

Psacharopoulos, George and Ana Maria Arriagada (1986) "The Educational Composition of the Labor Force: An International Comparison," *International Labour Review* 125(5): 561–74.

Ram, Rati (1990) "Educational Expansion and Schooling Inequality: International Evidence and Some Implications," *Review of Economics and Statistics* 72(2): 266–273.

Schultz, T.Paul (1988) "Education Investments and Returns," Chapter 13 in Chenery, Hollis and T.N. Srinivasan, eds., *Handbook of Development Economics*, Vol. 1, New York: Elsevier Science.

Senna, José Júlio (1976) "Escolaridade, Experiência no Trabalho e Salários no Brasil," *Revista Brasileira de Economia* 30(2): 163–193.

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

PRICES, INFRASTRUCTURE, HOUSEHOLD CHARACTERISTICS AND CHILD HEIGHT

Duncan Thomas
John Strauss

documento 04

Prices, Infrastructure, Household Characteristics and Child Height

Duncan Thomas
Yale University

John Strauss
Rand Corporation

May, 1990
Revised October, 1990

Financial support from National Institutes of Health grant P50-HD12639-11 and from the Economic Growth Center is gratefully acknowledged. Mauricio de Vasconcellos and Maria Helena Henriques provided invaluable help in understanding the data. We have benefitted from the comments of Ricardo Barros, Jere Behrman, Sue Horton, Alberto Palloni, Guilherme Sedlacek and two anonymous referees. K. Bruce Tustin and Michele Siegel were excellent research assistants.

ABSTRACT

Household survey data from Brazil, matched with information collected at the *municipio* (county) level, are used to examine the relation between parental characteristics, community characteristics and child height. Data are drawn from two sources. *Informacoes Basicas Municipais* is a periodic survey of every *municipio* in Brazil which gathers data on the availability of infrastructure, health and education services. *Estudo Nacional da Despesa Familiar* is a household survey with information on income, expenditure, anthropometry and household socio-demographic characteristics. These data are also used to create local food price indices. Child height is significantly affected by local infrastructure, in particular the availability of modern sewerage, piped water and electricity. These effects are stronger for older children, for those of better educated mothers and for those from higher expenditure households. Higher prices of sugar and dairy products are associated with lower child height, significantly for children of illiterate mothers. Mothers with at least elementary schooling are able to counteract the deleterious impact of prices on child height. Negative price effects are, however, largest for children in higher expenditure households. This suggests that the impact of mother's education on child height does not solely reflect the availability of resources. There is also evidence that mother's and father's education are complementary determinants of child height.

1. INTRODUCTION

Economists have long been concerned with the efficiency and equity of public investments in the social sector. In recent years, many governments have attempted to reduce public deficits in the face of macroeconomic shocks and structural adjustment programs. In doing so a good deal of attention has been paid to expenditures on social services, in particular health and education (Jimenez, 1987). Especially during periods of tight budgets, it is critical to know whether investments have had intended, or unintended, consequences on welfare and, if so, who has benefitted from these services. This seems to us to be especially important in poor economies where many people may not be able to afford services if they are privately provided.

This paper examines the impact of infrastructure and local market characteristics on one indicator of child health and welfare: child height. There is a large literature arguing that child height is a good indicator of long run child nutritional status (Falkner and Tanner, 1986) and many studies have demonstrated the importance of household characteristics as determinants of child anthropometry (see Alderman, 1990 and Behrman, 1990a, for reviews). In contrast, there are rather few studies of the impact of community services on child anthropometry (Horton, 1986; Barrera, 1990; Strauss, 1990; Thomas, Strauss and Henriques, 1990b). By and large, these studies indicate that there are substantial positive returns on child health to investments in the provision of clean water and modern sewerage services.[1]

If distributional issues are of concern, then it is important to also identify those children who are likely to benefit most from the provision of community services. The focus of the child anthropometry literature has been on interactions between community services and maternal education. This is, at least partly, because it is hypothesized that the effect of these inputs into the health production function are related to maternal education (Caldwell, 1979; Rosenzweig and Schultz, 1982).

In this study, we extend our previous work which examined the household determinants of child height in Brazil (Thomas, Strauss and Henriques, 1990a), and examine the impact of a broad range of community prices and services on child height, conditional on parental income, education and other background controls. We have matched with household survey data, information on local market food prices, the availability of infrastructure (such

[1]Several studies of child survival have included household use of piped water or sewerage services (for example, Martin, *et al.*, 1983; Merrick, 1985; DaVanzo, 1988). These studies typically do not treat the decision to *use* these inputs in the child health production function as being simultaneously determined with the child survival. It has been argued, (Rosenzweig and Wolpin, 1986) that the *availability* of services should also be treated as endogenous; in the absence of instruments to explain service placement or migration decisions, we ignore the issue.

as piped water and sewerage) in the *municipio* (county) as well as the availability and quality of health and education services.

Using a very large sample of 37,000 children, the effects of household and community characteristics are allowed to vary arbitrarily depending on the area of residence, age of the child and the education of the mother. In addition, interactions between community services and household resources are examined. We can, therefore, identify those children who are most affected by community characteristics.

Among urban children, water and sewerage facilities are associated with healthier children as is access to electricity in the rural sector. These effects tend to rise with maternal education and household expenditure. Prices of dairy products and sugar have a significant negative effect on child height; this effect is (absolutely) smallest for children of better educated mothers suggesting that better educated women allocate resources more effectively. Price effects tend to be absolutely larger for children in higher expenditure households further suggesting that the impact of better educated mothers on child height does not reflect solely the availability of more resources.

2. MODEL

The biological correlates of child anthropometric outcomes have been extensively studied in the medical literature (see, for example, Martorell and Habicht, 1986). We can think of child height in the current period, h_t, as depending on current inputs, M_t, into a health production function and, also, on height last period, h_{t-1}. The former might include the duration of breast-feeding, age at introduction of solid foods and the types of foods introduced, calorie and protein intake, disease incidence and severity, use of clean water, sanitary and health care practices. Household characteristics, including the age and sex of the child, z_{ht}, as well as parental education and heights, z_{mt}, may also affect child height both directly and, possibly, through their impact on allocation decisions. Finally, conditional on inputs, the environment in the local community, $\tilde{z}_{ct}$, may have a direct impact on child height; of course, many other community characteristics may only affect child height through inputs, M_t. The child anthropometric production function is:

$$h_t = f_t(h_{t-1}, M_t, z_{ht}, z_{mt}, \tilde{z}_{ct}, \upsilon_{ht}) \qquad [1]$$

where υ_{ht} are unobservable child, household and community characteristics which affect the child's height.

Estimation of the parameters of this production function is not, however, trivial and requires detailed information on the choice of inputs (Rosenzweig and Schultz, 1983). In addition, since these choices are simultaneously determined with the anthropometric outcome, an instrument, such as a price, is required for each input included in the production function. There are few datasets which can meet these requirements, but see, Barrera (1990) and Cebu Team (1988, 1989, 1990) for recent studies.

It is, however, possible to answer important questions even in the absence of such detailed data. In particular, economists have attempted to integrate the bio-medical approach with an economic model of family allocation decisions, in order to examine the impact of exogenous changes in the social and economic environment on health outcomes. Assume parents' preferences are inter-temporally separable, then in the current period, parents choose to maximize a quasi-concave utility function which depends on the consumption of commodities and services, x_t, the leisure of each household member, ℓ_t, as well as the quantity and quality of children, θ_t, which includes healthiness, (Becker, 1981).[2] Child height, h_t, is one element of the child characteristics vector, θ_t. Letting φ_t represent unobserved heterogeneity in preferences, then parents choose to

$$\max_{x\ell\theta} U(x_t, \ell_t, \theta_t; z_m, \varphi_t) \qquad [2]$$

but are constrained by the production function, [1], a time and a current period budget constraint[3]:

$$p_t x_t = w_t (T_t - \ell_t) + y_t \qquad [3]$$

where p_t is a vector of prices, w_t a vector of wages, T_t is a vector of the maximum number of hours each household member can work and y_t is household nonwage income.[4]

---

[2]See Schultz, (1990) and Thomas (1990) for studies of fertility and child health which test the assumption that parents have identical preferences. Since we have a single cross-section of data on child health, we ignore the dynamics of consumption decisions and their implications for child growth; see Foster (1990).

[3]Some purchases of inputs into the health production function may be valued only for their impact on health and not directly; they will not enter the vector x in the utility function but will enter the budget constraint appropriately defined.

[4]Below, we will maintain that non-wage income is unrelated to current labor supply behavior; this is a strong assumption, but necessary with the data we use to estimate the effect of household income on child height.

Solving the system [1] through [3], then there is a parental demand for child height function which depends only on exogenous child, household and community characteristics:

$$h_t = g(z_t, z_h, y, z_c, \xi_i) \qquad [4]$$

where z_c is the set of all community characteristics which affect child height directly, $\tilde{z}_c$, and also through inputs M; unobserved heterogeneity in child height, ξ_i, is assumed to be uncorrelated with the other elements of g(). Since lagged height enters the height production function, [1], in the reduced form, [4], the determinants of current height include both their current and lagged values (dating back to at least the birth of the child), except for those characteristics which are time invariant (such as gender or parental height). Estimation of this reduced form (typically using only current observations) has been the focus of much of the socio-economic literature examining health outcomes including fertility, child mortality and anthropometry.[5]

Our aim in this study is to investigate whether and how community characteristics affect child height. Since higher income households tend to live in neighborhoods with better services, failure to control properly for household resources is likely to lead to biased estimates of the effects of community services.

It is very difficult to accurately measure nonwage income, y, and so income is sometimes excluded or, alternatively, assets are also included (Horton, 1986; Strauss, 1990) on the grounds that child health should depend on long run resource availability. If leisure is (weakly) separable from commodity consumption and health in the utility function,

$$U = U(\psi(\ell_t), \upsilon(x_t, \theta_t); z_h, \omega_t) \qquad [2']$$

then it is possible to derive a conditional demand function which includes total income, $Y_t = w_t(T_t - \ell_t) + y_t$, but not its components, wages and unearned income, separately. If households smooth consumption in the face of transitory income shocks, then household expenditure is a better measure of long run resource availability than total

[5]Recent work (Pitt and Rosenzweig, 1989) has raised the specter of mortality and birth selection. Since we neither know the complete birth history of each mother in the survey nor have any instruments which affect child mortality or the probability of a woman having a child, but not child health, we focus on the estimation of height functions conditional on the child being in the home during the week of the survey.

income, especially in rural communities where income often varies substantially year by year.[6] Furthermore, household income is hard to measure, and there is some evidence in expenditure surveys that detailed expenditure accounts are more accurate than income instruments which are typically less detailed.[7]

Household expenditure (or income) should be treated as endogenous in the conditional height demand function since consumption, leisure and time allocation decisions are jointly determined with child health. Under the assumption of weak separability in the utility function, [2'], an appropriate instrument is that part of income which is unaffected by these choices, which we assume to be unearned income.[8] The use of household expenditure, rather than income, is common in the demand literature (Deaton, 1982), although recently there has been renewed awareness of the need to instrument (Leviatan, 1961; Blundell, Browning and Meghir, 1989). The theoretical underpinnings of this approach may be traced back, at least, to Pollak's (1969) work on conditional demand functions. It has recently been applied in the health literature by Thomas, Strauss and Henriques (1990a, 1990b) and Sahn (1990).

Since parents are likely to trade-off between the quality and quantity of their children (Becker, 1981), household size cannot be treated as exogenous. Nevertheless, it is possible to control, at least crudely, for household size by adopting household *per capita* expenditure, PCE, as the income measure;[9] partition z_h into {PCE $\tilde{z}_h$} then:

---

[6]Both current and past levels of household resources enter the height function; these might be split into a long run (permanent) and short run (transitory) components. With a single cross section, we are unable to measure shocks and instead include expenditure as our best measure of long run resource availability. The effects (on savings) of income shocks are discussed in Deaton (1989) and Paxson (1989); Udry (1990) presents evidence that communities share risks so that household consumption is smoothed in the face of shocks.

[7]This assertion is based on the fact that in many expenditure surveys, population weighted expenditure is closer to estimated GDP than weighted income which in most surveys is somewhat lower. The reasons are far from clear. It may be because in budget surveys more attention is paid to the collection of expenditure data, frequently in several hundred categories, whereas income is usually reported in only a small number of categories. It has also been suggested that respondents are inclined to under-report income for fear of incurring taxes.

[8]Productive assets, if available, would also be appropriate instruments although they share the same potential problem with lagged labor supply. In principle, covariates which affect wages but not child height directly may be additional valid instruments. Community variables measuring demand side influences may be candidates, however this requires that community covariates which do belong in the child height demand function, [4], are measured perfectly, a strong requirement.

[9]Since we use *per capita* expenditure, we have only one endogenous variable. We can thus use nonlabor income to instrument for it. If we had instruments, we could also include a series of covariates for household composition.

$$h_i = h(z_t, PCE_t, \tilde{z}_h, z_c, \varepsilon_i) \quad [5]$$

The vector of parental characteristics, $\tilde{z}_h$, are assumed to be time-invariant and will include their education and height. The latter will capture genetic differences, including ethnic heterogeneity which will be important since the survey data we study reports no information on the ethnic background of household members. In addition, parental height will also proxy for human capital, over and above observed levels of education.

We examine four groups of community characteristics, z_c. Local market price indices and child anthropometric information are derived from the same household survey data. There is enormous inter-regional and inter-sectoral heterogeneity in prices in Brazil (see V. Thomas, 1982, and the discussion below). While price levels certainly change over time, we assume that inter-regional variation in *relative* prices swamps inter-temporal variation during the decade preceding the survey.[10] We include price indices for six food groups, which are likely to have an impact on child healthiness. They are dairy products and eggs (hereafter dairy products), beans, cereals, meat, fish and sugar. Evidence on the significance of price effects on child health is, at best, ambiguous.[11]

In contrast, the level of urbanization and community infrastructure, such as water and sewerage services, have been shown to significantly affect child height in previous studies.[12] We include, therefore, the *per capita* number of buildings with water connections, sewerage hookups and electricity connections in the community; as more general measures of infrastructure, we include the *per capita* number of buildings and population density.

[10]For Brazil, during the 1970s, no other consumer price data exist which are as detailed or available at such a disaggregated level for both urban and rural areas. Thus lagged prices are not included.

[11]Barrera (1990) finds no effect of the price of rice, cooking oil, kerosene or milk in a reduced form model of child height; Rosenzweig and Schultz (1982) report that a food price, as reported by a local agricultural agent, has no effect on fertility or mortality in urban Colombia but has a negative impact on mortality in rural areas. Behrman and Deolalikar (1989a) on the other hand, show that in India the prices of sorghum, pulses and rice have positive effects on child weight for height in the lean season and little effect in the surplus season; price effects on nutrient intakes are also significant but in the *opposite* direction. Finally, Foster (1990) finds that child growth is negatively correlated with changes in rice prices.

[12]Using Philippine data, Horton (1986), Barrera (1990) and Guilkey and Akin (1990) show that water sources, excreta disposal and toilet facilities affect child height. Strauss (1990) reports water sources matter in the Cote d'Ivoire, while Behrman and Wolfe (1987) report that toilet facilities matter in Nicaragua. Thomas, Strauss and Henriques (1990) find that garbage disposal, water and sewerage services matter in the Northeast of Brazil.

The effects of the quantity and quality of health services on child health are also ambiguous.[13] In addition to measures of availability (the *per capita* number of hospitals and clinics in the *municipio*), quality indicators, albeit crude are included. In particular, we have information on the *per capita* number of doctors and nurses as well as a measure of the average size of health facilities: the number of beds per hospital.

The final group of community characteristics included in z_c, are measures of the quality of education services available in the community; they include student teacher ratios in elementary and post-elementary classes, elementary school sizes and the *per capita* number of teachers living in the community. These variables proxy for the quality of education available in the community. In the model above, child nutritional status (height) and education are both elements of θ and are likely to be jointly determined; there is no information on quality of an individual's education in the household survey data. We use community level measures of education quality to capture the possibility of substitutability or complementarity between it and other dimensions of human capital development. Higher quality primary education, for example, may raise the expected returns to education (Behrman and Birdsall, 1983) as well as raise the probability of advancing to higher levels (Behrman and Sussangkarn, 1989).

Since the availability and quality of infrastructure, health and education services tend to change only slowly, lagged and current values of these measures are likely to be very similar. Assuming also, that there is little migration of families with small children, then the inclusion of only current information is unlikely to result in substantial mis-specification bias.

The effects of both household and community characteristics on child height will, almost surely, vary in a systematic way with child characteristics (Barrera, 1990). For example, increases in the price of milk are likely to have different impacts on the heights of children of different ages. We will, therefore, stratify the data on child's age.

There are also likely to be important interactions between maternal education and the availability (and quality) of community services (Caldwell, 1979; Rosenzweig and Schultz, 1982). The direction of these interactions is not, however, *a priori* obvious. On the one hand, if better educated mothers are more able to process

[13]Strauss (1990) finds the presence of a traditional healer in the Côte d'Ivoire reduces child height, as does the absence of drugs and congestion problems in the nearest heath clinic. Barrera, (1990), finds the further away an outpatient clinic, the taller a child. Rosenzweig and Schultz (1982) report that fertility and mortality do not respond to the availability of health facilities in rural Colombia but are lower in urban areas with more clinics and, possibly, hospitals.

information, then they may better understand the advantage of using local services. Their children will therefore benefit more from community services in which case maternal education and community characteristics might be considered "complements".[14] On the other hand, uneducated mothers may use services which are locally available, (such as piped water), and in the absence of other inputs (such as modern sewerage), these services could have a larger impact on the health of their children relative to those of better educated mothers; in this case community characteristics and education would be "substitutes".

In spite of the important implications about who gains most from public investments, few studies have examined the impact of interactions between maternal education and community characteristics on child health.[15] In addition to interactions between maternal education and community services, there may be interactions between her education and her partner's education (Behrman and Sussangkarn, 1989) as well as household expenditures. We will, therefore, examine the determinants of child height, stratifying on three levels of mother's education.

Finally, not all community services are free and so, for some households, there may be resource constraints on their usage. In fact, a positive interaction between maternal education and community characteristics may have nothing to do with better information processing and simply reflect the fact that better educated mothers tend to live in better off households who either can afford these services or live in neighborhoods with better quality services. To examine this issue directly, we will permit interactions between community service availability and household *per capita* expenditure (treating the interaction as endogenous). Education and expenditure interactions of opposite signs would be *prima facie* evidence against the resource availability interpretation of the benefits of maternal education.

---

[14]In a gross sense since preferences as well as technology affect the signs of the reduced form coefficients.

[15]Rosenzweig and Schultz (1982) report there are no significant interactions between community characteristics and maternal education on fertility and mortality in rural Colombia but among urban women, the uneducated gained most from community services. Strauss (1990) also found no significant interactions in the determination of child anthropometry in rural Cote d'Ivoire. In Bicol Province, in the Philippines, children of less educated mothers gained most from an absence of excreta disposal and least from modern toilet facilities (Barrera, 1990). Children of uneducated mothers gained least from higher quality health facilities and most from modern sewerage systems in the northeast of Brazil (Thomas, Strauss and Henriques, 1990b).

3. DATA

To study the household and community level determinants of child height, we have drawn data from two sources. Household survey data provide information on child, parent and local market characteristics. Information on service availability and quality is extracted from a special community level dataset.

The *Estudo Nacional da Despesa Familiar*, (ENDEF), is a household socio-economic survey carried out by the Brazilian statistical agency, IBGE, during 1974/5. The survey is very large, covering just under 55,000 households, and also very rich. In addition to detailed expenditure and income modules, the survey collected information on, *inter alia*, demographic and anthropometric characteristics of *all* household members.

We will examine data collected from the poor Northeast of Brazil and the relatively better off South[16] which accounts for some 80% of households in the sample. In the model section above, it was argued that in order to estimate effects of community services on child height, it is crucial that good controls for household characteristics and parental background be included in the regressions. In addition to parental education, parental height has been shown to be a very good predictor of child height (Horton, 1986; Barrera, 1990; Strauss, 1990) and may also serve as a measure of family background (Thomas, Strauss and Henriques, 1990a). So that maternal and paternal height may be included in the regressions, the sample is restricted to include children with both parents present.[17]

Summary statistics of child and household characteristics for the 36 980 children aged under 8 years included in the sample are presented in panel A of Table 1. Since child height is systematically related to age and sex, it makes sense to control for these characteristics when comparing children. We follow a simple and parsimonious approach and relate each child's height to the height of a well nourished United States child of the same gender and age, in months (based on the NCHS, 1976, tables).[18] In Brazil, child height is, on average, about 95% of the median height of a well-nourished United States child and the average is slightly higher in the urban

[16]Rio de Janeiro, Sao Paulo, Santa Catarina, Rio Grand do Sul, Parana and Brasilia. In this paper, the excluded regions are the Center-West and the North; only urban households were surveyed in the latter.

[17]If parental height is excluded from the regression, then the results based on the sample used here and a larger sample (which includes female headed households) are essentially identical. This suggests that sample selection based on presence of the father is not important. For the reasons discussed in the text, we report those estimates which include paternal height.

[18]Results are reported for the percentage of median height; results based on Z scores are identical in all cases.

sector. About 20% of all children are stunted (below 90% of the median, Waterlow *et al.*, 1977) and this proportion is higher (25%) in rural households. Parental heights are slightly less than 95% of US median heights.

Mean household *per capita* expenditure is Cr$276[19] per month; the average urban household spends about two and half times as much as the average rural household per person. Relative to the rural sector, the distribution of PCE in the urban sector is both shifted to the right and is fatter tailed.

The household survey reports education levels only in discrete intervals: illiterate, some elementary school (can read or write a little; referred to as literate in the text), completed elementary school, completed secondary school and completed university level or higher. The latter two categories have been aggregated to avoid sparse cells. In comparison with other countries at a similar level of national income, Brazil has invested little in human capital. About half of the rural children have mothers and fathers who are illiterate; less than 10% of parents have some elementary school. Between 20 and 25% of urban children have parents who cannot read and about 10% of their parents have attended at least secondary school.

For over five hundred individual commodities, the ENDEF survey collected information on both amounts spent and quantities consumed, so that it is possible to calculate implied prices paid by households. It is not appropriate, however, to treat the ratio of expenditure to quantity as a market price; as expenditure rises, households tend to switch into higher quality commodities (Deaton, 1988) and there is inevitably measurement error in any survey so that several of the implied "prices" are very large outliers. We have, therefore, created a series of local market price indices for a set of commodity groups.

The definition of market boundaries is, however, far from clear since prices are likely to vary because of heterogeneity in transportation and information costs. With survey data, the appropriate definition is partly an empirical question and depends on the choice of commodity aggregation as well as regional aggregation. We were guided by two principles: there not be too much spread in the prices of highly disaggregated commodities within a market area and that there be enough households within each area who consume the good to compute a meaningful measure of central tendency (see Thomas, Strauss and Barbosa, 1989, for a description).

Exploiting the detail of the survey, prices were calculated for 135 commodities, distinguishing each of 26 states in Brazil and three levels of urbanization (metropolitan, non-metropolitan urban and rural). In order to

[19]Approximately US$35 per month in 1975. Household expenditure is defined as monetary and imputed expenditure excluding savings, expenditure on durables and housing semi-durables such as large appliances. Since annual inflation was about 30% during the survey period, all income and expenditure data have been deflated using indices compiled by IBGE.

minimize the influence of outliers, median prices for each good in each market were calculated. These were then aggregated into Tornquist price indices using expenditure shares on the same 135 commodities. The dairy price, for example, is based on the share weighted aggregate price of fresh unpasteurized milk, pasteurized milk, canned milk, cheese, yogurt, eggs and other dairy products.

Local market food price indices are included as the determinants of child height; the all country index[20] is 100 for each food group. There is a good deal of heterogeneity in prices: the standard deviations are high in all cases. Most foods are less expensive in rural areas presumably because marketing margins are smaller or because they involve little processing; sugar, which does require industrial processing, is the only food which is more expensive in rural areas. In order to examine the impact of community services and infrastructure on the heights of young children, the household survey data have been matched with community level information on infrastructure as well as the availability and quality of health and education services. The 1974 *Informacoes Basicas Municipais* (IBM), released by IBGE on micro-fiche, provides information for each of 4,000 *municipios* (counties).[21] In addition to special data reported by the administration in each *municipio sede*, the IBM includes data from several other sources including the 1970 Demographic, Agricultural and Industrial Censuses and, for example, the 1974 *Assistencia Medico-Sanitaria* which is an annual census of health facilities. There are 860 *municipios* included in the ENDEF household survey data, of which 604 are in the South and Northeast, and these have been matched with the 1974 IBM.[22]

Panel B of Table 1 describes characteristics of community services based on the *municipio* data, weighted by population. For the *municipios* included in this study, the first three columns report the weighted mean and standard deviation of each characteristic as well as the proportion of *municipios* with any of the services. Means

---

[20]Including the Center West and North.

[21]Just as the definition of market boundaries is not obvious, nor is it clear how to define a community. We have chosen the *municipio* as our definition; since some large cities have several *municipios*, reported infrastructure will vary within these cities.

[22]The 1974 IBM was purchased from IBGE on microfiche, one for each of 4,000 *municipios*; these data have been transferred to machine readable form but since the fiches are old, and some of the data were hand-written, many of the fiches were quite difficult to read. We have, therefore, taken great care to clean the data manually. In 1974, the city of Rio de Janeiro was divided into several *municipios*; since then, it has been aggregated into a single *municipio*. Unfortunately, the microfiches for the city of Rio are missing from both the master copy in the IBGE library and the copy we purchased. The IBM survey instrument changed between 1974 and the next survey in 1978 so that a good part of the information used in this study is not available for Rio in the 1978 data. Thus, we have been forced to exclude metropolitan Rio de Janeiro from the analysis and use data from 603 *municipios*.

distinguishing the South from the Northeast are in the fourth and fifth columns and the means for all 2,800 *municipios* in the Northeast and South of Brazil are in the final column.[23]

Municipio boundaries traverse the rural-urban dichotomy so that rural households may live in communities which are partially urban. On average, about half the people in each *municipio* lives in an urban center; since urban areas were over-sampled in ENDEF, the proportion is higher (65%) for our sample. In ENDEF, rural households live in *municipios* which are, on average, about one quarter urban; urban households live in *municipios* which are one third rural. As evidenced by the large standard errors of the community infrastructure indicators, there is substantial heterogeneity in their availability in Brazil. The quantity of services are much greater in the South, relative to the Northeast. Whereas all *municipios* are on an electricity grid, almost all have some modern water services but 30% of people in the sample live in communities without any modern sewerage services in the *municipio sede*.

There are, on average, five hospitals and five clinics in each *municipio*, in the South, Northeast and for all Brazil. Relative to the Northeast, in the South, hospitals have twice as many beds, about twenty *per cent* more doctors and fifty *per cent* more nurses, given the population of the community. There are just over ten teachers per thousand people in the Northeast and almost 13 per thousand in the South. Class sizes in both regions are about the same; schools, however, are about twice as large in the South.

4. RESULTS

Tables 2 through 4 report the results of regressing (the logarithm of) child height, standardized for age and sex, on household and community characteristics. All variance-covariance matrices are estimated with the jackknife (Efron, 1982) which is robust to heteroskedasticity of unknown form and also downweights the influence of leverage points. The first column of Tables 2 and 3 reports the estimated effects of household and community factors on (log) height for all 36,974 children in the sample. In order to permit flexibility in the effects of covariates, the data have been stratified by residential location (columns 2 and 3), the child's age (columns 4-7) and the education level of the mother (columns 8-9) and the regressions re-estimated with all the covariates (both household and

[23]The means based on the sample data (that is weighted by number of children under eight years old in the sample instead of total population) are quite similar. For example, in the (population) weighted *municipio* sample, there are 10.1 doctors per hundred thousand people on average; in the child level sample, there are 9.9 doctors per hundred thousand people. Rural households tend to have more children and there is a lower level of services available in the rural sector; this is reflected in the child sample means. In the urban sector, the child weighted mean is 14.1 and in the rural sector only 2.5.

community).[24] In addition, the conditional height function has been estimated with all the household and community covariates, together with interactions between all community factors and ℓnPCE. Results are reported in Table 4 for those interactions with ℓnPCE which turn out to be significant, namely prices and infrastructure; because of differences in the estimates, these regressions are reported separately for the urban and rural sectors.[25]

(a) Household characteristics

We begin with the household determinants of child height, reported in Table 2, focussing primarily on the interactions between these characteristics and mother's education. The other results are similar to those discussed in Thomas, Strauss and Henriques (1990a) which used the same survey data but did not include community characteristics; we will describe these results only briefly.

The logarithm of *per capita* expenditure is included as a measure of household resource availability; it should be treated as jointly determined with parents' time allocation decisions and child healthiness and is, therefore, instrumented with a quadratic in unearned income, which is assumed to be exogenous.[26]

There is some uncertainty in the literature about the size and significance of income effects on child anthropometry. Conditional on community characteristics, the expenditure elasticity of the demand for child height

---

[24]This is equivalent to allowing interactions between the stratifying variable and all other covariates. We also examined the effects of community characteristics on the heights of boys and girls but found that none was significantly different.

[25]All expenditure interactions are treated as endogenous. Interactions of non-labor income with community covariates are added to the instrument set.

[26]Two thirds of the variation in ℓnPCE (and ℓnPCE^2) is explained in the first stage regressions. Taken together, the covariates are clearly significant (with $F_{71,36902}$ statistics of 1023 and 1073 respectively). Household non-labor income and its square are each individually significant (with t statistics of over 20) and also jointly significant: higher non-labor income is associated with higher *per capita* expenditure but at a decreasing rate. 38% of all households in the sample report some unearned income -- and these households are not only at the top of the expenditure distribution. A quarter of households in the bottom decile of PCE report some unearned income and this proportion rises with PCE. Maternal and paternal education are also powerful predictors of log *per capita* expenditure, as are parental heights (representing, in part, the effect of family background). The month of the survey is included in the instruments to control for seasonality of income and, therefore, expenditures; these dummies also control for the effects of inflation. Infrastructure and relative prices are much weaker predictors, although some are significant. The instruments also include a housing price index and some additional local infrastructure measures (*per capita* number of post offices, telephones and vehicles as well as a dummy for the existence of a major highway in the *municipio*) together with a dummy for each state (to account for unmeasured components of infrastructure and price variation). Exclusion of the extra price index and infrastructure information from the instruments has no perceptible impact on the estimated coefficients in the height regression.

in Brazil is small but significant, although this significance disappears when the data are stratified on sector.[27] Whereas expenditure has no effect on the height of babies and infants, it has a positive, significant influence on the height of children 2 years or older.

There is a complicated non-linear relationship between child height, maternal education and expenditure. Expenditure is a significant determinant of child height for illiterate and literate mothers but not for mothers who have at least some elementary education. Resources in the hands of mothers with no or very little education will have a large positive impact on their children's height but additional *per capita* expenditure in households with better educated mothers will not significantly affect their children's height.[28]

There is a good deal of evidence that children of better educated parents are healthier and our results are consistent with this evidence. Although we can say nothing about the exact mechanisms through which parental education affects child height, these effects are robust to the inclusion of controls for both other indicators of family background (parental heights) and for household income (PCE). Relative to being illiterate, the size of maternal and paternal education effects are not significantly different and they are much larger in the urban sector for both parents. The impact of maternal education is largest on the recumbent length of babies and declines with the child's age. Father's education has no impact on length of babies and has its largest impact on infants (6-23 month olds).

The effect of interactions between parental education on child health has been little studied. Behrman and Sussangkarn (1989) report significant, negative interactions on the probability a child attends school in Thailand. In contrast, we find significant positive interactions suggesting that maternal and paternal education are complementary. This relationship is apparently not linear, if the mother is illiterate then child height is unaffected by father's education. For all levels of father's education, the effect is largest when the mother has at least some elementary schooling. Education has the biggest impact on the heights of children both of whose parents have some secondary schooling. The positive interaction between parental education does not simply reflect the fact that better

---

[27]For all but the regressions stratified on mother's education, quadratic terms in ℓnPCE are insignificant. If the community covariates are excluded then the expenditure elasticity, for all children, is three times larger at mean PCE; it is significant and declines with PCE in both the urban and rural sectors. This reflects the fact that household income is associated with more, better facilities in the community.

[28]At median PCE, the expenditure elasticity is largest for illiterate mothers (0.025), and smallest for the most educated mothers (0.012). The elasticity rises with PCE for both illiterate and literate mothers, faster for illiterate mothers (to 0.049 and 0.026 respectively at the 90th percentile of PCE); but declines for mothers with some education.

educated fathers earn higher wages and so their families tend to have higher levels of *per capita* expenditure. In fact, as noted above, there is a negative interaction between PCE and maternal education. It appears, therefore, that better educated mothers are better able to allocate a given sum of resources to improve their children's health when their husbands are also better educated.

It has been shown empirically that there is a strong positive correlation between parental and child height, part of which can be attributed to genetics. In addition, however, parental height reflects investments in health and other human capital; it may, therefore, also serve as a proxy for unobserved family background characteristics.[29] The effect of mother's height is about 30% bigger than father's in both the rural and urban sector and for all children 6 months or older. Paternal height has only a small effect on the length of a baby, which is significantly related to mother's height and presumably reflects her healthiness during pregnancy, as well as factors such as womb size (Mueller, 1986).

Each regression includes dummies for the sex and age of the child; since height has been standardized for age and sex, these coefficients reflect differences relative to the median child in the United States. Data from almost all developing countries reflect a similar child age-height profile, (Waterlow, *et al.*, 1977): relative to the standards, heights decline with age until around two years when they stabilize and, possibly, rise again. The decline is greatest for illiterate mothers but can, for all age groups, be ameliorated by mothers who can read or have received some education. While these differences in heights are significant, the shapes of the child age-height profiles are identical for all three maternal education categories.

(b) Community characteristics

The impact on child height of prices, infrastructure, the availability and quality of health and education services are reported in Table 3 for the pooled sample and stratified by urban-rural location, child age and mother's education. The impact of interactions between ℓnPCE and infrastructure, stratified by sector of residence, are reported in Table 4.[30]

[29]There are substantial differences in the racial composition of the people in the Northeast and South of Brazil; in the absence of race controls, parental height should also serve as good indicators of ethnic background.

[30]None of the interactions between health and education services and ℓnPCE was significant and so those groups of covariates are not included in Table 4.

There is little correlation across the groups of community covariates, reflecting the large degree of heterogeneity in the extent of services across Brazil. Thus, the results discussed below are robust to the exclusion of one or more of the groups of characteristics. In many cases, however, there is a fair amount of correlation within groups of characteristics and so χ^2s for the joint significance of all covariates in each group are reported at the foot of Table 3.

Taken together, prices have a significant effect on child height, in both the rural and urban sector and in all age groups. Prices are significant for all three levels of maternal education, although the χ^2 is much larger for illiterate mothers. Since the prices are measured in logarithms, the estimated effects can be interpreted as elasticities.[31]

Higher price indices for dairy products and sugar are associated with shorter children and this effect is greater for urban children.[32] The dairy price has a significant impact only on children aged 6 months or older, that is after children are weaned. In fact, the impact of both price indices varies with the age of the child in a non-linear manner. Higher fish prices are associated with shorter children, but only in the rural sector. The negative effects of increases in the prices of dairy, sugar and fish are greatest for children whose mothers are illiterate suggesting that educated mothers are better able to protect their children from the deleterious effects of these price rises. Even the healthiness of children of the most educated mothers is, however, significantly affected by higher prices for these commodities.

The prices of cereals (mostly rice) and meat have positive effects on the height of rural children and children whose mothers are illiterate. Other work (Thomas, Strauss and Barbosa, 1989) has shown that, relative to small children, cereals and meat are consumed relatively more by households with older household members, especially males; if a rise in the price of these foods results in switching to foods which are consumed by small

[31]Replacing *per capita* expenditure with household nonwage income then the estimated effects of community characteristics in the reduced form [4] are about 10% larger than in the conditional output function [5]; the largest changes are observed in the rural sector. Since price elasticities in the reduced form model are not conditional on consumption choices, the price effects differ the most, in some cases by 20%. Nevertheless, in almost cases, inference remains the same in both models. We focus, therefore, on results including controls for PCE.

[32]Sugar products are the source of approximately 13 *per cent* of per capita caloric intake in Brazil according to ENDEF tabulations.

children (and these include dairy products), then child health may improve as a result of the increase in meat and cereals prices.[33]

Price effects, including interactions with ℓnPCE are reported in Table 4. In addition to the coefficient estimates and a χ^2 test statistic for the significance of both the direct and interacted effect, the estimated impacts evaluated at quartiles of PCE are presented.

In both the urban and rural sectors, the price-expenditure interaction terms are jointly significant (χ^2 are 34.6 and 17.7 respectively) as are all direct and indirect price effects taken together (χ^2 are 98.7 and 112.2 respectively). Interactions between PCE and the prices of beans and meat in the urban sector, and the price of cereals in the rural sector are significant: all these interactions are negative. In the urban sector, a rise in the price of beans is associated with taller children at the bottom of the expenditure distribution and a decline at the top; the same is true of a rise in the price of cereals in the rural sector. All urban children are adversely affected by higher meat prices.

The fact that children from households at the top of the expenditure distribution are more affected by some prices contrasts with results on the demand for nutrients and demand for health which indicate that price elasticities decline with expenditure (Timmer, 1981; Strauss, 1982; Pitt, 1983; Behrman and Deolalikar, 1989b; Gertler and van der Gaag, 1990). Furthermore, since children of better educated mothers are least affected by price rises, the positive price-expenditure interactions suggest that maternal education does not simply proxy for resource availability. Part of the benefits of maternal education in Brazil presumably operate through information processing channels (Kottak, 1988; Thomas, Strauss and Henriques, 1990b).

Urban children tend to be taller, especially those of mothers with at least elementary education (Table 3). In the urban sector, child height is positively associated with population density and also the degree to which the *municipio* is urbanized. These variables are probably picking up effects of factors other than those we are able to measure directly.

The *per capita* number of buildings with water, sewerage hookups and electricity connections may be interpreted as measures of the availability, and to some extent quality, of basic infrastructure and services in a

[33]There is evidence that higher food prices can be associated with higher nutrient intakes (see Pitt, 1983; Pitt and Rosenzweig, 1985; and also Behrman, 1990b, for a review). This is also true in the data used in this study (Thomas, Strauss and Barbosa, 1989).

community.[34] They are all positively associated with the height of Brazilian children. The positive impact of sewerage hookups is significant only for children aged 5 years or older whereas the number of electricity connections is significantly positively associated with the length of babies. Both sets of services are complementary with maternal education: the effects are largest, and significant, for children whose mothers have at least some elementary education.

The positive correlation between all three sets of services and child height is also observed in urban Brazil but the height of rural children is positively associated only with the number of electricity connections and is inversely associated with the number of water connections. This most probably reflects problems in our measures of the health environment in rural areas; modern water and sewerage infrastructure is likely to be available primarily in urban areas and so it would be useful to have more detailed information on, for example, water sources in rural areas (recall that *municipios* in general contain both urban and rural areas). Unfortunately, these data are not available at a *municipio* level. We suspect that in the rural sector the number of electricity connections is indicative of the existence of a broader range of services.

Conditional on this level of infrastructure, the *per capita* number of buildings in the *municipio* may be interpreted as indicative of the number of buildings *without* modern water or sewerage facilities. They have a negative impact on child height which is significant in the urban sector. The impact is (absolutely) large and significantly negative for children with educated mothers. but positive for children with illiterate mothers. Maternal education and the number of buildings in a community are apparently substitutes.

When expenditure interactions are included in the model, (Table 4), the *per capita* number of water and sewerage hook-ups are significant determinants of child height. In the rural sector, water and sewerage services are complementary with *per capita* expenditure and this is also true of sewerage in the urban sector. Higher expenditure households apparently gain more from the availability of modern services similar to better educated women. This may reflect the existence of better quality water and sewerage services in areas where higher income households live. More buildings (without modern services) and PCE are substitutes in both sectors, the interaction being significant for urban children.

---

[34]For each *municipio*, the IBM reports the number of buildings, the number with water connections, and so on. To the extent that buildings are underreported, for instance in *favellas*, errors will be encountered. We have no information on these errors, but do know there is enormous heterogeneity in the availability of infrastructure (see Table 1); this variation should help minimize any effects of misreporting.

Whereas the infrastructure discussed above is informative about the environment in which a child is raised, the *per capita* number of hospitals and clinics, doctors and nurses are measures of the availability and quality of health services. Among these, only the number of nurses *per capita* has an impact on child height -- and the effect is negative, holding all other services constant. This effect is significant for urban children but not for children whose mothers are illiterate: for these women, presumably, whatever is behind the negative effect of nurses is offset by the availability of greater access to health care. The number of beds per hospital is an indicator of the size of each unit; larger institutions are associated with shorter children suggesting that children do not benefit from being near large centralized health facilities. These results may arise because health service quality is measured rather poorly. An alternative explanation could be that larger health facilities (with relatively more nurses) locate in poor areas (or where children are less healthy), in which case these services are not exogenous (Rosenzweig and Wolpin, 1986).

It has been argued that the quality of community education services may affect parents' investments in other dimensions of child human capital, including health. The effects of the quality of education services are reported in the bottom panel of Table 3. None of the education services covariates is significant in the urban sector. Among rural children, the number of teachers *per capita* in the *municipio* is positively associated with child height, and this effect is strongest for better educated mothers: there may be complementarities between investments in human capital at home and at school.

5. DISCUSSION

Our results demonstrate that local market prices and community infrastructure do have significant effects on child height, but it is difficult to infer the relative magnitudes of these effects from the tables. The standardized heights (as percentage of the US median) associated with raising prices and improving access to infrastructure are presented in Figures 1 and 2.

The upper panel of Figure 1 displays the effect on the height of an average child when each price is raised by two standard deviations from the mean. Dairy and sugar prices have a sizable impact on child height. If the price of dairy products rises by two standard deviations, then mean standardized height falls from 94.8% of the US median to 93.3%; for a boy aged five years, this is equivalent to about a 2 cm decline in height. A similar rise in sugar prices would reduce mean standardized height to 94%. A two standard deviation rise in cereal prices is associated with a *rise* of about 0.2% in average height.

The lower half of Figure 1 presents the effects of changes in dairy and sugar prices, distinguishing children of mothers with different levels of education. Since the height of an average child varies with maternal education, the base for each group is different: this base is represented by the bars with downward sloping lines. The height of the child after a two standard deviation rise in the price is represented by the bars with (heavier) upward sloping shading and so the portion of the bars with single lines represents the *change* in height associated with the rise in price. (Notice the scales are different in the upper and lower halves of the figure).

A two standard deviation rise in the dairy price will reduce the standardized height of a child with an illiterate mother by 1.8% to 90.7% of the US median. The declines for children with better educated mothers are also large, although not quite as dramatic: 0.7% if the mother is literate and 1.3% if she has some schooling. A similar rise in the price of sugar is associated with a reduction in average child height of about 1% if the mother is illiterate; the reduction declines to 0.6% if the mother has some schooling. In Brazil, then, better educated mothers are able to partially offset the deleterious effects of higher food prices. Recall, however, that children of higher income households are more affected by some prices suggesting that these maternal education effects do not purely reflect the role of income.

The magnitudes of the changes in height associated with a two standard deviation increase in infrastructure are displayed in Figure 2 (with the same scales as in Figure 1): the effects are not as dramatic as those for prices. Increasing the availability of electricity is associated with average height rising 0.4%. The impact is, however, substantially larger in the rural sector, where the rise in height is almost 2% (equivalent to over 3 cms in a five year old boy). Greater access to modern water and sewerage services is associated with a 0.2% increase in height (and these effects are slightly larger in the urban sector). These results add to the growing evidence that investments in basic infrastructure are likely to have a substantial payoff in their impact on child health.

Children of better educated mothers, and in higher income (urban) households, benefit more from the availability of sewerage and electricity. For example, whereas the height of a child of an illiterate mother will be increased by 0.3% with a two standard deviation rise in sewerage services, the rise for a child with a mother who has at least some elementary schooling is more than double that (0.7%). Similarly, a rise in electricity services is associated with a *decline* (of 0.4%) in the average height of a child with an illiterate mother, but a large increase (of 0.8%) if the mother has some schooling.

In contrast to the effects of water and sewerage sanitation, there is little evidence in these data of correlations between child height and the availability and quality of health services. Nor is there evidence that the quality of education services is associated with the height of children.

In sum, this paper has demonstrated that, over and above household characteristics, local prices and infrastructure affect child height. In addition to varying with the age of the child, the effects of community characteristics are systematically correlated with maternal education and household resources. We have been able to identify those (public and private) investments which are likely to have the largest return to (long run) child health as well as identify the probable distributional impact of these investments.

References

Alderman, H., 1990, New research on poverty and malnutrition: what are the implications for research and policy?, in M. Lipton and J. van der Gaag, *Including the Poor*, (Washington D.C., World Bank), forthcoming.

Barrera, A., 1990, The role of maternal schooling and its interaction with public health programs in child health production, *Journal of Development Economics* 32:69-91.

Becker, G. S., 1981, *A Treatise on the Family* (Harvard University Press, Cambridge, MA).

Behrman, J., 1990a, *Interactions Among Human Resources and Poverty: What Do We Know and Not Know?* (Washington D.C.: World Bank, PHR).

Behrman, J., 1990b, Nutrient intake demand relations: Incomes, prices and schooling, mimeo (University of Pennsylvania).

Behrman, J. and N. Birdsall, 1983, The quality of schooling: quantity alone is misleading, *American Economic Review* 73:928-46.

Behrman, J. and A. Deolalikar, 1989a, Seasonal demands for nutrient intakes and health status in rural South India, in D. Sahn, ed., *Seasonal Variability in Third World Agriculture* (Baltimore, Johns Hopkins University Press).

Berhman, J. and A. Deolalikar, 1989b, Is variety the spice of life? Implications for nutrient responses to income, *Review of Economics and Statistics* 71.4:666-67.

Behrman, J and C. Sussangkarn, 1989, Parental schooling and child outcomes: mother versus father schooling, quality and interactions, mimeo, (University of Pennsylvania).

Behrman, J. and B. Wolfe, 1984, More evidence on nutrition demand: income seems overrated and women's schooling underemphasised, *Journal of Development Economics* 14.1:105-28.

Behrman, J. and B. Wolfe, 1987, How does mother's schooling affect family health, nutrition, medical care usage and household sanitation?, *Journal of Econometrics* 36:185-204.

Blundell, R., M. Browning and C. Meghir, 1989, A Microeconometric Model of Intertemporal Substitution and Consumer Demand, UCL Discussion Paper 89-11 (University College, London).

Caldwell, J., 1979, Education as a factor in mortality decline: An examination of Nigerian data, *Population Studies* 33:395-413.

Cebu Team, 1988, A longitudinal analysis of child health outcomes, mimeo, (Carolina Population Studies Center).

Cebu Team, 1989, The production of child health: morbidity and growth differences related to gender of the infant, mimeo, (Carolina Population Studies Center).

Cebu Team, 1990, Underlying and proximate determinants of child health: the Cebu longitudinal health and nutrition survey, *American Journal of Epidemiology* forthcoming.

DaVanzo, J., 1988, Infant mortality and socioeconomic development: Evidence from Malaysian household data, *Demography* 25:581-596.

Deaton, A., 1982, Demand Analysis, in M. Intrilligator and R. Quandt eds., *Handbook of Econometrics* (North Holland, Amsterdam).

Deaton, A., 1988, Quality, quantity and spatial variation of prices, *American Economic Review* 78:418-430.

Deaton, A., 1989, Savings in Developing Countries: Theory and Review *Proceedings of the World Bank Conference on Development Economics* 61-96 (World Bank, Washington D.C.)

Efron, B., 1982, The Jackknife, the Bootstrap and other Resampling Plans, *SIAM CBMS-NSF Monograph*, 38

Falkner, F. and J. Tanner 1986, *Human Growth: A Comprehensive Treatise*, Vol 3, 2nd Edition, (Plenum Press, New York).

Foster, A., 1990, Rice prices, credit markets and child growth in rural Bangladesh, mimeo, (University of Pennsylvania).

Guilkey, D. and J. Akin, 1990, The production of infant health: input demand and health status differences related to gender of the infant, mimeo, (University of North Carolina).

Habicht, J., R. Martorell, C. Yarborough, R. Malina and R. Klein, 1974, Height and Weight Standards for Pre-school Children: How relevant are ethnic differences in growth potential?, *Lancet* 1:611-614

Horton, S., 1986, Child nutrition and family size in the Philippines, *Journal of Development Economics* 23:161-7.

Horton, S., 1988, Birth order and child nutritional status: evidence on the intrahousehold allocation of resources in the Philippines, *Economic Development and Cultural Change* 36.2:341-54.

Jimenez, E., 1987, *Pricing Policy in the Social Sectors: Cost Recovery for Education and Health in Developing Countries* (Baltimore, Johns Hopkins Press).

Kottak, C., 1988, Television's impact in Brazil, mimeo, (University of Michigan).

Leviatan, N., 1961, Errors in variables and Engel Curve analysis, *Econometrica* 29:336-362.

Martin, L., J. Trussell, F. Salvail and N. Shah, 1983, Covariates of child mortality in the Philippines, Indonesia and Pakistan: an analysis based on hazard models, *Population Studies* 37:417-32.

Martorell, R. and J. Habicht, 1986, Growth in Early Childhood in Developing Countries, in F. Falkner and J. Tanner, eds., *Human Growth : A Comprehensive Treatise*, Vol 3, 2nd edition, (Plenum Press, New York).

Merrick, T. W., 1985, The effect of piped water on early childhood mortality in urban Brazil, 1970 to 1976, *Demography* 22.1:1-24.

Mueller, W., 1986, The genetics of size and shape in children and adults, in Falkner, F. and J, Tanner, eds., *Human Growth : A Comprehensive Treatise*, Vol 3, 2nd edition, (Plenum Press, New York).

National Center for Health Statistics, 1976, *Growth Charts*, (U.S. Department of Health and Human Services, Public Health Service, Health Resources Administration).

Paxson, C., 1989, Household savings in Thailand: Responses to income shocks, Research Program in Development Studies Discussion Paper No.137, (Woodrow Wilson School, Princeton University).

Pitt, M., 1983, Food preferences and nutrition in rural Bangladesh, *Review of Economics and Statistics* 65:105-114.

Pitt, M. and M. Rosenzweig 1985, Health and nutrient consumption across and within farm households, *Review of Economics and Statistics* 67:212-223.

Pollak, R., 1969, Conditional demand functions and consumption theory, *Quarterly Journal of Economics* 83:70-78.

Rosenzweig, M. and T. P. Schultz, 1982, Child mortality and fertility in Colombia: individual and community effects, *Health Policy and Education*, 2:305-48.

Rosenzweig, M. and T. P. Schultz, 1983, Estimating a household production function: Heterogeneity, demand for health inputs and the effect of birth weight, *Journal of Political Economy*, 91:723-746.

Rosenzweig, M. and K. Wolpin, 1986, Evaluating the Effects of Optimally Distributed Public Programs, *American Economic Review* 76:470-482.

Sahn, D., 1990, Malnutrition in Côte d'Ivoire: Prevalence and determinants, SDA Working Paper 4, (World Bank, Washinton D.C.)

Schultz, T. P., 1984, Studying the impact of household economic and community variables on child mortality, in H. Mosley and L. Chen, eds., *Child Survival: Strategies for Research*, Population and Development Review supplement to volume 10.

Schultz, T. P., 1988, Population programs: measuring their impact on fertility and the personal distribution of their effects, *Journal of Policy Modelling*, 10.1:113-49.

Schultz, T. P., 1990, Testing the neoclassical model of family labor supply and fertility, *Journal of Human Resources* forthcoming.

Strauss, J., 1982, Determinants of food consumption in rural Sierra Leone: Application of the Quadratic Expenditure System to the consumption-leisure choice of a household-firm model, *Journal of Development Economics* 11:327-353.

Strauss, J., 1990, Households, Communities and Preschool Children's Nutrition Outcomes: Evidence from Rural Cote d'Ivoire, *Economic Development and Cultural Change*, 38:231-62.

Thomas, D., J. Strauss and M. Barbosa, 1989, Estimating the impact of price and income changes on consumption in Brazil, Economic Growth Center Discussion Paper #589.

Thomas, D., J. Strauss and M. Henriques, 1990a, Child Survival, Height for Age and Household Characteristics in Brazil, *Journal of Development Economics* forthcoming.

Thomas, D., J. Strauss and M. Henriques, 1990b, How does mother's education affect child height, *Journal of Human Resources* forthcoming.

Thomas, D., 1990a, Intra-household resource allocation: an inferential approach, *Journal of Human Resources* forthcoming.

Thomas, D., 1990b, Like father, like son: Gender bias and household resource allocations, mimeo, (Yale University).

Thomas, V., 1982, Differences in income, nutrition and poverty within Brazil, World Bank Staff Working Paper No. 505, World Bank, Washington D.C.

Timmer, P., 1981, Is there curvature in the Slutsky matrix?, *Review of Economics and Statistics* 63:395-402.

Timmer, P. and H. Alderman, 1979, Estimating consumption parameters for food policy analysis, *American Journal of Agricultural Economics* 61:982-87.

Udry, C., 1990, Credit markets in northern Nigeria: Credit as insurance in a rural economy, *World Bank Economic Review* forthcoming.

Waterlow, J., R. Buzina, W. Keller, J. Lane, M. Nichaman, J. Tanner, 1977, The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of ten years, *Bulletin of the World Health Organisation* 55:489-98.

Wolfe, B., and J. Behrman, 1987, Women's Schooling and Children's Health, *Journal of Health Economics* 6:239-254.

Table 1 : Summary statistics : means and standard deviations

— Household, child and local market characteristics (based on ENDEF survey data)

	All children Mean	[s.d.]	Rural children Mean	[s.d.]	Urban children Mean	[s.d.]
Household characteristics						
Household per capita expenditure	278.27	[362.87]	143.90	[115.93]	352.42	[426.74]
log(household per capita expenditure)	5.22	[0.83]	4.76	[0.63]	5.48	[0.82]
Dummy(1) if mother						
literate	0.43		0.39		0.45	
completed elementary school	0.15		0.06		0.21	
completed secondary school/higher	0.07		0.01		0.10	
Dummy(1) if father						
literate	0.44		0.44		0.44	
completed elementary school	0.15		0.06		0.21	
completed secondary school/higher	0.08		0.01		0.12	
Mother's height (% US median)	94.50	[3.91]	94.01	[3.84]	94.78	[3.92]
Father's height (% US median)	94.29	[3.94]	93.83	[4.01]	94.57	[3.87]
Child characteristics						
Standardized height (% US median)	94.79	[6.51]	93.25	[6.22]	95.68	[6.51]
Dummy (1) if male	0.51		0.51		0.51	
Dummy (1) if aged						
6 - 11 months	0.05		0.05		0.05	
12 - 17 months	0.05		0.05		0.05	
18 - 23 months	0.05		0.05		0.05	
2 years	0.11		0.11		0.11	
3 years	0.11		0.11		0.11	
4 - 5 years	0.23		0.23		0.23	
6 - 8 years	0.34		0.34		0.34	
Local market price indices						
Beans	1.00	[0.14]	0.93	[0.11]	1.04	[0.14]
Cereals	1.02	[0.14]	0.94	[0.09]	1.06	[0.14]
Dairly products	0.95	[0.09]	0.86	[0.08]	1.01	[0.05]
Fish	1.03	[0.12]	0.94	[0.11]	1.08	[0.08]
Meat	1.01	[0.07]	0.95	[0.04]	1.04	[0.08]
Sugar	0.97	[0.08]	1.01	[0.09]	0.94	[0.07]

B Community service quality and availability (based on municipio level data)

Weighted by municipio population

	Municipios in ENDEF					All Municipios in South & NE Brazil
	All municipios Mean	Std dev	Z=0	Region South	NE	
Urbanization						
% population urban (1970 census)	65.32	[2.31]	0.0	70.23	55.28	48.82
population density (persons/km²)	1361.68	[14212.62]	0.0	1466.77	1147.00	786.17
Community infrastructure						
per 100 000 capita # buildings	173.51	[621.35]	0.0	190.95	137.89	131.19
per 100 000 capita # buildings w/ water	94.22	[491.14]	5.1	111.84	58.22	70.00
per 100 000 capita # buildings w/ sewerage	46.82	[408.92]	31.7	63.02	13.71	33.61
per 100 000 capita # electicity connections	158.24	[660.73]	0.0	188.87	89.58	110.69
Health services						
# hospital beds per hospital	120.01	[1953.33]	4.8	142.96	73.14	81.05
per 100 000 capita # hospitals	4.96	[0.26]	4.8	4.91	5.04	4.98
per 100 000 capita # clinics	5.01	[0.54]	1.8	5.01	5.03	5.95
per 100 000 capita # doctors	10.11	[0.70]	1.0	10.81	8.70	6.59
per 100 000 capita # nurses	19.98	[0.21]	14.2	22.17	15.50	12.60
Education services						
elementary student/teacher ratio	26.09	[46.57]	0.0	25.74	26.81	26.69
elementary student/school ratio	311.22	[1756.83]	0.0	377.76	175.28	205.80
post elementary student/teacher ratio	12.71	[51.44]	4.6	13.46	11.18	9.95
# teachers per 100 000 capita	12.03	[37.48]	0.0	12.97	10.12	10.37
# municipios	603			363	240	2 756

Table 2 : Household determinants of log(child height for age)

	All	Sector of residence		Age of child in months				Education of mother		
		Urban	Rural	0-5	6-23	24-59	60-107	Illit	Literate	Elem+
ıts' characteristics										
r capita	0.875	0.137	0.635	-0.265	0.263	1.327	0.901	-8.174	-1.276	5.303
enditure)	[3.86]	[0.47]	[1.44]	[0.25]	[0.46]	[3.47]	[2.93]	[1.50]	[0.33]	[1.31]
r capita	.	.	.	.	.	.	.	1.032	0.308	-0.397
enditure)²								[1.80]	[0.86]	[1.28]
(1) mother	0.641	1.134	0.369	1.266	1.102	0.550	0.486	.	.	.
erate	[6.63]	[8.22]	[2.47]	[2.60]	[3.98]	[3.23]	[3.79]			
pleted	1.102	1.735	0.706	1.695	1.658	1.006	0.909	.	.	.
lementary school	[7.06]	[8.52]	[2.45]	[2.21]	[3.79]	[3.70]	[4.36]			
econdary/ more	1.618	2.615	1.510	3.538	2.250	1.365	1.421	.	.	.
	[5.99]	[7.65]	[2.06]	[2.68]	[3.31]	[2.96]	[3.75]			
(1) father	0.536	0.866	0.387	0.748	1.124	0.592	0.282	0.135	0.577	1.182
erate	[5.70]	[6.41]	[2.85]	[1.56]	[4.56]	[3.47]	[2.23]	[0.89]	[3.95]	[2.46]
pleted	1.197	1.748	0.550	1.063	1.951	1.251	0.896	0.530	0.767	1.836
lementary school	[7.89]	[9.11]	[1.90]	[1.45]	[4.87]	[4.69]	[4.31]	[1.56]	[3.52]	[3.31]
econdary/ more	1.817	2.670	1.805	1.043	3.432	1.824	1.327	2.676	1.245	2.998
	[6.83]	[8.25]	[2.37]	[0.78]	[4.98]	[4.10]	[3.68]	[1.61]	[2.85]	[4.15]
eight)	34.426	33.388	36.859	18.432	32.668	34.287	36.554	34.101	33.595	34.806
mother	[40.67]	[30.65]	[26.59]	[4.58]	[14.67]	[22.41]	[31.53]	[23.85]	[26.51]	[19.18]
father	28.112	26.225	27.887	8.480	23.914	26.253	29.073	26.431	24.194	26.863
	[29.42]	[22.26]	[19.80]	[1.94]	[9.90]	[16.39]	[24.48]	[18.08]	[18.17]	[13.54]
y (1) urban	0.580	.	.	2.075	0.387	0.084	0.850	0.231	-0.026	1.504
	[2.61]			[1.94]	[0.66]	[0.22]	[2.76]	[0.64]	[0.07]	[2.63]
d's characteristics										
y (1) male	-0.328	-0.307	-0.351	-0.831	-0.483	-0.112	-0.392	-0.292	-0.402	-0.250
	[5.39]	[3.93]	[3.55]	[2.77]	[2.91]	[1.03]	[4.73]	[2.65]	[4.48]	[2.08]
y (1) aged										
11 months	-3.799	-3.531	-4.225	.	.	.	.	-4.547	-3.848	-2.980
	[18.04]	[13.30]	[12.22]					[12.32]	[11.70]	[7.32]
-17 months	-4.768	-4.218	-5.642	.	.	.	.	-5.955	-5.026	-2.876
	[22.81]	[16.22]	[16.06]					[16.00]	[15.55]	[7.18]
-23 months	-5.225	-4.783	-5.969	.	.	.	.	-6.437	-5.621	-3.131
	[24.96]	[18.46]	[16.77]					[16.41]	[17.55]	[8.38]
years	-4.138	-3.718	-4.804	.	.	.	.	-5.056	-4.448	-2.545
	[22.78]	[16.45]	[15.73]					[15.49]	[15.69]	[7.61]
years	-4.613	-4.329	-5.101	.	.	.	.	-5.371	-4.977	-3.147
	[25.62]	[19.37]	[16.79]					[16.69]	[17.82]	[9.24]
5 years	-4.737	-4.478	-5.171	.	.	.	.	-5.485	-5.038	-3.479
	[28.45]	[21.80]	[18.29]					[18.67]	[19.17]	[11.11]
8 years	-4.619	-4.336	-5.066	.	.	.	.	-5.118	-5.064	-3.489
	[28.79]	[21.98]	[18.52]					[18.07]	[20.01]	[11.51]
/12-17 /36-47	.	.	.	0.221	-1.041	-0.463	0.263	.	.	.
/72-83 mths				[0.41]	[5.07]	[3.43]	[2.15]			
-4/18-23 /48-59	.	.	.	-0.434	-1.458	-0.563	0.143	.	.	.
/84-95 mths				[1.01]	[7.15]	[4.19]	[1.18]			
/ /./96-107	.	.	.	-1.859	.	.	0.021	.	.	.
/96-107 mths				[4.32]			[0.18]			
statistics										
all covariates)	358.54*	213.25*	108.49*	9.36*	63.15*	129.85*	188.82*	73.31*	115.48*	53.54*
for										
(PCE), lnPCE²=0	.	.	.	.	.	.	.	20.87*	54.09*	1.77
ther educn=0	55.37*	79.86*	8.58*	8.73*	17.61*	14.54*	20.36*	.	.	.
ther educn=0	64.06*	86.26*	9.69*	3.02*	30.05*	22.78*	20.60*	4.29*	18.83*	21.52*
ther=father educn	2.31	3.87	0.41	2.72	3.05	0.99	1.95	.	.	.
servations	36974	22737	14237	1819	5885	12534	16736	12930	15857	8187
height (% median)	94.8	93.3	95.7	98.6	94.8	94.8	94.8	92.5	95.0	97.7

s
ependent variable is logarithm of % median height of well nourished child in United States of the same age and sex: all oefficients have been multiplied by 100. t statistics in parentheses and χ^2 test statistics based on jackknifed estimates f variance covariance matrix.

Table 3 : Community determinants of log(child height for age)

	All	Sector of residence		Age of child in months				Education of mother		
		Urban	Rural	0-5	6-23	24-59	60-107	Illit	Literate	Elem+
market prices										
(ice) of	-5.476	-8.663	-4.551	-7.063	-5.557	-4.086	-6.345	-6.809	-2.455	-4.802
y products	[6.11]	[5.91]	[2.61]	[1.46]	[2.29]	[2.64]	[5.10]	[4.31]	[1.69]	[2.25]
ns	0.119	0.533	2.741	-1.384	-0.163	0.028	0.439	1.035	-0.381	0.247
	[0.25]	[0.85]	[2.04]	[0.60]	[0.13]	[0.03]	[0.67]	[1.05]	[0.53]	[0.25]
is	1.364	-0.358	2.887	1.675	3.613	0.937	1.059	2.845	0.542	-0.050
	[2.80]	[0.51]	[3.36]	[0.71]	[2.69]	[1.07]	[1.57]	[3.20]	[0.75]	[0.04]
	0.258	-1.261	12.310	-11.820	0.967	-0.065	1.863	2.660	1.317	-3.239
	[0.21]	[0.79]	[3.73]	[1.92]	[0.29]	[0.03]	[1.11]	[1.20]	[0.69]	[1.26]
sh	-0.791	0.968	-3.601	0.567	-1.101	-0.309	-1.542	-1.981	-0.455	-0.849
	[1.47]	[0.99]	[3.05]	[0.19]	[0.74]	[0.32]	[2.15]	[2.00]	[0.59]	[0.68]
	-4.999	-3.163	-2.778	-7.383	-4.285	-6.892	-3.659	-6.057	-5.076	-4.027
	[8.10]	[2.84]	[2.59]	[2.24]	[2.52]	[6.20]	[4.40]	[5.76]	[5.49]	[2.85]
anization										
	0.316	0.897	-0.115	1.559	-0.042	0.241	0.290	-0.638	-0.373	1.584
	[0.86]	[2.05]	[0.14]	[0.78]	[0.04]	[0.36]	[0.60]	[0.87]	[0.67]	[2.31]
tion	0.007	0.006	-0.016	0.025	0.008	0.008	0.005	0.011	0.010	0.008
ensity	[2.13]	[1.31]	[1.50]	[1.38]	[0.85]	[1.33]	[1.07]	[1.49]	[1.94]	[1.05]
nity infrastructure										
0 capita #										
er	0.234	0.371	-0.870	-0.795	0.415	0.277	0.283	-0.305	0.744	-0.245
installations	[1.76]	[2.45]	[2.62]	[1.10]	[1.14]	[1.07]	[1.65]	[1.15]	[4.14]	[0.85]
ewerage	0.353	0.490	0.040	0.843	-0.109	0.294	0.499	0.384	0.139	0.828
okups	[2.74]	[3.13]	[0.15]	[1.20]	[0.28]	[1.22]	[3.02]	[1.41]	[0.75]	[3.35]
tricity	0.345	0.358	1.484	1.669	-0.110	0.449	0.270	-0.327	0.412	0.632
nnections	[2.73]	[2.36]	[4.46]	[2.46]	[0.31]	[1.99]	[1.56]	[1.16]	[2.27]	[2.63]
uildings	-0.312	-0.373	-0.395	-1.190	-0.394	-0.207	-0.259	0.724	-0.515	-0.861
	[2.35]	[2.42]	[1.19]	[1.78]	[1.02]	[0.84]	[1.51]	[2.76]	[2.57]	[3.26]
h services										
r hospital	-0.040	-0.031	-0.174	-0.108	-0.123	-0.048	-0.008	0.024	-0.054	-0.021
	[2.13]	[1.59]	[1.44]	[0.59]	[0.48]	[1.74]	[0.32]	[0.18]	[1.97]	[0.69]
000 capita #	-80.367	-218.433	161.492	92.554	-139.836	165.047	-241.475	-186.389	-11.341	161.051
pitals	[0.91]	[1.61]	[1.24]	[0.21]	[0.54]	[1.01]	[2.13]	[1.24]	[0.09]	[0.73]
ics	-35.929	2.701	-33.868	-868.131	23.672	-105.588	50.812	21.712	-36.993	-5.738
	[0.70]	[0.04]	[0.42]	[2.46]	[0.12]	[1.11]	[0.85]	[0.25]	[0.63]	[0.03]
octors	4.441	-0.878	13.028	6.202	32.423	-11.229	7.022	1.449	11.440	10.610
	[0.59]	[0.10]	[0.40]	[0.16]	[1.56]	[0.81]	[0.71]	[0.09]	[1.02]	[0.77]
urses	-63.679	-62.843	-51.921	-104.983	-116.359	-53.591	-54.301	1.560	-79.773	-76.476
	[3.13]	[2.71]	[0.74]	[0.91]	[2.00]	[1.40]	[2.08]	[0.03]	[2.62]	[2.03]
ication services										
mentary students	-0.572	0.696	0.311	2.381	-0.866	-1.678	-0.191	-2.741	-0.448	1.224
er teacher	[0.76]	[0.58]	[0.28]	[0.61]	[0.43]	[1.24]	[0.19]	[2.14]	[0.40]	[0.70]
ary students	0.005	0.071	-0.522	-0.134	0.251	0.003	-0.052	-0.126	0.024	0.025
school	[0.13]	[1.68]	[3.54]	[0.72]	[2.52]	[0.05]	[1.01]	[1.42]	[0.43]	[0.40]
lementary	-0.189	-1.188	1.882	0.040	-0.395	-0.859	0.012	-0.062	0.341	-0.154
students/teacher	[0.32]	[1.50]	[2.01]	[0.01]	[0.25]	[0.79]	[0.02]	[0.06]	[0.40]	[0.12]
capita #	3.598	0.584	7.323	-0.413	11.119	1.532	2.826	0.707	4.129	3.935
ators	[2.64]	[0.32]	[3.22]	[0.08]	[3.02]	[0.61]	[1.55]	[0.26]	[2.04]	[1.46]
est statistics for significance of										
ices	212.77*	97.62*	136.36*	12.78*	38.71*	86.26*	8.19*	145.33*	67.85*	11.87*
anization	10.75*	8.63*	2.30	5.46*	0.95	2.55	98.99*	2.53	4.20	13.35*
structure	32.08*	39.23*	22.27*	9.59*	2.16	12.14*	24.62*	8.15*	35.42*	28.92*
services	5.77*	5.28*	4.21	6.35*	2.73	6.23*	5.34*	1.60	4.72*	1.57
ication services	14.87*	5.41*	33.17*	0.95	18.66*	5.16*	5.99*	12.52*	7.71*	2.85
l community covs	508.33*	303.83*	297.97*	34.20*	95.95*	229.71*	264.84*	242.67*	227.05*	91.03*

See Table 2. All coefficients multiplied by 100 except those on population density, beds per hospital and education services which are multiplied by 10000.

Table 4 : Interactions between prices, infrastructure and ℓnPCE

	Coefficient estimates: Direct	Coefficient estimates: Interaction with lnPCE	χ^2	Estimated effect evaluated at quartiles of PCE: bottom	medium	top
URBAN						
Local market prices						
log(price of)	-18.702	1.559	28.933	-10.99	-10.23	-9.36
dairy products	[0.64]	[0.29]	[0.00]			
beans	57.348	-10.238	16.623	6.70	1.74	-4.03
	[3.82]	[3.74]	[0.00]			
cereals	8.133	-1.593	0.813	0.25	-0.52	-1.42
	[0.60]	[0.64]	[0.74]			
meat	-42.651	-9.926	5.269	-91.75	-96.57	-102.16
	[1.27]	[2.18]	[0.04]			
fish	55.216	6.715	5.603	88.44	91.69	95.47
	[2.31]	[1.10]	[0.06]			
sugar	16.699	-4.335	22.865	-4.75	-6.85	-9.28
	[0.61]	[0.87]	[0.00]			
Community infrastructure						
per 000 capita #						
water	-0.157	0.094	4.509	0.31	0.35	0.41
installations	[0.03]	[0.10]	[0.06]			
sewerage	-8.118	1.521	8.467	-0.59	0.14	1.00
hookups	[1.72]	[1.81]	[0.01]			
electricity	-3.574	0.772	14.101	0.25	0.62	1.05
connections	[1.03]	[1.22]	[0.00]			
buildings	6.069	-1.168	9.073	0.29	-0.28	-0.93
	[2.20]	[2.33]	[0.01]			
Wald χ^2 test statistics for joint significance of:						
Prices		34.57	98.69			
Infrastructure		8.55	45.20			
Prices & infrastructure		41.37	215.21			
RURAL						
Local market prices						
log(price) of	42.641	-11.077	8.818	-5.19	-9.74	-14.42
dairy products	[0.49]	[0.60]	[0.01]			
beans	50.971	-9.036	11.200	11.95	8.24	4.43
	[0.82]	[0.69]	[0.00]			
cereals	105.639	-22.165	8.111	9.93	0.82	-8.53
	[2.46]	[2.35]	[0.01]			
meat	63.292	-4.937	0.880	41.97	39.94	37.86
	[0.55]	[0.54]	[0.82]			
fish	19.668	-11.917	0.487	-31.79	-36.69	-41.72
	[0.45]	[0.47]	[0.97]			
sugar	23.396	-6.938	6.410	-6.56	-9.41	-12.34
	[0.45]	[0.83]	[0.02]			
Community infrastructure						
per 000 capita #						
water	-20.558	3.948	9.824	-3.51	-1.89	-0.22
installations	[2.27]	[2.18]	[0.00]			
sewerage	-24.185	4.846	4.792	-3.26	-1.27	0.78
hookups	[2.15]	[2.16]	[0.06]			
electricity	-4.886	1.191	3.557	0.26	0.75	1.25
connections	[0.44]	[0.53]	[0.12]			
buildings	13.887	-2.849	2.404	1.59	0.41	-0.79
	[1.55]	[1.55]	[0.24]			
Wald χ^2 test statistics for joint significance of:						
Prices		17.68	112.18			
Infrastructure		11.18	21.53			
Prices & infrastructure		21.45	215.30			

Notes

χ^2 column is test statistic for joint significance of direct effect and interaction term. [p value below χ^2.] Wald test rows are for joint significance of interaction terms (first column) and of direct and interacted terms (second column) for covariates in each group; all these Wald test statistics have p-values less than 0.002. All coefficients multiplied by 100. Also see notes to Tables 2.

Figure 1

Effect of two standard deviation change in prices on child height for age

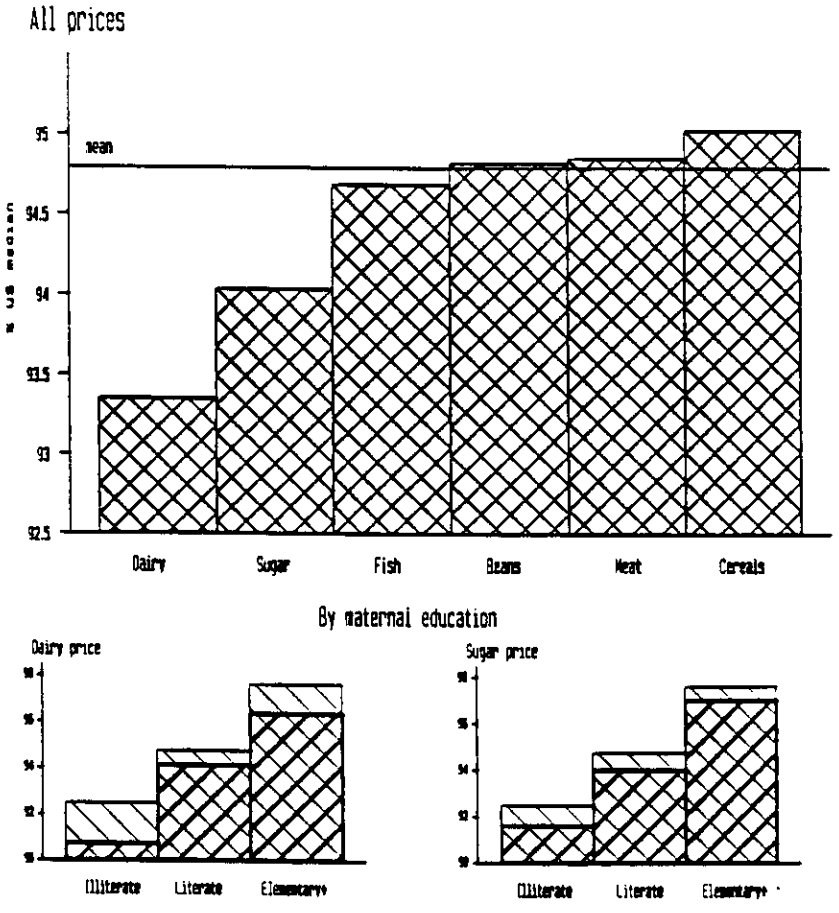
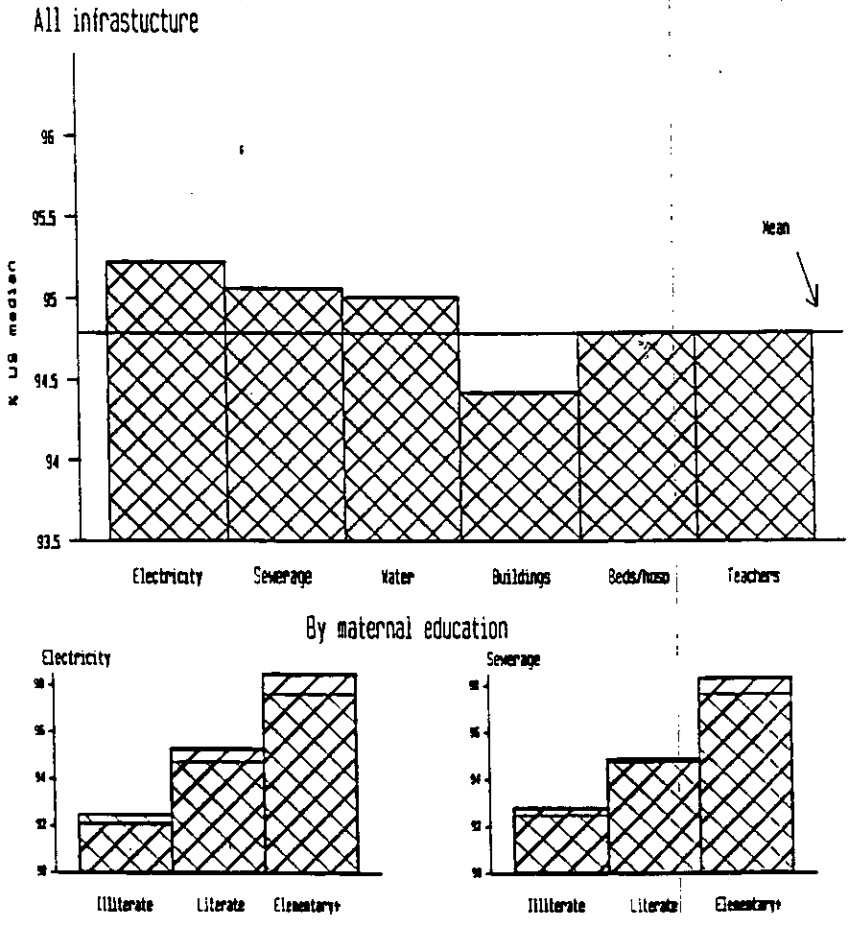


Figure 2

Effect of two standard deviation change in infrastructure on child height for age



IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

THE QUALITY OF SCHOOLING IN BRAZIL AND LABOR MARKET OUTCOMES: SOME FURTHER EXPLORATIONS

Jere Behrman
Nancy Birdsall
Robert Kaplan

documento 05

THE QUALITY OF SCHOOLING IN BRAZIL AND LABOR MARKET OUTCOMES: SOME FURTHER EXPLORATIONS

by

Jere R. Behrman, Nancy Birdsall, and Robert Kaplan*

18 December 1990

*Behrman is William R. Kenan, Jr. Professor of Economics at the University of Pennsylvania, Philadelphia, PA 19104-6297, USA and, for the 1990-1 academic year, Arnold Bernhard Visiting Professor of Economics at Williams College, Williamstown MA 01267, USA. He worked on this paper as a consultant to the World Bank-Mellon Foundation Project on "Education, Growth, and Inequality in Brazil" of which this paper is a part. Birdsall is Chief and Kaplan is a staff member of the Environment Division of the Technical Department in the Latin America and Caribbean Region at the World Bank. The authors along, and not the World Bank nor the Mellon Foundation, bear all responsibility for interpretations given in this paper.

Section 1. Introduction

Schooling is widely thought to be very important in the determination of labor productivity in developing nations, including Brazil. For this reason there are many strong advocates of increasing investment in schooling as part of the pursuit of economic growth and equity objectives. The World Bank (1980, 1981, 1989, 1990), Colclough (1982), Eisemon (1988), Psacharopoulos (1985, 1988), Schultz (1988), Asian Development Bank (1990), and UNDP (1990), among others, all place major emphasis on formal schooling, particularly at the primary level, for the pursuit of such goals in developing countries. Interest in schooling has been heightened recently by the focus on knowledge in the so-called "new economic growth theory" associated with Romer (1986, 1989a-c, 1990), Lucas (1988), Azariadis and Drazen (1990) and others. For the Brazilian context, there has been debate about the effectiveness of schooling investments in pursuing productivity and equity objectives at least since the debate in the early and mid 1970s about whether income distribution had deteriorated with growth in the "miracle" years and what was and should be the role of schooling investment in determining income distribution (e.g., Fishlow 1972, Langoni 1973, Fields 1975, Carnoy, Morley 1976, Jallade 1977).

Part of the basis for such advocacy is the association between years of schooling (or "quantity" of schooling) and wages that is found in many cross-sectional data sets. Such an association is interpreted by some to imply substantial real rates of return to schooling investments in many developing countries. For example, largely on the basis of such associations, World Bank (1980) and Psacharopoulos (1985, 1988) claim that the average real social rate of return to primary schooling in developing countries is over 24 per cent.[1]

But there are a number of possible problems in such estimates. One of these is that quality varies substantially across schools, which -- if not controlled in estimates of labor market returns to school -- may cause substantial misunderstanding of what the impact of schooling is on labor market returns.[2] While there have been a number of studies that investigate the impact of schooling quality

---

[1]In this literature, "social" refers to the incorporation of public as well as private costs, but not to the inclusion of externalities.

[2]Other possibly important problems include sample selectivity, random measurement error, unobserved ability and motivation, the failure to control for externalities, and geographical biases due

on schooling achievement as measured by such indices as test scores,[3] however, there has been very little investigation of the impact on estimated returns to schooling in terms of labor market outcomes of controlling for schooling quality. This is the case in part because most cross-sectional data sets do not have information with which to represent the schooling quality to which different individuals were exposed during their school years together with information on subsequent labor market outcomes.

In two earlier papers (Behrman and Birdsall 1983, 1985) we argued that on a priori grounds the failure to control for schooling quality in the estimates of the impact of schooling quantity on various outcomes would bias upwards the estimated return to schooling quantity, as well as provide no information about the tradeoff between investing in schooling quantity versus schooling quality. Of course whether the bias in the estimated impact of schooling quantity on outcomes is large or small is an empirical question, the investigation of which with most data sets is not possible because of the lack of information on relevant outcomes subsequent to school such as adult wages and on the quality of school. Therefore we proposed an indicator of schooling quality that is available in censuses and other large data sets: the average schooling of teachers in the area in which one received primary schooling. Such a schooling quality indicator has some strengths and some weaknesses, both of which are discussed extensively in the earlier of our two studies. However, all in all, it seems a promising representation of schooling quality that circumvents the usual problem of not having information in one cross-sectional data set on both the characteristics of schools that individuals attended and on subsequent labor market outcomes.[4]

We undertook estimates of the impact of incorporating schooling quality into the analysis of labor markets outcomes for males age 15-35 in Brazil using data from the 1970 census. Our estimates

---

to failure to control for differences in prices and in inputs into the production process that are complementary with labor and that are associated with schooling levels. For surveys and assessments of these biases, see Behrman (1987, 1990a,b,c), Behrman and Birdsall (1988), and Schultz (1988, 1991). In the present study we ignore the importance of these other possible problems in order to focus on impact of schooling quality.

[3]For example, see Alderman, Behrman, Ross and Sabot (1990), Fuller (1986), Glewwe (1990), Glewwe and Jacoby (1990), Heyneman and Loxley (1983) and Loxley and Heyneman (1980). [More recent references? Hanuscek et al on Brazil?]

[4]There are some exceptions. For example, the Peruvian LSMS contains some retrospective information on schooling quality for current adults (see King 1988).

suggest that the incorporation of schooling quality into the analysis changes understanding of the impact of schooling on such labor outcomes for the Brazilian national estimates in three major respects.[5] First, if the true specification should include the control for quality, the standard procedure without this control overestimates substantially the private returns to investing in schooling quantity. The standard procedure implies an estimated real private rate of return to investing in schooling quantity of 20.5 per cent, which is about 75 per cent above our preferred estimate of 11.7 per cent. Thus the bias is considerable. Second, the estimated internal social rate of return to investment in schooling quality is at least as large as is the estimated social rate of return to investment in school quantity.[6] Therefore there is at least as great social return in terms of productivity to "deepening" (in the sense of increasing quality) as to "widening" schooling (in the sense of increasing quantity of a given quality). Third, there probably is an important quality-quantity tradeoff in the allocation of resources to schooling. Concentration of resources has higher productivity returns than wider dispersion of such resources both because the social rate of return to quality is at least as great as that to quantity as noted above and because of positive quality-quantity interactions that are suggested by a priori theory and confirmed by the empirical estimates. This result contrasts with the suggestion of the World Bank (1981) and many others that one advantage of investing in schooling in developing countries is the congruence of pursuit of equity and productivity goals. The congruence of these goals, in turn, arises since the highest returns supposedly are to expanding primary schooling, which tends to promote equity since those who otherwise would not receive primary schooling tend to be from the bottom part of the income distribution.

Thus, our earlier work suggests that incorporating schooling quality into the analysis of the impact of schooling on labor markets outcomes for young Brazilian adult males changes substantially

---

[5]We also find some important effects on regional estimates. For example, control for schooling quality reduces substantially unexplained regional differences in income, reduces urban-rural differences, and reduces almost to zero migrant-nonmigrant differences that often have been attributed to unobserved differences in individual characteristics. In the present study, however, we do not explore these regional differences because they are less central to our basic concerns.

[6]In our 1983 article we claimed that the former is larger, but Eaton (1985) pointed out an error in our calculations that accounted for most of the difference between our estimated social rates of return to schooling quality and to schooling quantity. Therefore, in our 1985 article we amended this conclusion to read as in the present text.

our understanding of the impact of schooling investments on those outcomes.

In the present paper we further explore the impact of schooling quality on labor market outcomes for Brazilian males, using data on from the 1980 census. Our exploration includes investigation of the following questions: (1) How do estimates for the same birth cohort as considered in our previous studies change with an additional decade of experience? Do the effects of schooling quality appear to strengthen over the life cycle, perhaps because individuals are better sorted into work positions for which they have comparative advantages after initial periods of searching and matching? Or, alternatively, do the effects fade because of the greater lapsed time since schooling with the concomitant greater and more recent post-schooling experiences? (2) What is the decomposition of the effects of quality versus quantity on wage rates versus those on hours worked? Are the effects similar, or are there differential effects on hours worked versus the wage rate per hour? (3) How robust are our previous conclusions to variations in the data and in variable definitions? Do they reinforce or weaken our previous emphasis on the importance of incorporating schooling quality into the analysis of the impact of schooling on labor market outcomes in Brazil?

We organize our discussion as follows. Section 2 briefly motivates the incorporation of schooling quality into the analysis. Section 3 describes the data that we use. Section 4 presents and discusses our results. Section 5 summarizes and concludes this paper.

Section 2. Why Include Schooling Quality in the Analysis?

We give here a simple geometric argument for the inclusion of schooling quality in the estimation of the impact of schooling on various outcomes. This argument also suggests that school quantity and quality should enter into the relation in an interactive form, and the nature of the biases that are likely to result if schooling quality is not included.

The solid lines in Figure 1 give the "demand" (or the present discounted value of the marginal benefits from schooling) and the "supply" (or the present discounted value of the marginal costs of schooling) for years of schooling as presented in Becker's (1967) Woytinsky lecture.[7] Underlying the

[7]We put "demand" and "supply" in quotation marks the first time that we use them because, although this is standard terminology in this literature, these are not demand and supply curves in the sense that such terms are used more generally in economics (i.e., these curves do not necessarily reflect quantity decisions by individual entities that are so small relative to the market that they can not

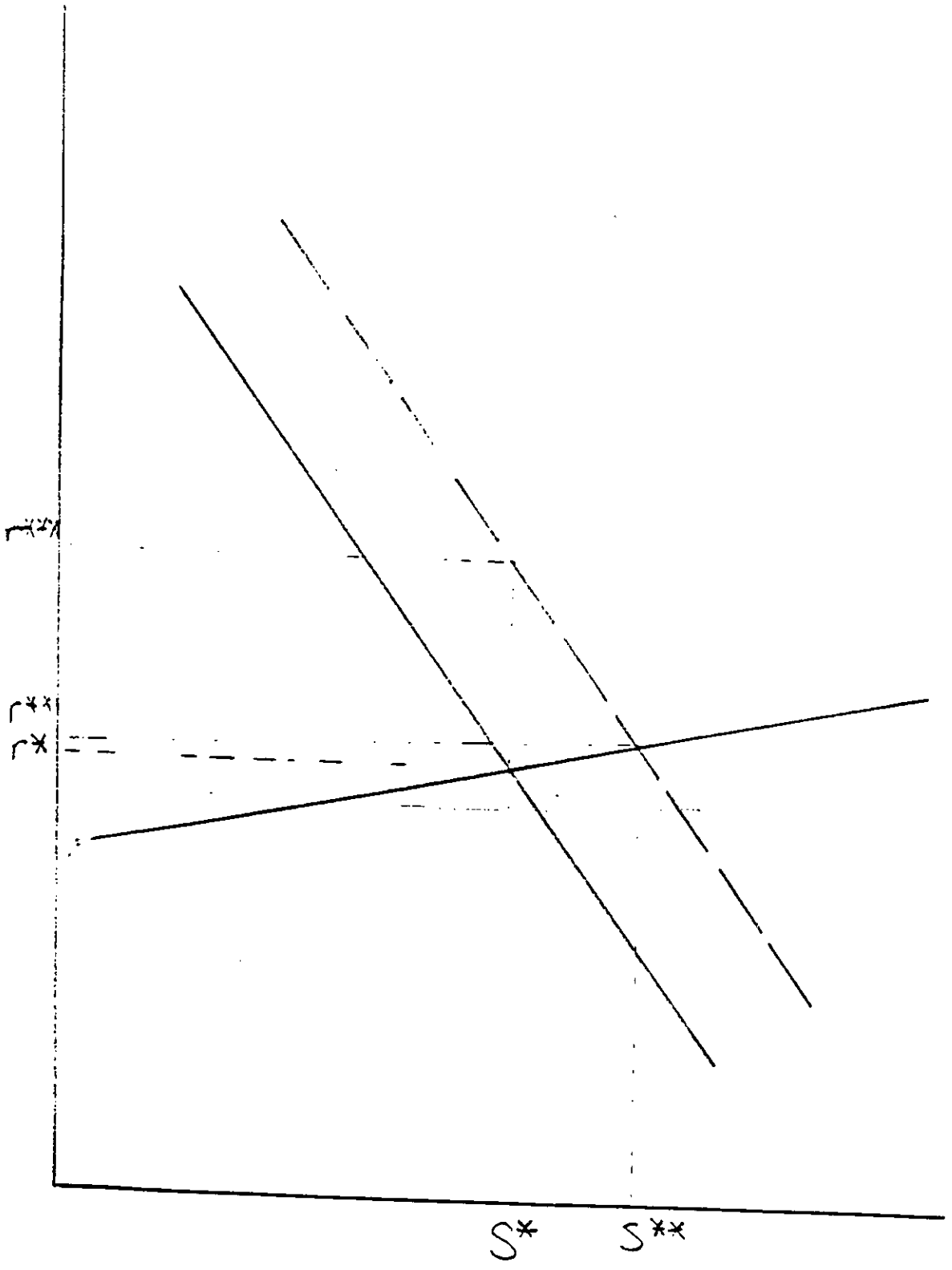


Figure 1

demand curve is a production function for the outcome of interest in which one input is the years of schooling. For example, the wage rate that an individual receives may be produced by the years that one spends in school, the quality of that schooling, one's innate ability, one's motivation, and one's family background. This curve is downward sloping because of diminishing returns to spending time in school both due to fixed factors such as innate ability and to limited post-schooling expected lifetimes to reap whatever benefits are received from schooling. The solid line is drawn for a given set of characteristics other than time spent in school. The supply curve reflects all the costs of attending school, both monetary and in terms of the opportunity costs of time. This curve is likely to be upward sloping because of increasing costs of attending more schooling, if for no other reason, due to the increasing opportunity cost of time with more schooling. The optimal level of schooling (S^*) is where supply equals demand, so that the marginal benefit of the last unit of time spent in school just equals the marginal cost of that time (r^*).

How do changes in schooling quality affect this story? Assume that schooling quality in public schools basically is determined by the government, so that the schooling quality that a particular individual faces depends upon his or her location during his or her school ages.[3] The solid line in Figure 1 reflects a given level of schooling quality, as indicated above. If schooling quality were to be better, ceteris paribus, the demand curve would be higher -- say, the dashed curve instead of the solid demand curve in Figure 1 -- under the assumption that better schooling quality increases the desired benefit at the margin. This has two important implications for the empirical analysis of the impact of schooling investments on outcomes, such as wage rates, First, there are interactions between the quantity and the quality of schooling in the sense that the marginal return to school quantity depends on the schooling quality (and vice versa). For example, at a given quantity of school, the marginal benefits increase with higher schooling quality (e.g., to r^{***} instead of r^* at S^*). Second, schooling quality and quantity within this framework are positively correlated, with the implication that if schooling quality is not included in the specification even though in fact schooling quality has an

---

have a perceptible effect on market prices).

[3]If the school quality instead were a choice variable, schooling quality and quantity both would be chosen simultaneously so that the expected marginal benefits equaled the expected marginal costs.

impact on the outcome of interest, the estimated impact of schooling quantity is biased upwards.[9] The positive correlation between schooling quality and quantity is illustrated by the fact that with better schooling quality, the equilibrium school quantity increases (e.g., to S^{**} with the quality associated with the dashed demand curve in Figure 1).

Section 3. Data

We use data from a random subsample of 5201 males of age 25-35 (of whom 4896 have hours worked in addition to income data so that we also can explore their average wage rate determinants) and 7447 males age 15-35 from the 1 per cent of households in the Public Use sample of the 1980 Brazilian census. We limit the sample to males in order to lessen selectivity problems and to make our results more comparable with those in our earlier studies. We focus on the same birth cohort than we considered in our earlier study: 15-35 year olds in 1970 and therefore 25-45 year olds in 1980. We also consider 15-35 year olds for 1980 in order to compare estimates for them with the estimates for 15-35 year olds in 1970 in an investigation of year effects, possibly related to differing macro conditions.

The left-side variables that we use are earnings and wage rates, with the latter obtained by dividing earnings by hours worked. In our previous study we considered only earnings. However, if hours worked is a choice variable, the wage rate is the more interesting dependent variable since it abstracts from choices about how time is used. Of course ln earnings equals ln wage rates plus ln hours worked, so the difference between the estimates for ln earnings and ln wage rates gives the impact on ln hours worked.

The right-side variables that we use are years of schooling, post-schooling adult experience,[10]

---

[9]The standard expression for the omitted variable bias in a linear regression is that such bias is equal to the true coefficient of the omitted variable (in this case, schooling quality) times the correlation between the included and the omitted variable (in this case positive by the argument in the text).

[10]We define this as in our 1983 article, as years over the age of 15 a male has been in the work force. For exploration of the sensitivity of the estimates to the use of this definition versus the more common total potential years of post-schooling experience (i.e., age minus years of school minus six, as in Mincer 1974), see our 1985 article. In this paper we use the 1983 definition because we find it preferable for reasons that are discussed in our 1985 article and because it facilitates comparisons with

and schooling quality. As noted in Section 1 above, we use the average years of schooling of school teachers in the locale in which an individual went to school as our measure of schooling quality. Our 1983 article gives an extensive discussion of the advantages and limitations of this indicator of schooling quality. In our earlier article we defined this schooling quality variable as the average schooling of teachers at all school levels. For comparability, we use the same indicator in some our estimates in the present study. But this measure has at least one problem that we did not recognize in our earlier article since higher schooling levels tend to have teachers with more schooling. Thus it confounds the impact of differences in schooling quality at identical school levels with differences in the importance of varying school levels. Therefore we have explored in this study a preferred indicator of schooling quality which is based on the schooling of only primary school teachers. For both of these indicators of schooling quality we use the data from the 1970 census in order to keep the schooling quality measures comparable with those in our earlier studies.

Table 1 presents the means and standard deviations for the variables that we use in our estimates. Years of schooling are low for Brazilian males, but with increases for more recent cohorts. The mean is about four grades for the 25-45 age group in 1980, though about a sixth higher for the 15-35 age group in the same year. Our measure of schooling quality averages about the same for the two age groups, with about 9.3 years of schooling for teachers. Our measure of experience, of course, is substantially higher for the older cohort -- with means of 18.2 versus 8.3 years. This translates into higher earnings for the older cohort. Underlying the variation in earnings are some variations in wage rates, but apparently also substantial variations in hours worked.

Section 4. Estimates

We first consider estimates with the dependent variable being earnings, with comparisons between the estimates for 1970 and 1980 for the same birth cohort and for the same age group. We then turn to comparisons of estimates for wage rates versus those for earnings for the 1980 data.

Section 4.1 Semilog Earned Income Relations

---

the 1983 results.

Table 1 -- Means, Standard Deviations for Relevant Variables: Males, by Age Group

Variables	Ages 25-45		Ages 15-35	
	Means	Standard Deviation	Means	Standard Deviation
Ln Income	8.45	2.36	6.81	3.72
Years of Schooling	3.97	4.04	4.68	3.95
Experience	18.20	6.28	8.34	5.88
School Quality	9.33	3.16	9.34	3.14

Variables	Ages 25-45	
	Means	Standard Deviation
Ln Wage	5.10	1.13
Years of Schooling	3.98	4.02
Experience	18.16	6.22
School Quality	9.32	3.17

In our original 1983 paper we estimated four basic relations for the determination of ln earnings a subsample of 15-35 year old males from the Brazilian national 1970 data. For convenience, these relations are reproduced as Table 2. The first of these was the standard ln earnings relation with the right-side variables including years of schooling and a quadratic in experience. The second, in addition to the standard right-side variables, allows for the possibility that years of schooling interacts with a quadratic in schooling quality. The third includes in addition to the standard right-side variables an additive term for schooling quality. This can be considered to be a linear approximation to the preferred relation in which there is not an interaction between school quantity and quality, but in which the effect of omitted variable bias on the estimated coefficient of schooling is relatively transparent from a comparison with the first relation. The fourth relation has a quadratic expansion in school quantity and quality. F-tests reject the restrictions for each of the three quality-inclusive relations that are required to obtain the standard relation. Therefore in a statistical sense, the estimates support the expansion of the standard model to include schooling quality. An F test indicates that the fourth relation is preferred to the third. But the second and the fourth are not nested, so such a test cannot be conducted for that comparison.

At the bottom of this table are given the percentage change in earnings given a change in years of schooling ($(\partial Y/Y)/\partial S$) and the percentage change in earnings given a change in schooling quality ($(\partial Y/Y)/\partial Q$). The former is the real private rate of return to the time spent in schooling under the Micerian (1974) assumptions. In the second and fourth relations these terms are not constant due to the interaction between schooling quality and quantity. Therefore at the bottom of the table they are evaluated at the point of sample means and with one or the other one standard deviation above the means. These percentage changes are major inputs into our conclusions that are summarized in Section 1: quality matters, failure to control for quality results in a substantial upward bias in the estimated impact of quantity, the social rate of return to quality is at least as high as is that to quantity, and there is an implied equity-productivity tradeoff.

The first four columns of Table 3 present parallel estimates for the same birth cohort based on the 1980 census. Examination of the estimates in Table 3, in comparison with those in Table 2, suggests the following points.

First, the estimates for 1980 are consistent with much less variation in earned income experience in 1980 than in 1970, whether or not the specifications include schooling quality. Our first

TABLE 2—ALTERNATIVE ESTIMATES OF LN INCOME FUNCTIONS FOR BRAZILIAN MALES, AGES 15–35 IN 1970[a]

Right-Side Variables	Relation (1') (1)	Relation (2'') (2)	Relation (3''') (3)	Relation (3'') (4)
S	.205	−.185	.148	.047
	(38.1)	(2.6)	(24.6)	(1.6)
$S \cdot Q$		.037		.0045
		(2.4)		(1.5)
$S \cdot Q^2$		−.0003		
		(0.3)		
Q			.122	−.256
			(18.6)	(4.5)
S^2				.0042
				(3.4)
Q^2				.022
				(6.4)
E	.303	.304	.300	.301
	(25.6)	(26.1)	(26.0)	(26.3)
E^2	−.0090	−.0091	−.0091	−.0091
	(15.6)	(16.0)	(16.2)	(16.4)
$\ln Y_0$[b]	2.15	2.24	1.29	2.75
$\bar{R}^2$	.345	.371	.380	.389
S.E.E.	1.444	1.415	1.405	1.394
Private Rate of Return to S				
at $\bar{Q}$ and $\bar{S}$	20.5	11.7	14.8	11.1
at $\bar{Q} + \sigma_Q$ and $\bar{S}$	20.5	21.6	14.8	12.6
at $\bar{Q}$ and $\bar{S} + \sigma_S$	20.5	11.7	14.8	14.1
Percent Change in Y for Change in Q: $(\partial Y/Y)/\partial Q$				
at $\bar{Q}$ and $\bar{S}$	0	10.3	12.2	14.5
at $\bar{Q} + \sigma_Q$ and $\bar{S}$	0	2.6	12.2	28.6
at $\bar{Q}$ and $\bar{S} + \sigma_Q$	0	2.0	12.2	16.0

[a] The absolute values of the t-statistics are shown in parentheses. The a priori bases for the specifications are discussed in Section I. The data are described in Section II.

[b] In cols. (3) and (4), the constant estimate includes the constant in the approximations to effective schooling (i.e., r_0^*) as well as in Y_0.

Table 3 --Alternative Estimates of Ln Income Functions for Brazilian Males, Ages 25-45

Right Side Variables	Relation (1)	Relation (2)	Relation (3)	Relation (4)
S	0.171 (20.43)	0.176 (1.91)	0.149 (15.77)	0.210 (5.16)
S*Q		-0.011 (-0.55)		0.003 (0.68)
S*Q2		0.001 (0.84)		
Q			0.058 (5.19)	0.079 (0.85)
S2				-0.007 (-3.59)
Q2				-0.002 (-0.39)
E	0.280 (8.67)	0.279 (8.63)	0.267 (8.27)	0.241 (7.32)
E2	-0.007 (-8.19)	-0.007 (-8.17)	-0.007 (-7.90)	-0.006 (-7.00)
ln Y_o	5.220 (17.40)	5.253 (17.49)	4.904 (16.06)	5.019 (11.01)
$\bar{R}2$	0.0775	0.0785	0.0823	0.0848
S.E.E	26701	26675	26564	26492
Private rate of Return to S				
at $\bar{Q}$ and $\bar{S}$	17.2	15.1	14.9	17.9
at $\bar{Q}$ $+\sigma_Q$ and $\bar{S}$	17.2	17.8	14.9	18.8
at $\bar{Q}$ and $\bar{S}$ $+\sigma_S$	17.2	15.1	14.9	12.2
Percent Change in Y for Change in Q: $(\partial Y/Y)/\partial Q$				
at $\bar{Q}$ and $\bar{S}$	0.0	2.3	5.8	4.9
at $\bar{Q}$ $+\sigma_Q$ and $\bar{S}$	0.0	4.6	5.8	3.5
at $\bar{Q}$ and $\bar{S}$ $+\sigma_S$	0.0	4.5	5.8	6.1

n=5201

reaction to this fact is that it is a surprising result from the point of view of life cycle earnings paths alone; from this perspective we initially would have expected the ensuing decade to have resulted in more sorting of jobs by comparative advantage as the respondents aged a decade and tended to search less and settle down into more permanent positions. But upon further reflection, such settling down according to comparative advantage presumably takes time precisely because some of the individual characteristics are not easily observed by employers. Employees also may learn more about their preferences regarding work with time (e.g., Novos 1990). The result of this learning over time is that the easily observable schooling variables become relatively less important over the life cycle as learning occurs and other, initially less easily to observe characteristics become clearer. In addition to such learning, more time has lapsed so that there has been more exposure to individual stochastic shocks with persistent effects (e.g., chronic bad health due to injury or disease, good or bad luck due to initial job choices and contacts that are costly to change[11]). We do not see how to identify the relative importance of these two possibilities.

Second, yet another possible explanation of the apparently weaker results in Table 3 than in Table 2 is that macro conditions changed in a way so that stochastic shocks in income were more important in 1980 than in 1970, say due to differential adjustments across individual incomes to substantial macro shocks. This certainly seems plausible given the Brazilian experience. 1970 was in the midst of a relatively stable growth period during which it is plausible that adjustment to the growth path had been considerable across the board. In contrast, 1980 was a time of substantial adjustment to the second oil shock and high international interest rates. To isolate the year effect,[12] we present

---

[11]For example, an individual may have been initially employed in a firm or an industry which turned out to do worse than anticipated at the time of the initial employment decision. But the transaction costs of switching jobs and the acquisition of specific human capital limit the subsequent mobility. For evidence that initial conditions at the time of job entry condition subsequent labor market success in Brazil, see Behrman and Birdsall (1988b).

[12]Though this comparison does not enable us to identify confidently that any differences are due to adjustments to macro shocks rather than to other effects, such as secular shifts in the importance of the observed variables. However our prior is that the secular shifts have led ceteris paribus to increased rather than reduced importance of schooling in income determination in Brazil. If this is correct, any evidence of reduced importance of schooling in the estimates between 1970 and 1980 well may be due in substantial part to the differing macro conditions.

estimates of the same four relations in Table 4 for 7447 males who were 15-35 years old in 1980. This permits direct comparison for the same part of the life cycle (not for the same birth cohort) with the estimates for 1970 in Table 2. This comparison suggests that there are some important year effects. The relations for 1980 systematically are somewhat less consistent with the earned income variations for the same age group than are those for 1970, However, though the difference in the consistency of the relations with the sample experience between Tables 2 and 4 is much less than the differences between Table 2 and 3. Therefore the learning and greater-exposure-to-unanticipated-persistent-shock effects discussed in the previous paragraph seem to be a large part of the explanation for the difference between the consistency of the estimates in Tables 2 and 3 with earned income variation for the same birth cohort. Another notable feature of the comparison between the estimates in Tables 2 and 4 regarding year effects is that, in addition to somewhat less consistency with sample income variance in 1980, the estimates in Table 4 suggest much smaller impacts of schooling on earned income than in Table 2. This comparison perhaps is clearest in the standard estimates since there is no confounding effect of schooling quality. In this case, Table 4 yields an estimate of the private rate of return to time spent in school to be 10.5 per cent, barely more than half the estimate in Table 2 for 1970. Thus the year effects seem to imply not only somewhat reduced consistency with the sample income variance, but substantially reduced estimated schooling impacts for the same age group. We would expect that some of the latter effect may carry over to older birth cohorts, such as those who were 25-45 in 1980 (Table 3), though the apparent persistent importance of initial conditions at the time of labor force entry decisions noted in Behrman and Birdsall (1988b) suggests that such effects are likely to be smaller in Table 3. This may explain in part the smaller decline in the standard estimates of the impact of years of schooling between Tables 2 and 3 (from an estimated private rate of return to time in school of 20.5 per cent in the standard estimate in Table 2 to 17.1 per cent in Table 3).

Third, F tests indicate that restrictions to exclude schooling quality from the third and fourth specifications are rejected in Tables 3 and 4 and from the second specification in Table 4.[13] But this result is dependent on the a priori specification for the 25-45 age cohort and does not hold for the

[13]The F values for restricting the second, third and fourth specifications in Table 3 to the first specification are 2.5, 26.8, and 10.2. The parallel values for Table 4 are 17.8, 38.1, and 11.3. The critical F values at the 1 per cent level are 4.6, 6.6, and 3.3.

Table 4 --Alternative Estimates of Ln Income Functions for Brazilian Males, Ages 15-35

Right Side Variables	Relation (1)	Relation (2)	Relation (3)	Relation (4)
S	0.105	-0.065	0.074	-0.002
	(11.36)	(-0.71)	(6.99)	(-0.06)
S*Q		0.012		0.008
		(0.61)		(1.87)
S*Q2		0.000		
		(0.18)		
Q			0.080	-0.035
			(6.18)	(-0.33)
S2				-0.001
				(-0.30)
Q2				0.005
				(0.80)
E	0.898	0.898	0.900	0.900
	(41.26)	(41.37)	(41.46)	(41.43)
E2	-0.032	-0.032	-0.032	-0.032
	(-28.13)	(-28.31)	(-28.42)	(-28.41)
ln Y_0^b	2.121	2.203	1.526	2.083
	(21.60)	(22.26)	(11.11)	(5.18)
$\bar{R}2$	0.3076	0.3109	0.3111	0.3118
S.E.E	71385	71046	71021	70953
Private rate of Return to S				
at $\bar{Q}$ and $\bar{S}$	10.6	6.8	8.1	6.8
at $\bar{Q}+\sigma_Q$ and $\bar{S}$	10.6	12.0	8.1	9.4
at $\bar{Q}$ and $\bar{S}+\sigma_S$	10.6	6.8	8.1	6.3
Percent Change in Y for Change in Q: $(\partial Y/Y)/\partial Q$				
at $\bar{Q}$ and $\bar{S}$	0.0	7.6	8.5	9.9
at $\bar{Q}+\sigma_Q$ and $\bar{S}$	0.0	8.2	8.5	13.0
at $\bar{Q}$ and $\bar{S}+\sigma_S$	0.0	13.9	8.5	13.1

n=7447

*** END OF DOCUMENT ***

Our original article considered only semilog earned income relations. However one can argue that of more interest are wage rate relations if individuals differ in their hours worked, particularly if such differences in part reflect individual choices. In such a case, the income relations may confound the impact of schooling on productivity (or the value of time) and that on hours worked. We now consider estimates of ln wage rates relations for the 25-45 age group in 1980 in Table 5. As we note above, since the ln hours worked equals the log of income minus the low of wage rates, differences between the estimates in Table 3 and those in Table 5 indicate the response of hours worked to the included variables.

We summarize the estimates in Table 5 and the comparison of these estimates with those in Table 3 with regard to five characteristics.

First, the ln wage rate estimates are consistent with a much higher proportion of the sample variance than are the ln income estimates -- as measured by the R^2s, over three times as much. Thus systematic patterns in the response of productivity or the value of time to the included variables in these relations may be obscured in the ln earnings patterns by a lot of stochastic variation in the hours worked. Of course such variations may have been particularly large in the macro conditions of 1980.[15]

Second, F tests reject the impositions of restrictions to reduce the quality-inclusive specifications to the standard specification in all three cases.[16] Therefore these results are much more robust to specification changes regarding the importance of schooling quality than is the case for the ln income estimates for the same age group.

Third, the ln wage rate estimates suggest somewhat more strongly than do the ln income estimates in Table 3 that there is an upward bias in the standard estimates of the private rate of return to time spent in school, but this result still is specification-dependent. The fourth relation indicates an upward bias of about one third at the sample means in the standard estimate, but the second relation

[15]Unfortunately we no longer are able to use the 1970 data so we can not compare ln wage rate and ln income relations for that year to see if there are similar large differences in this or in other respects.

[16]The respective F values are 34.1, 283.1, and 72.3, with critical F values at the 1 per cent level of 4.6, 6.6, and 3.3.

indicates basically no bias.[17] The two relations are not nested so it is not possible to say that one statistically dominates the other, though the fourth is more consistent with the sample variance. But this specification-dependence of the result on bias limits the confidence with which we can conclude anything about such biases.

Fourth, the ln wage rate estimates suggest strongly that schooling quality-quantity interactions are important, as is suggested in by our theoretical discussion in Section 2. As for the third point, this effect seems to be obscured in the ln income estimates by the variations in hours worked.

Fifth, the ln wage rates estimates suggest stronger effects of schooling quality relative to school quantity at the sample means (and vice versa therefore for ln hours worked) than the ln income estimates. The percentage changes in income or in wage rates due to unit changes in school quantity and quality at the bottom of the two tables indicate that at the sample means for the fourth relation the respective quantity and quality effects are 17.9 per cent and 4.9 per cent for income, but 13.3 per cent and 7.9 per cent for wage rates. Similar results hold for the other two relations. Therefore the impact of schooling quality is relatively greater on productivity/value of time, while that of school quantity is relatively greater on hours worked.

Section 5. Summary and Conclusion

On a priori grounds, the impact of schooling quality as well as of schooling quantity would seem to be important in labor market outcomes. Moreover, the failure to control for variations in public-provided schooling quality in estimates of the impact of schooling quantity on various outcomes is likely to cause omitted variable biases that overstate the effects of years of schooling.

In our 1983 and 1985 articles, we developed such a priori reasoning, proposed a tractable empirical measure of schooling quality, and investigated the implications of schooling quality for income relations for Brazilian males age 15-35 in 1970. We found that quality was important in a statistical sense, that the failure to control for schooling quality biased upwards substantially the estimated private rate of return to time spent in school, that the social rate of return to investing in

[17]The third relation also indicates an upward bias, but this relation is dominated statistically by the fourth relation and the fourth relation is preferable on a priori grounds because of the quality-quantity interaction.

schooling quality was at least as high as that to investing in school quantity, and that there were definite productivity-equity tradeoffs.

In the present paper we have investigated similar phenomena for the 1980 census data, both for earned income and for wage rates. We find that there seems to be some fading of the relative importance of schooling in explaining income variations over the life cycle, presumably because of a combination of learning by employers and employees and of greater exposure to persistent previously unanticipated events. There also seems to be some year effect, particularly for the younger age groups, which probably reflects the greater macro turmoil in 1980 than in 1970. But the wage rate estimates, which are preferred since they refer to productivity/value of time effects without being confounded by changes in hours worked, still indicate strong effects of schooling quality interacting with school quantity in 1980 even for the older age group that we consider. The relative effects of schooling quality in comparison with school quantity, moreover, are greater for the wage rates of primary interest than for earned income or hours worked. Some estimates also indicate fairly substantial upward biases in the estimated private rate of return to time spent in school, though conclusions about this result need to be qualified by its specification-dependence.

How do these results modify our conclusions in our earlier paper? First, they reaffirm that schooling quality is quite important in Brazilian labor market outcomes. In a certain sense, in fact, they suggest that our earlier studies may have underestimated substantially the impact of schooling quality by limiting attention to earned income instead of wage rates. Our current results also suggest some further nuances, such as some fading of the impact of schooling quality (and less so of schooling quantity) over the life cycle and the greater impact of macro variables on the schooling effects for those close to entry into the labor market. Second, they lead to more qualifications about the magnitude of upward biases in the estimated private return to time spent in school if there is not control for schooling quality. Some of the results suggest that such biases may be considerable -- as much as a third -- and concentrated in the estimates for wage rates instead of those for hours worked. But qualifications are necessary because they vary with the specification. Third, they reinforce our earlier conclusion that investments in schooling quality may be important from a social point of view ("deepening" schooling investments) as well as investments in schooling quantity ("widening" schooling investments). Fourth, they reinforce our earlier conclusion that there are likely to be substantial productivity-equity tradeoffs in schooling investments due to the productivity gains from concentrating

resources in improving both the schooling quantity and quality of relatively few individuals.

References

Alderman, Harold, Jere R. Behrman, David Ross, and Richard Sabot, 1990, "The Gender Gap in Human Capital Accumulation in a Poor Rural Economy," Williamstown, MA: Williams College, mimeo.

Asian Development Bank, 1990, Human Resource Policy and Economic Development: Selected Country Studies, Manila, Philippines: Asian Development Bank.

Azariadis, Costas and Allan Drazen, 1990, "Threshold Externalities in Economic Development," Quarterly Journal of Economics.

Becker, Gary S., 1967, "Human Capital and the Personal Distribution of Income: An Analytical Approach," Ann Arbor: University of Michigan, Woytinsky Lecture, republished in Gary S. Becker, Human Capital. New York: NBER, 2nd edition 1975, 94-117.

Behrman, Jere R., 1987, "Schooling in Developing Countries: Which Countries are the Under- and Overachievers and What is the Schooling Impact?" Economics of Education Review 6:2, 111-128.

_____, 1990a, Human Resource Led Development? New Delhi, India: ARTEP/ILO.

_____, 1990b, The Action of Human Resources and Poverty on One Another: What We Have Yet to Learn, Washington, D.C.: Population and Human Resources Department, World Bank.

_____, 1990c, "Women's Schooling and Nonmarket Productivity: A Survey and A Reappraisal," Philadelphia: University of Pennsylvania, mimeo (prepared for the Women in Development Division of the Population and Human Resources Department of the World Bank).

Behrman, Jere R. and Nancy Birdsall, 1983, "The Quality of Schooling: Quantity Alone is Misleading," American Economic Review 73, 928-946.

_____, 1985, "The Quality of Schooling: Reply," American Economic Review 75, 1202-1205.

_____, 1987, "Communication on 'Returns to Education: A Further Update and Implications," Journal of Human Resources 22:4 (Fall), 603-606.

_____, 1988a, "Implicit Equity-Productivity Tradeoffs in the Distribution of Public School Resources in Brazil," European Economic Review 32.

———, 1988b, "The Reward for Good Timing: Cohort Effects and Earnings Functions for Brazilian Males," Review of Economics and Statistics 70:1 (February), 129-135.

Birdsall, Nancy, 1985, "Public Inputs and Child Schooling in Brazil," Journal of Development Economics 18:1 (May-June), 67-86.

Birdsall, Nancy and Jere R. Behrman, 1984, "Does Geographical Aggregation Cause Overestimates of the Returns to Schooling?" Oxford Bulletin of Economics and Statistics 46, 55-72.

Carnoy, Martin, "Distribuicao da Redna Desenvolvimento Economico de Brasil: um Comentario," Revista de Administracao de Empresas.

Colclough, C., 1982, "The Impact of Primary Schooling on Economic Development: A Review of the Evidence," World Development 10, 167-185.

Eaton, Peter J., 1985, "The Quality of Schooling: Comment," American Economic Review 75:2 (December), 1195-201.

Eisemon, Thomas Owen, 1988, "The Consequences of Schooling: A Review of Research on the Outcomes of Primary Schooling in Developing Countries," Cambridge, MA: Harvard University, mimeo.

Fields, Gary S., 1975, "A Reexamination of Brazilian Economic Development in the 1960s'" New Haven, CT: Yale University, mimeo.

Fishlow, Albert, 1972, "Brazilian Size Distribution of Income," American Economic Review (May).

Fuller, Bruce, 1986, Raising School Quality in Developing Countries: What Investments Boost Learning? Washington, D.C.: World Bank.

Glewwe, Paul., 1990, "Schooling, Skills, and the Returns to Education: An Econometric Exploration Using Data from Ghana," Washington, D.C.: The World Bank, mimeo.

Glewwe, Paul and Hanan Jacoby, 1990, "Student Achievement and Schooling Choice: Results from Ghana," Washington, D.C.: The World Bank, mimeo.

Heyneman, Stephen P. and William Loxley, 1983, "The Effect of Primary-School Quality on Academic Achievement Across Twenty-Nine High-and Low-Income Countries,' American Journal of Sociology 88 (May), 1162-94.

Jallade, Jean-Pierre, 1977, "Basic Education and Income Inequality in Brazil: The Long-Term View," Washington, DC: World Bank, Staff Working Paper no. 268, mimeo.

King, Elizabeth M., 1988, "Does Education Pay in the Labor Market? Women's Labor Force

Participation, Occupation, and Earnings in Peru," Washington, D.C.: The World Bank, mimeo.

Langoni, Carlos Geraldo, 1973, Distribuicao da Redna e Desenvolvimento Economico de Brasil, Rio de Janeiro, Editora Expressao e Cultura.

Loxley, William and Stephen Heyneman, 1980, "The Influence of School Resources on Learning Outcomes in El Salvador," Washington, DC: World Bank, mimeo.

Lucas, Robert E., 1988, "On the Mechanics of Economic Development," Journal of Monetary Economics 21, 3-42.

Mincer, J.B., 1974, Schooling, Experience, and Earnings, New York: NBER.

Morley, Samuel A., 1976, "Changes in Employment and the Distribution of Income During the Brazilian Miracle," Geneva: ILO, mimeo.

Novos, Ian, 1990, "Learning by Doing, Adverse Selection, and Firm Structure," Los Angeles, CA: University of Southern California, mimeo.

Psacharopoulos, G., 1985, "Returns to Education: A Further International Update and Implications," Journal of Human Resources 20, 583-597.

_____, 1988, "Education and Development: A Review," The World Bank Research Observer 3:1 (January), 99-116.

Romer, Paul M., 1986, "Increasing Returns and Long-Run Growth," Journal of Political Economy 94:5, 1002-1036.

_____, 1989a, "Increasing Returns and New Developments in the Theory of Growth," Cambridge, MA: NBER, Inc., mimeo.

_____, 1989b, "Human Capital and Growth: Theory and Evidence," Chicago, IL: University of Chicago, mimeo.

_____, 1989c, "Capital Accumulation in the Theory of Long-Run Growth," in Robert Barro, ed., Modern Business Cycle Theory, Cambridge, MA: Harvard University Press.

_____, 1990, "Are Non-Convexities Important for Understanding Growth?" American Economic Review 80:2, 97-103.

Schultz, T. Paul, 1988, "Education Investments and Returns," in Hollis Chenery and T.N. Srinivasan eds., Handbook of Development Economics, Amsterdam: North-Holland Publishing Company, 543-630.

———, 1991, "Returns to Women's Education," in E.M. King and M.A. Hill, eds,. Women's Education in Developing Countries, Washington, D.C.: World Bank.

UNDP (Mahboub ul Haq, head of research team), 1990, Human Development Report 1990, New York: UNDP.

World Bank, 1980, World Development Report, 1980, Oxford: Oxford University Press for the World Bank.

———, 1981, World Development Report, 1981, Oxford: Oxford University Press for the World Bank.

———, 1990, World Development Report, 1990, Oxford: Oxford University Press for the World Bank.

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

FAMILY BACKGROUND QUALITY OF EDUCATION AND PUBLIC AND PRIVATE SCHOOLS IN SÃO PAULO: RELATIONSHIPS AND EFFECTS ON SCHOOL TRANSITIONS

Alberto de Mello e Souza
Nelson do Valle Silva

documento 06

FAMILY BACKGROUND QUALITY OF EDUCATION AND PUBLIC AND PRIVATE SCHOOLS IN SÃO PAULO: RELATIONSHIPS AND EFFECTS ON SCHOOL TRANSITIONS

Alberto de Mello e Souza*
e Nelson do Valle Silva**

Draft - Not to be quoted
January, 1991

* Faculdade de Educacão, UFRJ
** Laboratório Nacional de Computacão Cientifica

1. INTRODUCTION

The major challenge in the Brazilian education is to reduce significantly evasion in the 'Primeiro Grau', as now 95% of a cohort have access to a school. Attempts to have a better understanding of the factors that explain the high evasion rates seldom have available an adequate data set. The PNAD-82 can be used for this purpose as it provides information about the student and his family, quality and type (public or private) of schools, as well as on the transition rates. The limitations refer mainly to the few variables expressing quality of education and the fact that they cannot be used in most regressions and the absence of variables describing student's achievement.

The choice of the state of São Paulo was done on grounds that both family income and the quality of the public schools impose less severe constraints on the choice of the type of schools than in most other states. The organization of the work is the following: First, a discussion regarding the major objectives of the study is presented. Afterwards, a description of some characteristics of the student, its family and the quality of schools is made by region (urban or rural) and type of schools. Third, a model of decision regarding the choice of type of school is presented and its results discussed. Finally, regressions explaining delay in entering school, promotion and evasion have their results commented.

2. A DISCUSSION OF THE DETERMINANTS OF SCHOOL SUCCESS.

The low average number of years of schooling in Brazil (about six years) sets a severe constraint on the growth of the economy, is an important cause of the high inequality of income and an impediment on the exercise of political rights. A study about school attainement has to focus on the school, family and student factors that influence those results. The variables related to the student or his family used in this analysis are similar to those found in the literature and require no further comments. However, the introduction of the type of school deserves justification.

In the discusstion about the Brazilian education, one of the most recurrent themes is the antagonism between the defenders of public and private education.

In the early thirties, the major issue was the separation between the State and the Church regarding aid to the parochial schools, which comprised the majority of private school and the teaching of religion in the public schools. More recently, the divisive issue is expressed in the conditions for the private schools to receive aid, mainly in the form of schollarships and the public regulation of the private schools, mainly in the form of price controls.

One justification common to the views of both those who want

government resources to be spent only in public schools and the price control policies exerted by the government, especially in the last five years, is the deplorable condition of most public schools. Aid to private schools is perceived as a further neglect of the public schools and price controls are perceived as a way to facilitate access to private schools because a public school alternative is not available.

Thus, the concern for improving the knowledge about differences between public and private schools, the decision to enter one of them and the consequences regarding the chances of promotion and evasion is a central aspect of this work. Related to this concern is the role quality of education plays in the results of the student as compared to family background and student traits. There are clear indications that family expenditures in education have a high income-elasticity and that returns to quality are larger than those for quantity of education [see Mello e Souza (1979) and Birdsall ( )]. Here, information is brought on how quality varies between public and private schools, among each type of school and how this variation is related to family characteristics.

The use of the public-private dichotomy usually raises two issues. First, the selection bias effect appears whenever nonschool factors are not controlled adequately in the explanation of the results of the student and thus, the omitted variables may bias the effect due to the type of schools. This is the case if, more motivated students choose, say, private schools. Although there are procedures that may attenuate the problem, some authors deny the possibility of solving it [see Murnane (1981)]. In studies explaining achievement, the absence of family background or student variables should be more damaging than in this work because promotion and evasion are affected by school policies, which are also not considered.

Second, previous studies such as Coleman et alii (1982) and Jimenez et alii (1988) have found that private schools are more effective than public schools in influencing achievement levels. Policy implications of such findings regarding, for example, the financing and regulation of private schools, have stirred a debate over many issues [see the discussion about Coleman et alii in Harvard Educational Review (1981)]. In Brazil, the dominant issue is how to provide conditions for the public school to retain students until graduation in the "Primeiro Gráu". Other issues, although may be intelectually appealling, are secondary in our judgement.

The variables related to quality of education (time spent in school, availability of textbooks, frequency of homework and day or night classes) provide little information about school inputs or, worse, how they are used. Important dimensions of quality, such as the effective use of the time of the student and the maintenance of a favorable environment to learning (discipline, teacher demands and stimulus) are not captured by the variables mentioned above. Absence of teachers and poor supervision, for

example, are more common in public schools than in private ones. This line of reasoning leads to concluding about the importance of the combination of inputs in relation to its availability. Finally, the omission of student characteristics, such as intelligence and motivation, probably increases the direct effect of family background.

2. EDUCATION OUTCOMES AND TYPES OF SCHOOL

There is a discussion related to the transition rates presented by official statistics, implying that they are wrong and misleading in its consequences on the design of education policies. Fletcher and Ribeiro (1988) have obtained, through the use of PNAD and census data, results that point out overestimated evasion rates in the official statistics. The PNAD-82, which will be used in this study, contains an additional data set about education, presenting information, for those that were in school in 1981, about their situation in 1982. Thus, it allows to obtain knowledge first if the student was promoted or not and then if he continued in school or evaded. Evasion may have occurred before the beginning of the 1982 school year or afterwards.

One important cause of the high evasion rates in the MEC data is the overblown enrollment data by school directors in order to assure a larger share of resources distributed on a per student basis. Thus, policies both cause and are influenced by errors in education data and a better grasp about the transition rates is required.

The first table, presenting transition rates in São Paulo by grades, shows a high repeat rate in the first grade (29%), which declines to 18% in the second grade and, in the remaining grades of the "Primeiro Grau" varies between 10 and 19%. The school retains more than 90% of the repeaters. This compares very favorably with the proportion of evaders among the students who are promoted. Thus, the majority of students who evade (90%) are the ones viewed by its teachers as successful ones. An attempt to provide an explanation of the causes of the evasion is carried out later on. At the moment, the fact that the successful student is prone to evade deserves attention because conflicts with the usual view that failure leads to evasion. This fact also occurs for the first two grades of the "Segundo Grau".

The breakdown of the data by urban and rural areas (see tables 2.2 and 2.3) does not change the nature of the findings above. The repeat rates in the first grade are the same (28%) and in the second grade are higher for the rural area (24 vs 17%). For grades 3 to 8, the discrepancies between urban and rural repeat rates occur only in the last two grades. The proportion of evaders among the successful students is higher for the students in rural areas, as expected, and, for both areas is larger than the same proportion in relation to the students that flunked.

Thus, the major finding of this analysis, that success rather than failure leads to evasion, although more prevailing in rural schools, is also quite intensive in urban schools.

Another breakdown of the data was by type of school (Tables 2.4 and 2.5). In this case, there are important differences in the results. First, the repeat rates in the first two grades are, in the private schools, about one third of those in public schools. For the other grades, they remain smaller in private schools, with the exception of grade 8. Thus, there are clear indications that either the standards for promotion are different or the performance of the students is better in the private schools. Second, the proportion of evaders both among the students who passed and among the students who flunked is smaller in the private schools in grades 1 to 6. The ability of private schools to retain a larger share of its students thus is another significant feature. For grades 7 and 8, the situation is reversed. Although the reason for this reversal is not clear, it is well known that htemost prestigious private schools do not retain the students who are not promoted and this policy is implemented in the last four grades of "Primeiro Gráu". For "Segundo Gráu" evasion is proportionally larger among the repeaters in private schools, with the exception of the first grade.

It was possible to distinguish two major differences between public and private schools regarding both repeat and evasion rates. First, students from public schools experience very high repeat rates, especially in the two initial grades as compared to those in private schools. Second, the proportion of evaders among the successful students is much larger than that among the repeaters. Private schools present smaller evasion rates and evasion is more common among the repeaters.

Possible explanations for the differences in public and private schools are: characteristics of the students and their family background, variables related to quality of education and school policies. There is no direct evidence about school policies, although part of its effect is captured by the type of school. In the next sections, the distribution of variables pertaining to the student and its family is presented.

3. FAMILIES AND SCHOOLS: SOME RELATIONSHIPS

The characteristics of the students available in the PNAD are age, sex and colour. Thus, it is possible to know the proportion of students in an age group who are behind in their studies (see Table 3.1). For the urban area, half of the eight years old students are in the first grade, either because they entered in school with that age or because they are repeating the grade. The proportion of delayed students increases with age, reaching 77% at age fourteen. This proportion is higher in the rural areas, varying between 61% for the eight years old and 91% for the fourteen years old students. Another angle is that of

the student's age when entering school (see table 3.2). More than half of the students (57%) enter school at ages 6 or 7 in the cities, as compared to 42% in the rural areas. In the other extreme, 15% of those entering city schools are ten years old or older, as compared to 26% in the rural areas.

The distribution of the student's colour is about the same in urban and rural areas. In rural areas, the percentages of whites is smaller (71% vs 74%) and the percentages of blacks and "browns" is slightly higher (see table 3.3).

The next table presents information on the percentage of illiterates by age. At ages 9 and older, illiteracy rates reflect the failure of the school to provide literacy skills for those who finish second grade or overaged students. In these ages, illiteracy rates in rural areas are twice as large as those in urban areas.

Variables related to family background include family income, education of head of family, family size and female headship. The median years of schooling of the head of family is three. In the cities, 76% of the heads of families have at the most completed four years of education; similar percentage in the rural area is 95% (see table 3.5). Female headship increases with the age of the child, representing, in urban areas, about 10% of the families whose children are seven years old and 16% of those families whose children are fourteen years old. For rural areas, the proportions are, respectively, 1% and 6%.

Distributions for type of school present important differences. Thus, the proportion of overaged students for those who are eight years old is 55% in public school and 16% in private ones. On the average, over 2/3 of public school students are older than the norm as compared to 1/3 for the private school students (see table 3.6). To a large extent, the explanation for these differences is provided by the fact that in private schools 87% of the students enter school in the proper age and, for public schools, only half of the students have the same behavior. Furthermore, whereas 8% of public school students were 11 years old or older when entering school, no student in the 11-14 age group was admited in private schools (see table 3.7).

Private schools are, relatively, chosen more by whites and orientals than by blacks and "browns". Thus, for example, whereas orientals represent 5% of all students in private schools and 2% in public ones, the proportions of "browns" are, respectively, 5% and 19% (see table 3.8). Partly because private school students enter in school earlier than the public school students, the illiteracy rates for them at ages 7 and 8 are much smaller. Smaller repeat rates are the other part of the explanation for the lower illiteracy rates in private schools (see table 3.9).

The education of the head of family is much higher for

students in private schools. While in this case, 39% have at the most four years of schooling, this proportion in public schools is 80% (see table 3.10). In the other side of the spectrum, 44% of heads of family with children in private schools have ten or more years of schooling; the percentage for those with children in public schools is 9%. The occurrence of female headship is somewhat greater if the child is in public schools. For households of children aged 7-14, the average percentage of female headship is 10% in public schools and 8% in private ones.

4. INDICATORS OF QUALITY OF EDUCATION

The demand for private education has three major components: access to school in places where the supply of public education is inexistent, demand for schools with a specific profile (religious, teaching in other than the native language, pedagogical orientation, etc.) and demand for quality of education. Given the dismal condition of many public schools, the last factor must be the predominant one in explaining why parents are willing to pay for private education. Unfortunately, quality of education was registered in the PNAD only for 1982 and cannot be used in the regressions explaining the transition rates, which are based on information for both 1981 and 1982.

Two informations about quality of education were obtained. First, its variation within each type of school. Second, whether quality of education is related to education of the head of household and to tuition. There are four variables describing aspects of quality of education. First, if classes are held in daytime or at night. Second, the period of time the student spends in school. Third, the availability of textbooks and finally the frequency of homework.

In the first four grades practically all students go to day classes (see table 16). In the other half of the "Primeiro Grau" the proportion of students in day classes declines for both types of school, although more intensively for public schools. This reflects the increasing demand for the "Supletivo" by the overaged students. In "Segundo Grau", less than half of the students attend day classes. It is not possible to distinguish regular students in night classes from those in "Supletivo".

The average period of time spent in the public schools is four hours. In private schools, this average is 13 minutes greater and presents a larger standard deviation (40 minutes vs 22 minutes) than public schools. Thus, for most students in public schools (97%) the number of hours spent in school varies from three to five. The corresponding percentage for private school students is 88%. This may be explained by the fact that an important dimension of the services of private schools is the quantity of hours; its variation influences the price of education.

The percentage of students who receive daily homework declines for the higher grades in both types of school (see table

4.2). Private schools have a higher proportion in first grade and a smaller rate of reduction. This may be an important difference regarding school policies, which interact positively with family background. A more stimulating atmosphere at home and more frequent homework should produce higher achievement.

The availability of textbooks has proved one of themost effective ways to improve learning. Most students or private schools have all textbooks, independently of the grade (see table 4.2). The percentage in public schools is lower in the early grades, where more than 10% of the students do not have textbooks.

The next question is to verify if the variation of quality of education is related to education of the family head, the last one taken to represent family tastes and ability to invest in education. The proportion of students in day classes tends to increase with education of the family head for both public and private schools (see table 4.3). It is important to observe that the variation in private schools is much larger, reflecting the fact that the demand for "Supletivo" from poor families is, proportionally, met more intensively by the private school.

The proportion of students receiving daily homework in public schools shows little variation with years of schooling of family head; the same proportion in private schools presents a wide variation, indicating that its services adjust to the income constraints of its clientele (see table 4.4). Similar pattern is found in relation to the time spent daily in school. The number of minutes increases with the education of the family head for both types of school (see table 4.5). However, the variation both among and within educational levels is higher in private schools. Regulations concerning public schools must explain that, on average, there is an increase of only 11 minutes as compared to 32 minutes in private schools. The real question, the effectiveness of the use of time remains without an answer.

Especially in the private schools, it was seen that quality of education is related to family background. Another question is to find out whether, for these schools, quality of education is also related to tuition. For this purpose, the information about monthly tuition was divided in ten groups, corresponding roughly, to decides. For the lower four tuition groups, the proportion of students in day classes varies between 63% and 85%. For the other groups, the proportion varies between 84% and 100%.

Frequency of homework by tuition groups is presented in table 4.6. Clearly, there is an inverse relationship between the proportion of those receiving one homework or less weekly and tuition. The average time spent daily in school increases by more than an hour between the first and the last tuition groups (see table 4.7). For the two highest tuition groups the standard deviation is much higher, supporting the reasoning that higher tuitions buy, among other things, more time at the school.

5. THE CHOICE BETWEEN PRIVATE AND PUBLIC SCHOOL

To study the process of choice between private and public school it was used a logistic response model relating a set of variables pertaining to the student and his family to the log odds that the student is in a private school. The model can be described by the equation:

$$\ln\left(\frac{\phi_i}{1-\phi_i}\right) = \beta_0 + \sum_j \beta_j X_{ij}$$

where ϕ_i is the probability that the ith student was sent to a private school, Xij is the value of the jth explanatory variable for that student and the Bj are parameters indicating the effect of these variables on the natural logarithms of the odds of being in a private school.

The explanatory variables used in the analysis of the model proposed above were the following:

X_1 - Family Size - number of people in the family.

X_2 - Total Family Income - sum of the income earned by family members.

X_3 - Place of residence - 1 if urban; 0 otherwise.

X_4 - Female Headship - 1 if family head is a woman; 0 otherwise.

X_5 - Student's Color - 1 if white; 0 otherwise.

X_6 - Student's Color - 1 if brown; 0 otherwise.

X_7 - Student's Color - 1 if oriental; 0 otherwise.

X_8 - Student's Gender - 1 if girl; 0 otherwise.

Table 5.1 presents the results of the evaluation of equation 1 using the PNAD-82 data. In the lower three rows of table 5.1 are indicated the values of "R^2", sample size N and the overall probability P (Y=1) for being in a private school. "R^2" measures the proportion of reduction in error of prediction vis-a-vis the null hypothesis that all coefficients are zero (Durmouchel, 1976). In the first column are presented the results for the model using all the students enrolled when the data were collected, i.e., 1982. In the next column are the results for those enrolled in school in the previous years, 1981. The third column restricts the sample to only those entering school during 1982. The last four columns separates those enrolled in 1982 by school cycle: those in the 1st to 4th grade of "Primeiro Grau", those in the 5th to 8th grade, those in secondary school and undergraduates, respectivelly.

The overall fit of the model (as indicated by the goodness-of-fit statistic "R^2") indicates a reduction in prediction error of about 20%. However, the fit of the model declines in higher grades: while reduction in error is as high as almost 1/3 of total prediction error for 1st to 4th graders, it is only 5.5% for those at college level. This at least partially reflects the growing homogeneity of family background of students along the schooling process, given the selectivity based on cognitive performance factors which are related to the socioeconomic variables used in the model.

The results for those enrolled in both 1982 and 1981 are very similar. With two exceptions all variables proved to be significant predictors of type of school attained. Moreover most variables have effects in the expected direction. The strongest effect seems to be that for education of head of family, the positive sign indicating that the higher the educational level achieved by the head of the family the higher the chances of the student to be enrolled in a private school. A similar effect, although much less strong one, can be observed for family income. These two effects imply that, other things being equal, higher socioeconomic status are associated to higher chances of private school enrollment. On the other hand, the second strongest effect seems to be that for family size: bigger families lower the chances of private school enrollment, probably due to the decrease of the family income share available for each student.

Color contrasts are also important predictors, both whites and orientals showing higher chances (significant at any conventional level) than the base group, black students. The coefficient for "brown", though, imply that the difference between "brown" and black students is not significantly different from zero, a result that confirms what has been observed in many studies of race relations in Brazil (see e.g. Silva, 1981). It should be noticed that the coefficients for oriental students are particularly high, well above those for white students.

One expected result is the generally positive sign for female headship, when one should expect a negative one, given the notion of more fragile socioeconomic conditions among broken families. A similarly unexplained result - although not unexpected - is the significant sign for the gender contrast. Here the expectation was the absence of significant differences between boys and girls in the chances of private school enrollment. At any rate, the behavior of this variable in the other sections in table 5.1 seems to indicate that this is not a particularly noteworthy determinant of type of school choice.

In fact, the other regressions usually confirm these general results, with some minor exceptions, up to the results referring to secondary school enrollment. However, the results for college enrollment actually reverse the determination observed so far, all socioeconomic predictors and the color contrasts showing negative signs. Particularly significant is the one observed for

the effect of education of family head. This result strongly suggests that the better-off students are precisely those more likely to attend a public (and free) university, a perverse situation that characterizes higher education in Brazil.

6. ENTERING AND LEAVING FIRST GRADE

The next step will be to examine the conditions of entrance to, flow through and exit from the first grade of primary education. Brazilian law makes compulsory attendance to school from ages 7 to 14. The idea behind being that students during that time should complete the eight years of elementary school cycle. Clearly, reality is far from that ideal performance, and probably the most important reason for this wide difference is what happens during the first year of the students' school life.

First, many students do not enter school at age 7. As indicated before, the 1982 PNAD questionnaire included a set of questions about schooling in the previous year, so that it is possible to examine in some detail the transition between 1981 and 1982. Especial attention is paid to the situation of a student entering the school system in 1982, that is, those enrolled in 1982 in the first grade that were not enrolled in 1981. Tabulating the age of those students minus 7 - the ideal age for school entrance - we find that only 54% were at that ideal age, that 31% were one year late and the other percentages were 7% for two years of delay, 4% for three years and that another 4% had four or more years of delay. Thus, on average they enroll in the first grade at age 7.7 instead of the prescribed 7.

Not surprisingly, type of school is correlated with delay at entrance (see table 6.1): while almost 87% of those entering first grade at private school do so at the prescribed age, the corresponding figure for public schools is only 51%. Even if we allow for the fact that some of the students delayed one year did in fact enter school at the correct age of 7 - because the PNAD survey is taken late in the school year (October) - we still find that the proportion of those with delay of entrance of two or more years is 16.3% in public schools, compared with only 2.7% in private schools. Thus, in average terms, students entering first grade in private schools do so with 0.26 year of retard, while for those entering public school the average delay is of almost 0.81.

This is a significant difference (see table 6.2), type of school accounting for almost 2% of the variance of delay at entrance, as evaluated by an OLS regression model with type of school coded as a dummy variable. However, when we take into account the social background of students in those two types of school, this difference is not significantly different from zero at any conventional level (see columns 2 to 5 in table 6.2). Restriciting our observations to those up to 14 years of age, to make sure that those not enrolled in regular school (that is, those in the "supletivo" track) do not interfere in our results,

we arrive at results that are similar to those obtained above with a larger population regarding the average delay of entrance.

When dealing with those students that make the 1981/82 transition, that is, those enrolled in the first grade in 1981, we do not have the information on their age at school entrance. But their age in 1981 is known and, thus, we are able to calculate their age/grade fitness during that school transition. Applying a model similar to the one used previously, we arrive at the results displayed in table 6.3. It should be noticed that the dependent variable is the prescribed age at enrollment in the first grade (that is, 7) minus the student's age in 1981. Therefore, the coefficients in table 6.3 have signs opposed to the corresponding ones in table 6.2. The results indicate a very strong effect of education of family head, the positive sign implying that those coming from more educated family background have significantly better age/grade fitness than those with less educated parents. The effect of family size is also very strong, the bigger the family the lower (i.e., the older the age of school entrance and/or the more they have repeated - as we will see next - the first grade) the students' age adequacy relative to the legal norm. Also significant are the effects for female headship (a negative one) and for all color groups, being particularly strong the effect for oriental ancestry (a positive one). The remaining effects were not significant at the conventional levels, including the one for type of school.

Another characteristic relative to the 81/82 transition is whether the student successfully completed the grade in which he/she was enrolled in 1981. In the case of the first grade, applying the same kind of logistic regression model used in section 5 to this variable we arrive at the results presented in tables 6.4 and 6.5. In the latter, the results are restricted to the group aged up to 14 years, for the reasons given above.

Most results are congruent to expectations: head's education is again the strongest predictor of promotion; on the other hand, both family size and family income are significantly related to grade completion (both with the expected signs), indicating that children from poorer families are indeed less likely to succeed in completing the first grade. To be a girl also proved to be a positive effect on completion chances, suggesting that they are better students than the boys. This is compatible with the observation that in present day Brazil girls in the cohorts just leaving school have more years of schooling than their male counterparts. One unexpected result is that urban residence seems to be significant and negatively related to first grade success, suggesting as possible explanation that urban school have stricter promotion criteria than rural schools, given that socioeconomic differences between these two types of area seem to have been properly controlled for.

Finally age/grade fitness appears to be negatively related to first grade completion. In other words, younger students are

significantly less likely to be successful in their first year of schooling, other things being held constant. This suggests that "cognitive maturity" is one crucial element for success, eventually reached through first grade repetition. This seems to constitute what one observer of the Brazilian education scene calls "grade repetition pedagogy" (Ribeiro, 1990).

To explain promotion in the first grade, separate regressions for public and private schools were also obtained, for the purpose of comparing interactive effects of family background and type of school. Whereas coefficients did not change much and their significance levels were not altered in the public school, there were major changes regarding the private school regression. Only family size still remains significant, in part due to reduction in sample size from 1676 to 125. Family income has about the same coefficient of variation although its mean for students in private schools is about 3.5 times that for those in public schools. The mean years of schooling of family head for those in private schools is 8.8 and for those in public schools is 3.2 (the coefficients of variation are, respectively, 91% and 53%).

We may conclude, tentatively, that factors related to family background are effective only in public schools. Three possible explanations are suggested. First, differences in the behavior of the parents and their expectations regarding the success of the child are more pronounced in the case of public schools. Second, variations in the resources available to the public schools and their effectiveness, which are related to family characteristics. Third, negative attitudes of public school teachers regarding students from the poorest families, an observation often made in the literature.

Evasion during or justafter the first grade is relatively low by Brazilian standards, as about 3% of the students are drop-outs. The last columns in tables 6.4 and 6.5 present the results for the logistic regression model applied this time on the chances of dropping-out. In addition to the expected results of significant negative effects of socioeconomic family conditions on these chances (particularly family head education and family income), two results should be underlined: first, age/grade fitness is strongly and negatively related to the chances of dropping-out, the relatively younger students showing higher propensity for staying in school; second, those who completed first grade - and as we have seen, are more likely to be older students - are actually more likely to drop-out of school (of course, always given the ceteris paribus condition) than those who failed. Therefore, the combination of this perverse causal mechanism with the fact that those students coming from worse-off families enter school relatively later seems to produce a situation in which these students are subject to repeated failures up to the point which, when they finally succeed in being promoted, they also reach an age when other factors exert a decisive pull from school.

As a final remark, it should be noticed that type of school is not significantly related to promotion when socioeconomic family conditions are controlled for. That is to say, private schools do not seem to add any significant independent amount to the chances of completing successfully the first grade.

7. LATER STAGES OF SCHOOLING

When dealing with the results for the other grades selected for analysis (the 4th, 8th and 11th grades) one should keep in mind that the schooling process selects students by cognitive-academid performance, which are expressed in terms of promotion, which in turn (as we have seen) are partially determined by the students' family background. This process of selectivity tends to cause both an increase in the average values of the social background variables and a decrease in the variance (relative to the means), indicating greater homogeneity in some of those characteristics. Therefore, when we compare, for instance, family size and family income for students in the 1st and the 11th grades, we find that while family size decreases, family income increases and variance for both variables decreases too. Considering both variables, these results suggest that per capita family income increases almost threefold, from about Cr$15.812 in the first grade to Cr$45.277 in the 11th grade, being simultaneously more homegeneous in the latter grade.

As a consequence of this selectivity the effect of socioeconomic family background tends to decline as the schooling process goes on, and actually seems to be reversed at the end (see table 7.2). Up to 8th grade the effects of background variables, although progressively reduced, goes in the same direction observed for the first grade: students coming from better-off families are more likely to be promoted and less likely to drop-out; girls seem to be better students than boys; students with greater delays, as well as those who succeed in being promoted are more likely to drop-out.

But when one reaches the 11th grade, the results indicate that better-off students, those with more educated parents are actually less likely to be promoted to the next grade. However, the effect of personal characteristics seems to keep the same directions observed before for all other schooling stages. This seems to indicate that those few students from relatively worse-off families that survived up to this point are indeed better students on average than those from better-off families. An alternative explanation is that many students in secondary schools are in the "supletivo" (night classes for the overaged students, which have special programs), with less strict requirements for promotion.

As a final comment, it should be pointed out that in all of the schooling stages examined the public/private contrast again failed to add any significant effect on both promotion and evasion chances to those determined by personal and socioeconomic

circunstances of the students.

8. PROMOTION AND QUALITY OF EDUCATION

The previous analysis about promotion and evasion did not include variables related to the quality of education because information about quality of education refers only to 1982. This fact presents two difficulties. First, there is no information for students in 1981 that were not in school in 1982. Second, use of the quality data requires the hypothesis that it reflects the conditions which existed in 1981. Promotion is the dependent variable and the equation form is the same as used before. The quality variables are frequency of homework, availability of textbooks and time spent in school. It is possible to observe the impact of these variables on the log-odds of being promoted and how they change the variables related to family background.

For the first grade, of the four variables which are highly significant in explaining promotion among those who continue in school, only family income loses its significance after the introduction of quality variables (table 8.1). However, among these, only homework is significant and has the wrong sign. In the first grade, the importance of homework may be overshadowed by the school activities.

For the fourth grade it was possible to include day classes in one regression (table 8.2). Its significance expresses the fact that promotion in regular classes is more difficult than in night classes, where many are in "supletivo" schools. Family background variables are not significant in any regressions, probably because of the evasion previous to the fourth grade. Time spent in school is highly significant, stressing its importance for learning. Availability of textbooks has the correct sign, although with a low significance level. Since more than 90% of the students have all textbooks, this may express São Paulo peculiarities regarding the supply of textbooks.

9. CONCLUSIONS

This study centered around explanations for promotion and evasion among students from São Paulo, using the PNAD-82 data, which provides information about the transition from 1981 to 1982. First, it was observed high repeat rates in the two initial grades of primary education. Second, evasion was much higher among those students promoted than among the ones which had to repeat. Separating the information for private and public schools, it was seen that in private schools both repeat and evasion rates are substantially smaller than in public schools.

Further data analysis revealed important differences among public and private schools regarding characteristics of the student, such as color, and of his family. Information about quality of the school, available only for 1982, showed that both types of school had large variation regarding the time spent in the school daily by the student, the frequency of homework and a

smaller variation regarding the availability of textbooks. Unfortunately, it was not possible to include quality variables in most of the regressions.

Initially, it was estimated a decision model regarding the choice between public and private schools. For all students, all the background variables and ~~whom~~, in the case of whites and orientals, are highly significant and with a positive sign, indicating they increase the log-odds of choosing a private school. For the primary and secondary levels, only female headship is not significant, whereas ~~whom~~ also loses its importance. At the university, family income and education of head change signs (and loose their significance) indicating that private institutions are chosen by students with lower socioeconomic status.

Both the age of the child when entering school and the age of the student related to the norm in his grade are heavily influenced by family background variables. A model was used in which promotion was explained by student characteristics (including its delay), background variables and the type of school. Then evasion was explained by the same group of variables, including promotion. Regressions were obtained for four grades, whose transitions were considered the most relevant: first, fourth, eigth and eleven grades. Overall, the results point out the importance of family background and lack of significance of private school. However, when separate regressions explaining promotion in the first grade were run, background variables lost their significance in the private school regression, suggesting that it may exist discriminatory factors in the public schools.

Regressions including quality variables showed the importance of number of hours spent in school. Unfortunately, limitations of the data prevented us to inquire about the relative importance of these variables in the promotion and evasion results. The other major constraint of this study is the lack of information about achievement. Still, it was possible to have a better knowledge about the transitions and to show that, to a large extent, school performance in São Paulo reflects the wide ~~irregularity~~ existing in the society and that family background is, if any, more important in influencing the transitions in public schools.

REFERENCES

Birdsall, N.

Coleman, J. et alii - "Report Analysis: Public and Private Schools", Harvard Educational Review, vols. 4,4: 481-545. November 1981.

Dumouchel, W.H. - On the Analogy between Linear and Log-linear Regression, University of Michigan, Dept. of Statistics, Technical Report no. 67, 1976.

Jimenez, E. et alii - "The Relative Efficiency of Private and Public Schools: The Case of Thailand", The World Bank Economic Review. Vol. 2, 2: 139-164, May 1988.

Mello e Souza, A. - Financiamento de Educacão e Acesso à Escola no Brasil, Rio de Janeiro: IPEA/INPES, 1979.

Murnane, R.J. - "Evidence, Analysis and Unanswered Questions". Harvard Educationa Review, Vol. 54, 4: 483-489, November 1981.

Ribeiro, S.C. - A Pedagogia da Repetência (mimeo) LNCC/CNPq, September 1990.

Silva, N.V. - "Cor e o Processo de Realizacão Sócio-Econômica", Dados 25: 391-409, 1981.

Fletcher, P.R. and Ribeiro, S.C.) Ensino de Primeiro Grau no Brasil de Hoje, (mimeo) 1987

Table 2.1

TRANSITION RATES BY GRADES - TOTAL

	PROMOTED		REPEATED		TOTAL
	EVADED	RETAINED	EVADED	RETAINED	
1ª	2,8	68,1	0,6	28,5	765128
2ª	3,3	78,5	0,3	17,9	648888
3ª	6,0	81,0	0,2	12,8	569922
4ª	10,9	79,5	0,6	9,0	501455
5ª	11,1	70,1	1,5	17,3	492761
6ª	9,6	73,4	2,1	14,9	399351
7ª	9,8	77,5	1,2	11,5	328794
8ª	21,9	67,5	0,8	9,8	253519
9ª	9,2	72,6	1,1	17,1	221209
10ª	5,5	84,2	2,0	8,3	181581
11ª	43,5	38,5	14,9	3,1	157905
12ª	11,1	81,9	3,0	4,0	82984
13ª	6,1	89,4	1,5	3,0	54584
14ª	12,6	86,0	-	1,4	29865
15ª	41,7	49,3	3,6	5,4	23061
16ª	91,8	8,2	-	-	5022

* * *

Table 2.2

TRANSITION RATES BY GRADES - URBAN AREAS

	PROMOTED		REPEATED		TOTAL
	EVADED	RETAINED	EVADED	RETAINED	
1ª	2,5	68,4	0,5	28,6	663451
2ª	2,8	79,5	0,4	17,3	576265
3ª	4,9	82,2	0,1	12,8	514752
4ª	9,6	80,9	0,6	8,9	459448
5ª	10,6	70,6	1,5	17,3	462071
6ª	9,7	73,3	1,9	15,1	375684
7ª	9,4	77,4	1,3	11,9	311366
8ª	21,8	67,9	0,8	9,5	242724
9ª	9,2	72,7	0,7	17,4	213283
10ª	5,5	84,0	1,9	8,6	174559
11ª	44,0	37,5	15,3	3,2	154208
12ª	11,3	81,5	3,1	4,1	80916
13ª	6,4	89,0	1,5	3,1	52532
14ª	12,6	86,0	-	1,4	29865
15ª	42,4	50,3	3,7	3,6	22654
16ª	91,8	8,2	-	-	5022

* * *

Table 2.3

TRANSITION RATES BY GRADES - RURAL AREAS

	PROMOTED		REPEATED		TOTAL
	EVADED	RETAINED	EVADED	RETAINED	
1ª	4,8	65,9	1,2	28,1	101677
2ª	7,9	68,6	-	23,5	72623
3ª	16,4	69,3	0,7	13,6	55170
4ª	25,6	63,7	0,9	9,8	42007
5ª	17,6	63,5	1,3	17,6	30690
6ª	8,7	73,8	5,2	12,3	23667
7ª	16,5	78,7	-	4,8	17428
8ª	23,2	61,3	-	15,5	10795
9ª	10,4	68,5	10,8	10,3	7926
10ª	6,1	88,0	5,9	-	7022
11ª	22,3	77,7	-	-	3647

* * *

Table 2.4

TRANSITION RATES BY GRADES - PRIVATE SCHOOLS

	PROMOTED		REPEATED		TOTAL
	EVADED	RETAINED	EVADED	RETAINED	
1ª	-	88,8	-	11,2	53034
2ª	0,9	92,7	-	6,4	45161
3ª	-	94,5	-	5,5	45895
4ª	1,0	89,9	2,0	7,1	40741
5ª	4,1	86,5	1,0	8,4	40074
6ª	4,2	86,2	2,1	7,5	38966
7ª	9,4	82,0	4,8	3,8	43859
8ª	18,4	71,1	4,0	6,5	32042
9ª	5,7	86,0	0,5	7,8	80711
10ª	3,9	88,2	3,4	4,5	75000
11ª	36,8	44,7	16,6	1,9	63257
12ª	8,9	85,5	2,5	3,1	66190
13ª	6,8	89,6	0,8	2,5	48269
14ª	13,7	84,6	-	1,7	409
15ª	45,4	47,9	-	6,7	477
16ª	100,0	-	-	-	2515

* * *

Table 2.5

TRANSITION RATES BY GRADES - PUBLIC SCHOOLS

	PROMOTED		REPEATED		TOTAL
	EVADED	RETAINED	EVADED	RETAINED	
1ª	2,9	66,7	0,6	29,8	712094
2ª	3,5	77,3	0,4	18,8	603727
3ª	6,5	79,8	0,2	13,5	524027
4ª	11,8	78,5	0,5	9,2	460714
5ª	11,7	68,7	1,5	18,1	452687
6ª	10,1	72,1	2,1	15,7	360655
7ª	9,8	76,8	0,7	12,7	284935
8ª	22,4	67,1	0,3	10,2	221477
9ª	11,3	64,7	1,5	22,5	139998
10ª	6,7	81,2	1,1	11,0	106581
11ª	48,1	34,3	13,7	3,9	94648
12ª	19,7	67,8	5,0	7,5	16749
13ª	-	87,0	6,4	6,6	6315
14ª	7,8	92,2	-	-	5456
15ª	27,0	54,7	18,3	-	4584
16ª	83,5	16,5	-	-	2507

* * *

Table 3.1

PROPORTION OF OVER-AGED STUDENTS BY AGE AND AREA

AGE	URBAN AREA	RURAL AREA
8	50,3	60,6
9	57,0	76,6
10	65,2	83,1
11	68,1	88,3
12	72,3	91,0
13	77,1	87,5
14	77,4	91,3

* * *

Table 3.2

AGE OF STUDENT WHEN ENTERING SCHOOL BY AREA

AGE	URBAN	RURAL	TOTAL
6	15953	1647	17600
7	274000	30777	304777
8	155971	22760	178731
9	30284	10783	41067
10	16351	6225	22576
11	6263	2068	8331
12	6692	2077	8769
13	1654	814	2468
14	860	415	1275
TOTAL:	508028	77566	585594

* * *

Table 3.3

POPULATION IN THE AGE GROUPS 5-24 BY COLOUR AND AREA

	WHITE	BLACK	MULATO	YELLOW
URBAN AREA	74,2	5,5	18,4	1,9
RURAL AREA	71,2	6,7	20,3	1,8
TOTAL	**73,9**	**5,6**	**18,6**	**1,9**

* * *

Table 3.4

ILLITERACY RATES BY AREA AND AGE

AGE	URBAN AREA	RURAL AREA
7	54,5	62,4
8	26,2	36,3
9	11,7	26,0
10	8,6	17,2
11	5,2	9,6
12	3,9	9,7
13	3,4	9,6
14	2,9	7,0

* * *

Table 3.5

EDUCATION OF HEAD OF FAMILY BY AREA

PERCENTAGES

YEARS OF SCHOOLING	URBAN AREA	RURAL AREA	TOTAL
0	21,0	41,2	23,1
1	4,2	7,0	4,5
2	8,6	12,3	9,0
3	12,8	16,2	13,2
4	29,6	18,7	28,5
5-6	3,9	1,8	3,7
7-8	7,4	0,9	6,7
9-10	6,1	1,6	5,6
11-14	6,4	0,3	5,7

* * *

Table 3.6

PROPORTION OF OVER AGED STUDENTS BY AGE AND TYPE OF SCHOOLING

Percentage

AGE	PUBLIC SCHOOL	PRIVATE SCHOOL
8	55,2	16,1
9	62,3	20,1
10	70,3	31,9
11	73,7	38,3
12	76,4	43,2
13	81,0	41,7
14	81,2	43,6
15	83,2	29,9
16	84,7	53,1
17	81,6	62,0
TOTAL:	67,8	36,1

* * *

Table 3.7

AGE OF STUDENT WHEN ENTERING SCHOOL BY TYPE OF SCHOOL

AGE	PUBLIC SCHOOL	PRIVATE SCHOOL
7	260760	44017
8	173272	5459
9	40636	431
10	22146	430
11	8331	-
12	8769	-
13	2468	-
14	1275	-
TOTAL	517657	50337

* * *

Table 3.8

POPULATION IN THE 7-24 AGE GROUPS
BY COLOUR AND TYPE OF SCHOOL

Percentage

	WHITE	BLACK	MULATO	YELLOW
PRIVATE SCHOOL	88,6	1,4	5,1	4,9
PUBLIC SCHOOL	73,6	5,5	19,0	1,9

* * *

Table 3.9

ILLITERACY RATES BY TYPE OF SCHOOL AND AGE

Percentage

AGE	PUBLIC SCHOOL	PRIVATE SCHOOL
7	32,6	6,4
8	21,9	2,8
9	9,4	0,0
10	6,1	0,0
11	3,5	1,0
12	1,2	0,0
13	0,6	1,0
14	0,4	0,0
TOTAL	8,8	1,7

* * *

Table 3.10

EDUCATION OF HEAD OF FAMILY BY TYPE OF SCHOOL

Percentage

YEARS OF SCHOOLING	PUBLIC SCHOOL	PRIVATE SCHOOL
0	19,5	5,6
1	4,8	0,1
2	9,2	3,6
3	13,8	6,3
4	32,4	23,6
5	1,9	2,0
6	2,1	2,5
7	1,6	2,0
8	5,4	9,8
10	5,4	16,4
14	3,9	27,1

* * *

Table 4.1

PROPORTION OF STUDENTS IN DAY CLASSES BY TYPE OF SCHOOL AND GRADES

GRADE	PUBLIC SCHOOL	PRIVATE SCHOOL
1	99,9	99,2
2	99,4	100,0
3	99,1	100,0
4	97,0	99,0
5	85,0	90,5
6	75,5	88,8
7	62,7	72,7
8	52,8	68,3
9	46,5	39,8
10	36,5	45,7
11	32,8	42,1

* * *

Table 4.2

FREQUENCY OF HOMEWORK BY TYPE OF SCHOOL AND GRADE

Percentage

GRADE	PUBLIC SCHOOL			PRIVATE SCHOOL		
	Daily	2-3 Times Weekly	Once a Week or Less	Daily	2-3 Times Weekly	Once a Week or Less
1	63,5	20,2	16,3	75,0	15,3	9,7
2	59,1	21,8	19,1	75,3	12,8	11,9
3	51,4	24,0	24,6	69,8	17,1	13,1
4	46,3	22,8	30,9	66,1	11,0	22,9
5	35,3	28,6	36,1	62,2	15,6	22,2
6	30,8	26,0	43,2	43,0	33,0	24,0
7	32,0	27,7	40,3	42,8	28,1	29,1
8	26,7	28,8	44,5	44,7	17,7	37,6

* * *

Table 4.3

PURCHASE OF BOOKS BY TYPE OF SCHOOL AND GRADES

Percentage

DE	PUBLIC SCHOOL			PRIVATE SCHOOL		
	ALL	AT LEAST ONE	NONE	ALL	AT LEAST ONE	NONE
	82,0	4,8	13,2	94,7	2,3	3,0
2	83,7	5,4	10,9	95,6	0,9	3,5
3	83,6	5,0	11,4	98,0	-	2,0
4	86,3	5,1	8,6	95,2	3,8	0,1
5	87,6	7,9	4,5	95,3	2,9	1,8
6	92,5	4,8	2,7	94,4	1,1	4,5
7	94,1	4,1	1,8	95,9	1,0	3,1
8	93,6	3,8	2,6	97,1	1,0	1,9

* * *

Table 4.4

PROPORTION OF STUDENTS IN DAY CLASSES BY TYPE OF SCHOOL AND EDUCATION OF FAMILY HEAD

YEARS OF SCHOOLING	PUBLIC SCHOOL	PRIVATE SCHOOL
1	86,2	57,3
2	84,7	66,2
3	89,3	56,3
4	86,8	71,4
5	89,3	78,9
6	91,1	81,0
7	93,0	92,4
8	94,6	100,0
9	91,6	94,9
10 or +	96,0	99,1

* * *

Table 4.5

PROPORTION OF DAILY HOMEWORK BY TYPE OF SCHOOL AND EDUCATION OF FAMILY HEAD

YEARS OF SCHOOLING	PUBLIC SCHOOL	PRIVATE SCHOOL
1	44,4	34,7
2	47,8	33,7
3	46,3	30,7
4	47,9	46,8
5	45,4	55,7
6	46,4	60,0
7	57,3	65,3
8	45,6	61,9
9	49,3	54,3
10 or +	54,2	68,0

* * *

Table 4.6

AVERAGE NUMBER OF MINUTES SPENT IN SCHOOL BY TYPE OF SCHOOL AND EDUCATION OF FAMILY HEAD

	PUBLIC SCHOOL		PRIVATE SCHOOL	
YEARS OF SCHOOLING	NUMBER OF MINUTES	COEFFICIENT OF VARIATION	NUMBER OF MINUTES	COEFFICIENT OF VARIATION
1	236	10,0	227	17,6
2	238	10,0	230	11,4
3	239	9,5	237	13,3
4	239	8,9	241	10,6
5	242	9,6	245	17,1
6	241	8,2	240	11,8
7	244	8,3	248	17,0
8	240	8,6	266	8,9
9	244	8,3	264	17,9
10 ou +	247	7,8	259	15,4

* * *

Table 4.7

FREQUENCY OF HOMEWORK AND TUITION

Percentage

TUITION GROUPS	DAILY	2-3 TIMES WEEKLY	ONCE A WEEK OR LESS
1	47,9	22,7	29,4
2	60,2	12,1	27,7
3	59,4	12,4	28,2
4	61,3	13,2	25,5
5	66,8	14,3	18,8
6	57,7	26,0	16,3
7	60,5	23,7	15,7
8	70,4	14,8	14,8
9	59,9	31,2	8,9
10	62,4	31,3	6,3

* * *

Table 4.3

AVERAGE NUMBER OF MINUTES SPENT IN SCHOOL AND TUITION

TUITION GROUPS	NUMBER OF MINUTES	COEFFICIENT OF VARIATION
1	233	13,8
2	236	12,4
3	246	10,1
4	245	12,3
5	253	13,2
6	259	10,3
7	260	10,6
8	272	13,4
9	272	22,4
10	309	25,7

* * *

Table 5.1

REGRESSIONS FOR THE DECISION MODEL

VARIABLE	STUDENTS ENROLLED IN 1982	STUDENTS ENROLLED IN 1981	STUDENTS ADMITED IN 1982	PRIMARY LEVEL 1º to 4º	PRIMARY LEVEL 5º to 8º	SECONDARY LEVEL	UNIVERSITY
Size of Family	-0,2761**	-0,2537**	-0,3251**	-0,3112**	-0,1624**	-0,1157**	-0,1603*
Family Income	0,5249E-5**	0,4572E-5**	0,1089E-4**	0,4692E-5**	0,3577E-5**	0,3442E-5**	-0,1588E-0
Urban Area	0,7920**	0,9274**	1,1070*	1,5234**	0,7080*	0,7182*	-0,2527
Female Headship	0,3266**	0,3575**	1.1014**	0,1221	0,3710*	0,0068	-0,3877
Education of Family Head	0,0983**	0,1091**	0,0531**	0,2081**	0,1384**	0,0539**	-0,1043**
White	0,6796**	0,7421**	0,8585	0,4984	0,9119*	-0,1755	-4,7643
Brown	-0,0404	-0,2140	0,5085	-0,4094	0,7388	-0,1226	-
Oriental	1,0596**	0,9863**	1,3755*	0,5638	1,1463**	-0,4389	-5,7893
Female	0,1093*	0,0701	0,2498	0,2055*	-0,1024	-0,0880	0,1928
Constant	-3,0278**	-3,3257**	-3,8972**	-4,7853**	-4,2000**	-1,3808**	8,6541*
"R^2" (%)	20,0	19,5	28,6	31,5	16,5	6,6	5,5
N	11.524	11.159	1.586	5.936	3.623	1.394	564
P(Y =1)	0,160	0,153	0,153	0,074	0,109	0,372	0,870

** 1%

* 5%

* * *

Table 6.1

DELAY AT ENTRANCE BY TYPE OF SCHOOL

(1982)

DELAY AT ENTRANCE (years)	TYPE OF SCHOOL		TOTAL
	PUBLIC	PRIVATE	
0	256.548 (50.8)	43.602 (86.6)	300.148 (54.0)
1	166.139 (32.9)	5.459 (10.8)	171.598 (30.9)
2	40.212 (8.0)	431 (0.9)	40.643 (7.3)
3	21.730 (4.3)	430 (0.9)	22.160 (4.0)
4 and +	20.434 (4.0)	431 (0.9)	20.865 (3.8)
TOTAL	500.063 (100%)	50.353 (100%)	555.416 (100%)

TABLE 8.2

DETERMINANTS OF AGE AT SCHOOL ENTRANCE (1982) - OLS REGRESSION

VARIABLE	COEFFICIENTS				
	MODEL 1	MODEL 2A	MODEL 3A	MODEL 2B	MODEL 3B
Family Size		0.097**	0.098**	0.096**	0.096**
Family Income		-0.246E-6	-0.407E-6	-0.476E-6	-0.478E-6
Urban Residence		-0.199*	-0.195*	-0.195*	-0.195*
Female Headship		0.562**	0.554**	0.539**	0.539**
Education of Family Head		-0.062**	-0.065**	-0.058**	-0.058**
White		-0.483**	-0.480**	-o.215	-0.215
Brown		-0.444**	-0.441**	-0.185	-0.185
Oriental		-0.744**	-0.764**	-0.450	-0.450
Female		-0.199**	-0.201**	-0.156**	-0.159**
Private School	-0.550**		0.139		0.002
Constant	0.812**	1.152**	1.153**	0.865**	0.865**
R^2	0.018	0.157	0.158	0.160	0.160
F	24.124**	27.160**	24.567**	27.670**	24.884**

Note: Model A - all ages, Model B - up to 14 years old
** significance level = .01%; * significance level = .05%

Table 6.3

DETERMINANTS OF AGE/GRADE FITNERS (81/82)

OLS REGRESSION - AGES UP TO 14 YEARS

VARIABLE	COEFFICIENTS
Family Size	-0.113**
Family Income	0.143E-6
Urban Residence	0.157
Female Headship	-0.418**
Education of Family Head	0.108**
White	0.436**
Brown	0.310*
Oriental	0.682*
Female	0.114
Private School	-0.113
Constant	-3.389**
R^2	0.159
F	33.483

Note: ** significance level = 01%

* significance level = 05%

Table 6.4

MODEL ESTIMATES FOR PROMOTION AND EVASION - 1st GRATE (1989)

	PROMOTION[a]				EVASION[b]
	MODEL A			MODEL B	
	ALL	PUBLIC SCHOOL	PRIVATE SCHOOL		
Family Size	-062**	-068**	437*	-073**	076
Family Income	203E-5**	246E-5**	196E-5	207E-5**	687E-5**
Urban Residence	-365**	405**	1.477	-359**	-396
Female Headship	073	066	1.358	035	156
Education of Family Head	121**	1.299**	094	133**	-117*
White	063	082	-	114	517
Brown	-240	-224	-	-201	221
Female	457**	431**	1.560**	469**	010
Private School	330	-	-	304	-
Age/Grade Fitness	-	-	-	-101**	-404**
Grade Completed	-	-	-	-	700**
Constant	847**	857**	-3.323*	492	-5.270**
"R^2" (%)	4.3	3.5	11.4	4.5	12.7
P (Y=1)	712	698	894	712	033

Notes: a) Oriental omitted due to perfect correlation with Y (all students in this group were approved)

b) Oriental and Private School omitted due to perfect correlation with Y (all drop-outs from public school)

Table 6.5

MODEL ESTIMATES FOR PROMOTION AND EVASION - 1st GRADE (1981)
STUDENTS AGED UP TO 14 YEARS

VARIABLE	PROMOTION	EVASION
Family Size	-.069**	.036
Family Income	.196E-5**	-.570E-5*
Urban residence	-.365	-.412
Female Headship	.045	.190
Education of Family Head	.132**	-.099
White	.129	.897
Brown	-.186	.524
Female	.461**	.087
Private School	.288	-
Age/Grade Fitness	-.079*	-.460**
Grade Successfully Completed	-	.667*
Constant	.542*	-5.675**
"R^2" (%)	4.4	12.1
P(Y=1)	.709	.032

Note: see notes in table 6.4

Table 7.1

MEAN (AND STANDAND DEVIATION) FOR BACKGROUND VARIABLES BY SCHOOL GRADE (1981)

	SCHOOL GRADE			
VARIABLE	1st	4st	8st	11st
Family Size	6.22 (2.16)	5.99 (2.03)	5.47 (1.90)	5.02 (1.49)
Family Income	98.349 (130.319)	125.139 (141.967)	165.202 (164.452)	227.284 (238.703)
Urban Residence	0.87 (0.31)	0.92 (0.28)	0.96 (0.20)	0.98 (0.15)
Female Headship	0.10 (0.30)	0.11 (0.31)	0.11 (0.31)	0.10 (0.30)
Education of Family Head	3.63 (3.42)	3.98 (3.68)	4.72 (3.80)	5.85 (4.09)
White	0.69 (0.46)	0.75 (0.43)	0.81 (0.40)	0.85 (0.36)
Brown	0.23 (0.42)	0.17 (0.38)	0.13 (0.33)	0.05 (0.22)
Oriental	0.02 (0.12)	0.02 (0.15)	0.03 (0.16)	0.05 (0.22)
Female	0.47 (0.50)	0.50 (0.50)	0.45 (0.50)	0.52 (0.50)
Private School	0.07 (0.26)	0.08 (0.27)	0.13 (0.34)	0.39 (0.49)
Age/Grade Fitness	-3.23 (1.59)	-3.66 (1.79)	-3.80 (1.93)	-3.44 (1.62)

Table 7.2

MODEL ESTIMATION FOR PROMOTION AND EVASION: 4th, 8th AND 11th GRADES

VARIABLE	4th GRADE			8th GRADE			11th GRADE (a)		
	PROMOTION		EVASION	PROMOTION		EVASION	PROMOTION		EVASION
	MODEL A	MODEL B		MODEL A	MODEL B		MODEL A	MODEL B	
Family Size	-.023	-.028	.146**	-.117*	-.112*	.059	.209*	.209	.062
Total Family Income	.202E-5*	.205E-5*	-.523E-5**	.228E-6	.217E-6	-.143E-5	-.147E-7	-.145E-7	-.207E-5**
Urban Residence	.015	.008	-1.068**	.573	.559	.275	-	-	1.860**
Female Headship	-.138	-.151	-.039	-.049	-.034	-.170	-.205	-.205	.265
Education of Family Head	-.022	-.018	-.197**	-.055	-.060	-.074*	-.159**	-.159**	-.101**
White	-.174	-.134	.179	-1.104	-1.134	.054	-.048	-.047	-.624
Brown	-.046	-.023	.414	-.894	-.912	.587	.211	.212	.204
Oriental	.900	.962	-.332	-.287	-.315	-2.616**	-1.226	-1.225	-.209
Female	.542**	.552**	-.150	.494*	.482*	-.622	-.342	-.342	-.468**
Private School	.020	.016	-.299	.083	.127	.131	.227	.226	-.023
Age/Grade Fitness	-	-.039	-.425**	-	.037	-.455**	-	-.001	-.003
Grade Completed	-	-	.754*	-	-	1.697**	-	-	-2.019**
Constant	2.113**	1.951**	-3.668*	3.286**	3.465**	-4.614**	1.801**	1.795*	1.732
"R^2" (%)	1.4	1.4	18.8	2.1	2.1	16.3	7.8	7.8	9.8
P(Y= 1)	.903	.903	.118	.893	.893	.227	.819	.819	.582

Notes: a) all unsuccessful students were urban residents

Table 8.1

FIRST GRADE: PROMOTION AND QUALITY OF EDUCATION

VARIABLE	REGRESSION COEFFICIENTS	(Day Classes)
Size of Family	-.0778**	-.0743**
Family Income	.1916E-5*	.1440E-5
Urban Area	-.3766**	-.4595**
Female Headship	.0199	.0036
Education of Family Head	.1305	.1381
White	.0942	.0334
Brown	-.2124	-.3150
Private School	.3041	.4167
Student Delay	-.0625*	-.0548
Female	.4780	.4907
Time Spent in School	-	.0019
Some Textbooks	-	.6724
All Textbooks	-	.3979
Homework - 2 ou 3 Times	-	-.3477*
Daily Homework	-	-.3308*
Constant	-.6708**	.2705

** Significance level =.01
* Significance level =.05

Table 8.2

FOURTH GRADE:PROMOTION AND QUALITY OF EDUCATION

VARIABLE	REGRESSION COEFFICIENTS		
	DAY	CLASSES	ALL CLASSES
Size of Family	-.0443	.0061	.0118
Family Income	.1253E-5	.9066E-6	.1160E-5
Urban Area	.1680	.0605	.1200
Female Headship	-.2834	-.2772	.0125
Education of Family Head	-.0068	-.0097	-.0224
White	-.2335	-.5547	-.4033
Brown	-.0316	-.3136	-.3132
Oriental	.9002	-	-
Private School	.4837	.3232	.2866
Student Delay	-.0151	-.0872	-.0468
Female	.7416**	.8647**	.7318**
Time Spent in School	-	.0375**	.0385**
Some Textbooks	-	.8439	.6957
All Textbooks	-	.7417	.3869
Homework - 2 or 3 Times	-	-.0830	.0417
Daily Homework	-	-.2890	-.1234
Day Classes	-	-	-1.6159**
Constant	1.9192**	-8.0279**	-6.4492**

** Significance level= 01%
* Significance level= 05%

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

BRAZILIAN HIGHER EDUCATION SYSTEM: AN ECONOMICS APPROACH OF ITS RATIONALITY

Jean-Jacques Paul

documento 07

Brazilian Higher Education System: An Economic Approach of its Rationality

Jean-Jacques Paul
Institut de Recherche sur l'Economie de l'Education (Dijon-France)
Centre National de la Recherche Scientifique

Communication at the Workshop
"Education, Growth and Inequality in Brazil"

Rio de Janeiro, March 1991

First Draft

Introduction

The brazilian higher education system presents a very large institutional diversity which causes many discussions where some words appear always, in a rather spell-binding way: quality, free entrance, dismantling, unemployment, privatization. In other words, the main issue is the fact that the privates institutions control a large share of the higher education system, with a teaching quality generally perceived as low. In spite of that, according to the university community, the government would be always planning a privatization of the public higher education system. The objective of this paper is to supply such a discussion which is lacking in concrete elements and which often takes refuge in preconceived ideas.

Unfortunately, the data are very scarce to answer some important questions: what types of courses does each component of the system prepares? What are the main indicators relating to the production function? What are the costs? What is the students' social background? How is today the graduates' situation in the labor market? To answer, it is necessary to use the existing data in a way which they were not prepared for, or to collect new ones, sometimes without guarantee about the possibility of generalizing the results. In spite of these limitations, this is the methodology we used to throw light on these issues. Consequently, the objective of this paper is essentially factual, in order to give new elements to an old debate.

I. General presentation of the brazilian higher education system

A brief presentation of the brazilian higher education system will be made in this paragraph. After a rapid overview on the evolution of the system and on its diversity, the institutional specialization of courses will be emphasized.

I.1. The evolution of the enrollments

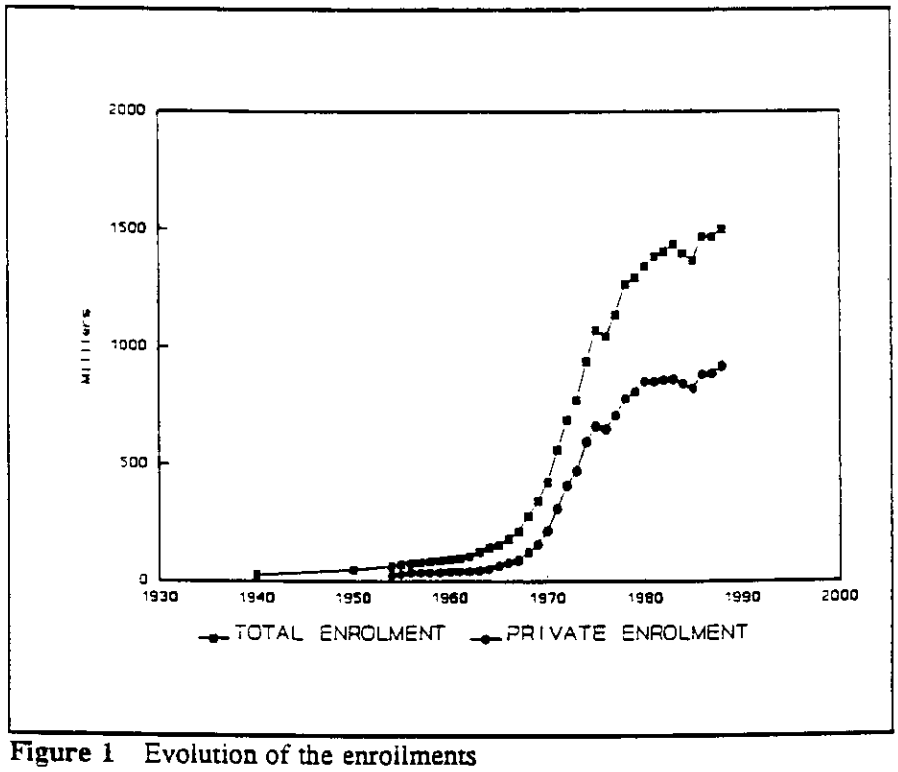


Figure 1 Evolution of the enrollments

The brazilian higher education system counts today 1,5 million students. It knew a strong growth, especially from 1963 to 1974, supported by the growth of the private system (of which part goes from 38% in 1963 to 64% in 1974). Nowadays, this system represents 60% of the total enrolment. The gross enrolment ratio climbed to 11.9% in 1980 but felt to 10.5% in 1986 (data from Unesco Statistical Yearbook). It can be noticed that this rate is relatively low if compared with countries with similar level of development.

I.2. The diversity of the system

The relative importance of each type of institution will be obtained considering the relative enrollments for each one. The enrolment data collected by the Statistical Service of the Education Ministry referring to the second semester of 1987 and the first semester of 1988 will be used to study the diversity of the system with regard to the various kinds of institutions.

The universities as institutions represent a little more than one half of total enrollments (51.6%). The remainder is essentially localized in independent faculties -instituições isoladas- (34.9%) or in federations of faculties (13.5%).

From the point of view of the administrative status, it appears that the private institutions are predominant and control 52.2% of the enrollments. Within this group, the secular private institutions appear to be more numerous (35.2% of the total enrollments) than the religious ones (17%). Within the public institutions group, the federal institutions enroll 21.6% of the total, the state institutions 12.5% and the municipal institutions 5%.

An important fact refers to the structure of organization which is quite different with respect to the administrative status. As the universities absorb 96 % of the federal enrollments, 74% of the religious private enrollments and 68% of the state enrollments, they represent only 22% of the municipal enrollments and 24% of the secular private ones. These results show a certain heterogeneity in each of the two sectors, public and private. In the public one, the municipal enrollments are essentially localized in faculties whereas the federal and state enrollments are essentially the fact of universities. In the private sector, the universities prevail within the religious part whereas the faculties are dominating in the secular part.

Globally, if the criteria of kind of organization and of administrative status are considered simultaneously, the independent private faculties absorb the largest part of the enrollments (23.3%), followed by the federal universities (20.7%), the religious universities (12.6%), the federations of secular private faculties (11.9%), the secular private universities (8.7%), the state universities (8.5%), the state independent faculties (4.0%), the municipal independent faculties (3.8%), the independent religious faculties (2.9%), the federations of religious faculties (1.5%), the municipal universities (1.1%), the state faculties (0.9%) and the federations of the municipal faculties (0.1%).

I.3. The institutional specialization of courses.

The objective is to enlighten the degree of specialization of the various kinds of institutions in relation to the type of course they offer, in order to test if the students have theoretically a choice between several kinds of institutions to follow a given course.

Before a more detailed analysis, it is important to detect the more attended courses. To restrict the study to the courses[1] with enrollments representing at least 3% of the total (ten courses), it appears that a group composed by Applied Social Sciences courses is predominant (31.6% of the total enrolment); it includes Administration (11.0%), Law (10.2%), Accountancy (5.9%) and Economy (4.5%). In second place, a group of three courses more directed for teaching: Pedagogy (8.1%), Literature (6.7%) and Science (4.2%). The courses of Engineering represent 9.6% of the total, Medicine absorbs 3.3% of the enrollments and Psychology 3.1%.

Each kind of institution does not attend the demand with the same strategy in relation to the type of course it offers. It can be assumed the supplied courses to vary with respect to such parameters as the tradition, the cost, the adaptation to the labor market. It can be supposed that the public institutions are more traditional and less attentive to the costs than the private ones whereas the private institutions elect more frequently cheap courses and adapt themselves more easily to the evolution of the labor market[2].

To study the question of the institutional specialization, the results of a factor analysis of correspondences were used. The input of the analysis is a table crossing 43 courses and 10 types of institutions. The first two axes of this analysis represent 69% of the total variance, what gives a good quality to the representation. The first one (which explains 53% of the total variance) opposes the public universities (especially the federal ones) to the other institutions, whereas the second axis (16%) opposes the faculties to the private universities. What are the courses involved in these opposition?

[1]The 140 courses of the official nomenclature of the Education Ministry were grouped in 43 sub-groups. The distribution of enrollments by course is given in the annex.

[2]An cost analysis by course is presented below.

Distribution of the courses by type of institution[3]

	FEUN	FEFC	ESUN	ESFC	MUIN	SPUN	SPFF	SPFC	RPUN	RPFC	TOTAL
ACCO	12.5	0.0	4.4	4.3	6.9	6.0	16.4	34.5	11.5	3.5	100.0
ADMI	8.8	0.2	4.0	3.7	6.6	6.6	21.0	32.3	12.2	4.6	100.0
AGRO	49.1	7.9	16.8	0.7	9.6	2.9	0.6	10.1	2.3	0.0	100.0
ARQU	31.2	0.0	7.2	0.0	0.8	16.1	9.4	9.4	21.9	4.0	100.0
ARTS	35.5	0.0	7.2	6.0	2.2	11.1	11.1	18.1	5.6	3.2	100.0
BIOL	30.8	0.2	14.9	1.5	1.4	10.9	1.4	18.5	19.4	1.0	100.0
DATA	14.7	0.4	8.5	4.4	7.1	15.0	7.8	8.2	28.8	5.1	100.0
DENT	31.0	2.2	13.7	2.4	3.9	12.1	6.5	13.2	9.1	5.9	100.0
DOEC	53.5	0.0	3.0	0.0	8.4	17.0	15.6	0.0	0.0	2.5	100.0
ECON	20.1	0.3	5.8	2.5	6.0	8.9	15.1	22.5	14.7	4.2	100.0
ENGI	28.1	3.6	9.9	6.1	2.1	12.3	5.6	18.0	13.3	1.0	100.0
GEOG	29.2	0.0	15.8	11.1	12.0	3.1	5.6	11.2	9.0	3.0	100.0
GEOL	70.4	0.0	16.5	0.0	0.0	6.3	0.0	0.0	6.8	0.0	100.0
HIST	22.4	0.0	13.7	9.8	10.5	3.6	6.3	16.1	11.8	5.8	100.0
IDRA	16.4	0.0	12.9	15.3	0.0	17.4	13.1	17.3	7.6	0.0	100.0
INDQ	39.0	0.0	8.0	0.0	0.0	8.9	30.9	0.0	13.2	0.0	100.0
LAW	14.3	0.0	5.5	0.4	5.0	12.7	15.2	27.8	16.9	2.2	100.0
LIBR	66.6	0.0	8.1	0.0	1.5	0.0	8.4	8.6	5.7	1.1	100.0
LITE	18.0	0.1	11.0	6.3	6.2	4.5	10.8	25.9	11.2	6.0	100.0
MATH	27.6	0.0	19.7	3.2	3.1	4.3	1.5	26.2	11.6	2.8	100.0
MEDI	42.5	3.4	8.7	3.9	1.8	3.8	1.0	28.6	6.3	0.0	100.0
MUSI	46.1	0.0	16.0	7.7	0.0	1.8	7.1	14.0	3.4	3.9	100.0
NURS	35.3	2.5	11.9	5.5	3.6	11.0	4.2	6.6	12.2	7.2	100.0
NUTR	43.9	0.0	8.4	0.0	0.0	15.5	3.6	1.8	15.4	11.4	100.0
PAME	5.7	1.5	2.0	2.1	0.0	11.0	11.1	37.4	22.6	6.6	100.0
PEDA	12.1	0.2	6.8	5.2	5.4	6.6	13.5	29.9	8.4	10.9	100.0
PHAR	56.1	2.2	18.1	0.8	1.8	5.3	3.7	0.9	11.1	0.0	100.0
PHIL	29.6	1.2	16.3	1.9	0.4	5.9	2.4	3.5	22.6	16.2	100.0
PHTE	10.7	0.0	9.8	1.2	1.2	12.5	14.4	28.0	15.9	6.2	100.0
PHYS	46.2	0.0	36.3	0.0	1.7	1.1	0.0	4.2	10.5	0.0	100.0
PSYC	12.6	0.5	5.9	1.9	0.8	14.2	16.0	19.6	20.4	8.1	100.0
QUEM	45.3	0.0	25.3	0.0	0.9	9.4	0.4	8.3	9.0	1.4	100.0
SCIE	9.8	0.1	4.8	9.4	10.5	11.1	16.5	24.6	7.2	6.0	100.0
SOCO	16.6	0.0	5.5	0.0	0.9	8.7	15.9	26.6	22.8	3.0	100.0
SOCS	29.9	0.0	12.9	2.5	0.9	1.3	9.4	22.8	13.4	6.9	100.0
SOSE	25.7	0.0	11.3	1.3	1.3	5.6	10.8	13.2	27.1	3.7	100.0
SOST	4.9	0.0	5.6	3.5	6.8	12.3	21.8	32.3	7.1	5.7	100.0
SPOR	19.5	0.0	10.2	6.0	9.0	13.6	7.9	19.1	8.0	6.7	100.0
STAT	41.7	8.3	27.5	0.0	0.0	0.0	11.5	5.7	5.3	0.0	100.0
TEAC	2.0	0.8	18.0	1.7	8.5	19.4	11.6	30.4	0.0	7.6	100.0
TOUR	7.5	1.9	0.9	4.0	0.0	5.2	27.8	38.0	14.6	0.0	100.0
VAIN	8.9	22.6	0.0	6.3	0.0	10.6	37.9	0.0	6.8	6.9	100.0
VETE	61.7	2.1	20.6	0.0	0.0	3.7	2.2	7.2	2.5	0.0	100.0
TOTA	20.7	0.9	8.5	4.0	5.0	8.7	11.9	23.3	12.6	4.4	100.0

[3] The meaning of each abreviation is given in annex.

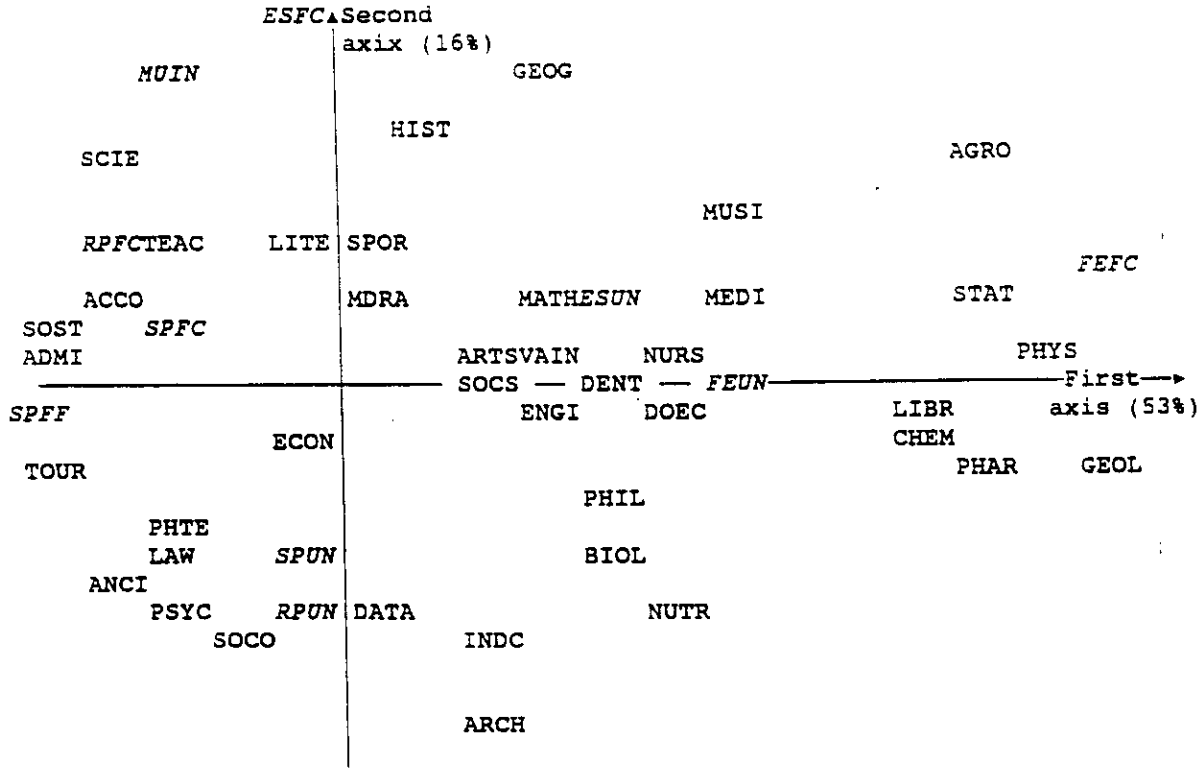


FIGURE 2 FACTOR ANALYSIS OF THE TABLE INSTITUTIONSxCOURSES

The courses which represent the opposition between the public universities and the private faculties follow our assumption. The courses for which the public universities are the most represented are traditional or and costly[4]. If the courses are ordered with regard to the value of their relative contribution [5],it can be evidenced from the side of the public universities: Agronomy (49.1% of enrollments are federal and 16.8% state, against 0.6% for federations of secular private faculties and 10.1% for independent private faculties), Pharmaceutics (56.1% of the enrollments are federal, 18.1% state against 3.7% and 0.9% for the private faculties, federated and independent respectively), Veterinary Science (61.8% of the enrollments are federal and 20.6% state), Medicine (42.6% of the enrollments are federal), Engineering (the federal universities control 28.0% of the enrollments, the federal faculties 3.6% and the state universities 9.9%), Physics (the federal universities absorb 46.3% of the enrollments and the state ones 36.3%), Chemistry (the federal universities control 45.3% of the enrollments and the state ones 25.3%), Geology (the federal universities absorb 70.4% of the enrollments) and Nursing (37.8% of the enrollments are federal). On the same side, some traditional courses with fewer students can be met, like Librarian (66.6 % of the enrollments are federal), Statistics (the federal and state universities control respectively 41.7% and 27.5% of the enrollments) and Music (the federal and state universities control respectively 46.1% and 16.0% of the enrollments).

[4] The costs will be analysed below.

[5] The coordinates of the courses and institutions, like the values of the relative contributions are shown in the annex.

On the opposite side, the courses where the secular private faculties are more present are less expensive, in the way they do not need heavy investments: they are related to the business and the teaching careers. The more typical cases are Administration (the secular private faculties control 53.3% of the enrollments), Accountancy (50.9%), Pedagogy (43.4%), Science (40.9%), Law (43%), Social Studies (54.1%).

The second axis is the symmetrical of the first: it opposes the private universities to the public (state and municipal) faculties. In this case, the public faculties appear more involved in the preparation of teachers. Relatively to their size, they control an important part of the enrollments of Geography (23.1% of the enrollments), History (20.3%), Science (19.9%), Literature (12.5%).

The opposition reveals the strong position of the private universities in courses following the evolution of the labor market like Data Processing (43.8% of the enrollments), Architecture (38%), Psychology (34.6%), Social Communication (31.5%). The case of Law (29.6% of the enrollments) draw these universities nearer by the private faculties.

Within the private sector, it can be noticed some difference between universities and faculties on the one hand and between secular and religious institutions on the other hand. The faculties are more linked to the teaching careers, whereas the universities have a more noticeable role in more prestigious courses, like Architecture, Data Processing, Psychology. The religious institutions, with respect to their traditions in teaching religious sciences, present an active role in the supply of Philosophy (38.8% of the enrollments).

In conclusion, it appears that it is true that some institutions prevailed in the supply of certain courses. It is especially the case for some traditional courses more represented in the public institutions and less in the private ones. But these ones have a strong position too in the offer of some more prestigious courses like Data Processing. At the same time, the public institutions participate actively to the supply of more banal courses, like those preparing to the teaching careers.Theses observations mean that for most courses the students can apply for various kinds of institutions to attend a given course. It remains to be seen if behind a common appellation, the courses offered by different institutions correspond to the same reality. That has to be checked according either to the production conditions or to quality measures.

II. The productivity in the brazilian higher education system.

If it is assumed that higher education institutions can be considered as firms which produce skills, the production process must be characterized. This process can be studied through its physical aspects (students/teachers ratios, enrolment flux/graduate flux ratios, time to produce a graduate), as through its financial aspects (unit cost per student or per graduate, structure of the costs). In this part, the physical aspects will be taken in account, whereas the financial ones will be studied in the next paragraph.

With regard to the kind of available data, two physical measures of the production process were selected. The first one is the internal productivity, estimated as the proportion of graduates within a cohort of students. This indicator represents the complement to one of the proportion of dropouts and is used to assess the wastage. The second indicator is the time used to produce a graduate. It can be noticed that these two indicators are needed to estimate the cost per graduate, together with the cost per student.

II.1. The internal productivity in the brazilian higher education system.

To produce a measure of the internal productivity, the number of graduates for one year can be related to the new enrollments. But, as it was not possible to obtain the new enrollments corresponding to four or five years ago, it was necessary to use the same year (1988) for the numbers of graduates and of enrollments. Nevertheless, it can be shown that the structure and the size of the new enrollments did not change these last years and consequently the methodology probably did not bias the results[6].

Six variables are supposed to have an influence on the internal productivity: a variable which combines the administrative status and the initial selection (measured as the ratio between applicants and successful candidates), the kind of organization of the institution, the field of study, the shift, the number of enrollments, the date of creation of the institution.

The variable which combines administrative status and initial selection aims to avoid the problem of different levels of selection with regard to the administrative status. For each kind of status, a division was made between the courses with a selection below or equal to 3 and the others. It is assumed that higher is the selection level, higher is the academical level of the students and consequently higher is the productivity. The effect of the administrative status is a priori unknown, like the effect of the kind of organization of the institution.

With respect to the field of study, two factors are susceptible to have an influence on the productivity: the initial selection, as a proxy for the academic level of the students, and the labor market for graduates. With reference to this last aspect, it is possible to use the data collected by the "Guia do Estudante" which gives the average earnings for the main careers. If the selection level (above or below the mean) and the position in the labor market (average earnings above or below the mean) are crossed, four groups can be obtained. Two groups allow a prediction: Literature and Humanities on the one hand and Engineering and Health on the other hand. For the first group ,which presents low relative earnings and a low selection ratio, it can be expected a low internal productivity. On the contrary, the second group, which exhibits high relative earnings and a high selection ratio, should show a good internal productivity. The two other groups do not permit clear expectations. Biological Sciences and Agrarian Sciences have low relative earnings and a high selection ratio; Exact Sciences and Social Sciences present high relative earnings and a low selection ratio.

The three technical parameters used, the number of new enrollments, the date of creation of the course and the shift, are susceptible to influence the internal productivity. With respect to the number of new enrollments, it can be expected the size to have a negative impact on the productivity. With regards to the shift, it can be assumed the students of the night shift to present a lower productivity, insofar as a large part of them are working too. The internal productivity is also related to the year of creation of the course, with the assumption that the courses of long standing have a more efficient organization.

The unit of observation is the course. The file elaborated by the Ministry of Education, which contains a reliable information for 3,007 courses, was used.

---

[6] See J.J. Paul, "A produtividade interna das instituições de ensino superior no Brasil", Working Paper prepared for The World Bank, mimeo, 1990.

Productivity Equations

Variable/ Modality	Parameter	Marginal effect
Administrative status and initial selectivity		
Federal and R≤3	Omitted	
Federal and R>3	0.380***	9.5%
State and R≤3	-0.162	
State and R>3	0.550***	13.8%
Municipal and R≤3	0.012	
Municipal and R>3	0.639***	16.0%
Secular priv. and R≤3	0.144	
Secular priv. and R>3	0.795***	19.9%
Religious priv. and R≤3	0.108	
Religious priv. and R>3	0.612***	15.3%
Kind of organization		
University	Omitted	
Federation of faculties	0.009	
Independent faculties	0.105***	2.6%
Field		
Exact Sciences	-0.237***	-5.9%
Biological Sciences	0.144	
Engineering	-0.150	
Health	0.851***	21.3%
Agrarian Sciences	0.602***	15.1%
Social Sciences	-0.011	
Humanities	0.182*	4.6%
Literature	Omitted	
Shift		
Day	Omitted	
Night	-0.101	
Number of admissions		
Adm.≤50	0.137*	3.4%
50<Adm.≤80	0.142**	3.6%
80<Adm.≤130	0.146**	3.7%
Adm.>130	Omitted	
Date of creation		
Before 1971	0.225***	5.6%
1971 and after	Omitted	
Intercept	-0.649***	
R^2	0.1279***	
N	3,007	
Average productivity	0.502	
Level of significance:	*: 10%	**: 5% ***: 1%

Before considering the influence of the administrative status, it can be noticed some interesting results with respect to the others variables. For instance, the independent faculties show a slightly higher productivity than the universities, the more ancient courses have a higher productivity than the recent ones, the more numerous courses present a lower productivity. With respect to the field of study, it is interesting to notice that the courses of Engineering present a lower productivity (not significantly different from Literature) than it was expected, others things being equal especially with regard to the selection rate. That could mean that the level of academical requirements for these courses are particularly higher than for others fields. This result is worth examining more deeply, principally regarding the needs of the country of technical staff to promote development.

Considering the administrative status, the model shows that within the courses with selection rate below or equal to 3, there is no influence of the administrative status on the internal productivity. On the contrary, the courses with selection rate higher than 3 present differences between them. Within the courses with selection rate higher than 3, the larger difference with the omitted modality refers to the secular private institutions, of which internal productivity is 19.9% higher than for the courses of federal universities with selection rate lower or equal to 3. The shortest significative difference refers to the courses of the proper federal universities, with an internal productivity of 9.5%. The others differences are, decreasingly, 16% for the municipal institutions, 15.3% for the religious private institutions and 13.8% for the State institutions.

According to these results, the "wastage" would be higher in the federal institutions for the more selective courses, whereas the administrative status does not have any influence for the less selective courses. But it would be better to have the results of the time analysis to discuss the meaning of these findings. Therefore, the time data will be presented now.

II.2. Time to produce a graduate

Insofar the institutions which produce indicators able to compute the average time taken over producing a graduate are very scarce, it is necessary to try to elaborate a rough estimation of this variable. The methodology we propose offers the possibility to use the official data of the Ministry of Education; nevertheless, it will be convenient to check the results with the micro data we produced in some universities.

If it is assumed that the dropouts stay at university during the half of the time of the graduates (we noticed this result in our micro observations) , it is possible to connect the total enrollments (ENR), the number of admissions (ADM), the number of dropouts, the number of graduates (GRAD) and the time to produce a graduate (TIME). The following equations can be written:

$$ENR = GRAD \times TIME + DROP \times TIME/2$$

with $DROP = ADM - GRAD$.

So, it follows: TIME= ENR/(GRAD+DROP/2).

Using the same file that for the estimation of the internal productivity, it is possible to estimate TIME.

It can be noticed that the average time to produce a graduate is 4.5 years. Nevertheless, there are wide differences between the various kinds of institutions. The federal universities present the longer time (6.1 year)and municipal faculties the shorter. In reality, within each type of administrative status, the universities have the longer time: 5.0 years for the State universities, 4.1 for the municipal ones, 4.4 for the secular private ones and 4.8 for the religious private universities. The faculties present shorter delays, more or less 4 years.

Time to produce a graduate (Years)

	Time
Federal universities	6.1
Federal faculties	5.1
State universities	5.0
State faculties	4.1
Municipal universities	4.1
Municipal faculties	3.7
Secular universities	4.4
Fed. secular faculties	4.0
Ind. secular faculties	4.0
Religious universities	4.8
Fed. religious faculties	4.3
Ind. religious faculties	3.8
Mean	4.5

Of course, it can be expected that other factors than the kind of institution influence the delay of production. Therefore the influence attributed to the institution could be in fact the influence of others variables, like the course for instance. To avoid this difficulty, it is possible to build a regression model using the same variables than the internal productivity model.

The results reveal two important phenomena: on the one hand the federal institutions need a longer time to produce a graduate; but on the other hand the courses with lower rate of selection need a shorter time. This last result would mean that the courses with a high selection

rate may be courses with a curriculum which need a longer period to be finished. like Medicine for instance.

In spite of the over-simplification of the methodology, it can be noticed that the results are of the same magnitude than those obtained with accurate data for the Federal University of Ceará or for the University of São Paulo. In the first case, the time varies between 4.4 years (Law) and 8.3 years (Geology). In the case of USP, the time varies between 4.1 years (Nursery) and 7.0 years (Chemistry).

The production time equations

Variable/ Modality	Parameter
Administrative status and initial selectivity	
Federal and R≤3	Omitted
Federal and R>3	-0.365***
State and R≤3	-1.973***
State and R>3	-1.141***
Municipal and R≤3	-2.547***
Municipal and R>3	-1.225***
Secular priv. and R≤3	-2.214***
Secular priv. and R>3	-1.199***
Religious priv. and R≤3	-2.128***
Religious priv. and R>3	-1.331***
Kind of organization	
University	Omitted
Federation of faculties	-0.654***
Independent faculties	-0.184***
Field	
Exact Sciences	-0.146
Biological Sciences	-0.583*
Engineering	0.131
Health	-0.347***
Agrarian Sciences	-0.041
Social Sciences	0.171
Humanities	-0.374***
Literature	Omitted
Number of admissions	-0.001***
Date of creation	-0.012***
Intercept	-0.649***
R^2	0.2391***
N	3,015
Average time	4.51
Level of significance:	*: 10% **: 5% ***: 1%

To sum up the results of the two models, the model of internal productivity and the model of time, it can be concluded that the public institutions, especially the federal ones, have a lower internal productivity, either considering the proportion of dropouts or considering the time they need to produce a graduate. On the one hand, one may assume the private institutions to have lower academical requirements than the public ones. This behavior could be explained by the concern to not discourage the potential students. But on the other hand, it can be assumed that the students in the private institutions, owing to the fact that they pay their studies, are more incited to conclude them, and in less time than possible. This explanation fits with a classical human capital vision where the individuals would seek to maximize the returns of their investment, by concluding their studies and maximizing the time which produces returns. If the first hypothesis be true, it can be expected the quality of the graduates of the private institutions to be lower. In this case, the market would price differently the graduates of the two sectors. But if no earnings differences can be shown, others things being equal, this would be the case for a deep analysis of the pedagogical methods of the public institutions. Labor markets data are required and it will try to analyze this question at the end of this essay. Before that, the unit costs of the various sectors ought to be studied.

III. The financial analysis

III.1. The cost of the higher education system

According to "Brazil Public Spending on Social Programs; Issues and Options", the higher education system absorbs 23% of the aggregate public spending. The public spending per beneficiary would be US$ 163 at the primary level, US$ 257 at the secondary level and US$ 2086 at the tertiary level. Insofar as these data are very rough and are referring only to the public sector, it is necessary to try to produce more complete results.

Unfortunately, data on costs in private higher education system do not exist in Brazil. They would permit to compare the relative efficiency of the private and public systems. Nevertheless, it is possible to avoid the problem of the scarcity of official data using the file of the national program of students loans and merging this file with the file of total enrollments per course elaborated by the Education Ministry. This methodology, though rather complicated and sometimes dubious, was followed here. In fact, the national program of students loans pays directly to the private faculty or university the fees of the beneficiary. Therefore, the institution has no reason to hide the real value of its fees. The fees data for the second semester of 1989 will be used, weighted by the total enrollments for the corresponding course for 1988. The results of this analysis will be utilized to study the costs of the private system. As regards the public system, especially the federal one, the data we produced in another study[7] will be used.

---

[7]J.J. Paul, E. Wolynec (1990), "O Custo do Ensino Superior nas Instituições Federais", NUPES, USP.

III.2. The costs in the private higher education system

The average fees by course and kind of institutions will be presented. Four categories of courses and eight types of institutions will be distinguished: Law-Economics-Administration, Science-Technology-Engineering, Health, Humanities; municipal universities, secular universities, religious universities, independent municipal faculties, federations of secular faculties, independent secular faculties, federations of religious faculties, independent religious faculties. The municipal institutions presented here are those which recover fees.

Annual fees per institutions and per courses (US$, 1989)

	Administration	Science	Health	Humanities
Municipal universities	1930	1952	2652	1452
Municipal faculties	1225	1331	1613	592
Secular universities	1781	2324	3233	1717
Fed. secular faculties	1744	2174	2166	1781
Ind.secular faculties	1413	2148	3106	1253
Religious universities	1745	2387	3528	1842
Fed. religious faculties	1253	1633	2566	1530
Ind. religious faculties	750	1496	2143	1055

It appears a fracture between Administration and Humanities on the one hand and Science and Health on the other hand. The unit cost of the first group varies between US$ 592 and US$ 2,327, whereas the unit cost of the second group varies between US$ 1,496 and US$ 3,106. But the fees vary considerably, for a same group of course, with respect to the kind of institution. Thus, the municipal institutions and the religious faculties present the lowest fees, whatever the course. At the opposite, the secular and religious universities have the higher fees. The federation of faculties has an intermediate position between independent faculties and independent schools. Therefore, it appears that the institutionalization of the school, from independent faculty to university, results on an increase of the fees. This fact is not evident a priori because it could be expected that economies of scale, or the possibility for a

university to transfer a part of the costs of the more costly courses (like Health) to less costly (like Humanities), would cause a shifting down for the costs of courses offered by the universities and federations compared with the independent faculties. It is possible that these results could be explained not by reasons linked to the production function but by the position of the institution on the market. In this case, it must be accepted that the fee does not represent only the cost of teaching production but that it includes a profit (what is prohibited by the brazilian legislation). Another explanation could rely in differences in quality.

A model was built to summarize these data. The independent variable is the logarithm of the annual fees and the explanatory variables are the course, the kind of institution and the average State per capita income . This last variable allows to take in account the great income disparities in Brazil from one region to one other, especially between the North and the Northeast compared with the rest of the country.

The results of the model allow to study the effect of the course and of the kind of institution upon the fees, holding the state per capita income constant. Taking the courses of Humanities as reference, it appears that Health is more expensive by 52.7% as compared with Humanities, whereas Sciences are more expensive by 30.6% and Administration by 6.1%. These results are corresponding to what was shown when the course specialization by kind of institution was considered. The relative costs explain why the private institutions tend to specialize, in spite of noticeable exceptions, in courses of Humanities and Administration

Concerning the kind of institution and taking as reference the secular universities, it appears that the religious universities are the institution presenting the higher fees (+13.1% relative to the secular universities). The other structures are less expensive. The municipal faculties are 55.4% less expensive, the religious faculties 36.3%, the secular faculties 20.0% and the municipal universities 15.9%. The results will be studied later on a cost function basis using some quality proxies like the education level of teachers and so on.

Equation of logarithm of annual fees

	Coefficient	Elasticity[a]
Per capita income (1)	0.0078***	0.78%
Administration (2)	0.0610**	6.09%
Science (2)	0.3173***	30.60%
Health (2)	0.6088***	52.73%
Municipal universities (3)	-0.1599**	-15.85%
Municipal faculties (3)	-0.6564***	-55.42%
Fed. secular faculties (3)	-0.0676*	-6.75%
Ind. secular faculties (3)	-0.2032***	-20.03%
Religious universities (3)	0.1311***	13.03%
Fed. religious universities (3)	-0.1135***	-11.30%
Ind. religious universities (3)	0.3834***	-36.33%
Intercept	6.5881***	
R^2	0.3964***	
N	1802	

(1) In US$

(2) Compared with Humanities

(3) Compared with secular universities

Level of significance: *: 10% **: 5% ***: 1%

III.3. The costs in the public system.

There is a scarcity in Brazil in relation to detailed cost data in public universities in Brazil. Some partial estimations exist, which can be used here. According to our own estimations, the budget per student in the federal universities is US$ 7,930. It is true that it should be not convenient to compare this data with the data computed for the private institutions because there is few research activities in these last institutions. If it is accepted that the average teacher divides his time between 58% to teaching and 42% to the others final activities (re-

[a]Computed according to the Kennedy's formula. Cf Kennedy P. (1981), Estimation with Correctly Interpreted Dummy Variables in Semi-logarithmic Equations, A.E.R., vol.71, n°4.

search and extension)[9], an estimation of the unit cost for teaching would be US$ 4,599. This estimation is perfectly coherent with the precise computations we did in some universities.

According to the estimations realized within the Federal University of Ceará, the relation between the unit costs would be, considering the cost of Humanities as reference, 0.66, 1.44, 2.66 respectively for Administration, Science and Health. If the average brazilian cost is used, the unit cost for Administration would be US$ 2,185, for Humanities US$ 3,302, for Science US$ 4,748 and for Health US$ 8,794. If these results are compared with the cost data for the religious universities, which have the higher costs, it appears that the costs of the federal institutions are higher, but not in matchless proportions. Administration presents the lower difference (25.2%). Humanities and Science are clearly more costly in the federal institutions, with a respective difference of 79.3% and 98.9%. The case of Health is more specific, insofar as the kind of courses is rather different between the federal and the private institution (with a heavier representation of Medicine stricto sensu in the one hand and of ancillary services on the other hand); the difference reaches 149.3%.

With respect to the State institutions, one has to make shift with budget per student data, computed with the official global data. According to these data, the State institutions would receive per student 67% of what the federal institutions receive. The budget per student in the State institutions would be US$ 5,313.

It could be noticed that there are cost differences between courses and between kinds of institutions. But insofar as the public ones are free, it is important to know what groups are the beneficiaries of a such education.

IV. The characterization of the institutions by the social background of the students

As no official data exist in Brazil with respect to the socio-economic background of the students, such a question needed a specific study. This is why we perform, with researchers from the Federal University of Ceará, a study relating to this matter, in Fortaleza (Ceará). But to examine the generality of the results, some observations were made in São Paulo.

IV.1. The origin of the data.

To study the students' socio-economic profile by kind of institution, it will be used the results of a research we conducted in the three universities of Fortaleza (Ceará) about the students' way of life. Fortaleza offers a interesting situation for the researcher insofar as the higher education system is composed by three universities, a federal one, a State one and a private

[9] As observed in the Federal University of Ceará.

one. They have comparable sizes (13,000 students for the federal, 12,000 for the private and 10,000 for the State university).

The unit costs are similar to those presented previously: US$ 4,100 for the federal, US$ 2,500 for the State and US$ 1,600 for the private. The differences between the unit costs are due partly to differences in the students/teacher ratios and to earnings differences. Some courses are offered by the three universities like Administration-Accountancy-Economics, Teacher Training, Nursing or by two of them, like Law and Engineering offered by the federal and the private. Some specificities distinguish the institutions: the high reputation of the Health courses in the federal university (Medicine and Odontology), the prevalence of the Teacher Training in the State one (Literature, Pedagogy) and Ancillary Medical Services courses in the private one (Physiotherapy, Occupational Therapy, Speech Therapy).

A research was conducted at the second semester of 1988 with the students of the three universities. They were asked about their socio-economic origin, their academic history, their way of life, their financial resources and their expenses, their opinions about the institution. A second part of the research aimed to study the distribution of the time of the students during one week.

IV.2. The main results.

Before the socio-economic analysis, it is interesting to characterize the three institutions by the students' reasons of choice of the institution. In the federal university, the main reason of the choice is "the reputation and the tradition" (38% of the answers); in the State one, that is the supply of courses at night appears as the first incentive (23% of the answers). The first reason to choice the private university is more negative, for 35% of the students declared it was the only institution where they passed. The answers mean that the most positive choice refers to the federal university, whereas the State one attracts the students who cannot study during the day (the federal university does not offer a shift at night) and the private one receives many students who did not succeed to enter the free public institutions.

Personal Characteristics by Institution

	Federal	State	Private
Father's occupation:high or high-middle	46.6%	35.3%	51.7%
Father's educational level: higher	33.6%	19.5%	30.7%
Age at admission: 18 years and less	38.1%	20.1%	26.3%
Public secondary education	20.4%	32.3%	15.9%
Did not attend "cursinho"	59.7%	43.2%	45.6%
Does not work	57.4%	48.5%	51.6%

The federal and the private universities appear in fact very similar with respect to the socio-economic profile of their students: a majority of their students come from the upper classes whereas this proportion, although not negligible, is much lower in the State university. The students who attended a public secondary school is not high in the State university but it is still weaker in the two other universities. The difference between the federal and the private universities seems to rely on the academic profile of their students. This can be noticed with the proportion of students who enter the university with 18 years or less, which can be considered as a signal of a good academic level: this proportion equals 38.1% in the federal and 26.3% in the private university. The proportion of students who did not attend a "cursinho" is higher too in the federal university. The higher proportion of not working students can be considered at the same time through a stronger implication in studying and a high social origin.

To sum up, it appears that the federal and the private universities receive a majority of upper classes' students, but the best ones from an academical point of view passed the federal whereas the others have to enter the private institution and to pay to study. The state university receives more modest students, more often originating from the middle classes. The students from the lowest classes represent 14.5% in the federal, 15.4% in the State and 12% in the private institution.

If the courses are considered, this simple vision becomes more complex. The results of a factor analysis of a table crossing the courses and the students' attributes will be used. The first axis of this analysis was clearly a socio-economic one. To synthesize the results, the ten courses at the top and at the bottom of the distribution will be presented to characterize more precisely the universities.

The ten courses at the top are Civil Engineering, Data Processing (Private), Data Processing (Federal), Administration (day shift, State), Medicine (Federal), Dentistry (Federal), Data Processing (State), Administration (Federal), Administration (day shift, Private), Veterinary (State). The ten courses of the bottom of the distribution are Geology (Private), Geography (Federal), Literature (day shift, State), Pedagogy (night shift, State), Nursing (Federal), Geography (day shift, State), Literature (night shift, State), Literature (Federal), Sciences (night shift, State) and Geography (night shift, State). The variables stood out by the analysis are: the proportions of students aged 18 or less at the admittance, of students with higher education level father, of students who attended a public secondary school, of students who did not attend a "cursinho", of males.

The personal characteristics by courses

	Abscis.	< =18	Father higher educat.	Public Second.	Not cursin.	Male
Civil Engineering (Fed.)	435	53.7%	61.0%	17.1%	70.7%	78.0%
Data Processing (Priv.)	399	61.5%	42.3%	7.7%	73.1%	76.9%
Data Processing (Fed.)	356	60.8%	49.0%	11.8%	80.4%	76.5%
Administration (Day, State)	355	33.3%	41.7%	8.3%	83.3%	50.0%
Medicine (Fed.)	348	50.0%	47.8%	7.7%	70.7%	65.2%
Dentistry (Fed.)	323	57.1%	28.6%	4.8%	66.7%	42.9%
Data Processing (State)	286	50.0%	50.0%	14.3%	78.6%	92.9%
Administration (Fed.)	251	41.4%	27.6%	6.9%	75.9%	41.4%
Administration (Day, Priv.)	237	44.1%	38.9%	5.6%	66.7%	34.3%
Veterinary (State)	203	31.6%	47.4%	10.5%	47.4%	63.2%
Geology (Priv.)	-288	0.0%	0.0%	10%	60%	60.0%
Geography (Fed.)	-301	18.2%	18.2%	27.3%	45.5%	54.5%
Literature (Day, State)	-315	33.3%	9.5%	47.6%	42.9%	19.0%
Pedagogy (Night, State)	-332	10.7%	17.9%	46.4%	39.3%	32.1%
Nursing (Fed.)	-338	6.9%	6.9%	44.8%	24.1%	0.0%
Geography (Day, State)	-402	0.0%	0.0%	41.7%	25.0%	58.3%
Literature (Night, Priv.)	-436	10.8%	8.1%	40.5%	21.6%	32.4%
Literature (Fed.)	-455	6.0%	8.0%	46.0%	28.0%	14.3%
Science (Night, State)	-537	0.0%	0.0%	54.5%	9.1%	36.4%
Geography (Night, State)	-613	8.3%	12.5%	58.3%	29.2%	58.3%
Average	0	29.9%	29.0%	21.7%	50.3%	42.1%

The polarization observed in the global analysis of the universities keeps but it appears a certain continuity at the same time. The State university is much more represented in the courses of the bottom than in the courses of the top. This is the contrary for the federal and the private universities. Nevertheless, the frontiers are not between the universities but within the universities and outline clusters which overstep the limits of each university. The most

evident clusters concern the Teacher Training on the one hand and the prestigious professional courses, like Data Processing, Administration, Engineering, Medicine, Odontology, Veterinary. At this division of the courses corresponds a division of the individual attributes. Within the cluster of the more prestigious courses, the students are younger, from upper classes, did not attend a public secondary school, did not need to attend a "cursinho", more frequently males. One only has to take the opposed characteristics to describe the courses of the bottom of the distribution.

Thus, it is not convenient to oppose simplistically public and private institutions or federal and the others institutions because the brazilian higher education institutions are not homogeneous from an academical or a socio-economical point of view. The opposition goes through the institutions to outline clusters which gather together courses of each one of the institutions.

The reference to the students way of life confirms this vision. The distribution of time is rather the same from an institution to the other. Globally, the students stay in the classroom 19 hours by week in the federal and State universities and 16 hours in the private one. The average time for self study is 16 hours at the federal university, 13 hours at the State one and 14 hours at the federal one. The average time for work is 8 hours at the federal institution, 13 hours at the State one and 12 hours at the private one. But if the weekly academical time (classroom more self study) is analyzed through a model, with the institution, the hierarchy of the course and the working time as explanatory variables, the institution has no significantly effect, whereas there is a difference of 3 hours and 47 minutes for the courses of the top of the distribution compared with the courses of the bottom. Each working hour withdraws 23 minutes from the academical time.

If the financial aspect is considered, the factors of differentiation of the distribution of the expenses and of the income sources rely more on such characteristics like the matrimonial status. Without taking in account the fees of the private university, there are some differences between the institutions which rely on the global differences in the representation of the social classes. The students spend US$ 23 by month for education at the federal university, US$ 17 at the State one and US$ 26 at the private one (more US$ 74 on fees). These expenses are essentially expenses on books (70% of the monthly expenses). With respect to the kind of course, there are strong differences between Humanities on the one hand which correspond to an US$ 15 outlay and the others courses which correspond to expenses varying between US$ 24 and 26. To give a comparison point, it can be noticed that the average student spends monthly US$ 26.6 on clothes, US$ 18.7 on entertainment and US$ 8.4 on travel.

To examine the power of generalization of such an analysis, some comparable data were sought in São Paulo State private institutions.

IV.3. Some results from São Paulo

Unfortunately, though each institution would collect the academical and socio-economic data referring to the applicants, only some of them do that and very few analyze the data. And in most cases, the results refer only to the applicants and not to the successful candidates, and only globally to the whole institution or to wide departments.

Characterization of the courses of the University of Mogi das Cruzes

	Proportion in the new admissions flux	=< 18	Father higher educat.	Public second.	Not cursinho
Engineering Day	7.8%	30.4%	30.4%	49.6%	53.5%
Engineering Night	18.0%	20.5%	23.7%	68.9%	67.3%
Biomedical Scienc. Day	15.4%	24.8%	34.2%	39.9%	25.6%
Biomedical Scienc. Night	8.8%	11.4%	12.2%	62.8%	69.5%
Law Day	2.8%	24.3%	35.7%	43.7%	56.3%
Law-Adm-Eco-Acc. Night	27.1%	15.5%	16.0%	59.0%	68.6%
Teacher Training	20.1%	14.8%	13.1%	61.6%	72.6%
Total	100.0%	18.7%	20.9%	57.5%	61.1%

The University of Mogi das Cruzes, private university of the State of São Paulo with 17,000 students, escapes this general vision, insofar it elaborates socio-economic data by courses for applicants and successful candidates. Thus, it is possible to test the hypothesis of a strong internal heterogeneity which links individual attributes and clusters of courses.

In this private university which offers courses in Engineering, Biomedical Sciences, Law, Administration, Economics, Accountancy, Teacher Training (Literature, Pedagogy, Sciences, History, etc.), it is possible to distinguish, like in the cearense universities, different clusters. To make a rapid picture, it can be distinguished a group composed by courses where a strong proportion of students enter at 18 or less and belong to the upper classes and a group of courses with the opposed characteristics. The first group gathers the courses of Engineering, Biomedical Sciences (day shift) and Law (day shift). In these courses, the proportion of students with 18 or less varies between 24% and 30%, the proportion of students whose father has a higher education level varies between 24% and 36%. A relatively lower proportion attended the public secondary education. At the contrary, the courses of Biomedical Sciences (night shift), Law (night shift)-Administration-Economics-Accountancy, and of Teacher Train-

ing have older students, whose father is less frequently graduate and which attended more often a public secondary school.

It is interesting to notice that the "cursinho" has a different status in the cearense universities and in that one. In Fortaleza, the fact of having attended a "cursinho" was negative insofar as the proportion of students who did that was lower in the prestigious courses. Here, the proportion of students who did not attend a "cursinho" is higher in the less prestigious courses. The average values are different too between the private university of Fortaleza and this pauliste university. The proportions of young students, of students whose fathers are graduates, of students who attended a private secondary school, are higher in the first case. These results are due probably to a stronger selectivity at the primary and secondary levels in the Ceará state like in the Northeast in general. The differences in selectivity can be read in the differences of enrolment ratios in higher education, which are 5.1% in the Ceará state and 11.1% in the São Paulo state.

The findings produced by the São Paulo analysis confirm the results of the Fortaleza analysis. But this vision is contrary to accepted ideas in Brazil, according which the public especially federal universities would offer the best courses and would receive the best students, whereas the private institutions would be specialized in less prestigious courses for students with low academic level belonging to the lower classes. Reality is not so simple: the private institutions, like the others, are heterogeneous and offer courses with diversified academic levels for students with varied academical and sociological backgrounds. But what it is evident is the fact that all the institutions, federal ones, State ones, private ones, show the same rationality, that is to say that the best courses receive the students from the upper classes and the less prestigious courses receive the others. There is no opposition between the universities, there is no segmentation outlined by the kinds of institution but a continuity, with a functioning which relies on the same principles. The students from the upper classes are willing to enter into the more prestigious courses. There is a preference for the public universities based on the tradition, the reputation and the free education. But in case of failure, they entered into the best courses of the private universities, not into the other courses of the public institutions. In fact, the competition to enter into the higher education probably channels the best students to the public institutions but this is true within each cluster of courses. When one does not succeed or thinks to be unable to pass in a course in a public university, one goes to a private one rather than to accept a less prestigious course in a public university. With such a processus, the more prestigious courses are filled with the students from the upper class (which generally have the best academical level) and the less prestigious ones, essentially those preparing to the teacher professions, receive the students from lower classes. On this social division, a gender division is superimposed. The result of this procedure is that each institution is heterogeneous and does not pick up students from an only background.

V. The labor market for graduates

V.1. Some words with respect to the data

Like we signaled in Paul (1989)[10], there are very few studies performed in Brazil on the graduates' situation in the labor market and none allowing to compare the situation of graduates by the different kinds of institutions. The tracer study we performed in collaboration with researchers from the Federal University of Ceará at Fortaleza allows to analyze such a question.

The field of the study is constituted by all the ex alumni from the three universities (the federal one, the State one and the private one) graduated from 1984 to 1986 (12,944 students). A random sample of 5,500 graduates was elaborated and 2,140 answered (after two mailings). A second random sample (100 graduates) was picked up from the group of the people who did not send back the questionnaire. A contact was tried by phone (or with the help of colleagues or relatives) with everyone of this second group. This second stage revealed that at least one half of these graduates had moved and had not received the questionnaire. With the questionnaires of the individuals who were finally localized and contacted (a little more than fifty), it was possible to compare the global results (rate of unemployment, earnings) referring to the respondents and non respondents and to conclude to the homogeneity of the two populations, except in relation to the mobility, higher in the second group. Taking in account the fact that the rate of return was effectively (within the population contacted in fact) 60% and that the professional situation of the non respondents was not different from that of the respondents, it is possible to trust in the data.

V.1. Employment situation and earnings models.

Three parameters were chosen to illustrate the employment situation: the fact of working or not, the level of the occupation and the earnings.

The first result concerns the low level of unemployment among the graduates. This fact is however contradictory with a common opinion in Brazil, which considers that there are great difficulties for the graduates in the labor market. We called this opinion in question in Paul (1989)[11] and the analysis of Leal and Werlang (1989)[12] which showed the increasing of the

---

[10] Cf. J.J. Paul (1989) Algumas reflexões sobre as relações entre o ensino superior e o mercado de trabalho no Brasil, Working Paper, NUPES, USP, 8/89.

[11] Op. cit.

[12] Cf. C.I.S. Leal and S.R.C. Werlang (1989) Retornos em Educação no Brasil:1976-1986, EPGE/FGV, Rio de Janeiro, mimeo.

rates of returns between 1976 and 1986 with global data, confirms that the economic situation of the graduates is not bad.

Employment and unemployment by institution

	Federal	State	Private	Total
Employment	95.9%	95.6%	94.6%	95.4%
Unemployment	4.1%	4.2%	5.4%	4.6%
Total	100.0% 4,545	100.0% 3,506	100.0% 4,414	100.0% 12,465

Although the unemployment seems to be slightly higher for the ex alumni of the private university, it is difficult to conclude that the students faced different unemployment situations in the labor market with regard to their university.

Job level by institution

	Federal	State	Private	Total
High level jobs	50.8%	29.4%	50.8%	44.8%
Middle level jobs	28.1%	36.0%	28.2%	30.3%
Low level jobs	21.1%	34.6%	21.0%	24.8%
Total	100.0% 4,598	100.0% 3,492	100.0% 4,364	100.0% 12,454

It is not the same for the job situation. If the job situations are gathered in three groups: high jobs (executives, engineers, professionals, professors), middle jobs (secondary teachers, middle-salaried staff in the public and private sectors) and low jobs (primary teachers, low-salaried staff in the public and private sectors), it appears strong differences between the federal and the private universities on the one hand and the State university on the other hand. It is even surprising how the situations are similar for the federal and the private universities graduates.

One half of the graduates from the federal and the private universities are filling high level jobs. This proportion is only 29% for the State university graduate. These ones more frequentiy fill middle level jobs (36% against 28%) and low level jobs (35% against 21%).

Nevertheless, such results do not allow to judge the university effect per se on the employment situation. Insofar as the structure of the population of each university by course is not the same, it is necessary to try to distinguish the effect of the course from the effect of the institution.

It is possible to distinguish the courses offered by the three universities and the courses offered by at most by two of them. Within the first group, three wide sets were built up: Administration-Accountancy-Economics, Teacher Training, Nursing.

Graduates by categories of courses

	Federal	State	Private	Total
Administration Accountancy Economics	11.3%	16.4%	31.5%	19.8%
Teacher Training	19.9%	54.8%	7.8%	25.5%
Nursing	2.7%	5.5%	5.7%	4.5%
Others	66.2%	23.3%	55.0%	50.2%
Total	100.0% 4,786	100.0% 3,643	100.0% 4,515	100.0% 12,944

The flux composition indicates the importance of Teacher Training for the State university, where they represent 55% of the flux whereas they represent 20% for the federal and only 8% for the private. In the private university, Administration-Accountancy-Economics count for 32% of the graduates. The other courses are more important in the federal and in the private. Some of them is common to these universities, like Engineering (7.4% of the graduates of the federal and 16.8% for the private) or Law (12.7% of the graduates of the federal and 22.2% of those of the private).

Beside the institution and the course, several factors are susceptible to explain the earnings. Three factors refer to the experience earnings profile: the fact of working at the moment of the graduation, the age and the year of the graduation. As it is assumed that the earnings grow with the experience, either in a Mincerian perspective or in an institutionalist one, it can be expected that the individuals who are working at the moment of the graduation earn more than the others, that the older earn more than the younger and that the graduates in 1984 earn more than those of 1985 and 1986. With respect to this last factor, this assumption holds others things being equals with regards to the general conditions of the labor market. Two others factors refers to ascriptive attributes: the gender and the social origin. With the inclusion of the gender, it is possible to estimate the discrimination effects, whereas with the social origin it is possible to check if the higher education equalizes the job opportunities.

Two models were tested. The first one refers to the whole population and includes the three sets of courses (Administration-Accountancy-Economics, Teacher Training, Nursing). The second one was built for each of the three sets of courses and for Engineering and Law, the two main courses common to the federal and the private universities.

Considering first the influence of the course, it appears that the only significative difference, but a strong one, refers to Teacher Training which are related at earnings 94.5% lower than for the uncommon courses.

The experience earnings profile effect is evident. The graduates in 1985 and in 1986 earn respectively 55.5% and 83.4% less than those graduated in 1984. There an age effect appears too, of 0.3% per year.

Global earnings (logarithm) models

Regressor	Coef.	Std Er.	Elast.
Constant	6.479	0.0610	
Admin.-Acc.-Eco.(1)	-0.001	0.0236	
Teacher Training(1)	-0.6657***	0.0252	-94.5%
Nursing(1)	-0.0209	0.0432	
Working at graduation(2)	0.3066***	0.0224	35.8%
Graduate in 1985(3)	-0.0813***	0.0235	8.4%
Graduate in 1986(3)	-0.2236***	0.0237	25.0%
Age	0.0033**	0.0016	0.3%
Federal(4)	0.1924***	0.0244	21.2%
Private(4)	0.1256***	0.0251	13.3%
Female(5)	-0.5532***	0.0184	73.9%
Father with sec. or sup.(6)	0.1671***	0.0193	18.2%
R^2	0.3019		
N	7,281		

(1) Compared with the courses not supplied by the three universities together.
(2) Compared with people not working at graduation
(3) Compared with graduate in 1984
(4) Compared with State university
(5) Compared with Male
(6) Compared with Father with educational level lower than secondary
Level of significance: *** 1%, ** 5%.

The effects of the attributes seem strong. The females earn 73.9% less than the males (even taking in account the Teacher Training effect). And the graduates with father with secondary or higher education earn 18.2% more than the others with less educated father.

Others things being equal,it appears that the federal university graduates and the private university graduates earn respectively 21.2% and 13.3% more than the State university graduates. Theses findings seem to indicate a relative hierarchy between the three institutions, with the federal university at the top and the State one at the bottom.

Elasticities for the models by course
(variables significant at least at 10% level)

Regressor	Adm-Acc-Eco	Teach.	Nurs.	Eng.	Law
Working at graduation(1)	19.7%	35.5%	34.9%		389.3%
Graduate in 1985(2)		12.0%	-28.2%	-10.8%	-55.5%
Graduate in 1986(2)	-21.3%		-1.47%	-38.2%	-83.4%
Age					1.0%
Federal(3)	-9.1%	8.4%			
Private(3)	-10.3%	-12.5%			47.5%
Female(4)	-44.1%	-93.9%		-19.2%	-21.9%
Father with sec. or sup.(5)	14.5%		29.2%	13.5%	178.5%
R^2	0.0932	0.1701	0.3000	0.0804	0.4829
N	1,583	1,845	357	598	832

(1) Compared with people not working at graduation
(2) Compared with graduate in 1984
(3) Compared with State university
(4) Compared with Male
(5) Compared with Father with educational level lower than secondary

To improve the analysis of the institutional effect, it is convenient to select the courses offered by several universities. But a clear perspective does not appear from the models by course. Within the courses offered by the three universities, the graduates in Teacher Training of the private university receive lower earnings than the graduates of the two others universities. It is for Administration-Accountancy-Economics that the graduates from the State university have the best position, whereas there is no difference between the private and the federal. There is no difference between the graduates of the three universities for Nursing.

With respect to the courses common to the federal and the private university, the graduates in Law from the private one present a strong earnings advantage (47.5% more). But this course seems very peculiar, showing a strong influence of the experience (it is true that many students of this career are working since a long time) and of the social origin, as this career

could be used to legitimate by a cultural dimension the economic power of a part of the local upper middle class. The students with a father with an educational lever higher than the primary earn 178.5% more than the others.

The results of this study show first that the unemployment is not very high among the graduates, whatever the institution. Secondly, it appears that the earnings differences between graduates from different institutions are due more to differences in the relative weight of each course, than to an university effect. In particular, the everlasting opposition between Teacher Training and the other courses is confirmed when the earnings conditions are considered. And it is difficult to conclude, after the analysis of the economic situation of graduates in the same field from different universities, than a specific university leads to a best situation. Moreover, the graduation does not equalize the job opportunities. The ascriptive attributes and the gender continue to exert a strong influence on the earnings, even holding constant the field of graduation.

The extensive analysis of the functioning of the brazilian higher education system conducted in this paper points out the unavailability of national data about numerous aspects. This why it was necessary to use either the official data in a way sometimes rather acrobatic, either data especially collected, but with problems to generalize them. Nevertheless, some strong features can be shown up.

Contrary to the general feeling in Brazil, it does not appear a clear opposition between public and private universities with respect to the quality of the training and to the students' academical level. Each university offers a range of courses and through the procedure of "vestibular", the students with the best academical level pass in the more prestigious courses. It exists a preference for the public institutions, which are free. But the students who chose a course with a given level of prestige in a public institution and do not pass, will go in a private institution rather to shift down their level of exigence within the public institution. This students'strategy creates a certain continuity in terms of quality of students and courses, more than an opposition like the general feeling wants. The important fact to consider in this matter is that the functioning of the primary and secondary levels cause a strong correlation between academical level and socio-economic background. This involves a strong polarization of students and of courses, with the upper classes students in the most prestigious careers, whatever the kind of institution. In such a context, the fact that public institutions are free cannot be justified for the principal beneficiaries are the upper class students.

Our original data about unit costs show that the more prestigious courses are more costly (especially Medicine and Engineering), and that the costs are higher in the public institutions. Our data show also that holding constant the degree, the students receive similar earnings, whatever the kind of institution. From a political point of view, these data confirm that the brazilian higher education system is counter-redistributive. But it is necessary to put the dogmas aside to study this question.

List of courses abbreviations

Abbreviation	Course	Proportion in total Enrolment (%)
ACCO	Accountancy	5.9
ADMI	Business Administration	11.1
AGRO	Agronomy	2.0
ANCI	Ancillary Medical Services	0.5
ARCH	Architecture	1.4
ARTS	Arts	1.4
BIOL	Biology	1.4
CHEM	Chemistry	0.5
DATA	Data Processing	1.6
DENT	Dentistry	1.8
DOEC	Domestic Economy	0.1
ECON	Economics	4.5
ENGI	Engineering	9.6
GEOG	Geography	1.7
GEOL	Geology	0.2
HIST	History	2.3
INDC	Industrial Chemistry	0.2
LAW	Law	10.2
LIBR	Librarian	0.3
LITE	Literature	6.7
MATH	Mathematics	1.4
MDRA	Mechanical Drawing	0.3
MEDI	Medicine	3.3
MUSI	Music	0.2
NURS	Nursing	1.4
NUTR	Nutrition	0.5
PEDA	Pedagogy	8.1
PHAR	Pharmaceutics	1.0
PHIL	Philosophy	0.7
PHTE	Physiotherapist	0.5
PHYS	Physics	0.5
PSYC	Psychology	3.1
SCIE	Sciences	4.2
SOCS	Social Sciences	1.2
SOCO	Social Communication	1.2
SOSE	Social Service	1.3
SOST	Social Studies	1.8
SPOR	Sports	2.5
STAT	Statistics	0.2
TEAC	Teacher Training	0.3
TOUR	Tourism	0.4
VAIN	Various Industrial Courses	0.2
VETE	Veterinary	0.7
Total		100.0

List of institution abbreviations

Abbreviation	Kind of Institution	Proportion in total Enrolment (%)
FEUN	Federal University	20.7
FEFC	Federal Faculty	0.9
ESUN	State University	8.5
ESFC	State Faculty	4.0
MUIN	Municipal Institution	5.0
SPUN	Secular Private University	8.7
SPFF	Secular Private Federation of Faculties	11.9
SPFC	Secular Private Independent Faculty	23.3
RPUN	Religious Private University	12.6
RPFC	Religious Private Faculty	4.4
Total		100.0

Results of the factor analysis
(First two axes)

Institution	1#F COOR.	CORREL.	REL.CONT.	2#F COOR.	CORREL.	REL.CONT.
FEUN	569	934	446	-9	0	0
FEFC	1215	350	88	153	6	5
ESUN	443	622	111	106	35	22
ESFC	-57	7	1	517	541	249
MUIN	-226	140	17	402	443	187
SPUN	-68	23	3	-252	319	129
SPFF	-461	755	168	-53	10	8
SPFC	-293	628	133	63	29	21
RPUN	-80	36	5	-343	678	346
RPFC	-314	199	29	177	63	32
Total			1000			1000

Results of the factor analysis

(First two axes)

Course	1#F COOR.	CORREL.	REL.	CONT.	2#F COOR.	CORREL.	REL.	CONT.
ACCO	-316		711	42	85		52	10
ADMI	-427		884	142	35		6	3
AGRO	892		769	103	272		71	31
ANCI	-425		445	7	-311		237	12
ARCH	287		237	8	-468		630	72
ARTS	291		438	8	48		12	1
BIOL	437		618	19	-250		202	20
CHEM	904		879	29	-71		5	1
DATA	16		1	0	-317		256	38
DENT	371		710	17	-17		1	0
DOEC	581		315	3	-61		3	0
ECON	-82		228	2	-83		230	7
ENGI	291		555	55	-83		45	15
GEOG	368		292	16	449		434	78
GEOL	1275		917	25	-104		6	1
HIST	177		120	5	365		511	73
INDC	291		102	1	-373		169	8
LAW	-203		333	30	-239		460	136
LIBR	941		668	20	-16		0	0
LITE	-30		16	0	198		665	62
MATH	386		498	15	102		35	3
MDRA	56		6	0	120		25	1
MEDI	524		552	61	109		24	9
MUSI	671		709	8	251		99	4
NURS	483		697	22	7		0	0
NUTR	588		449	13	-304		120	11
PEDA	-276		416	44	202		224	78
PHAR	1026		933	74	-107		10	3
PHIL	429		225	9	-149		27	3
PHTE	-207		296	2	-210		306	6
PHYS	1108		742	48	61		2	0
PSYC	-206		194	9	-333		503	79
SCIE	-326		407	32	286		313	81
SOCS	248		337	5	15		1	0
SOCO	-152		119	5	-375		721	90
SOSE	215		161	4	-352		432	37
SOST	-486		804	30	63		14	2
SPOR	39		13	0	173		242	17
STAT	867		623	11	53		2	0
TEAC	-264		112	2	193		60	3
TOUR	-551		519	9	-173		51	3
VAIN	-539		174	3	-175		18	1
VETE	1146		894	63	39		1	0
TOTAL				1000				1000

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

BORN OLD: WHY BRAZIL LAGS BEHIND IN EDUCATIONAL DEVELOPMENT

David Plank
José Amaral Sobrinho
Antonio Carlos da Ressurreição Xavier

documento 08

Draft: Not to be quoted or cited without authors' permission

BORN OLD:

WHY BRAZIL LAGS BEHIND IN EDUCATIONAL DEVELOPMENT

David N. Plank
University of Pittsburgh
and Universidade Federal da Bahia

José Amaral Sobrinho
Instituto de Pesquisa Econômica Aplicada

Antonio Carlos da Ressurreição Xavier
Instituto de Pesquisa Econômica Aplicada
and Ministério da Educação

BORN OLD:

WHY BRAZIL LAGS BEHIND IN EDUCATIONAL DEVELOPMENT

According to Anisio Teixeira, the **Lei de Diretrizes e Bases da Educacao Nacional** (LDB) approved in 1961 to define the structure and goals of the Brazilian educational system was "born old" (Fontoura, 1968, pp. 8-9; Saviani, 1987, p. 98). With their positions defined by long-standing conflicts having relatively little to do with education, the principals in the long debate over the LDB displayed a remarkable disinterest in real conditions within the educational system, or in the relative capacity of alternative policies to resolve the country's educational problems. Rather, the law they finally approved was defined by the exigencies of balancing competing interests, and reliant for success on the hopeful assumption that the passage of the law would in itself be sufficient to bring about educational improvement (Saviani, 1987, p. 22; for an analogous view see Oliveira, 1984). Regrettably but not surprisingly, this assumption has turned out to be unfounded.

The educational system defined by the LDB was similarly "born old." In a perpetual and unsuccessful race to overcome old problems, those in charge of the system are unable to come to terms with or even acknowledge new problems. Confronted by the vast and painful legacy of the past (e.g. 20 million adult illiterates, 4 million children of primary school age not enrolled), subject to the particularistic demands of powerful constituencies, and obstructed by long-standing and irreconcilable conflicts over the distribution of power and resources, policy-makers are prevented from considering how to adapt the educational system to the present or the

future. The consequence is paralysis in the face of problems that grow steadily worse.

I. Background and Conceptual Framework

The persistent backwardness of the Brazilian educational system has been recognized, analyzed, and discussed for more than six decades. In the years preceding the Revolution of 1930 politicians and policy-makers began to acknowledge that for Brazil to join the ranks of the developed countries would require vast improvements in the performance of the educational system, and in the educational attainments of Brazilian citizens (Romanelli, 1978, 129). In the years since the development plans and policy documents put forward by successive governments have invariably acknowledged the country's educational problems and the threat they pose to future economic growth and social well-being. Both military and civilian regimes have called for the expansion and improvement of the school system, assigning the highest priority to the achievement of universal primary schooling and the elimination of illiteracy.

In the years since 1930 much has changed for the better: enrollment rates at all levels have greatly increased, universities have proliferated, and literacy rates have risen sharply. Brazil nevertheless continues to lag behind other countries on virtually all indices of educational development. The Ministry of Education (MEC) estimates that four million children between the ages of seven and fourteen are not enrolled in school at all, while only 16 percent of those between the ages of fifteen and nineteen are enrolled in secondary schools. (See Table 1.) The literacy rate among adults remains below 85 percent, which means that more than 15

million Brazilians cannot read and write (Brasil, 1990). Far from matching the educational standards of Europe and North America, educational standards in 1990 barely exceed those of the poorest countries in the hemisphere.

The reasons for the poor performance of the Brazilian educational system are well known. Among them are low teachers' salaries and a consequent shortage of qualified teachers, especially in rural areas; scarcity of textbooks and instructional material; abbreviated school days; decaying and ill-equipped school buildings; administrative inefficiency; and curricular and pedagogical rigidities that perpetuate high rates of grade repetition and dropout. The **Pioneiros da Educacao Nova** published a diagnosis of Brazil's educational problems in 1932, and recommended policies to resolve them (Romanelli, 1973, pp. 146-149). Their analyses and policy proposals have been repeated often since, in documents ranging from the first version of the **Lei de Diretrizes e Bases da Educacao Nacional** (LDB) in 1948 to the National Development Plans of the 1960s and 1970s to the **Educacao Para Todos** manifesto published by the Sarney government in 1985 to the preliminary version of the new LDB and the education policy objectives recently proposed by the Workers' Party (Villalobos, 1969; Freitag, 1978, pp. 100-103; MEC, 1985; Camara dos Deputados, 1990; Folha, 5 September 1990). Despite consensus on the nature of Brazil's educational problems and the policies needed to correct them, however, the relative backwardness of the educational system persists.

A variety of explanations are commonly put forward for the continuing lack of improvement in the Brazilian educational system: scarcity of financial and human resources, failure of "political will" (vontade politica) to put necessary reforms into practice, overstaffed and

underqualified administrative and planning agencies at all levels, ignorance of policy alternatives and effective reform strategies (e.g. Castro, 1989, 271-273). These explanations have in common a view of the problem as one of policy implementation, in which one or more of a set of material, institutional, and political obstacles prevent the achievement of clearly defined and universally approved educational objectives.

The central difficulty faced by proponents of explanations of this type is the monumental task of accounting for six decades of consistent policy "failure" in the Brazilian education system. To attribute the persistence of Brazil's educational backwardness to problems in policy implementation is to impute an extraordinarily low level of competence to a long line of Brazilian governments, both civilian and military. It is simply implausible to suppose that all of the laws, plans, and policies put forward in the past sixty years to bring about improvements in the educational system have come to nothing for lack of "leadership" or money or technical skill.[1]

The argument that the continuing backwardness of the Brazilian education system represents a failure to implement worthy educational policies is rooted in two closely related and equally mistaken assumptions. The first of these assumes that stated goals coincide with real goals.[2] In fact, however, the irreproachable public objectives of the educational system may be and often are quite different from the objectives pursued by those in charge of the system. The latter often include the provision of jobs and financial benefits for clients and the maximization of electoral support through the protection or advancement of particularistic interests. The second assumption follows from the first, and asserts that the key

policy problem in the educational system is the identification of the "best" (most effective, most efficient) means for accomplishing system goals. In an educational system where private objectives commonly take precedence over public, however, political conflict focuses not on the definition of policy objectives but on the ostensibly technical question of the choice of policy instruments. Bitter conflicts over the control of resources and responsibilities within the educational system have presented nearly insurmountable obstacles to educational reform in Brazil from 1930 to the present.

The Brazilian educational system does not lag behind those of other countries because of a lack of knowledge either of the problems that it faces or of the costs that bad schools impose on the wider society: virtually all Brazilians acknowledge the ineffectiveness and inefficiency of the school system, and support calls for reform. Many simultaneously see present policies as essential to the protection or advancement of their own interests, however, and change as threatening to those interests (Plank, 1990b). Few publicly defend the performance of the schools, but those who benefit from present educational policies may well prefer them to the available alternatives. Policy debates over the past six decades have almost invariably ended in reafffirmation of the status quo, both because current policies are preferred by powerful interests and also because those seeking change are irrevocably divided over the form that change should take.

The problems of policy objectives and policy instruments are discussed in the following sections of the paper. The second section discusses the goals of the education system, and the priority generally accorded to

private over public interests. The third section surveys three contentious and recurrent policy debates in Brazilian education, each of which hinges on the control of resources and responsibilities within the educational system. Subsequent sections discuss recent policy initiatives aimed at resolving some of these problems.

II. Public Purpose and Private Interest

Debates on policy objectives in the Brazilian educational system are characterized by a remarkable degree of unanimity.[3] Political parties, candidates, and public officials at all levels of government agree that the exigencies of economic progress and political democracy demand the reduction of the "social debt" (**divida social**) owed by the government to Brazil's poorest citizens. In educational policy this has been translated into agreement that priority within the educational system should be assigned to the goals of eliminating illiteracy and ensuring universal access to basic education.[4] Despite consensus on the importance of these policy objectives, however, the number of illiterates in Brazil has not been significantly reduced in recent years, enrollment rates in basic education have barely increased, and large numbers of school-aged children remain entirely outside the educational system (Brasil, 1990).

Discussions of the persistent problems of Brazilian education typically focus on identifying the causes of repeated failure to implement educational policies and achieve agreed educational objectives. Among the commonly cited candidates for blame are the insufficiency of financial resources, the absence of political leadership, the incompetence and venality of public officials at all levels, the complexity and inefficiency

of administrative structures, and the lack of timely and reliable information needed for educational planning.[5] These and similar explanations have been proposed often to account for the nearly uniform failure of successive policy initiatives to bring about significant and lasting improvement in the performance of the Brazilian educational system.

A change of perspective may now be in order. Rather than assuming the priority of publicly affirmed policy objectives and asking why worthy goals have not been attained, it may make more sense to assume that policy actions coincide with policy objectives and to ask what policy "successes" have been achieved in the Brazilian educational system over the past six decades (Plank, 1990b). The question then becomes not why educational policies are not implemented, but why present educational policies are preferred to the available alternatives.

The starting point for such an analysis is the acknowledgement that the ostensible "failures" of the Brazilian educational system serve some powerful interests well. The educational objectives assigned priority by these groups may depart radically from those that are universally affirmed in public debate by politicians and education officials, but they may nevertheless take precedence in decisions about the allocation of resources within the system.[6] Insofar as this is so the advancement or protection of the interests of these groups represent policy "successes," even if they are achieved at the expense of "failure" in the achievement of other, more widely shared goals. From this point of view the persistent backwardness of the Brazilian educational system is attributable not to problems in the implementation of policies, but rather to the fact that the most important goals of the system are not those published in policy documents and

campaign promises. The public purposes that are affirmed in these documents are systematically subordinated to the service of private interests. Examples of this subordination include the many varieties of clientelistic politics that are practiced in the educational system, the provision of public subsidies to private schools and private school students, and the perpetuation of "free" higher education in public universities. The implications of these policies are discussed below.

A. Clientelismo

Clientelismo represents the systematic subversion of public purposes in the service of private interests, through the diversion of public resources to private ends. Rather than responding to the "public" interest through the development and implementation of policies that provide generalized benefits to the society at large, Brazilian politicians often find that their electoral prospects are best served by concluding private agreements with particular voters or groups of voters. These may extend from the literal purchase of votes to the distribution of jobs and contracts to supporters to the provision of nominally public services to different groups on a particularistic and discriminatory basis.[7] The crucial issue in Brazilian politics is therefore not what policies are to be assigned priority, but <u>who</u> is to control the instruments of power. Under these circumstances many of the benefits of government action are captured by favored groups and individuals, while the interests of those with less influence (e.g. the poor, supporters of opposing candidates) are systematically neglected.

Widespread reliance on clientelistic politics provides the clearest examples of the subordination of public purposes to private interests in the Brazilian educational system. **Clientelismo** in education comprises a variety of practices, including the provision of jobs for clients and supporters, the awarding of public contracts to political allies, the distribution of public resources in accordance with the exigencies of electoral politics, and the diversion of public resources to private uses. Most of these practices are discouraged or legally barred in Brazil, but their continued importance in the educational system can hardly be overestimated (Leal, 1990).

The provision of jobs for clients (known as **empreguismo** or **fisiologismo**) is the most important and most costly manifestation of **clientelismo** in the Brazilian educational system.[8] Among its consequences are overstaffed and underqualified administrative agencies at all levels of the educational system; large numbers of "ghost teachers" (**fantasmas**) working outside of schools, or not working at all; massive turnover among administrators, school directors, and even teachers in the wake of state and local elections; and the parade of over 300 new faces in senior administrative and technical positions in MEC that accompanies each new Minister into office (Oliveira, 1984; O Globo, 29 October 1987). Perpetual turnover among system personnel and recruitment based on criteria other than merit virtually prevent the acquisition of professional competence among educators, and rule out continuity in the execution of educational policies. Pressing educational objectives are not achieved, not because of problems encountered in policy implementation but because serious efforts to

implement policy are pre-empted by efforts to cultivate and expand political support through the distribution of jobs.

Other examples of clientelismo in the educational system include the awarding of school construction contracts to political supporters, which has been estimated to inflate costs by as much as 40 percent (Mello e Souza, 1989); the rapid diversion of federal revenue transfers from states to municipios following the election of 25 opposition governors in 1986 (CEC/IPEA, 1987, 10, 13); the upsurge in educational investment that accompanies state and local elections, and the decline that typically follows (Bahia, 1990); and periodic accounts of corruption in school feeding programs and elsewhere in the educational system (Folha de Sao Paulo, 20 April 1988; Folha de Sao Paulo, 21 April 1988; A Tarde, 27 August 1990). Whether legal or not, these and similar activities shift resources within the educational system toward persons and groups with political or economic ties to those in charge of the system, and away from those who lack such ties. The distribution of educational resources consequently favors politicians and their clients at the expense of those who rely on public schools to educate their children.

B. Public Authorities and Private Schools

A second set of examples of the subordination of public objectives to private interests can be found in the complex relationship between public authorities and private schools. This relationship has two main dimensions. On the one hand, private schools receive large quantities of public money through direct and indirect transfers from federal and state governments. On the other hand, the fees that private schools charge parents are subject

to regulation by public authorities. In concert these policies serve to ensure the survival of a large number of relatively high-quality private schools, and to guarantee the "right" of middle-class parents to send their children to them. At the same time these policies contribute to the further deterioration of the public schools, both by depriving them of potential revenues and by encouraging the flight of parents who might provide an articulate and effective voice in favor of their recuperation. As a result the public schools are widely and accurately perceived to be schools for the poor, of no immediate concern to anyone other than those condemned to work in or attend them.

Public subsidies to private schools take several different forms. Private schools are exempt from the payment of income tax, and also from the wage tax (**salario-educacao**) destined to the support of primary education. They participate in a variety of agreements with state and local governments in which public authorities "purchase" school places.[9] Students may receive scholarships for private school tuition from a variety of public sources at both state and federal levels, some of which are distributed through the offices of elected officials. Under a policy known as the **Sistema de Manutencao do Ensino** (SME) firms may withhold the payment of contributions under the **salario-educacao** if they maintain their own schools or provide tuition scholarships to the children of their employees (Velloso, 1987). In addition to providing opportunities for fraud and the practice of **clientelismo**, these policies result in the diversion of huge quantities of resources from public to private schools. In 1986, for example, more than half of all resources generated by the **salario-educacao** were retained by firms under the SME (Bahia, 1990). Direct federal

expenditures on the purchase of school places were even larger (Leal, 1990, 189).

Public authorities in Brazil have also adopted policies to protect the access of middle-class households to private education. Over the protests of private school directors, the series of economic "plans" decreed by the Sarney and Collor governments have included the regulation of private school fees (**mensalidades**), in a reasonably successful effort to keep them in line with (likewise regulated) salaries.[10] The main effect of this policy has been to spare middle-class parents from the obligation to send their children to public schools.

The role of private schools in the Brazilian educational system has been a topic of intense political controversy for four decades. (The nature of these conflicts is discussed further below, in Section IIIB). A campaign to restrict the allocation of public funds to public institutions produced one of the most contentious debates in the recent Constituent Assembly (Plank, 1990a), and the question has been raised again in the debate over the new LDB. Conflicts engendered by the regulation of private school fees have in turn been the most loudly contested educational issue in Brazil in the past five years. With respect to these conflicts, however, it is important to note that they have emerged in consequence of competition between specific private interests (e.g. between middle-class parents and the directors of private schools) and not between competing conceptions of the public interest. The majority of Brazilians who lack the economic or political resources necessary to escape from the public schools are not represented in these debates, and their interests are systematically neglected as a result.

C. Keeping Public Universities "Free"

A third example of the subordination of public to private interests is the perpetuation of "free" higher education in public universities. Despite the priority universally accorded to primary education and the conquest of illiteracy in political manifestoes and policy documents, the largest share of federal education resources continues to be allocated to the support of federal universities (Verhine, in press; Gomes, 1988). The shares of state education budgets allocated to state university systems are also steadily increasing. Only a tiny minority of Brazilians succeed in enrolling in higher education institutions, and the majority of these pay fees to attend private colleges. As the clients of public universities are disproportionately recruited from among urban residents and members of the middle and upper classes (many if not most of whom have attended private primary and secondary schools), the failure to charge tuition in public universities in large part represents a public subsidy to those least in need of subsidization, at the cost of scanting other objectives including the expansion and improvement of basic education (Saviani, 1986, 14).[11]

As with the issue of public subsidies for private schools, the question of "free" public higher education has been intensely debated in recent years, in the Constituent Assembly and elsewhere. The main beneficiaries of present policies are students in federal and state universities, who are relatively few but nevertheless cohesive, articulate, conscious of their own interests, and politically important. Those who pay the price to keep higher education "free" are far more numerous but almost entirely disorganized and inarticulate. The consequence is a distribution

of public resources for education that systematically favors the privileged at the expense of those most in need of public assistance.

D. Summary

The need for educational reform and improvement is almost universally acknowledged in Brazil, but those who gain from present arrangements are unwilling to give up either current or prospective advantages. Though publicly affirmed goals are not achieved this hardly represents policy "failure." In fact the educational system is reasonably successful in serving powerful private interests, including those of politicians and their clients and middle and upper class households. Resources are scarce, and policy choices systematically favor those with privileged access to power. The consequences include jobs for clients; subsidies for private schools, public university students, and middle-class parents; and the continued deterioration of educational services for those who remain effectively disenfranchised.[12]

III. Policy Objectives and Policy Instruments

Political conflicts over educational objectives occur only when the interests of clearly-defined and politically influential groups are directly threatened, as in the debate over "free" university education. In general, however, the most contentious educational issues have emerged elsewhere, in the struggle to control the means of policy implementation and the distribution of educational resources. Three of these policy debates have been of particular importance: the question of the appropriate location of administrative and financial responsibility for schools, especially at the

primary level; the question of the status of regional differences in the effort to reduce educational inequalities; and the question of the role of private schools in the educational system. These debates have animated the discussion of Brazilian educational policy for six decades, and the issues they raise remain unresolved.

A. Administrative Decentralization

Conflicts between advocates of centralized and decentralized administration are virtually inevitable in a large and heterogeneous country, and such conflicts have a long history in Brazil. The relatively strong central authority of the Empire was displaced in 1891 by the federalism of the First Republic, in which most important administrative and political powers were delegated to the states (Souza, 1986, p. 12). On the basis of an explicitly nationalist and authoritarian ideology, the Vargas dictatorship of the 1930s and 1940's established an extensive administrative apparatus that asserted central control over virtually all areas of public policy. The military regime that governed Brazil in the 1960s and 1970s further centralized administrative authority, and significantly increased the share of public revenues controlled by the federal government. In contrast, the Brazilian Constitution of 1988 (like those of 1934 and 1946) includes a variety of measures aimed at delegating administrative and financial power to states and municipios.

Conflict between advocates of centralization and decentralization has marked the educational system as well. A Ministry of Education, Post, and Telegraphs established by the new Republican government was shortly disbanded, and in 1911 full autonomy in the establishment, maintenance, and

governance of schools was vested in state, local, and private authorities (Romanelli, 1978, p. 42). The centralization of administrative and financial authority that began under Vargas (and continued, somewhat ambivalently, under the elected governments of 1946-1964) was accelerated by the military regime, but there are signs that it may be reversed under the new Constitution (Campello e Souza, 1983; Camara dos Deputados, 1990).

Steady progress toward centralization in the educational system has been opposed at virtually every turn by advocates of decentralization and local control. The 1932 manifesto of the **Pioneiros da Educacao Nova** called for flexibility, diversity, and the delegation of administrative and financial control to states and municipios. According to the manifesto,

> "A organizacao da educacao brasileira...nao implica um centralismo esteril e odioso, ao qual se opoem as condicoes geograficas do pais e a necessidade de adaptacao crescente da escola aos interesses e as exigencias regionais. Unidade nao significa uniformidade....nao e, pois, na centralizacao mas na aplicacao da doutrina federativa e descentralizadora, que teremos de buscar o meio de levar a cabo, em toda a Republica...." (Azevedo, 1932).

In keeping with the views of the **Pioneiros**, the Constitution of 1934 called for the states to organize their own school systems under the general guidance of the federal government, as did the democratic Constitution of 1946 and the first version of the LDB in 1948. To the present, however, the political and administrative advantages of centralized control have proven stronger than legal mandates to decentralize power and resources.

Efforts to define the division of responsibilities between central and local authorities invariably generate enormous controversy, but the variety of interests at stake precludes an easy summary of the terms of the debate, or even of the identities of the protagonists. In the debate over the LDB, for example, the proponents of decentralization included a variety of

"progressives," who saw the policy as an inevitable response to Brazilian diversity and a spur to political pluralism; and the defenders of private education, who viewed the decentralization of administrative authority as a useful protection against the regulatory power of the central government. Opponents included the architects of the economically and politically nationalist **Estado Novo**, who insisted upon central control and planning to advance the integration and development of Brazil (Villalobos, 1969; Romanelli, 1978). At present, in contrast, advocacy of decentralization tends to be associated with economic liberals and proponents of privatization, while "progressives" tend to be skeptical about the commitment of local officials to the support of education; apprehensive about the effects of decentralization on teachers' unions and teachers' salaries; and fearful of the abandonment by the federal government of responsibility for the education of poor children (Oliveira, 1986; Castro, 1989; Namo de Mello and Maia, 1987).

Positions on the issue often cut across organizational and geographical categories as well. On the one hand, state and local officials in the relatively prosperous states of the South and Southeast tend to look favorably on decentralization, which promises them greater control over local resources, while their counterparts in the Northeast seek first to ensure the continued flow of federal transfers (Castor and Zabot, 1989). Education officials in some states and municipios resent the burden of compliance with the administrative procedures of the federal government, while others are adept at exploiting bureaucratic confusion in Brasilia to advance local interests. The welter of competing interests involved in the

debate and the complexity of the positions enunciated prevents even a clear statement of policy alternatives, far less a choice among them.

The persistent failure to resolve the conflict between centralization and decentralization is not just a matter of bureaucratic detail. The indeterminate division of educational responsibilities between national, state, and local governments combined with a lack of transparency in relations among the spheres of government has a variety of pernicious consequences. The most important of these is the maximization of administrative discretion at all levels of the educational system, which leaves the system open to the practice of **clientelismo** and responsive to the demands of particularistic interests. Another is the minimization of administrative responsibility, as it is virtually impossible to determine precisely who is responsible for ensuring the right to education of Brazilian citizens.

Administrative decentralization has been an objective of official educational policy in Brazil since 1971. The educational reforms adopted in that year called for shifting responsibility for primary education to municipal governments in step with the development of local administrative and financial capacity (Barretto and Arelaro, 1985). In fact, however, little decentralization has taken place. The control of tax bases remains highly centralized and unequal, and state and federal officials remain hesitant to delegate responsibility for schools to authorities at the local level. (See Table 2.)

There are signs that further decentralization may now be in prospect, however, for two main reasons. First, tax changes required by the new Constitution are projected to bring about a significant decline in the

quantity of revenues controlled by the federal government, with correspondingly large gains by states and especially municipios (Gomes, 1988, pp. 249-252). Shifts in administrative responsibility may be expected to follow the shift in resources. Second, state and local governments are increasingly assertive in their claims to control their own school systems. The emergence of organizations representing state (CONSED) and municipio (UNDIME) education officials suggests that the pressures in favor of decentralization are growing, and that they now represent local aspirations as well as competing interests in national politics. The form that decentralization will ultimately take is still very much in question, however.

The question of whether administrative decentralization is good or bad educational policy is not at issue here. The point to be emphasized is rather that political disagreements about the means by which the ostensible goals of the educational system are to be achieved have for forty years almost entirely displaced efforts to actually achieve those goals. There is widespread agreement on the goals themselves, but intense disagreement about how those goals should be achieved, and about who should be invested with the task of achieving them. The failure to define the division of administrative responsibility between central and local authorities generates confusion and irresponsibility in the educational system and establishes the conditions under which private interests flourish at the expense of public purposes. Compromise in the debate over decentralization is made difficult by deeply-rooted political differences among the protagonists, and by fears of making a bad situation worse. In fact, however, the debate itself perpetuates the lack of definition in the

administrative structure in the educational system, facilitates the displacement of public by private objectives, and hinders the solution of basic educational problems.

B. Educational Inequalities and the Problem of the Northeast

Closely related to the problem of identifying the appropriate seat of responsibility for basic education is the problem of reducing educational inequalities and improving the quality and quantity of educational opportunities available to the poor. Brazilian society is marked by extreme disparities in income between social classes, between urban and rural residents, and between regions, and recent economic policies appear in many instances to have increased rather than reduced their scope (Fishlow, 1972; World Bank, 1990). Inequalities in income are clearly reflected in other indices of social welfare, including educational access and attainment (Calsing, 1989).

Perhaps the single most striking characteristic of Brazilian society is the huge gap between the industrialized and relatively prosperous states of the Southeast on the one hand and the laggard and impoverished states of the Northeast on the other, on virtually all indices of social and economic development. (See Table 3.) A major focus of Brazilian political economy (with support from the international aid agencies) has been an effort to reduce the chronic poverty and backwardness of the northeastern region. In the field of education, for example, the World Bank has recently sponsored a large project aimed at increasing the quality and quantity of educational opportunities available in the region, and MEC consistently allocates the lion's share of its discretionary resources to projects in northeastern

states and municipios. To date, however, these efforts have made relatively little difference. The Northeast remains poor, and continues to lag behind the rest of Brazil on all measures of educational access and attainment. Indeed, the gap between enrollment rates in northeastern and southeastern states in 1980 was larger than it had been in 1940 (Plank, 1987).

The issue with respect to the problem of educational inequalities is whether they are best addressed on a regional or some other basis. It can be argued, for example, that the crucial policy problem is not so much that the Northeast lags behind other regions in educational development as that many of the people who live in the Northeast lack access to schools of even minimal quality. Attempts to increase the availabilty of educational resources in the region may or may not improve the educational opportunities of those penalized by the present system, and in fact may often work to the advantage of the relatively privileged. This has clearly happened in the educational system: resources allocated to the region only reach the ostensible target population in a much-reduced form, having meanwhile been put to work in the service of other interests, including those of politicians and their clients (Barretto, 1983; CEC/IPEA, 1987). A report published by MEC in 1987, for example, determined that only about half of the educational resources allocated to the Northeast reach the region's classrooms; the balance is used for the support of functionaries, politicians, and other interested parties, most of whom are not poor (Veja, 21 October 1987; see also Xavier and Marques, 1987).

There are areas of relative privilege in the Northeast, just as there are areas of brutal poverty in the Southeast. Urban municipios in the

Northeast are better off than rural municipios in the Southeast on many indicators of social welfare (Mahar and Dillinger, 1983). Allocating resources in such a way as to reduce regional inequalities without an explicit and sustained effort to target resources to the poorest residents will not necessarily do much to make the distribution of income or social services more equal.

There are many in the Northeast who derive important benefits from present policies. Local politicians throughout the region depend on federal transfers for much of their income, and their numbers are increasing steadily with the "liberation" of new municipios (A Tarde, 9 September 1990). State politicians too depend on federal transfers to fund the jobs and other benefits that sustain their clients. A change in policy that targeted resources to poor people rather than to poor states would deprive many of these people of their livelihood, and of many of the political resources on which their power is based. Change is therefore resisted, despite the manifest ineffectiveness of present policies in improving the circumstances of those to whom they are nominally directed. As in the conflict over administrative decentralization, the political dispute is rooted in the struggle to retain control of means rather than in disagreement over the ends to be accomplished.

C. Public and Private Schools

Conflict over the role of private schools in the Brazilian educational system is at least as old as that between advocates of centralization and decentralization. In 1759 the Jesuits were expelled from Brazil in consequence of a dispute with the Portuguese Crown over the control of

schools (Souza, 1986, pp. 25-26). In the two intervening centuries public authorities have assumed an increasing share of responsibility for education, and as the educational system has expanded the percentage of children enrolled in public schools has risen steadily. (See Table 4.) Private schools have nevertheless continued to play an important and in many respects privileged role in the Brazilian educational system, and the nature and extent of that role have been the subject of intense debate. Disagreement has focused on the provision of public subsidies for public schools, with the control of curriculum emerging as a subordinate issue.

Conflict over the role of private schools in the educational system succeeded the dispute between advocates of centralization and decentralization in the long controversy over the LDB, and completely dominated the last five years of the debate. On one side were those who sought to ensure priority for public schools in the distribution of public resources, in accordance with the State's obligation to provide education for its citizens. Opposing them were those led by the Church who defended "freedom of choice" (**liberdade de ensino**), and called for public revenues to be distributed equally and impartially among the public and private schools to which parents chose to send their children. The advocates of **liberdade de ensino** warned against the dangers of a State monopoly in education in the absence of public support for private schools, and denied any threat to the well-being of public schools, while the defenders of public education asserted the State's obligation to provide schools for all and denied any intention to restrict the independence of private schools (Villalobos, 1969; Naccaratto, 1984).

This conflict became virulent in the debate over the LDB in the 1950s, and blocked approval of the law for several years. In 1958, for example, the Archbishop of Porto Alegre asserted that "...um grupo poderoso, instalado no Ministerio da Educacao e Cultura no Rio de Janeiro, esta promovendo, nao so o laicismo do ensino, mas tambem a laicizacao e o materialismo da vida." The defenders of public schools meanwhile denounced the "...ambicao da Igreja Catolica de lograr o maior dominio possivel em nossa politica e em nossa administracao educacional" (Martins, 1976, pp. 24-26). With the terms of the dispute defined so sharply and encompassing so much more than the educational issues ostensibly in question, compromise between the competing positions became extremely difficult, though a formula was eventually found.[13]

The current debate continues to revolve around the provision of public subsidies to private schools, but the focus has shifted from the question of Church influence and control in the educational system to the question of the profits of private school directors. At the heart of the debate is the inability of the public school system to provide sufficient school places of sufficient quality to serve the children of the middle class. Responsibility for the education of these children has been delegated to private schools, while the responsibility for educating lower class children has been left to whomever will accept it, or abandoned. While these facts are generally acknowledged their implications remain in dispute.

Proponents of the restriction of public funds to public schools argue that profits are the primary motive of the directors of private schools, and that the transfer of funds to private schools deprives the public schools of needed revenues. The defenders of private schools note the

insistent demand for private education, and the crucial role now filled by private schools in the Brazilian educational system.[14] They also argue that the amount of money transferred to private schools is relatively small, given the needs of the public schools, and that the schools that receive subsidies are most often those in rural areas and on the urban periphery that serve the relatively poor, rather than those that serve the elite (Mello e Souza, 1989). An end to public subsidies would therefore harm those most in need of help.[15]

The solution to this conflict adopted in the new Constitution and the new LDB is to restrict transfers to schools organized on a "non-profit" basis, but this has not ended the debate. (See Section II.B. for a discussion of the various ways in which funds may be transferred to private schools.) Some of the short run problems that may be encountered in the implementation of this policy have been discussed by Velloso (1988). In the longer run subsidizing a relatively small and selective network of private schools rather than investing in the expansion and improvement of the public schools is likely to reinforce the traditional dualism of the Brazilian educational system, at the expense of students obliged to remain in public schools.

As in the debate over the decentralization of administrative authority, the debate over public support for private schools represents a struggle over means rather than ends. There is agreement on the goals to be pursued, but disagreement about how they should be pursued, and by whom, interferes with their achievement. The policy debate has come to focus on the question of who shall provide educational services, and at whose

expense, rather than on the more important question of how (or whether) a sufficient quantity of educational services shall be provided.

D. Summary

The sharpest and most persistent conflicts in the Brazilian educational system in the past sixty years have arisen not over the choice of policy objectives but over the choice of policy instruments. The precedence accorded to private interests over public objectives has shifted the focus of educational policy debate from ends to means: the question of what is to be done is of less moment than the subsidiary questions of who is to do it, and how. It should also be noted that the continuing failure to define the distribution of resources and responsibilities between national, state, and local officials and between public and private schools in itself serves the interests of those in charge of the system, by maximizing their administrative discretion and minimizing their administrative responsibility. The debates that blocked the passage of the LDB for so many years continue unresolved, and the educational backwardness that the **Pioneiros da Educacao Nova** set out to reverse in the 1930s continues as well.

IV. Current Trends

Strategies to bring about significant and lasting improvements in the Brazilian educational system must begin with the acknowledgement that the problem is neither a technical matter of policy design and implementation, nor one of lack of resources. Rather the key problem resides in the deeply rooted conflicts between competing interests in Brazilian society. These

conflicts can only be resolved in the political arena, with the development of democratic institutions capable of representing and mediating divergent interests in ways consistent with and not subversive of the rights of Brazil's citizens. The construction of a more democratic society is by nature slow, ambiguous, and ridden with conflict, and its success or failure is entirely beyond the control of planners. Moreover, the federal organization of the Brazilian government means that progress toward the establishment of democratic institutions and attendant policy reforms will occur in different ways and at different rates in different parts of Brazil. Existing and emerging institutional and political structures thus define the context within which competing groups pursue their interests, and within which changes in educational and other policies will take place. In this section of the paper we review recent changes in Brazilian institutions as these have affected educational policies and practices.

A. Democratization, Decentralization, and Innovation

The political abertura that began at the end of the 1970s has been accompanied by potentially important changes in administrative and political relationships within the educational system. First, educational officials at state and municipio levels have begun to abandon their traditional complaisance with respect to policy direction from MEC, and to adopt an increasingly active and critical role in the formulation and implementation of educational policies. The state secretaries have organized themselves into the Conselho de Secretarios de Educacao (CONSED), while officials at the municipio level are affiliated in increasingly large numbers with the

Uniao Nacional dos Dirigentes Municipais de Educacao (UNDIME). Representatives of these organizations participate in educational policy debates at all levels. They are now beginning to define a policy agenda for state and municipio education systems on a basis increasingly independent from the centralizing interests of MEC.

Second, taking advantage of their newly-won autonomy in administration and policy-making, many states have undertaken significant changes in administrative and pedagogical practice. Included among the innovations that have been adopted are the introduction of full-day school programs, the extension of the school day, and the adoption of the ciclo basico in the early grades.[16] Recent data on educational achievement suggest that these programs may already be having positive effects.

Third, freed from their exclusive dependence on the Ministry of Education education officials at state and municipio levels have begun to build relationships with other institutions, and specifically to enter into direct contact with federal and state legislators. CONSED and UNDIME were important participants in educational debates during the drafting of Brazil's new Constitution, and they remain active in the current debate over a new LDB. Educational policy debates are far more open than they were under the military regime, and with their entry into these debates state and local officials have further increased their administrative autonomy.

Finally, in the search for more efficient and effective procedures three new administrative practices have been adopted in several states: election of school principals by parents, teachers and community members; establishment of school councils comprising representatives of teachers,

students, and parents; and devolution of day-to-day financial control to the school level. Some states have adopted all three measures, while others have adopted only one.

School principals in most states are now appointed by the State Education Secretary, commonly under the guidance of local politicians. The shift to direct elections has reduced the influence of the Secretary and elected officials in school administration, though at the cost of enhancing the influence of groups associated with teachers and their unions. The net benefits of the shift have yet to be evaluated, but the studies that have been done have turned up various problems in the relationships between elected principals and personnel in their schools. On the one hand, principals often find themselves isolated after the initial euphoria of their supporters has dissipated. On the other hand, they are obliged to confront the hostile opposition of those who supported other candidates.

The establishment of elected school councils is intended to provide a mechanism for consultation and the for the division of responsibility between principals and those who attend or work in their schools. In principle councils should provide a forum in which administrative decisions and school level policies could be discussed and conflicts mediated, but the available information on their performance suggests that in fact they play a far more restricted role.

Several states have begun to transfer funds directly to schools to cover the costs of minor repairs and other urgent expenditures. Judgements on the legality of this practice differ from state to state; in Parana, for example, the transfer of public resources to school administrators was found to contravene state laws.

These administrative and policy innovations are emblematic of a new seriousness on the part of some state and local officials in their efforts to come to terms with long-standing educational problems. While none of them has been an unequivocal success the acknowledgement of a need for change and the willingness and capacity to experiment with new policies in themselves provide some ground for optimism with respect to eventual improvements in Brazil's educational system.[17]

B. Constitutional Changes

One important step in the construction of democratic institutions in Brazil was the promulgation of a new Constitution in 1988, which both provided space for policy innovations like those described above and also established new instruments for the definition and protection of the rights of citizens. Many of the important policy shifts embodied in the Constitution have yet to be fully defined in law, but the changes that they entail can already be foreseen.

With respect to decentralization the new Constitution for the first time acknowledges the autonomy of municipal education systems, which are no longer to be regarded as subordinate agencies of state governments. The concession of independence to municipios significantly reduces the power both of MEC and of state governments, while greatly expanding the opportunity for administrative and policy innovation. At the same time, however, by introducing nearly 5000 new actors into education policy debates it renders the search for more efficient and equitable national policies all the more difficult.

Tax reforms, to be fully implemented by 1993, assign sources of revenue previously controlled by the federal government to state and municipio authorities. In association with Constitutional provisions requiring state and local governments to spend 25 percent of their revenues from taxes and transfers on education the anticipated decentralization of resources should significantly increase the total quantity of resources available to the educational system. In addition, the corresponding reduction in the quantity of resources controlled by federal authorities may be expected to lead to a further decentralization of administrative responsibility, with especially significant gains at the municipio level (Gomes,1988).

With reference to the policy innovations described above, a majority of the state Constitutions that have been adopted following the approval of the federal Constitution have incorporated articles directing that recent policy experiments including the election of school principals and the establishment of school councils be institutionalized. State laws defining how these new Constitutional principles are to be implemented are now being drafted.

Both federal and state Constitutions include new legal guidelines to govern the budgeting process. Previously Presidents and Governors developed their budgets in consultation with the heads of administrative agencies, and they were subsequently submitted to the legislature for approval. Under the new Constitutions, however, a budget resolution defining guidelines for public expenditure must be approved by the legislature prior to the elaboration of a budget. While this procedure allows for broader participation in the definition of budgetary priorities it remains flawed in

the opportunities that it provides for the allocation of resources to specific uses on the basis of criteria rooted in the practice of clientelismo.

Federal and state Constitutions also require the elaboration of medium-term educational plans at national and state levels to define policy priorities for the educational system. These plans must be approved by legislators, which provides an additional opportunity for public participation in the debate over educational policies.

The new Brazilian Constitution also makes the long-standing right to education actionable (um direito publico subjetivo) for the first time, assigning legal responsibility for the provision of educational opportunities to the "relevant public authorities" (Article 208, Paragraphs 1 and 2).[18] This change could prove to be the most far-reaching of all, if a successful legal strategy can be devised for defining what the citizen's right to education and the government's obligation to provide it entail. The dispersion of administrative responsibility within the educational system makes it hard to say who the relevant public authorities are, however, and the general disregard for "rights" in the Brazilian legal system poses a serious obstacle to successful legal action. No citizen has yet sued to oblige the government to honor his or her right to education.

C. Federal Policy Initiatives

Confronted with the emergence of new participants in educational policy debates and facing the likelihood of significantly reduced resources, MEC has lost some of the power that it previously exercised, and has often lost the initiative in current policy debates. Somewhat tentatively,

however, the Ministry is now trying to define its new role in the educational system, in consultation with CONSED and UNDIME, according to principles including the following:

a) State and municipio governments are now partners in the administration of the educational system, and national education policies can no longer be decided without their participation;

b) MEC must therefore develop its own capacity to promote debate and formulate policy alternatives in collaboration with other actors, in an effort to define priorities and develop implementation strategies to achieve them;

c) MEC must work together with states and municipios in the search for policies and practices that will make the administration of the Brazilian education system more equitable, efficient, and effective.

With respect to the first point, MEC has encouraged the participation of CONSED and UNDIME in the development of national policy guidelines and in the effort to define technical criteria to govern the distribution of federal transfers to support basic education. As might be expected, however, the effort to foster this partnership has encountered a variety of obstacles, both within and outside of the Ministry.

With respect to the second point, MEC is now working on a geographical analysis of primary school quality, in an effort to locate the most serious gaps in the provision of basic educational opportunities. In the first instance this project involves the development of an index of the educational situation of primary schools throughout Brazil, in an effort to identify those regions most in need of additional assistance. At the same time it seeks to define minimum standards of educational access and

quality, in order to provide an empirical basis for a more equitable distribution of educational resources and a more acceptable level of educational outcomes. An additional focus of this project is an investigation of alternative mechanisms for the generation and allocation of revenues, intended to provide the resources necessary for improvements in the quality of education provided in Brazilian primary schools.

With respect to the third point, MEC has undertaken a large-scale distance training program in educational administration and planning for administrators at the state and especially the municipio level. A similar program for school principals is under consideration.

Recent developments within the Ministry are thus consistent with the tendencies described above toward the decentralization of administrative authority and the encouragement of broader participation in decisions about educational policy. In themselves, clearly, these changes cannot produce solutions to the problems described in earlier sections of this paper. They do, however, mark the establishment of new opportunities for organizations and individuals to contribute to the debate over the increasingly desperate problems of the Brazilian education system, and they further open the way to local experimentation and innovation. Given the failure of recent Brazilian governments to assign priority to the improvement of the basic education system, it is at the local level, in the demands of citizens and in the commitment of educators, that the search for solutions must begin.

TABLE 1

ENROLLMENTS IN FIRST AND SECOND LEVEL EDUCATION,

BRAZIL, 1980 - 1990

	ENROLLMENT (1° GRAU)	RATE (7-14)	ENROLLMENT (2° GRAU)	RATE (15-19)
1980	18,746,634	84.2	1,930,289	14.5
1981	18,361,803	79.8	1,967,350	14.5
1982	19,176,132	82.9	1,986,802	14.7
1983	19,767,713	85.3	1,900,500	13.9
1984	20,134,509	82.7	1,987,171	14.5
1985	19,609,311	80.9	1,998,212	14.4
1986	20,480,420	80.6	2,057,920	14.7
1987*	21,782,757	82.0	2,182,866	15.5
1988*	22,832,067	83.0	2,300,000	16.0
1989*	24,059,933	84.6	2,400,000	16.3
1990*	25,000,000	86.0	2,500,000	16.7

* Estimate

Sources: Instituto Brasileiro de Geografica e Estatistica, Pesquisa Nacional por Amostra de Domicilios (PNAD); MEC/SAG/CPS/CPI-SEEC.

TABLE 2

PUBLIC EXPENDITURES, BY LEVEL OF GOVERNMENT, 1983
(in billions of $Cr)

	FEDERAL	STATE	MUNICIPIO
Total Revenue	11,105	7,953	3,049
Percent from taxes		43	18
Percent from transfers		19	59

Source: World Bank. Brazil: Public Spending on Social Programs.

TABLE 3

COMPARATIVE DEVELOPMENT INDICATORS,
NORTHEAST AND BRAZIL, 1989

	NORTHEAST	BRAZIL
Literacy (10+)	64.1	81.8
Children 10-17 Working	15.9	12.1
Participation in Soc. Sec.	29.3	50.6
Earn Less than Min. Sal.	44.7	27.2
Piped Water	51.3	72.7
Infant Mortality (per 1000)*	116	52

* 1985

Sources: Veja, 21 November 1990, pp. 44-45; World Bank. Brazil: Public Spending on Social Programs.

TABLE 4

PERCENTAGE OF ENROLLMENTS IN PRIVATE SCHOOLS, BRAZIL, 1960 - 1987

	Primary	Secondary	Tertiary
1960	11.5	65.0	44.3
1970	9.0	40.1	50.5
1980	12.9	46.5	63.3
1985	12.1	33.3	N.A.
1987	13.2	35.1	61.1 (1988)

Sources: Brazil, Anuarios Estatisticos, 1960-1988; MEC, Censo Educacional 1987 and 1988; and Levy (1986), Table 5.1.

NOTES

1. This is particularly so because several of Brazil's poorer and smaller neighbors have done far better than Brazil in terms of progress toward these objectives.

2. The distance between the goals that are formally stated in the Brazilian education system and those that are actually pursued has been noted previously, by authors including Anisio Teixeira (date) and Benno Sander (date). Earlier analyses of this disjunction focused on curriculum and administrative structure, while we focus on the distribution of resources.

3. For a recent example see the analysis of the candidates' education platforms in the 1990 gubernatorial elections in Sao Paulo published in Folha de Sao Paulo, 21 September 1990. The platforms are virtually identical, both in the objectives that they define and in their common failure to specify from where the resources to achieve those objectives will come.

4. The obligation to eliminate illiteracy and to achieve universal primary education in the ten years following the adoption of Brazil's new Constitution (i.e. by 1998) are included among the Constitution's so-called transitory provisions (Article 60).

5. These are among the explanations proposed for the problems encountered in the implementation of the recently concluded EDURURAL project. The same list is adduced by Castro (1989) in his analysis of the persistent problems of the basic education system.

6. Two points are worth noting in this connection. First, the most heated educational policy debates in recent years have focused on precisely those issues that place distinct private interests in conflict with the achievement of publicly-affirmed educational objectives. The most important of these include the continued provision of public subsidies to private schools, and the defense of "free" public higher education. Second, the education policy "successes" claimed by Castro (1989) in his recent review--that is, the expansion of university enrollments and the establishment of technical secondary schools--similarly advanced the interests of the relatively well-off rather than those of the poor.

7. For an assessment of the market for votes in Bahia, see A Tarde, 23 September 1990. For the manipulation of state expenditures in Sao Paulo to favor some candidates and penalize others, see Folha de Sao Paulo, 23 September 1990.

8. The literature on **empreguismo** is extensive but not very systematic. A partial catalogue of the the abuses associated with the practice is provided by Farhat (1987). With specific reference to education an excellent review is provided by Leal (1990).

9. The forms taken by the purchase of school places may include the provision of space in public school buildings for private schools, the payment of public school teachers to teach in private schools, the provision of scholarships to students, and the provision of subventions to private schools that accept public school students (CEC/IPEA, 1987, pp. 14-18).

10. With the end of salary indexation in the **Plano Collor**, the government has introduced an extraordinarily unwieldy system of "free negotiation" of school fees, which is satisfactory neither to parents nor to the schools. For a critique see editorials on the subject in the Folha de Sao Paulo, 16 and 18 August 1990.

11. It is worth noting that admission to public universities is based on successful performance on an entrance examination (**vestibular**), which systematically favors those who have prepared for admission in relatively high-quality private schools. Those who fail to gain admission to public universities end up paying fees to attend private institutions, where the quality of facilities and instruction is commonly much lower than in public institutions. Approximately 61 percent of enrollments in higher education are now in the private sector.

12. It is possible to classify this as "mistargeting," as the World Bank has recently done, but this raises the problem of who is entitled to determine what represents "good" public policy. The Brazilian political system distributes resources in accordance with expressed preferences, and it is not clear what right the Bank or anyone else has to prescribe different policy choices.

13. The main lines of the compromise included the requirement that religion be included as a regular subject in the curriculum of all schools, and that public schools receive priority in the distribution of public funds, with subsidies to private schools permitted in cases where public educational provision was insufficient. Speaking for the defenders of the public schools, Anisio Teixeira described the LDB that was finally approved as "half a victory, but still a victory," while the leading advocate of **liberdade de ensino** called it "the best law we could get" (Saviani, 1987, p. 98).

14. That private schools are an essential part of the school 'system' is confirmed by the recent threat by the Minister of Education to sue the owners of private schools in order to force them to keep their schools open. The closure of significant numbers of private schools would have literally catastrophic consequences for the Brazilian educational system, and for the political careers of those who allowed it to happen.

REFERENCES

A Tarde (Salvador), 27 August 1990; 9 September 1990; 23 September 1990.

Azevedo, Fernando (1932). "Manifesto dos Pioneiros da Educacao Nova." Revista Brasileira de Estudos Pedagogicos 79: 108-127.

Bahia (1990). Plano Decenal de Educacao. (Versao preliminar, July).

Barretto, Elba Siqueira de Sa (1983). "Novas Politicas Educacionais para Velhas Escolas Rurais: Um Estudo de Caso no Sertao do Piaui." Cadernos de Pesquisa 46: 23-49.

Barretto, Elba Siqueira de Sa and Lisete Regina Gomes Arelaro (1985). "A Municipalizacao do Ensino de 1º Grau: Tese Controvertida." Revista da Faculdade de Educacao (Universidade de Sao Paulo) 11(1/2): 193-210.

Brasil. Ministerio da Educacao (1990). Desenvolvimento da Educacao: 1988-1990. Report presented to the 42nd International Education Conference, Geneva, September 1990.

Calsing, Elizeu Francisco (1989). Estudos de Assimetrias Educacionais no Brasil. Brasilia: Ministerio da Educacao e Cultura, Secretaria de Ensino Basico.

Camara dos Deputados (1990). Projeto de Lei nº 1.258/88.

Campello e Souza, Maria do Carmo (1983). Estado e Partidos Politicos no Brasil (1930 a 1964). Sao Paulo: Editora Alfa-Omega.

Castor, Belmiro Valverde Jobim and Nircelio Zabot (1989). Revista ANDE.

Castro, Claudio de Moura (1989). "What Is Happening in Brazilian Education." In Social Change in Brazil, 1945-1985: The Incomplete Revolution, ed. Edmar L. Bacha and Herbert S. Klein. Albuquerque: University of New Mexico Press.

Coordenacao de Educacao e Cultura. Instituto de Planejamento Economico e Social - CEC/IPEA (1987). Relatorio Anual de Acompanhamento - 1987: Educacao. Brasilia: IPEA.

Farhat, Emil (1987). O Paraiso do Vira-Bosta. Sao Paulo: T.A. Queiroz Editora.

Fishlow, Albert (1972). "Brazilian Size Distribution of Income." American Economic Review 62: 391-402.

Folha de Sao Paulo, 20 April 1988; 21 April 1988; 16 August 1990; 5 September 1990; 21 September 1990; 23 September 1990.

15. The empirical evidence on each of these points is neither complete nor conclusive, but recent research in Bahia suggests that subsidies directed to middle-class households under the SME are far larger than those that assist the relatively poor.

16. The so-called **ciclo basico** integrates the first and second years of schooling, postponing promotion (or failure) to the end of the second year. The program allows children a longer time to master basic skills, and is expected to reduce rates of repetition and drop-out in the early grades.

17. On a more pessimistic note, however, it should be noted that virtually all of these policy experiments have taken place in the states of the South and Southeast, where resources are more plentiful and educational problems are in general less severe. Insofar as they are successful the relative backwardness of the Northeast may therefore increase.

18. Speaking of previous Brazilian Constitutions, Souza (1986, p. 35) notes that "A obrigacao do Estado permaneceria envolta num certo sentimento filantropico, sem que o usuario desatendido pudesse aciona-lo judicialmente por descomprimento da norma legal."

Fontoura, Amaral (1968). Diretrizes e Bases da Educacao Nacional. Rio de Janeiro: Aurora.

Freitag, Barbara (1978). Estado, Escola, e Sociedade. Sao Paulo: EDART Livraria Editora.

Gomes, Candido (1988). "Quatro Anos da Emenda Calmon: Qual O Seu Impacto?" Revista Brasileira de Estudos Pedagogicos 162: 237-255.

Leal, Maria Cristina (1990). "Os Des(Mandos) do Clientelismo de Estado sobre os Recursos Publicos da Educacao de 1° e 2° Graus." Doctoral dissertation, Universidade Federal do Rio de Janeiro.

Mahar, Dennis J. and William R. Dillinger (1983). Financing State and Local Government in Brazil. World Bank Staff Working Papers Number 612. Washington: IBRD.

Martins, Waldemar Valle (1976). Liberdade de Ensino. Sao Paulo: Edicoes Loyola.

Mello e Souza, Alberto (1989). "Consideracoes sobre a Distribuicao dos Recursos Educacionais." Em Aberto 42: 31-33.

Ministerio da Educacao e Cultura—MEC (1985). Educacao Para Todos. Brasilia: MEC.

Naccaratto, Miguel S.J. (1984). Escola Livre e Gratuita. Sao Paulo: Edicoes Loyola.

Namo e Mello, Guiomar and Eny Marisa Maia (1987). "A Municipalizacao do Ensino." Brasilia: CENDEC/IPEA.

O Globo (Rio de Janeiro), 29 October 1987.

Oliveira, Joao Batista de Araujo (1984). "Bases para Novas Diretrizes em Educacao." Educacao Brasileira 13: 125-151.

Oliveira, Joao Batista de Araujo (1986). "Basic Education in Brazil: Municipalization, Decentralization and Debureaucratization." Unpublished paper prepared for the Emilio Odebrecht Foundation.

Plank, David N. (1987). "The Expansion of Education: A Brazilian Case Study." Comparative Education Review 31:

Plank, David N. (1990a). "The Politics of Basic Education Reform in Brazil." Comparative Education Review 34: 538-559.

Plank, David N. (1990b). "Public Purpose and Private Interest in Brazilian Education." Paper presented to the annual meetings of the Comparative and International Education Society, Los Angeles, March.

Romanelli, Otaiza de Oliveira (1978). Historia da Educacao no Brasil. Petropolis: Editora Vozes.

Saviani, Dermeval (1986). Ensino Publico e algumas falas sobre Universidade. Sao Paulo: Cortez.

Saviani, Dermeval (1987). Educacao Brasileira: Estrutura e Sistema. Sixth edition. Sao Paulo: Cortez.

Souza, Paulo Nathaniel Pereira (1986). Educacao na Constituicao e Outros Estudos. Sao Paulo: Livraria Pioneira Editora.

Stepan, Alfred (1989). Democratizing Brazil: Problems of Transition and Consolidation. New York: Oxford University Press.

Teixeira, Anisio (1959). "A Nova Lei de Diretrizes e Bases: Um Anacronismo Educacional?" Revista Brasileira de Estudos Pedagogicos 76: 27-33.

Velloso, Jacques (1987). "Politica Educacional e Recursos para o Ensino: O Salario-Educacao e a Universidade Federal." Cadernos de Pesquisa 61: 3-29.

Velloso, Jacques (1988). "A Nova Lei de Diretrizes e Bases da Educacao e o Financiamento do Ensino: Pontos de Partida." Educacao e Sociedade 30: 5-42.

Verhine, Robert Evan (in press). "Higher Education in Brazil," in International Encyclopedia of Higher Education, ed. Philip Altbach. New York: Garland Press.

Villalobos, Joao Eduardo Rodrigues (1969). Diretrizes e Bases da Educacao: Ensino e Liberdade. Sao Paulo: Livraria Pioneira Editora.

World Bank (1990). World Development Report, 1990. Washington: IBRD.

Xavier, Antonio Carlos da Resurreicao and Antonio Emilio Sendim Marques (1987). "Quanto Custa um Aluno nas Escolas que os Brasileiros Frequentam?" Brasilia: IPEA.

IPEA
Instituto de Pesquisa
Econômica Aplicada

Banco Mundial

PNUD
Programa das Nações
Unidas para o Desenvolvimento

SEMINÁRIO SOBRE EDUCAÇÃO, CRESCIMENTO E DESIGUALDADE NO BRASIL

SEMINAR ON EDUCATION, GROWTH AND INEQUALITY IN BRAZIL

Rio de Janeiro, Brasil

24 a 27 de Março de 1991

PRIVATE EDUCATION AND PUBLIC REGULATION IN BRAZIL

Estelle James
Carlos Alberto Primo Braga
Paulo de Tarso Afonso de André

documento 09

PRIVATE EDUCATION AND PUBLIC REGULATION IN BRAZIL

Estelle James
Department of Economics
SUNY, Stony Brook
and U.S. Naval Academy, Annapolis

Carlos Alberto Primo Braga
Department of Economics
University of Sao Paulo
and Fundacao Instituto de Pesquisas Economicas - FIPE

Paulo de Tarso Afonso de Andre
Fundacao Instituto de Pesquisas Economicas - FIPE

Private Education and Public Regulation in Brazil

An important feature of the Brazilian educational system is its reliance on private institutions. The percentage of enrollments that were private in 1985 were 36%, 12%, 34% and 58% respectively, at the pre-primary, primary, secondary and higher levels. Moreover, public policies have been formulated to influence the growth and nature of the private sector. This paper investigates the individual's choice of public versus private sector, the determinants of private sector size across states and the impact of government regulations over private schools at the primary and secondary levels in Brazil.[1]

Section I introduces a conceptual framework for the analysis of the role of the private sector in providing educational services. Section II provides a brief description of the private sector in the Brazilian educational system. Section III analyzes the causes of the large differences across Brazilian states in the public-private division of responsibility, using state level variables, mainly from the 1980 Census. Section IV examines the individual's choice between attending public or private schools, or not attending school at all, in the metropolitan areas of Sao Paulo and Pernambuco, using individual-level variables obtained from the 1982 PNAD. Section V focuses on the impact of government regulations on the quantity and quality of private education, based on data from schools in the state of Sao Paulo. We conclude that basic economic and cultural variables, including both individual and community-level variables, play a major role in shaping the

size and nature of the private sector, but key policies adopted by the state, including the provision of public education and the regulation of private education, can alter this outcome.

I. The Role of the Private Sector in Providing Educational Services

This section sets forth a conceptual framework for analyzing the role of the private sector in education. We start by assuming that, through some collective choice process, each country (or state or locality) decides how much and what kind of public education to provide, depending on its per capita income, the size of its school age population and its taste for education. Each family must then choose its preferred alternative among three options: attending no school, attending public school if available, and attending private school. The private sector thus emerges as a market response in situations where some people are dissatisfied with the amount or type of government provision. Two very different patterns of private education have evolved, depending on whether it is motivated by excess demand or differentiated demand.

Excess demand for education may exist when the capacity of the public school system is less than full enrollment; that is, the option of attending a public school is not available to everyone. If the private benefits from education are high (e.g. because of labor market rewards), many people who are left out of the public schools will seek places in private schools, and these may come both from upper and lower income groups. Given the size of the relevant age cohort and their demand for education, the larger the

capacity of the public sector, the smaller will be the excess demand for the private sector.

A second demand-side model views private production as a response to differentiated tastes about the kind of service to be consumed, in situations where that differentiation is not accommodated by government production. The private sector would then grow larger if people's preferences with respect to product variety are more heterogeneous and intense. We postulate that important taste differences about education stem from religious, linguistic and nationality differences that concern group identification. The greater the cultural diversity of the population and the more centralized and uniform the public educational system, the larger will be the differentiated demand for private education, coming heavily from cultural minorities.

Differential preferences about quality may also lead to the development of a private alternative. In particular, a low quality public sector may stimulate a high quality private sector, meeting the demand of those willing and able to pay the price. We hypothesize that, the greater the income diversity in a society, the more likely it is that a public quality level will be chosen that leaves (upper income) people dissatisfied; or, if the upper income group is satisfied with public quality, this signifies it has been purchased at the expense of a small public quantity provided through selective public institutions which exclude many applicants. In either case, we would expect income heterogeneity to be associated with a large private sector.

We hypothesize a high income elasticity of demand for quality, so quality-driven private education sectors will serve a predominantly high income clientele. We expect that the differentiated demand stemming from cultural heterogeneity and the excess demand stemming from the absence of a public alternative will be much less closely related to income. Therefore, a private education sector that mainly serves the upper classes is likely to be quality-driven.

While the size and nature of the private sector in a society is thus partially determined by the source of demand, research in other countries has shown that supply forces usually also play a crucial role. Private schools are often established as nonprofit organizations, i.e. as organizations that cannot distribute a monetary residual. Indeed, nonprofit status is legally required for educational institutions in many countries. Even if not legally required, nonprofit organizations may have lower cost functions than for-profits or government due to donated capital or labor and tax advantages. Since research elsewhere suggests that most nonprofit entrepreneurs are motivated by ideology, particularly religious ideology, we hypothesize that private schools will be concentrated in areas where religious heterogeneity is high, hence many independent religious groups are competing for clients through the schools they establish.

Finally, government policies may influence the demand for and supply of private schools. As already noted, excess demand and differentiated demand for private education depend critically upon

the size and nature of the public school system. A second important policy concerns the provision of public subsidies to private schools, which increases the total effective demand that they face. And a third policy concerns government regulation of private schools, which may increase their costs or control their prices, decreasing their profitability and supply.

In sum, the relative size of private education in a society is predicted to be a positive function of its economic and cultural heterogeneity, augmented by government policies that encourage or discourage private sector growth. (For empirical analysis of the importance of these variables in other countries see James, 1986, 1987a, 1987b).

II. Private Education in Brazil

The private sector has traditionally played a major role in the provision of educational services in Brazil.[2] Since the 1960s, however, the expansion of public schools has outpaced the growth of the private sector (see Table 1). The rate of expansion in public enrollments was particularly dramatic at the secondary level. Yet, the parallel increase in the throughput of graduates from primary schools allowed the private sector at the secondary and higher levels to continue to grow at a very fast pace. Overall, one could characterize the 1960-80 period as an era of rapid expansion of the private educational sector despite the long-run trend toward the diminution of its relative weight.

Part of the dynamism of the private sector over this period can be explained in terms of the quality-quantity trade-off posed

by the expansion of the public school system. It is quite clear that the fast expansion of the public sector did improve educational access, as indicated by the increase in gross enrollment rates reported in Table 2. Yet, as this expansion was widely perceived to have occurred at the expense of quality, the decrease in excess demand was paralleled by an increase in the differentiated demand motive for private education at the primary and secondary levels of education. Simultaneously, this created a large excess demand for private higher education, a development which led to a growing participation of the private sector in total enrollments in higher education: from 44% in 1960 to 64% in 1980.

The 1980s brought new challenges for the Brazilian private educational system. The expansion of the capacity of the public system slowed down as the dynamism of the Brazilian economy faltered, but the demand for private education also slowed down and fluctuated widely with economic conditions.[3] In the first half of the decade the income-effect associated with the 1981-83 recession seems to have dominated, fostering a substitution of public for private schooling, but with the resumption of economic growth from 1984 until 1986, this trend was reversed.[4]

This period was also characterized by an increasingly interventionist approach at the regulatory level with respect to private education. Most private schools in Brazil (in contrast to those elsewhere) are for-profit and their owners claim that tuition controls significantly affected the profitability of the sector. They also emphasize the high instability of the rules of the game

as a major deterrent to growth. Guimaraes (1990, 63), for instance, points out that approximately 240 different regulations concerning tuition controls were introduced in Brazil between 1986 and 1990.

In part this trend merely reflected the general thrust of heterodox stabilization programs. One can argue, however, that the 1980s witnessed the development of a new hostile attitude from the public sector toward the private educational system. Accordingly, the policy-constellation faced by Brazilian private schools moved in the direction of more restrictive regulations (basically, more stringent tuition controls) and fewer facilitating policies.

For example, scholarships financed by the education salary tax for students to attend private schools fell in real value and tighter eligibility rules were adopted (Primo Braga and Cabral, 1986); and the federal income tax allowance for education expenses (tuition, transportation costs, and other education-related expenses) was eliminated in the 1989 income tax reform. Despite the active lobbying efforts of the private schools during the period of the Constituent Assembly, the 1988 Brazilian Constitution adopted a more restrictive position concerning the transfer of public resources to private schools. In the new Constitution, these transfers can only be made to private schools established as non-profit organizations, a limitation which was not present in the previous constitution (1967), although it is found in many other countries.

Nevertheless, despite these forces threatening its growth and stability the private educational sector continues to play an

important role in Brazil. Its relative size varies significantly across regions, but even in the poorest states its contribution is large particularly at the secondary level (see Table 3). Operating in a socio-economic context characterized by a highly concentrated income distribution, private enrollments are positively correlated with family income (see Table 4), but private schools provide educational opportunities even for the lowest income groups, underscoring their heterogeneity.[5]

We proceed now to discuss these differences across states and across individual households, as well as the impact of the restrictive regulatory regime.

III. Differences Across Brazilian States in the Public-Private Division of Responsibility for Education

Methodology

In this section we attempt to explain differences across the 26 states, territories and the federal district, in the proportion of enrollments that are private (%PVT), in 1980. Our analysis is conducted for the primary and secondary levels, since higher educational enrollments are concentrated in a small number of states. We hypothesize that regional differences in %PVT are a function of differences in income, income diversity, cultural heterogeneity and public policies. More specifically,

%PVT = f(PCI, CULT HET, INC DIV, POL)

where:

PCI = income per capita or per household

INC DIV = measures of income diversity, such as proportion of the population that is not "middle class"

CULT HET = measures of cultural diversity, such as proportion of the population that is non-Catholic, foreign-born, or Black

POL = public policies such as capacity constraints within the public sector, subsidies to or regulations over private schools.

Per capita income. Ceteris paribus, we would expect per capita income (PCI) to serve as an indicator of gross demand for education as well as ability to pay for differentiated and higher quality education, both implying a positive relationship between PCI and %PVT across states. Also, high income states are often urbanized, hence contain heterogeneous clusters of people and offer a higher rate of return to education, which should increase %PVT. This would hold under the assumption that the public sector does not respond to the differentiated tastes or greater demand of its wealthier states, as in countries where educational decisions are centralized.

However, this assumption may not hold in Brazil which is a federal system, with primary and secondary education largely controlled by the states. It may well be that wealthier and more urbanized states respond to popular demand by providing larger and better public schools, thereby leaving a smaller role for their private schools. Thus, until we can model public sector behavior, we cannot predict whether PCI will be positively or negatively

related to %PVT. We can predict, however, that PCI will be more positive if public educational spending is included as an exogenous variable.[6]

Income diversity. As discussed above, differentiated demand for quality of education is believed to play an important role in explaining the private sector in Brazil. In some countries, public schools are highly differentiated, thereby accommodating a wide range of tastes and incomes. For example, in Japan this is accomplished through a rigorous entrance examination system and in the U.S. through residential zoning together with neighborhood catchment areas. In Brazil, however, these mechanisms are not prevalent, so the public sector is relatively uniform within a given city or state. We hypothesize that the more disparate the income distribution, the greater will be the share of the private sector, as those who prefer higher cost education must opt out of the public sector to get it. Also, if student peers are an input into the educational production process, high income families will prefer to separate themselves from low income families when the income distribution is disparate. Our measure of income disparity is the proportion of working age population having less than 1 or more than 5 minimum salaries (PN15) (i.e. we exclude the middle income group), and we expect this variable to have a positive effect on %PVT.

Cultural heterogeneity. As discussed earlier, cultural (particularly religious) heterogeneity is expected to have a positive influence on %PVT, because it is a source both of

and EDSP to be negatively correlated but for very different reasons from those we have postulated.

Ideally, we would like to have dealt with this problem by modelling EDSP as well as %PVT. However, so far we have been unable to find instruments that would be included in the EDSP equation but excluded from the %PVT equation. (We plan to obtain and experiment in the future with possible identifying variables such as state governmental spending on non-educational matters or political affiliation of state governors and legislators, etc.). Therefore, in the present paper we present reduced form equations that predict %PVT on the basis of exogenous variables without EDSP, plus equations that include EDSP as if pre-determined in a recursive model.

Besides EDSP, another public policy that has influenced %PVT (positively) in other countries is the subsidization of private schools; but direct subsidies are not significant in Brazil. Nonprofit schools do benefit from tax advantages, but these do not seem large enough, or variable enough across states, to include in our regressions. Regulations of private schools, which have increased over the past decade, may indeed be important now, but probably were much less effective in 1980. Moreover, we could not readily capture their characteristics in a single scalar value, particularly one that would be measurable and comparable across states. Instead of including regulations in our regression we devote a later section of this paper to a more detailed analysis of how regulations, particularly price controls, have induced

changes in the provision of private education over the decade.

Thus, in our regressions we explain differences across Brazilian states in the relative size of the private sector, at the primary and secondary levels, as a function of PCI, PN15, FOREIGN, PNCATH, PBLACK, INFLOW, EDSP and POPAGE. We use both logit and OLS - logit because it assures us that all predicted values will fall between 0 and 1, OLS because we do not have an a priori reason to believe that the marginal effect of the independent variables will be smaller at the two extremes than it is in the middle.[7] Although the absolute magnitudes of the coefficients differ somewhat, the basic conclusions are unchanged. Tables 5 and 6 present the OLS and logit results at the primary and secondary levels, respectively. Tables 7A and 7B provide the basic statistics as well as the definitions of variables used.

Results

The small size of our sample and multicollinearity among the variables make it difficult to get significant results. (We are now trying to obtain observations from other years, which may improve this situation). Nevertheless, some underlying tendencies emerge that are consistent with our expectations.

It can readily be seen that, at both the primary and secondary levels, PN15 is a strong predictor of %PVT. A one percent decrease in the middle class increases %PVT almost 1 percentage point at the primary level, 2-5 percentage points at the secondary level and these effects are always significant. This is consistent with our hypothesis that differentiated demand for quality is a raison

d'etre for the private sector; upper income groups opt out in order to separate themselves from and acquire superior education to that available to lower income groups in the public schools. Income inequality, thus, is a major driving force behind the private sector in Brazil.

Cultural heterogeneity, on the other hand, plays a very limited role. PNCATH and PBLACK are not significant. INFLOW has a negative effect, perhaps because of the low socio-economic status of much of the migrant population which causes both public and private enrollments to decline, the latter proportionately more than the former. FOREIGN has a large and significant positive coefficient at the primary level but this disappears at the secondary level when PCI is in the equation; since Foreign and PCI are strongly correlated it is difficult to disentangle these two effects.

From the policy point of view, it is important to note that EDSP decreases %PVT, both because it expands the number of public enrollments and contracts private enrollments. This is consistent with our expectations about excess demand for quantity and differentiated demand for quality as a motivation for private education. This also means that when public educational spending increases, total educational spending does not go up by a commensurate amount since some private spending is crowded out. Also as expected, PCI has a positive effect on %PVT but this becomes much smaller when EDSP is excluded from the equation. That is, %PVT is only weakly related to PCI, given the positive impact

of PCI on EDSP, in the course of economic growth.

Overall, we are able to explain over two-thirds of the variance in percentage of enrollments that are private at the primary and secondary levels, across Brazilian states, on the basis of these social and economic characteristics of the region, particularly its income inequality and key policy choices about public spending.

IV. The Family's Choice About (Private) School Attendance

Methodology

In this section the individual family, rather than the state as a whole, is the unit of analysis. We view the family's schooling decision as a two stage process: first a decision is made about whether to attend or evade school and, second, for those attending, a decision is made about whether to use a public or a private school. We divide the schooling experience into three levels - elementary, junior high and senior high; the first two levels are 4 years in duration and the third level is 3-4 years long. The basic ideas are summarized in the tree structure below, where:

evae = the child evades elementary school (1=yes, 0=no)

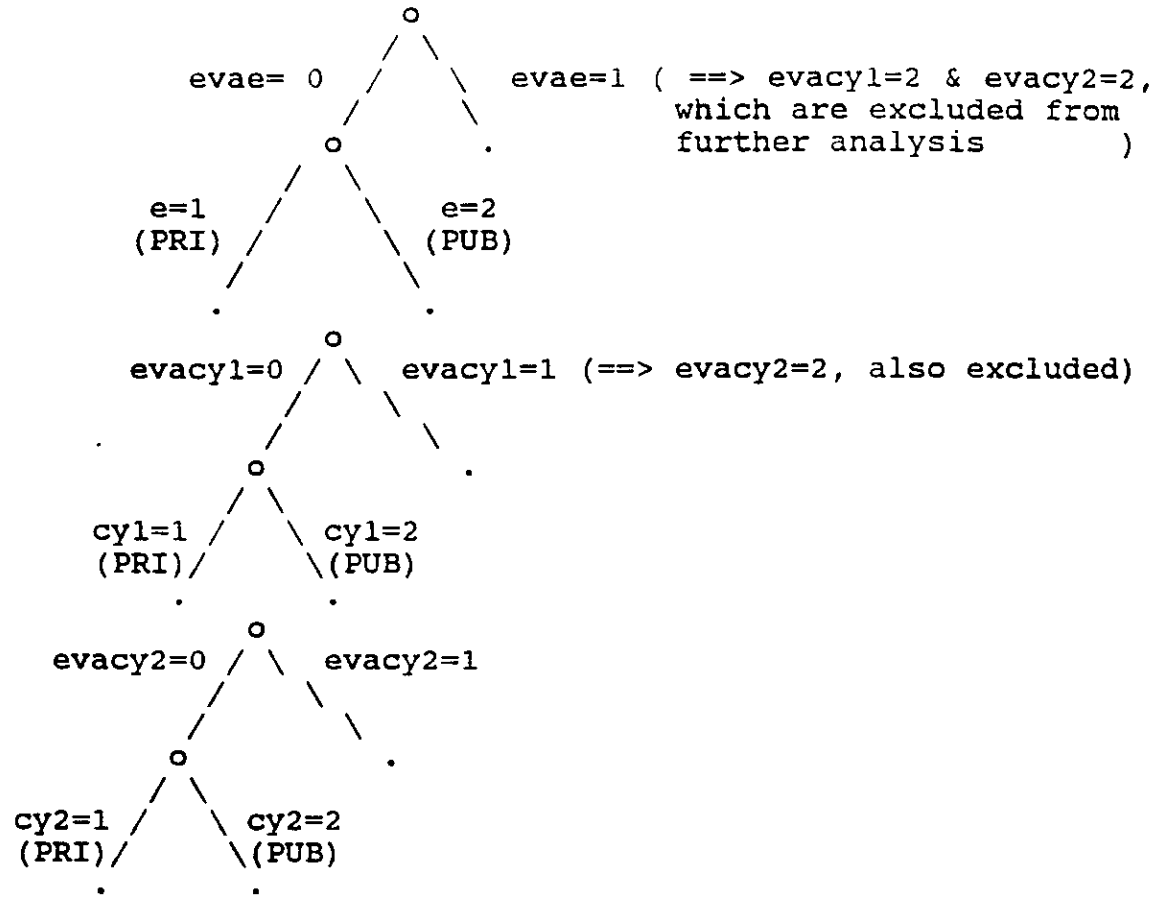
e = the child goes to a PRIVATE (e=1) / PUBLIC (e=2) elementary school

evacy1 = the child evades jr. high school ("1st. cycle") (0=no, GIVEN (completed elementary school), 1=yes ¦ (c.e.s.), 2=yes ¦ (evae=1))

cy1 = the child goes to a PRIVATE (cy1=1) / PUBLIC (cy1=2)
junior high school

evacy2 = the child evades sr. high school ("2nd. cycle")
(0=no, GIVEN (completed jr. high school),
1=yes ¦ (c.j.h.), 2=yes ¦ (evacy1 > 0))

cy2 = the child goes to a PRIVATE (cy2=1) / PUBLIC (cy2=2)
sr. high school



At a given "branch level", say that of EVAE, our model is:

Pr(EVAE=0)= Prob(not evade elementary school)= F(B'x),

where F(.) is the logistic distribution, B the vector of coefficients and x the vector of explanatory variables.

We use data from the 1982 PNAD, which includes questions about attendance at public versus private school, for nine metropolitan regions in Brazil. This paper analyzes the cases of Sao Paulo and Pernambuco.

We hypothesize that the child's decision about school attendance is a function of background variables such as family income and size, parental education, color, child's age and gender. We investigate the effect of mother's working, of child's working and of child's contribution to family income. We also include, as a policy variable, the availability of a free school lunch. Although in theory we had information about prior attendance at public and private elementary schools, to use that information as one of the variables determining junior and senior high school choices would have required careful screening for data consistency. In later work we plan to include prior school attendance and to add the other metropolitan regions, which will also permit us to include community-level explanatory variables. One problem with these variables is the potential endogeneity of some of them, such as "child's contribution to family income." Another problem is multicollinearity, between variables such as "family income" and "mother working outside home." Nevertheless, we believe a clear *picture* does emerge and this picture is very similar for Sao Paulo and Pernambuco. (For details on how we treated the data, on variable definitions and basic statistics, see Appendix A).

In Table 8 we present an overview of the results for primary, junior high and senior high school levels, the details of which are

shown in Tables 8 A/B, 9 A/B and 10 A/B.

Table 8A includes all those age 7-14 who have not yet completed primary school; we use logit to estimate the probability that a child falling into this category will be attending school versus dropping out. Table 8B estimates for the group in school, the probability that such a child will be attending private school (rather than public school.) Table 9A includes all those aged 11-17 who completed primary school but have not yet finished junior high school, and estimates the probability that these children will still be in school; Table 9B estimates for the group still in school, the probability that they will be in private school. Tables 10A and 10B do the same for age group 15-20 and senior high school.

The large decrease in number of observations as we move from Tables 8 to 9 to 10 stems from the exclusion from higher schooling levels of those who did not complete lower levels. (For example a 13 year old who drops out of primary school is included in Table 8A but when that child reaches the age of 15 she is excluded from Table 9A). But the small disparity in observation numbers between Tables A and B is surprising, since it suggests that most people in the relevant age range who have not completed the appropriate schooling level report themselves as still attending school (e.g. of the 7-14 year old who have not completed primary school, 85-90% still appear to be in school). This is not consistent with other information about the high drop-out rate usually reported in Brazil. We suspect there is an overreporting of school attendance,

which may bias downward the magnitude and significance of our coefficients. However, it is also possible that the official statistics on drop-out rate should be reevaluated. Another aspect worth mentioning is that our sample takes into account only those children in formal families whose parents are the heads of the household. This approach excludes all other children, in particular, street children and the children of live-in servants.

Results

Results to this point are consistent with those presented in Section III. That is, a low family income (and parental education) increases the probability that a child will drop out of school, while a high family income (and parental education) increases the probability of attending private school; both these factors imply that a community with a small middle class will have a high %PVT, as we found earlier. Both mother's and child's working increase the probability of dropping out and decrease the probability of attending private school, possibly because of their negative correlation with family income; these effects are particularly strong at the primary level in Sao Paulo and are dissipated by the senior high level. Larger family size has a strong negative effect - evidently a choice of quantity over quality of children. The effect of race on attendance decisions is inconclusive, although in several regressions those of "mixed" race seem less likely to attend school, especially private school, than Whites or Orientals. Similarly, the effect of gender differs across levels and states; in Sao Paulo being female decreases the probability of dropping out

of primary but increases the probability of evasion from junior and senior high schools; for those who remain, it increases the probability of attending a private primary school, and has no effect on high school decisions. Contrary to prevailing expectations and unfortunately for policy-makers, the availability of free school lunch does not seem to affect attendance or public-private choices.

V. The Impact of Regulation on the Private Sector: The Case of Sao Paulo in the 1980s

In Sections III and IV we analyzed how the basic social and economic characteristics of the individual family and the community influenced the decision about school attendance and the public-private choice. In this section we consider how public policies, particularly policies regarding tuition, can influence the quantity and quality of the private sector. We start with a set of theoretical predictions about the input of price controls, and follow with an examination of the behavior of a group of schools in Sao Paulo, to see whether our expectations are confirmed. Appendix B contains a detailed historical description of the main regulations adopted in this area.

The Impact of Price Controls on Private School Theory

Suppose that the school sector is initially in long run equilibrium with revenue per teacher (RT) equal to costs per teacher and similarly for revenue (and cost) per student (RS). One can express these equalities as follows:

$$RT = P(ACS)\ (TL)\ (1-S) = W + TTR + r\ K/L + MR \qquad (1)$$

$$RS = P(1-S)\ (SL) = \frac{[W + TTR + r\ K/L + MR]\ (SL)}{(ACS)\ (TL)} \qquad (2)$$

where:

RT = revenue per teacher per year

RS = revenue per student per year

P = tuition rate per student per class

ACS = average class size

TL = number of classes per year taught by the average teacher

SL = number of classes per year attended by the average student

S = proportion of students who are on scholarship

W = basic wage per year of teacher with minimal training

TTR = average teacher training costs per year (above minimal levels) that are covered by the school directly or (in long-run equilibrium) via a wage premium

r K/L = cost of borrowed capital and ancillary supplies per teacher per year

MR = minimum necessary return on equity, entrepreneurship and risk-taking, per teacher

In a rough sense, teacher training and ancillary supplies (TTR and r K/L) may be a proxy for quality. (ACS) and (TL) may proxy either quality or productivity, depending on whether class size and teaching load influence value added. Assuming perfect information, tuition and quality will adjust to the point where the benefits of

marginal improvement just equal their marginal costs. In equilibrium, variety may be found, to satisfy diverse tastes and incomes.

Now, let us assume that price controls are imposed and the tuition ceiling falls below the market equilibrium value. This requires corresponding cuts in (W + TTR + r K/L) or an increase in (ACS) (TL) (1-S). If productivity does not increase, either scholarships, teacher salaries or school quality must fall. And, if enough savings are not achieved, the profit rate falls below MR and the school closes, diminishing quantity supplied by the education industry.

When price controls are binding -- i.e., the regulated price is indeed lower than the free market price -- a downgrading of quality may occur. However, in an environment in which differentiated demand for quality plays a major role in explaining the performance of the private sector, one may expect that consumers will conspire with the schools to subvert the system -- e.g., by accepting a system of "voluntary" contributions or ancillary fees. In an inflationary environment, the "fog" generated by changing relative prices may reduce the ability of consumers and producers to evaluate and negotiate such mutually advantageous but quasi-legal arrangements. This is particularly true for lower-income consumers. Hence, we hypothesize that non-elite (low tuition) schools will have more difficulty in evading price controls and are more likely to downgrade quality. If this were the case it would exacerbate the quality differences between

education received by high and low income households and therefore would have important implications for educational equality.

We also hypothesize that, under binding price controls, fewer schools will enter the education industry and those that do enter will tend to be high tuition, in a regulatory environment where starting prices are not controlled but price increases are. While existing high quality schools can reduce their quality levels and still find a clientele, those schools at the bottom of the quality spectrum may fail to find sufficient consumers when they downgrade quality (because they fall below the minimum point in the range of acceptable quality levels) and may go out of business. Thus the entry of high tuition, high quality schools and the closure of low quality, low tuition schools may restore the previous equilibrium, given a long enough period of stable regulatory and other conditions.

In the interim, much of the brunt of price controls will probably be borne by teachers, either by increasing their workload (ACS and TL) or decreasing their salaries (W and TTR), particularly if the supply of teachers is inelastic. As the elasticity increases over the longer run, this should diminish the ability of the education industry to attract and retain teachers particularly high quality teachers with alternative opportunities. Schools may also try to economize on teaching costs by hiring more part-time teachers, a common cost-cutting method of private schools.

In many countries there is a political tension between consumers, who want to keep prices low, and teachers, who want to

the mid-1980s, and the numerous conflicts between the schools and their consumers and regulators that raises the administrative, legal and transactions costs of the educational industry. We proceed below with an analysis of the impact of these regulations.

The Impact of Tuition Controls in Sao Paulo

In this section we examine the available evidence to determine whether it is consistent with our hypothesis regarding the impact of price controls over private education. Although anecdotal evidence stresses the "ulcer factor" associated with the regulations, the available data do not allow us to quantify these costs.

To evaluate the impact of price-controls on school revenues also is not an easy task. Private schools are quite reluctant to provide any information concerning their revenues. Furthermore, the "memory" of the sector is extremely limited, especially because of the high rate of inflation during much of this period, constraining any attempt to build relevant time series based on information provided directly by the schools. We were able, however, to establish a proxy for the relative prices of private schools in the city of Sao Paulo, using information contained in the Consumer Price Index from the Fundacao Instituto de Pesquisas Economicas (CPI-FIPE).

The CPI-FIPE provides an indicator of the evolution of the cost of living for families with an income between 2 and 6 minimum wages in the city of Sao Paulo. One of the items explicitly considered in the index are "educational expenses." Tuition

accounts for 84% (since 1984) of the weight of this item in the construction of the index. Approximately forty-six schools (serving the relevant income class interval) provide monthly information about their prices to FIPE researchers. Table 11 presents this information for the period 1974-90, in the format of an index showing relative movements in tuition and the CPI-FIPE.

This index provides an estimator of the evolution of the relative price of education as perceived by consumers in the relevant family-income range in the city of Sao Paulo. This index moved up and down inconclusively during the 1970s, but the relative weight of tuition clearly decreased between 1982 and 1989. Of course, we cannot attribute these changes solely to regulation, since we have not controlled for other factors affecting price, such as changes in per capita income, school-age population and public school capacity; the latter, in this entire period, reducing the excess demand for private education. Nevertheless, the evidence is consistent with the proposition that price controls were not binding prior to 1982 but began to affect the evolution of tuition thereafter. Moreover, through most of the heterodox era, real tuition was maintained at a much lower level than the one which prevailed previously. However this trend was reversed toward the end of 1989 and by 1990 tuition returned to relative levels similar to the ones which prevailed in the early 1980s. This is consistent with the proposition that the regulatory authorities have not been able to effectively enforce price-controls lately.

One can also look at this index as a rough indicator of the

relevant "terms of trade" (price of service/price of main inputs) for the private schools in Sao Paulo, since the CPI-FIPE has followed a path similar to that of indices used for wage indexation in Brazil. Under this interpretation, it appears that the terms of trade between tuition and price of labor declined in this period of intense regulatory activity, but improved during the latter part of 1989 and 1990.

This reversal during the last two years is consistent with theories that predict regulated groups will eventually "capture" the regulatory agency. The number of CEE-SP members linked to the private schools has increased over time, possibly in response to the lobbying efforts of the industry against the more effective controls of the 1980s. This reversal may also be a response to supply changes, described below.

In theory if the ratio between price and costs has fallen we would expect a decrease in the quantity of educational services offered. Thus, information about entry to and exit from the industry provides us with indirect evidence about the changing profitability of private schools, due in part to price controls. Unfortunately, the available data, presented in Table 12, are quite poor. It appears that net entry (new schools minus schools closed) is still positive, but declining over the 1985-90 period, in Sao Paulo. However, most of the openings and closures were at the pre-primary levels. If we exclude schools that were purely pre-primary we observe a stable but rather low positive net entry rate. For the country as a whole, the number of private primary schools and

private secondary students actually declined. This may be contrasted with the periods of 1950-70 during which private primary education grew rapidly and 1960-80 during which private secondary education greatly expanded (see Table 1). Although many other factors besides government regulations were undoubtedly involved in this process, the evidence is consistent with the hypothesis that the uncertainty, transactions costs and price constraints imposed by the government dampened the growth of the private sector in the 1980s. Although we were unable to obtain hard data, anecdotal evidence suggests that excess demand for private education increased over this period, as would be expected under this scenario. The dampened growth of supply and the repressed excess demand in the mid-1980s may have contributed to the price resurgence and the ineffectiveness of tuition controls at the end of the decade.

Have price controls affected elite and non-elite schools in a different way? In order to address this question we worked with two sets of schools offering primary and/or secondary education in the city of Sao Paulo. The first set had approximately forty non-elite schools -- a sub-set of the FIPE sample, which basically provide services to the modal family-income range (between two and six minimum wages). The second set consists of approximately forty schools which belong to an association of elite schools in the state of Sao Paulo (entitled "O Grupo") and which have tuition rates at least as high as the ones prevailing in the most expensive courses offered by schools in the first set.

We expected that the elite schools would be better positioned to evade price controls, either by pursuing legal loopholes in the regulatory process (appealing to the CFE or to the judiciary system), or because their clientele would be less inclined to resist a return to market equilibrium after periods of government intervention. The information concerning the tuition of these schools was provided by the CEE for December 1988, July 1989, and March 1990. (We could not obtain the larger time series that we would have preferred.)

The basic statistics concerning tuition for both sets of schools are presented in Tables 13 (primary education) and 14 (secondary education). On the average, elite schools did raise their tuition (at both levels) faster than non-elite schools between December 1988 and July 1989. Between July 1989 and March 1990, however, non-elite schools readjusted their tuition much more than elite schools; the net effect was to narrow rather than widen their relative tuition rates. One possible explanation for this divergent performance in price setting follows.

The first period was dominated by the price-freeze introduced by the Summer Plan (January 1989). As we theorized above, elite schools would be in a better position to defy these controls. The second period, in turn, was characterized by the collapse of the enforcement capacity of the regulatory authorities as the Brazilian economy approached a hyperinflation. Amid the chaos of this period, non-elite schools tried to recuperate the more dramatic deterioration that they suffered during the period of binding

controls in the earlier 1980s.[9] It is important to acknowledge, however, that the low quality of the data limits our capacity to derive any conclusive proposition in this respect: the data are not good enough to apply standard statistical tests, which might show the differences between the two groups to be insignificant.

We also expected that new entrants to the industry would be high-tuition schools, while most of the closing units would be non-elite schools. The data available in the CEE-SP did not allow us to pursue this line of analysis with respect to schools leaving the industry. In the case of new schools, however, it is true that for new primary courses both the nineteen price observations obtained for 1988 and the twenty-seven observations for 1989 had a higher average than the ones prevailing for our sample of non-elite schools in the same years, but we cannot ascertain whether this difference is statistically significant.

In order to assess the impact of tuition controls on other aspects of school performance, we applied a questionnaire to a sub-group of elite schools. Of the twenty-three schools contacted, approximately eleven partially answered the questionnaire.[10] It is worth pointing out that these are elite schools with much better accounting and administrative practices than the average Brazilian private school.

For the schools analyzed the performance of Q (= (ACS) (TL) (1-S)) over the 1987-90 period is reported in Table 15. We expected to find an upward trend in Q over these years, reflecting efforts to adjust to price controls via productivity increases (and

eventually downgrading of quality). The results obtained, however, are not conclusive. In part, this can be explained by the simple fact that schools do not have -- at least in the short-run -- complete control over the relevant variables. The number of scholarships, for instance, cannot be diminished substantially given legal determinations which bind school behavior in this respect (mandatory scholarships for sons and daughters of school personnel). The alternative of increasing ACS in elite schools, which have been working under excess demand conditions, is constrained by the physical lay-out of the schools; many private schools operate in buildings whose room size cannot easily be expanded. And the reliance on a higher TL cannot be significantly pursued if labor-relations between school-owners and teachers are conflictive. Also, the clientele of these elite schools may have been willing to increase price informally (through contributions, lab fees, etc.) rather than face decreases in quality.

Looking for evidence of other cost adjustments, we calculated the ratio of wages to tuition between June 1987 and October 1990 for the elite schools that answered our questionnaire. These data are summarized in Table 16. Consistent with the terms of trade data for a broader group of schools given in Table 11, it appears that the mark-up of price over wages decreased until 1989 but increased thereafter. This corresponds to the fact that wages rose faster than the CPI-FIPE until 1989 but slower thereafter; the private schools have apparently been able to economize on labor costs in recent years. This may have been a delayed response to

effective price controls in the earlier period, or it may simply be a response to a weak labor market, as real wages of public school teachers also declined sharply.

The actual position of the teachers is even worse than reflected in Table 16, due to the timing of wage payments and tuition revenues in an inflationary environment. Tuition is usually received at the beginning of the month while wages are paid at the end of the month; in effect, the workers are required to make an interest-free loan to the schools, an important source of profits to the schools and loss to the workers in a period of double-digit monthly inflation. All of these points support the proposition that the teachers have borne much of the brunt of the deteriorating financial condition of the schools, thereby enabling the schools to stay afloat despite the price controls.[11]

Summing up, the Brazilian experience with tuition controls provides a cautionary tale for those who advocate government regulation of private schools. First of all effective regulation is very difficult to achieve, when it is not achieved the credibility of the government is badly damaged, when it is achieved it adds high transactions and uncertainty costs to the education industry, and some of the consequences may be different from those intended. While we have not been able to establish conclusively the effect of controls on price, quantity, quality or wages, it appears that relative tuition prices moved downward but then reasserted themselves, the growth of private schools and enrollments came to a halt, and the real wages of teachers declined

over the 1980s together with the increasing regulatory efforts over this period.

Conclusion

Pulling together all of these diverse strands: We started by discussing the family variables that influence the student's decision about school attendance and public private choice, and the state-level variables that influence variations in the relative size of the private sector across regions. We found that family income and income dispersion within the community play a major role in these equations. Consistent with our hypothesis that private primary and secondary education in Brazil are driven by a differentiated demand for quality, high income families are more likely to use private schools and the private sector will be larger in communities where families are polarized into high and low income groups, rather than falling into a large middle class. This suggests that educational achievement and the quality of education received by diverse income groups will be similarly polarized in these communities.

While family income and the income distribution within the community thus determines who goes to school, who chooses private school, and why equilibrium levels of public versus private education differ across states, it appears that government policies also influence changes in the quantity and quality of private education supplied through time. We observe in Brazil an increasingly hostile regulatory environment to private education, featuring price controls which seem to have become binding by the

mid-1980s. These policies are found in many other countries as well. They may be designed to constrain (quality) competition between private and public schools. Or they may be a political response to the numerous families, especially working class families, who use private schools and do not see a link between the price schools charge, the available places, and the quality offered.[12]

In any event, tuition rose slower than the CPI during the 1980s (until 1989) and the growth of the private sector came to a virtual halt. While we cannot attribute these price and quantity changes solely to the controls, it seems plausible that they contributed to this outcome. Unfortunately, we were not able to measure changes in school quality. We did, however, observe a large drop in real wages of teachers at the end of the decade; if price constraints can be passed back to the workers this may mitigate quantity and quality declines, especially in the short run. The longer run effects may be quite different.

Endnotes

1. Since the 1971 Education Reform, primary education (**Ensino de Primeiro Grau**) is defined as comprising first to eight grades, while secondary education (**Ensino de Segundo Grau**) comprises ninth, tenth, eleventh -- and in some cases twelfth -- grades.

2. The analyses developed here focus on the regular primary and secondary levels of education. Lack of adequate data constrained the extension of the analyses to pre-school and accelerated adult education (**ensino supletivo**). The private provision of educational services, however, goes well beyond regular education and the "supletivo" courses. Actually, one of the most dynamic segments of the industry is composed of the so-called "cursos livres" -- e.g., foreign language courses, computer-related courses, the "cursinhos" (intensive preparatory courses for students taking entrance examinations for universities and colleges), etc.

3. Brazilian per capita income decreased by 0.1% per year on an average basis over the 1980-89 period. This negative performance was in clear contrast with the growth experience of the previous two decades when the Brazilian economy achieved yearly average growth rates for per capita income of 2.5% (1961-70) and 6.2% (1971-80). See IADB (1990, 265).

4. Enrollment data at the national level for the 1988-90 period is still in a preliminary format. Yet, a new shift of demand in favor of public schools has been identified, for instance, in Sao Paulo from 1987 to 1988.

5. By 1983, the lowest 20 percent of households in the income distribution had a share of only 2.4% of total household income, while the top 20% accounted for 62.6% (World Bank, 1990, 237).

6. Since PCI and indices of urbanization are highly correlated we used these as alternatives and the results for PCI, which give a better fit, are presented in this paper.

7. The predicted values fell outside the (0,1) range by a small amount for only 1 state, using OLS.

8. Appendix B relies on Campino, Primo Braga and Cyrillo (1986) and Primo Braga and Cyrillo (1988).

9. An alternative explanation is that non-elite schools followed more closely the instructions of the employers' association (Sindicato dos Estabelecimentos de Ensino do Estado de Sao Paulo - SIEESP). The SIEESP defended the adoption of indexed contracts for tuitions, defying the prevailing regulatory norms in the second semester of 1989. Schools that adopted these contracts were able

to increase their tuitions at a faster pace than other schools. The elite schools which belong to "O Grupo" seem to have lagged behind in this process -- according to some observers because of their adversarial relationship with the SIEESP.

10. A Brazilian consulting company (XYZ Consultoria) which specializes in providing administrative guidance to private schools helped us to choose the schools in the sample and applied the questionnaire.

11. Despite this evidence, private entrepreneurs have consistently claimed that their financial position continued to deteriorate last year. This complaint may be in part a public relations strategy. But there are three reasons why the deterioration may be real. First, the steep increase in capital costs after the Collor Plan (see BACEN 1990) has undoubtedly hurt the schools (as well as other private firms). Second, the temporary fall in the Brazilian inflation rate may have, ironically, hurt the private schools that relied on "inflationary profits" to survive. Third, the freezing of financial assets by the Collor Plan added a new dimension to the problems of those schools that indeed saved their monthly tuition to pay for their monthly labor costs.

12. The case of the Philippines is another good example. See James 1991.

Appendix A2:

Basic statistics for the dependent and independent variables used in section IV.

a. S.Paulo: dataset for EVAE=0,1 (E=0,1,2)

EVAE	E	nobs	%
1	0	1212	17.2
0	1	5387	76.7
0	2	431	6.1
		7030	100.0

var	nobs	n missing	mean	std	min	max
aepai	7030	0	.37	.37	0	1.7
aemae	7030	0	.296	.329	0	1.7
tf	7030	0	.610	.216	.2	1.8
age	7030	0	.956	.199	.7	1.4
yshare	7030	0	.0064	.043	0	1.0
yfamega	7030	0	.0979	.110	.00035	3.06

b. S.Paulo: dataset for E=1,2 (EVAE=0)

E	nobs	%
1	5387	92.6
2	431	7.4
	5818	100.0

var	nobs	n missing	mean	std	min	max
aepai	5818	0	.40	.382	0	1.7
aemae	5818	0	.32	.339	0	1.7
tf	5818	0	.60	.210	.2	1.8
age	5818	0	.957	.180	.7	1.4
yshare	5818	0	.002	.023	0	1.0
yfamega	5818	0	.104	.117	.00035	3.06

c. S.Paulo: dataset for EVACY1=0,1 (CY1=0,1,2)

EVACY1	CY1	nobs	%
1	0	585	14.9
0	1	338	8.6
0	2	3016	76.6
		3939	100.00

var	nobs	n missing	mean	std	min	max
aepai	3939	0	.430	.395	0	1.7
aemae	3939	0	.334	.340	0	1.7
tf	3939	0	.581	.195	.2	1.6
age	3939	0	1.402	.177	1.1	1.7
yshare	3939	0	.048	.107	0	1.0
yfamega	3939	0	.135	.144	2.6E-5	2.75

d. S.Paulo: dataset for CY1=1,2 (EVACY1=0)

CY1	nobs	%
1	338	10.1
2	3016	89.9
	3354	100.0

var	nobs	n missing	mean	std	min	max
aepai	3354	0	.468	.408	0	1.7
aemae	3354	0	.366	.351	0	1.7
tf	3354	0	.572	.189	0.2	1.6
age	3354	0	1.372	.168	1.0	1.7
yshare	3354	0	.032	.090	0	1.0
yfamega	3354	0	.142	.153	2.6E-5	2.75

e. S.Paulo: dataset for EVACY2=0,1 (CY2=0,1,2)

EVACY2	CY2	nobs	%
1	0	123	9.0
0	1	438	32.0
0	2	809	59.1
		1370	100.00

var	nobs	n missing	mean	std	min	max
aepai	1370	0	.578	.448	0	1.7
aemae	1370	0	.429	.384	0	1.7
tf	1370	0	.526	.173	.2	1.6
age	1370	0	1.731	.145	1.5	2.0
yshare	1370	0	.097	.146	0	1.0
yfamega	1370	0	.199	.211	0.004	2.64

f. S.Paulo: dataset for CY2=1,2 (EVACY2=0)

CY2	nobs	%
1	438	35.1
2	809	64.9
	1247	100.0

var	nobs	n missing	mean	std	min	max
aepai	1247	0	.595	.454	0	1.7
aemae	1247	0	.441	.390	0	1.7
tf	1247	0	.521	.167	0.2	1.6
age	1247	0	1.718	.141	1.0	1.7
yshare	1247	0	.089	.141	0	1.0
yfamega	1247	0	.203	.218	0.004	2.64

g. Pernambuco: dataset for EVAE=0,1 (E=0,1,2)

EVAE	E	nobs	%
1	0	1443	25.8
0	1	765	13.7
0	2	3391	60.5
		5599	100.0

var	nobs	n missing	mean	std	min	max
aepai	5599	0	.2625	.3359	0	1.7
aemae	5599	0	.2275	.3057	0	1.7
tf	5599	0	.7218	.2590	.2	1.7
age	5599	0	1.0012	.2173	.7	1.4
yshare	5599	0	.0101	.0586	0	1.0
yfamega	5599	0	.0573	.0740	.0008	1.21

h. Pernambuco: dataset for E=1,2 (EVAE=0)

E	nobs	%
1	765	18.4
2	3391	81.6
	4156	100.0

Appendix B: A Historical Review of Tuition Controls

Tuition Controls Prior to 1986

Tuition controls were already in use in Brazil in the late 1960s. A determination (portaria) from SUNAB in February 1969, for instance, established that tuition for 1969 could not be increased by more than 15% vis-a-vis the values that had prevailed in 1968 (inflation was running at 22% per year at that time.)[1] The establishment of the current regulatory framework, however, began with the previously mentioned Decree-Law No. 532 in April 1969.

In August 1969, a document (parecer) of the CFE suggested a formula which should be utilized to set an upper limit to the prices of private schools. The formula, which was based on specific assumptions concerning the relationships between capital costs, current costs and revenues in a private school, read as follows:

$$AT = 50\ (MW)/(ACS-m) \qquad (3)$$

where:

AT = average annual tuition
MW = average monthly wage of professors per class
ACS = average enrollment per class
m = average number of scholarships per class

Referring back to equation (2) and assuming that AT = RS, SL = TL, and teachers get twelve months pay each year, this formula implied that teacher wages are 25% of total costs (fringe benefits, other current costs, capital costs and allowable profits constituting 75%). It also implied that if schools raised teacher wages, their allowable tuition rates would increase as well.

This formula was adopted by the CEE of Sao Paulo in 1971. (Deliberation CC No. 14/71). Moreover, if application of the formula required a price increase of more than 20%, its adoption would require an appeal by the school to the CFE. Throughout the 1970s, this formula was applied, with the binding inter-year rate of increase adjusted to account for the accelerating rate of inflation in the second half of the 1970s.

As noted above, one political problem with control over annual price increases is the downward force this exerts on teacher salaries, leading to political pressures from the teachers to relax the controls. Thus in 1977-78, and again in 1980, a more flexible rule was adopted: basic readjustment rates (35%) were announced, reflecting official inflation expectations, but further increments were allowed to take into account discrepancies between teacher wage increases and the basic adjustment rate. Also in 1980, reflecting the progressive indexation of the Brazilian economy, tuition adjustments were authorized twice a year (Deliberation CEE/CEnE No. 13/80) -- the two installments of tuition payments known as "semestralidades." The old formula for AT continued to provide the benchmark for allowable initial tuition for new schools.

In 1982, a new method was adopted for adjusting the "semestralidade," based on the variation of an official inflation index (at that time the Indice Nacional de Precos ao Consumidor, INPC) for schools operating in Sao Paulo (Deliberation CEE No. 27/82). The values of the INPC in the months of December and July

would provide the guidance for readjustments of the first and second "semestralidades," respectively. Schools that considered themselves unable to operate under these guidelines were entitled to ask for special readjustment, supported by documents demonstrating their difficult financial situation. The CEnE would then analyze these special requisitions on a case by case basis. New schools and courses were to inform the CEE of their tuition rates at least 60 days before the beginning of classes.

The Deliberation CEE No. 08 of 1983 reintroduced the formula approach, based on the same methodology that had generated the previous one. Its objective was to determine the maximum tuition acceptable for new courses. This new formula was based on an empirical study focusing on the actual operating conditions of a sample of private schools in Sao Paulo. The study suggested that a fixed coefficient of 38 -- instead of 50 -- was sufficient to provide a proper rate of return for new schools.

Rules were once again altered in 1984. Deliberation CEE No. 08/84 maintained in general terms the practice of readjustment based on the INPC, as defined by Deliberation 27/82, although June replaced July as the reference month for the calculation of the readjustment index of the second "semestralidade." It allowed, however, private schools to ask for a special readjustment if their accounting profits (gross revenues minus operational costs) were less than 10% of gross revenues. It also determined that new schools would be free in establishing their initial tuition.

This deliberation generated an intense debate concerning what kind of expenses should be considered in the determination of the typical operational costs of a private school. Advertising expenses and financial costs, for instance, were excluded from the accepted definition of operational costs. The impact of this new regulation, however, was not significant, for in May 1985, Deliberation CEE No. 11/85 overruled it, returning to the practice of allowing tuition readjustments to be based on INPC changes plus a factor reflecting discrepancies between teacher-wage readjustments and the change in the INPC.

This brief summary of the experience with tuition controls in Brazil -- based on the experience of the state of Sao Paulo -- suggests that in its origins tuition controls were rationalized as an instrument to constrain pricing behavior that led to abnormal profits. This rationale reflected the belief that schools did have a certain degree of market power and/or that consumers did not have correct information about the benefits derived from education. Of course, it also implicitly assumed that the regulatory authorities were better positioned than consumers and producers of education to evaluate the economics of the sector.

An analysis of the numerous documents on this subject produced by the CFE, CEEs, and CEnEs over the 1969-85 period confirms that the main concern of the authorities was to guarantee a relationship between costs nd revenues compatible with a "fair" rate of profits -- usually defined in these documents in the neighborhood of 8 to 10% of gross revenues. Ironically, the original formula adopted to establish a price ceiling for tuition was based on a much higher implicit rate of profit (around 15% of gross revenues plus generous provisions for depreciation and evasion-rates). Accordingly, the

the freeze as their costs begin to rise again. During this phase, legal friction between consumers and the schools tend to increase and the CEEs receive a growing number of complaints concerning "illegal" increases of tuition;
c) A point is then reached in which the generalized price freeze is either formally suspended or becomes meaningless. At this stage, the authorities either reintroduce indexation rules -- usually, based on wage increases -- to regulate tuition increases or adopt a market-oriented approach, leaving to the schools the decision to establish their tuition under the condition that the values adopted would properly reflect their costs. In theory, the CEEs keep track of these values, intervening to adjudicate eventual complaints of abuses in the determination of tuition rates. This type of attitude has been known as "controlled freedom" (liberdade vigiada) and typically it has led to a dramatic increase in the number of complaints presented to the councils. Under pressure, the councils tend to return to some form of indexation;
d) A new generalized price freeze is introduced. Accordingly, the cycle repeats itself.

From the point of view of the regulatory authorities -- particularly, the CEE -- the post-1986 period was characterized not only by a growing work-load, but also by a progressive sense of frustration.[3] In 1986, for instance, the CEnE of the CEE of Sao Paulo analyzed 36 requests for special readjustments from private schools while by 1987 these requests grew to 416 -- of which 199 were approved. In 1988, the number of requests for special readjustments climbed to 509 -- of which 355 were approved. The number of official resolutions (indicacoes) produced by the CEnE -- a proxy for its work-load -- which had previously peaked at 223 in 1984 (decreasing to 157 in 1985 and 37 in 1986) escalated to 424 in 1987 and 723 in 1988.

The growing frustration of the CEE-SP with the task of controlling school tuition is captured by the fact that twice during this period the council tried to free itself from this responsibility. The "indicacao" CEE No. 05/89 (published in July 8, 1989), for instance, explicitly declared that the council did not have the capability of enforcing the latest federal determinations concerning tuition and that the control should be exercised by SUNAB. In July 1990 once again, a communique from the presidency of the CEE-SP proclaimed that the CEEs were "renouncing" the responsibility of regulating the prices of private schools. In practice, however, the CEEs remain the regulatory authorities in this area.

It is also obvious that the credibility of the CEEs as regulatory authorities has been significantly damaged since 1986. This not only reflects the inability of the councils to effectively control the behavior of private schools, but also the continuous interference of other governmental authorities (including federal ministries, state secretaries and the judiciary) in this area.

Private schools have also become increasingly belligerent in their response to the regulatory authorities and the instability of the "rules of the game." In 1988-89, a growing number of schools of Sao Paulo went to the CFE in order to gain special readjustments, overturning decisions of the CEE. In 1990, schools

adopted an even more defiant attitude, openly disobeying some of the new regulations introduced by the federal government, appealing to the judiciary power to overrule governmental decisions.

Summing up, it is clear that the level of regulatory activity in the area of price controls and the frictions among governmental authorities, consumers and private schools have increased substantially in the post-Cruzado Plan period.

Endnotes

1. SUNAB (Superintendencia Nacional de Abastecimento) is an agency of the Finance Ministry which oversees supply-conditions for goods and services in Brazil.

2. This paper was already in a preliminary version when the government announced a new stabilization attempt in January 1991: the Collor Plan II.

3. Data concerning the activities of the CEE of Sao Paulo was obtained from CEE (1989) and CEE/CEnE (1989).

REFERENCES

Bagen, 1990. Brazil: Economic Program, vol. 27. Brasilia, D.F.: Central Bank of Brazil.

Campino, A.C.C., C.A. Primo Braga and D.C. Cyrillo, 1986.. "Criterios para o Reajuste de Anuidades Escolares no Estado de Sao Paulo," research report, Sao Paulo: FIPE.

CEE, 1989. ACYA Especial. Sao Paulo: Conselho Estadual de Educacao de Sao Paulo.

CEE/Cene., 1989. "Relatorio da Presidencia da CEnE." Sao Paulo: CEE/Comissao de Encargos Educacionais.

Fogaca, A., 1990. "Educacao," in A Politica Social em tempo de Crise: Articulacao Institucional e Descentralizacao, vol. 4, C.L. Salm and L.C. Eichenberg Silva, eds., Brasilia, D.F.: MPAS/CEPAL.

Guimaraes, O., 1990. Voce e o Dono da Escola, Curitiba: Posigraf.

IADB, 1990. Economic and Social Progress in Latin Ameica, Washington, D.C.: InterAmerican Development Bank.

IBGE, 1983. Anuario Estatistico do Brasil.

James, Estelle, 1986. "The Private Nonprofit Provision of Education: A Theoretical Model and Application to Japan," Journal of Comparative Economics, September 1986, pp. 255-276.

James, Estelle, 1987a. "The Political Economy of Private Education in Developed and Developing Countries," Washington: World Bank Discussion paper EDT81.

James, Estelle, 1987b. "The Public/Private Division of Responsibility for Education: An International Comparison," Economics of Education Review, 1987, pp. 1-14.

James, Estelle, 1991a. "Private Higher Education: The Philippines as a Prototype," Higher Education.

James, Estelle, 1991b. "Public Policies Toward Private Education," International Journal of Educational Research, (forthcoming).

Primo Braga, C.A. and M.C. Castro, 1986. "O Salario-Educacao e o Financiamento do Ensino de 1o. Grau no Estado de Sao Paulo," research report. Sao Paulo: FIPE.

Primo Braga, C.A. and D.C. Cyrillo, 1988. "Educacao: Uma Analise do Custo/Aluno da Rede Privada," in Brasil 1980: Os Desafios da Crise Economica, C.A. Rocca et al., eds. Sao Paulo: IPE/USP.

World Bank, 1986. Brazil: Finance of Primary Education. Washington, D.C.: The World Bank.

World Bank, 1990. World Development Report. New York: Oxford University Press.

TABLE 2

BRAZIL: GROSS ENROLLMENT RATES IN PRIMARY AND SECONDARY EDUCATION, SELECTED YEARS

	1955	1962	1970	1975	1980	1985
PRIMARY EDUCATION (ENROLLMENT IN GRADES 1-8 AS PERCENTAGE OF POPULATION IN AGES 7-14)	54.0	63.0	80.0	85.0a	88.0	90.0b
SECONDARY EDUCATION (ENROLLMENT IN GRADES 9-12 AS PERCENTAGE OF POPULATION IN AGES 15-19)	-	-	9.8	16.6	20.8	21.0

SOURCES: MEC; WORLD BANK (1986)

(a) Figure for 1974
(b) Figure for 1983

Table 3

Percentage of Private Enrollments, 1981

	Primary	Secondary
Rondonia	2.1	3.2
Acre	8.3	16.7
Amazonas	8.0	26.5
Roraima	5.6	.1
Para	14.2	30.5
Amapa	2.3	.1
Maranhao	14.3	74.1
Piaui	8.8	28.6
Ceara	21.3	52.7
Rio Grande do Norte	12.4	23.9
Paraiba	14.7	37.2
Pernambuco	15.2	41.1
Alagoas	19.0	55.2
Sergipe	15.7	36.4
Bahia	11.9	43.8
Minas Gerais	8.8	61.7
Espirito Santo	10.1	33.9
Rio de Janeiro	31.8	61.2
Sao Paulo	9.7	39.0
Parana	10.6	23.5
Santa Catarina	7.3	52.1
Rio Grande do Sul	14.4	34.2
Mato Grosso do Sul	7.5	40.6
Mato Grosso	6.5	14.3
Goias	7.6	25.3
Distrito Federal	11.8	26.0

Table 7A

Mean Values of Variables

	Mean	Std. Dev.
%PVTPRI	11.5	6.2
%PVTSEC	33.9	18.8
PN15	25.8	6.2
PNCATH	.1	5.2
FOREIGN	.5	.7
INFLOW	19.3	18.6
PBLACK	4.8	2.5
PCI	70.5	39.7
EDSPPRI	50.8	97.2
EDSPSEC	8.9	9.7
POPAGEPRI	9.3	10.6
POPAGESEC	5.3	6.2

Note: percentages are expressed as whole numbers, not decimals.

Table 7B

Definitions of Variables and Data Sources

%PVTPRI	=	% of primary school students in private schools, 1981
%PVTSEC	=	% of secondary school students in private schools, 1981
PN15	=	% of persons age 10 or more who earn less than 1 or more than 5 minimum salaries, 1980
PNCATH	=	% of population who were not Catholic, 1980
FOREIGN	=	% of state's population that was foreign born, 1980
INFLOW	=	% of state's population that was born in another state, 1980
PBLACK	=	% of population who were black, 1980
PCI	=	per capita income, in US dollars, 1980
EDSP	=	public educational spending at the primary and secondary levels, respectively, 1985, in 10 million CZ.'s
POPAGE	=	number of individuals age 7-14 and 15-19 at the primary and secondary levels, respectively, in 100,000's.

All variables are calculated from data in 1980 Census except that %PVT is calculated from 1984 Statistical Yearbook, EDSP is from 1987 Statistical Yearbook, PCI is from... and POPAGE is from....

TABLE 8A: Determinants of the probability of not evading elementary school - Pernambuco

state: Pernambuco age range: 7-14 years old # obs: 5599
dep. var: EVAE= (0,1)
Prob(EVAE=0)= Prob(not evade elementary school)= F(B'x)

RUN(#var)	1(13)	2(8) --FINAL--	3( )	4( )	5( )
-2lgL @0	7761.86				
-2lgL @B	2877.80	5684.65			
-2lgLgain	4884.06	2077.21			
conv.gain	6.5E-09	1.5E-12			
INTERCEPT	-1.16	--			
chi-sq	19.03				
*Pr(tail)	a				
AEPAI	0.71	0.524			
chi-sq	14.52	12.36			
Pr(tail)	a	a			
AEMAE	2.31	2.215			
chi-sq	104.44	142.49			
Pr(tail)	a	a			
TF	-1.39	-0.938			
chi-sq	58.45	61.72			
Pr(tail)	a	a			
AGE	1.56	1.411			
chi-sq	55.50	205.13			
Pr(tail)	a	a			
SEX	-0.050	--			
chi-sq	1.20				
Pr(tail)	27.4%				
YELLOW	--	--			
chi-sq					
Pr(tail)					
WHITE	--	--			
chi-sq					
Pr(tail)					
MIXED	-0.339	-0.189			
chi-sq	10.18	7.47			
Pr(tail)	a	a			
BLACK	-0.093	--			
chi-sq	0.24				
Pr(tail)	62.6%				
MERE	20.62	--			
chi-sq	0.01				
Pr(tail)	93.7%				
TRAB	-0.554	-0.893			
chi-sq	12.42	71.47			
Pr(tail)	a	a			
YSHARE	-2.85	-3.526			
chi-sq	8.93	27.36			
Pr(tail)	a	a			
YFAMEGA	4.64	3.288			
chi-sq	13.33	9.69			
Pr(tail)	a	a			
TRABMAE	-0.261	--			
chi-sq	5.75				
Pr(tail)	b				

Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 8B: Determinants of the probability of attending a private elementary school - S. Paulo

state: S.Paulo age range: 7-14 years old # obs: 5818
dep. var: E= (1=goes to PRIVATE elementary school,2=idem PUBLIC)
Prob(E=1|EVAE=0)= F(B'x)

RUN(#var)	1(14) -initial-	2(10) --FINAL--	3( )	4( )	5( )
-2lgL @0	8065.46				
-2lgL @B	245.03	1964.83			
-2lgLgain	6101.79	6100.63			
conv.gain	9.7E-09	8.1E-10			
INTERCEPT	3.56	-1.51			
chi-sq	10.01	10.74			
*Pr(tail)	a	a			
AEPAI	0.292	1.56			
chi-sq	0.25	78.55			
Pr(tail)	61.4%	a			
AEMAE	0.790	0.847			
chi-sq	1.25	17.66			
Pr(tail)	26.4%	a			
TF	-4.55	-3.31			
chi-sq	23.94	49.06			
Pr(tail)	a	a			
AGE	-1.91	-1.04			
chi-sq	3.65	6.03			
Pr(tail)	b	b			
SEX	-0.498	-0.222			
chi-sq	2.27	3.26			
Pr(tail)	13.2%	c			
YELLOW	-0.83	--			
chi-sq	0.95				
Pr(tail)	33.0%				
WHITE	--	--			
chi-sq					
Pr(tail)					
MIXED	0.228	-0.813			
chi-sq	0.18	9.37			
Pr(tail)	66.7%	a			
BLACK	-1.30	--			
chi-sq	3.75				
Pr(tail)	c				
MERE	-70.24	--			
chi-sq	0.01				
Pr(tail)	93.0%				
TRAB	-0.228	0.699			
chi-sq	0.11	4.69			
Pr(tail)	74.5%	b			
YSHARE	6.37	--			
chi-sq	1.15				
Pr(tail)	28.3%				
YFAMEGA	18.37	4.57			
chi-sq	28.51	73.60			
Pr(tail)	a	a			
TRABMAE	-0.936	-0.952			
chi-sq	5.13	33.23			
Pr(tail)	b	a			

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 8B: Determinats of the probability of attending a private elementary school - Pernambuco

state: Pernambuco age range: 7-14 years old # obs: 4156
dep. var: E= (1=goes to PRIVATE elementary school,2=idem PUBLIC)
Prob(E=1|EVAE=0)= F(B'x)

RUN(#var)	1(13)	2(7) --FINAL--	3( )	4( )	5( )
-2lgL @0	5761.44				
-2lgL @B	1171.54	3224.28			
-2lgLgain	4589.90	2537.16			
conv.gain	3.8E-09	8.7E-10			
INTERCEPT	1.46	-1.710			
chi-sq	11.42	119.40			
*Pr(tail)	a	a			
AEPAI	0.594	1.11			
chi-sq	4.61	53.75			
Pr(tail)	b	a			
AEMAE	0.580	1.01			
chi-sq	3.48	35.80			
Pr(tail)	c	a			
TF	-1.48	-1.39			
chi-sq	22.49	46.66			
Pr(tail)	a	a			
AGE	-1.16	--			
chi-sq	11.20				
Pr(tail)	a				
SEX	-0.004	--			
chi-sq	0.00				
Pr(tail)	97.8%				
YELLOW	--	--			
chi-sq					
Pr(tail)					
WHITE	--	--			
chi-sq					
Pr(tail)					
MIXED	-0.77	--			
chi-sq	0.23				
Pr(tail)	63.3%				
BLACK	0.945	0.443			
chi-sq	9.23	6.33			
Pr(tail)	a	b			
MERE	-32.40	--			
chi-sq	0.00				
TRAB	-0.986	--			
chi-sq	12.87				
Pr(tail)	a				
YSHARE	0.406	--			
chi-sq	0.07				
Pr(tail)	78.7%				
YFAMEGA	18.32	7.15			
chi-sq	45.27	66.24			
Pr(tail)	a	a			
TRABMAE	-0.242	-0.336			
chi-sq	1.94	9.43			
Pr(tail)	16.3%	a			

Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 9A: Determinants of the probability of not evading jr. high school - S. Paulo

state: S.Paulo age range: 11-17 years old # obs: 3939
dep. var: EVACY1 (=0: did not evade jr. high school, =1: evaded)
Prob(EVACY1=0 | evae=0)= F(B'x)

RUN(#var)	1(13) -initial-	2(10) --FINAL--	3( )	4( )	5( )	6( )
-2lgL @0	5460.61					
-2lgL @B	2270.14	2270.84				
-2lgLgain	3190.47	3189.77				
conv.gain	5.4E-12	4.8E-12				
INTERCEPT	11.74	11.74				
chi-sq	332.88	334.11				
*Pr(tail)	a	a				
AEPAI	1.29	1.28				
chi-sq	24.49	24.31				
Pr(tail)	a	a				
AEMAE	1.89	1.89				
chi-sq	37.89	38.24				
Pr(tail)	a	a				
TF	-0.927	-0.918				
chi-sq	12.50	12.32				
Pr(tail)	a	a				
AGE	-6.78	-6.77				
chi-sq	268.68	269.01				
Pr(tail)	a	a				
SEX	0.250	0.250				
chi-sq	5.12	5.11				
Pr(tail)	b	b				
YELLOW	1.80	--				
chi-sq	0.07					
Pr(tail)	78.8%					
WHITE	--	--				
chi-sq						
Pr(tail)						
MIXED	0.025	--				
chi-sq	0.03					
Pr(tail)	85.4%					
BLACK	0.179	--				
chi-sq	0.62					
Pr(tail)	43.1%					
MERE	--	--				
chi-sq						
Pr(tail)						
TRAB	-0.768	-0.823				
chi-sq	27.59	31.90				
Pr(tail)	a	a				
YSHARE	-1.43	-1.158				
chi-sq	7.33	4.83				
Pr(tail)	a	b				
YFAMEGA	2.38	2.55				
chi-sq	6.30	7.12				
Pr(tail)	b	a				
TRABMAE	-0.377	-0.374				
chi-sq	9.02	8.90				
Pr(tail)	a	a				

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 9A: Determinants of the probability of not evading jr. high school - Pernambuco

state: Pernambuco age range: 11-17 years old # obs: 1680
dep. var: EVACY1= evades (=1) or not (=0) jr. high school
Prob(EVACY1=0)= F(B'x)

RUN(#var)	1(12)	2(6) --FINAL--	3(6)	4(4)	5( )	6( )
-2lgL @0	2328.97					
-2lgL @B	811.60	816.30				
-2lgLgain	1517.37	1512.67				
conv.gain	6.3E-11	1.9E-11				
INTERCEPT	12.03	12.16				
chi-sq	95.16	100.61				
*Pr(tail)	a	a				
AEPAI	0.957	0.951				
chi-sq	6.18	6.31				
Pr(tail)	b	b				
AEMAE	0.906	1.001				
chi-sq	3.89	4.96				
Pr(tail)	b	b				
TF	0.115	--				
chi-sq	0.09					
Pr(tail)	76.2%					
AGE	-6.80	-6.85				
chi-sq	79.03	80.96				
Pr(tail)	a	a				
SEX	-0.096	--				
chi-sq	0.25					
Pr(tail)	61.7%					
YELLOW	--	--				
chi-sq						
Pr(tail)						
WHITE	--	--				
chi-sq						
Pr(tail)						
MIXED	0.116	--				
chi-sq	0.31					
Pr(tail)	57.9%					
BLACK	-5.73	--				
chi-sq	2.50					
Pr(tail)	11.4%					
MERE	--	--				
chi-sq						
Pr(tail)						
TRAB	-1.20	-1.18				
chi-sq	20.41	35.50				
Pr(tail)	a	a				
YSHARE	0.164	--				
chi-sq	0.03					
Pr(tail)	85.7%					
YFAMEGA	3.53	3.67				
chi-sq	2.70	3.18				
Pr(tail)	10.0%	c				
TRABMAE	0.115	--				
chi-sq	0.25					
Pr(tail)	61.4%					

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 9B: Determinants of the probability of attending a private jr. high school - S. Paulo

state: S.Paulo age range: 11-17 years old # obs: 3354
dep. var: CY1 (=1:goes to a PRIVATE jr. high school, =2: idem PUBLIC)
Prob(CY1 | evacy1=0)= F(B'x)

RUN(#var)	1(13) -initial-	2(6) --FINAL--	3( )	4( )	5( )	6( )
-2lgL @0	4649.63					
-2lgL @B	1655.49	1661.49				
-2lgLgain	2995.01	2988.14				
conv.gain	2.5E-10	1.2E-10				
INTERCEPT	-3.40	-2.66				
chi-sq	28.01	91.81				
*Pr(tail)	a	a				
AEPAI	0.957	0.943				
chi-sq	27.08	26.68				
Pr(tail)	a	a				
AEMAE	0.741	0.719				
chi-sq	11.68	11.23				
Pr(tail)	a	a				
TF	-2.26	-2.20				
chi-sq	23.13	22.26				
Pr(tail)	a	a				
AGE	0.544	--				
chi-sq	1.62					
Pr(tail)	20.3%					
SEX	-0.0152	--				
chi-sq	0.01					
Pr(tail)	91.0%					
YELLOW	0.444	--				
chi-sq	1.62					
Pr(tail)	20.3%					
WHITE	--	--				
chi-sq						
Pr(tail)						
MIXED	-0.169	--				
chi-sq	0.42					
Pr(tail)	51.9%					
BLACK	-1.48	--				
chi-sq	0.10					
Pr(tail)	75.3%					
TRAB	0.283	--				
chi-sq	1.96					
Pr(tail)	16.1%					
YSHARE	-1.110	--				
chi-sq	0.76					
Pr(tail)	38.4%					
YFAMEGA	4.67	4.71				
chi-sq	75.55	77.67				
Pr(tail)	a	a				
TRABMAE	-0.593	-0.554				
chi-sq	12.72	11.33				
Pr(tail)	a	a				

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 9B: Determinants of the probability of attending a private jr. high school - Pernambuco

state: Pernambuco age range: 11-17 years old # obs: 1512
dep. var: CY1 (=1: goes to a PRIVATE jr. high school, =2:idem PUBLIC)
Prob(CY1 | evacy1=0) = F(B'x)

RUN(#var)	1(12) -initial-	2(9) --FINAL--	3( )	4( )	5( )	6( )
-2lgL @0	2103.01					
-2lgL @B	1054.25	1062.01				
-2lgLgain	1048.76	1041.00				
conv.gain	1.2E-12	9.6E-16				
INTERCEPT	-1.18	--				
chi-sq	2.53					
*Pr(tail)	11.2%					
AEPAI	1.08	1.024				
chi-sq	21.08	20.32				
Pr(tail)	a	a				
AEMAE	1.25	1.23				
chi-sq	22.68	19.71				
Pr(tail)	a	a				
TF	-0.704	-0.862				
chi-sq	3.48	5.62				
Pr(tail)	c	b				
AGE	-1.05	-1.79				
chi-sq	4.60	68.54				
Pr(tail)	b	a				
SEX	0.384	0.361				
chi-sq	5.62	5.23				
Pr(tail)	b	b				
YELLOW	- + -	--				
chi-sq						
Pr(tail)						
WHITE	12.24	--				
chi-sq	0.0					
Pr(tail)	97.3%					
MIXED	-0.546	-0.515				
chi-sq	11.27	10.46				
Pr(tail)	a	a				
BLACK	-0.972	--				
chi-sq	2.46					
Pr(tail)	11.7%					
TRAB	0.4	--				
chi-sq	1.09					
Pr(tail)	29.6%					
YSHARE	-2.11	--				
chi-sq	0.86					
Pr(tail)	35.5%					
YFAMEGA	7.97	8.24				
chi-sq	55.78	59.15				
Pr(tail)	a	a				
TRABMAE	-0.509	-0.497				
chi-sq	6.60	6.36				
Pr(tail)	b	b				

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 10A: Determinants of the probability of not evading high school - S. Paulo

state: S.Paulo age range: 15-20 years old # obs: 1370
dep. var: EVACY2 (=0: did not evade high school, =1: evaded)
Prob(EVACY2=0 | evae=0 & evacy1=0)= F(B'x)

RUN(#var)	1(13)	2(3) --FINAL--	3( )	4( )	5( )	6( )
-2lgL @0	1899.22					
-2lgL @B	672.12	971.49				
-2lgLgain	1227.10	927.73				
conv.gain	6.0E-09	1.1E-09				
INTERCEPT	15.35	--				
chi-sq	101.87					
*Pr(tail)	a					
AEPAI	0.460	--				
chi-sq	1.66					
Pr(tail)	19.8%					
AEMAE	0.232	--				
chi-sq	0.30					
Pr(tail)	58.7%					
TF	-1.35	--				
chi-sq	6.45					
Pr(tail)	b					
AGE	-6.71	--				
chi-sq	68.32					
Pr(tail)	a					
SEX	-0.04	0.798				
chi-sq	0.04	25.31				
Pr(tail)	84.5%	a				
YELLOW	-0.594	--				
chi-sq	1.64					
Pr(tail)	20.1%					
WHITE	--	--				
chi-sq						
Pr(tail)						
MIXED	-0.021	0.762				
chi-sq	0.0	5.70				
Pr(tail)	95.3%	b				
BLACK	-0.606	--				
chi-sq	1.49					
Pr(tail)	22.3%					
TRAB	-0.464	--				
chi-sq	12247					
Pr(tail)	11.6%					
YSHARE	-1.41	--				
chi-sq	3.23					
Pr(tail)	c					
YFAMEGA	0.226	10.22				
chi-sq	0.09	195.08				
Pr(tail)	76.5%	a				
TRABMAE	-0.211	--				
chi-sq	0.67					
Pr(tail)	41.3%					

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 10A: Determinants of the probability of not evading sr. high school - Pernambuco

state: Pernambuco age range: 15-20 years old # obs: 558
dep. var: EVACY2 (=0: did not evade high school, =1: evaded)
Prob(EVACY2=0)= F(B'x)

RUN(#var)	1(12) -initial-	2(5) --FINAL--	3( )	4( )	5( )	6( )
-2lgL @0	772.17					
-2lgL @B	234.56	238.71				
-2lgLgain	537.61	533.46				
conv.gain	1.5E-14	5.9E-09				
INTERCEPT	18.24	17.57				
chi-sq	33.28	33.64				
*Pr(tail)	a	a				
AEPAI	-0.40	--				
chi-sq	0.51					
Pr(tail)	47.6%					
AEMAE	0.650	--				
chi-sq	0.76					
Pr(tail)	38.4%					
TF	-0.950	--				
chi-sq	1.91					
Pr(tail)	16.7%					
AGE	-8.18	-8.30				
chi-sq	24.28	26.45				
Pr(tail)	a	a				
SEX	-0.09	--				
chi-sq	0.06					
Pr(tail)	80.5%					
YELLOW	--	--				
chi-sq						
Pr(tail)						
WHITE	--	--				
chi-sq						
Pr(tail)						
MIXED	-0.379	--				
chi-sq	1.05					
Pr(tail)	30.5%					
BLACK	-1.70	-1.377				
chi-sq	5.38	4.01				
Pr(tail)	b	b				
TRAB	-1.44	-1.61				
chi-sq	7.50	20.59				
Pr(tail)	a	a				
YSHARE	-0.377	--				
chi-sq	0.08					
Pr(tail)	78.4%					
YFAMEGA	8.27	8.27				
chi-sq	5.14	7.76				
Pr(tail)	b	a				
TRABMAE	-0.257	--				
chi-sq	0.34					
Pr(tail)	55.7%					

* Pr(tail)= Prob(upper & lower tails)= a < 1% <= b < 5% <= c < 10%

TABLE 11

INDEX OF TUITION/CONSUMER PRICE INDEX - FIPE

1974-90

March 1986 = 1.00

Month/Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
January	1.57	1.55	1.54	1.99	1.56	1.58	1.69	1.21	1.51	1.48	1.14	1.04	1.04	1.03	1.65	0.92	1.56
February	1.52	1.51	1.82	2.05	2.03	1.67	1.62	1.57	1.92	1.91	1.19	1.29	0.94	1.27	1.73	0.93	1.53
March	1.63	1.53	1.92	2.16	1.98	1.95	1.65	1.48	1.84	1.74	1.52	1.49	1.00	1.41	1.47	0.88	1.99
April	1.69	1.64	1.87	2.06	1.94	1.88	1.59	1.41	1.74	1.64	1.41	1.37	1.02	1.31	1.38	0.82	1.69
May	1.66	1.82	1.82	2.02	1.95	1.85	1.51	1.41	1.65	1.56	1.32	1.26	1.04	1.03	1.25	0.99	1.57
June	1.63	1.84	1.79	1.97	1.96	1.77	1.44	1.36	1.52	1.40	1.18	1.17	1.07	1.09	1.11	0.98	1.41
July	1.57	1.80	1.76	1.93	1.88	1.69	1.70	1.29	1.42	1.83	1.09	1.43	1.11	1.00	1.67	1.09	1.45
August	1.57	1.75	1.70	1.90	1.83	1.64	1.62	1.92	1.93	1.70	1.65	1.79	1.14	1.53	1.46	1.29	1.51
September	1.54	1.71	1.65	1.87	1.79	1.54	1.53	1.80	1.86	1.53	1.51	1.69	1.17	1.54	1.36	1.26	1.59
October	1.52	1.68	1.61	1.82	1.74	1.47	1.43	1.72	1.80	1.40	1.38	1.51	1.19	1.50	1.19	1.26	1.68
November	1.49	1.65	1.59	1.81	1.70	1.40	1.34	1.64	2.24	1.34	1.26	1.34	1.19	1.40	1.02	1.37	1.83
December	1.45	1.63	1.55	1.76	1.67	1.31	1.27	1.57	2.08	1.24	1.16	1.19	1.12	1.32	0.92	1.56	2.04
Average	1.57	1.68	1.72	1.95	1.84	1.65	1.53	1.53	1.79	1.56	1.32	1.38	1.09	1.29	1.35	1.11	1.65

SOURCE: FIPE

NOTE: The index reflects the behavior of tuitions of non-elite schools in the city of Sao Paulo deflated by the CPI-FIPE. It is worth mentioning that in 1984 the weight of the item tuitions in the CPI-FIPE was changed from 1.71845 to 1.1443, reflecting the results of a new household survey for families with income between 2 and 6 minimum-wages.

TABLE 12

ENTRY AND EXIT IN THE EDUCATION INDUSTRY

IN THE CITY OF SAO PAULO (a)

	NEW SCHOOLS						
	COURSES OFFERED						
YEAR	TOTAL b	Pre-Primary	Pre-Prim. and Primary	Pre-Prim. and Primary and Secondary	Primary	Secondary	Primary and Secondary
1985	56	32	9	0	5	6	2
1986	28	5	9	0	7	3	3
1987	31	8	11	0	4	5	3
1988	29	6	12	1	5	2	3
1989	28	2	12	3	9	0	0
1990	20	3	6	1	4	2	2
	SCHOOLS CLOSED						
	COURSES OFFERED						
YEAR	TOTAL b	Pre-Primary	Pre-Prim. and Primary	Pre-Prim. and Primary and Secondary	Primary	Secondary	Primary and Secondary
1985	14	6	3	0	3	0	2
1986	11	4	0	0	4	2	1
1987	15	11	1	0	1	2	0
1988	16	8	3	0	0	3	2
1989	22	12	5	0	0	5	4
1990	15	7	4	0	1	4	2

SOURCES: CEE-SP; Secretaria de Educacao-SP

(a) The schools considered are the ones under the "Divisoes Regionais de Ensino da Capital" (DRECAP 1, 2 and 3).

(b) Figures may not exactly add to total because of missing information.

TABLE 13

TUITIONS FOR A SAMPLE OF SCHOOLS

IN THE CITY OF SAO PAULO

PRIMARY

	NON-ELITE (a)					ELITE (b)				
	N. OBS	MEAN	STD DEV	CV	RATE OF GROWTH	N. OBS	MEAN	STD DEV	CV	RATE OF GROWTH
December 1988	48	22.18	9.12	40.69	-	46	71.14	29.61	41.62	-
July 1989	48	84.31	34.34	38.16	280.12	46	335.66	362.19	107.90	371.83
March 1990	48	2 947.73	1058.04	39.01	3 396.30	46	7 438.40	2047.10	27.52	2 116.05

SOURCE: CEE-SP

NOTES: Tuitions (in cruzeiros) as informed by the schools to the CEE-SP in first semester of 1990.
(a) Non-elite schools belong to the sample utilized to estimate the CPI-FIPE.
(b) Elite schools belong to the association entitled "O Grupo".

TABLE 14

TUITIONS FOR A SAMPLE OF SCHOOLS

IN THE CITY OF SAO PAULO

SECONDARY

	NON-ELITE (a)					ELITE (b)				
	N. OBS	MEAN	STD DEV	CV	RATE OF GROWTH	N. OBS	MEAN	STD DEV	CV	RATE OF GROWTH
December 1988	55	25.70	10.46	40.69	-	15	67.88	12.66	18.65	-
July 1989	57	102.11	38.96	38.16	297.32	15	281.61	19.79	19.79	314.86
March 1990	59	3 400.90	39.01	39.01	3 230.62	15	7 846.90	26.06	26.06	2 686.44

SOURCE: CEE-SP

NOTES: Tuitions (in cruzeiros) as informed by the schools to the CEE-SP in the first semester of 1990.
(a) Non-elite schools belong to the sample utilized to estimate the CPI-FIPE.
(b) Elite schools belong to the association entitled "O Grupo".

TABLE 15

PRODUCTIVITY INDICES FOR ELITE PRIVATE SCHOOLS IN SAO PAULO, 1987-90

YEAR	Primary		Secondary
	1-4	5-8	
1987	100.00	100.00	100.00
1988	102.82	103.79	98.34
1989	106.10	101.64	101.21
1990	102.82	99.34	101.56

SOURCE: Questionnaire applied to private schools

NOTE: Productivity as reflected by Q= ACS (TL) (1-S) . Indices reflect observations for 7 schools for grades 1 to 4, 8 schools for grades 5 to 8 , and 4 schools for secondary education.

TABLE 16

REAL WAGE INDICES FOR A SAMPLE OF ELITE SCHOOLS

IN THE CITY OF SAO PAULO

PERIOD	WAGE/TUITIONS (a)				1-4 WAGE/ CPI-FIPE(b)	PUBLIC SCHOOL WAGE/CPI-FIPE(c)
	Pre-Primary	1-4	5-8	Secondary		
Jun 87	100.00	100.00	100.00	100.00	100.00	100.00
Jun 88	91.49	103.23	103.03	94.63	135.47	52.28
Jun 89	98.18	107.43	107.90	106.02	174.64	101.53
Mar 90	80.77	85.85	88.80	82.99	156.78	65.31
Jun 90	82.82	88.35	89.01	79.19	111.92	63.29
Out 90	73.89	80.85	81.71	88.35	149.14	93.28

SOURCES: Questionnaire applied to private schools and APEOESP

NOTES :
(a) Indices reflect observations for 8 schools for pre-primary, 9 schools for grades 1 to 4, 10 schools for grades 5 to 8 , and 6 schools for secondary courses.
(b) Wages of professors teaching grades 1 to 4 of primary school deflated by the CPI-FIPE.
(c) Wages of professors in public schools in Sao Paulo deflated by the CPI-FIPE.