

Work, Study, Both or Neither? Time Allocation of Brazilian Teenagers

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Abstract

Labor force participation among youth is extremely high in Brazil when compared to countries with a similar economic background. In Argentina and Chile labor force participation, among those with 10 to 14 years old, is around 1% while in Brazil this rate is as high as 17 %. For the those between 15 and 19 years old these figures are around 10% in Chile, 15% in Argentina and 53% in Brazil. On the other hand the data on school attendance give a more optimistic picture. The percentage of children, between 10 and 14 years old, enrolled in school increased steadily from 79% to 95% from 1981 to 1998 and with age between 15 and 19, from 46% to 66% in the same period. These figures are close to the ones presented by Chile and Argentina. around 99% among the youngest group and around 70% for the 15 to 19 years old group. The objective of the paper is to understand the determinants of the time allocation decision of the Brazilian youth during the last twenty years. Using a multinomial logit regression we investigate the conditional effect of various micro and macro variables on the time allocation decision for the 1991 to 1998 period. Our main findings are: working and studying became the most likely allocation among the youngest in the poor rural areas and, in general, to study, whether working or not, became less dependent on family background for the youngest group but not for the older.

JEL Classification J22.

1. Introduction

Several studies that investigate the causes of poverty and income inequality in Brazil attempt to evaluate the weight of demographic, economic, and social variables on individual income. In general, education that reflects human capital accumulation and inequality in the distribution of educational opportunities are identified as the most important variables explaining Brazilian poor performance (*see* Barros and Mendonça, 1995¹).

Education can be seen to be the result of family decision-making on the time allocation of its youngest members and their crucial choices (not mutually exclusive) of working and/or studying as they become old enough to enter the job market. As discussed in Barros, Mendonça e Velazco (1994) those decisions are made in order to maximize the family's welfare, subject to their budget constraints. They interact with the consumption and investment opportunities available to each generation, and they depend on the incentives and restrictions offered by the macro-economic environment. Those choices have a direct impact on family gains in the short run, but since they are also decisions on the human capital investment of their offspring, they affect the next generation's income as well.

In empirical terms, however, the studies are more partial, sometimes investigating the possible deleterious effects of working on the human capital accumulation of the children, sometimes investigating the effects of several micro- and macro- variables that affect education. For instance, Barros *et al* (1999) analyze the family decision on time allocation between working or not, without taking into account the decision of studying or not. On the other hand, Behman, Dureya, and Szekely (1999) investigate the role of family and macro- and social variables on school attendance. In this paper, we attempt to analyze these choices as a whole, trying to identify the determinants of time allocation decisions among four possibilities: i) only work, ii) Only study, iii) doing both, work and study, and iv) doing Neither; taking into account the simultaneity of the relation between school attendance and teenager work in Brazil.

2. Recent empirical evidence

The participation of the teenage labor force in Brazil is very high when compared to other countries with a similar economic background. The relative position of Brazil in Latin America can be seen in Figures 1.a and 1.b. Argentina and Chile, countries with a per capita income similar to Brazil, have a participation rate of 1% for those between the ages of 10 and 14 years, while in Brazil this rate is 17%. The figures are higher for those between 15 and 19 years of age: 53% in Brazil compared to 10% in Chile and 15% in

¹ Paes de Barros R. & Mendonça R. *Os determinantes da desigualdade no Brasil* Rio de Janeiro, Texto para Discussão No 377, IPEA, 1995.

Argentina. Brazil also has one of the highest proportions of young people who work and study at the same time.

FIGURE 1.a

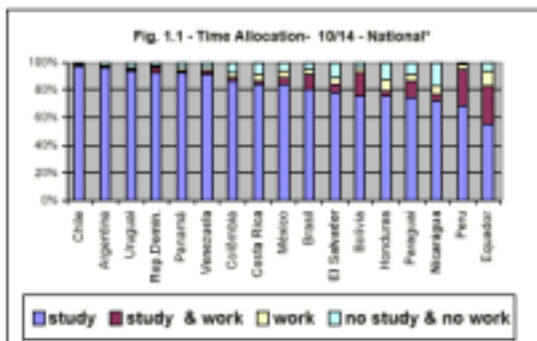
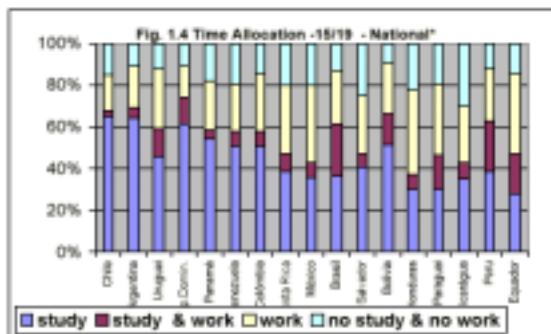


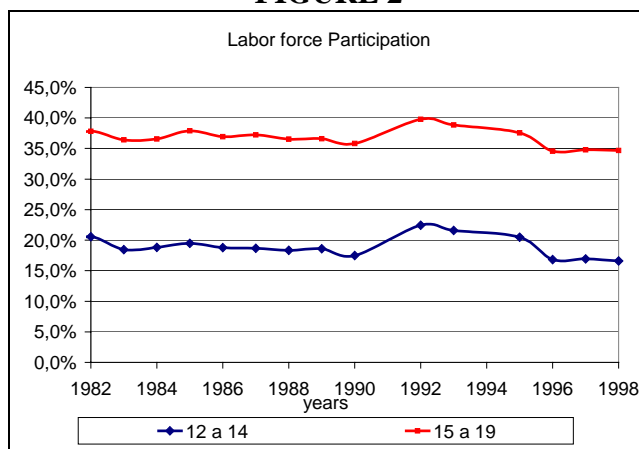
FIGURE 1.b



Source: Menezes *et al* (2000)

Figure 2 shows the evolution through the years of labor force participation for both age groups. It changed very little in the 1981/98 period: from 16,6% in 1998 to 22,4% in 1992 for those between the ages of 12 and 14 years, and from 34,6% in 1996 to 39,8% in 1992 for those in the 15 to 19 year old age group. On the other hand, in the last three years, those rates have stabilized at their lowest levels. Overall, those are very pessimistic results, but fortunately they don't tell the whole story.

FIGURE 2



When we analyze school attendance, we get a more optimistic picture. The proportion of children between the ages of 10 and 14 years who attend school increased systematically over the whole period, from 79% to 95%. This last figure is close to the one shown in Argentina and Chile, 99%. For the group between the ages of 15 and 19 years, the rate increased from 46% to 66%--also close to the one shown in Argentina and Chile, around 70%. During that period, the average rate of growth in school attendance was higher for those 15 to 17 years old.

FIGURE 3

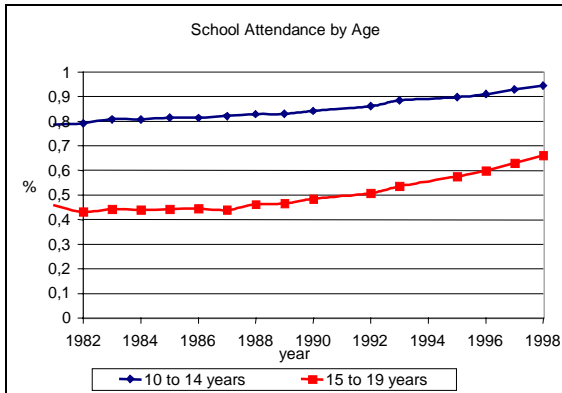
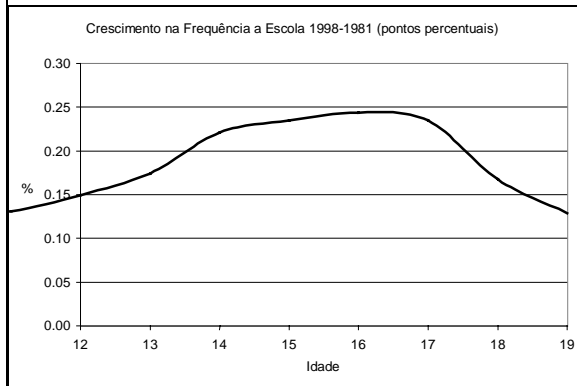


FIGURE 4



The mixed results presented above can be better understood by separating the decisions into the four groups: those who only worked, those who only studied, those who did both, and those who did neither. For children 10 to 14 years old (Figure 4.1), the percentage of those who only studied increased from 70% to 80%, but the percentage of those who worked and studied also increased from 9% to 15%. In the 15 to 19 year old group, the proportion of those who only studied increased less, from 30 to 36%, but of those who did both, which is the most likely time allocation for this age, the rate increased from 16% to 30%. Therefore in both age groups, the decline was in the allocation of doing neither and only working, but it was greater for the younger group.

FIGURE 4.1

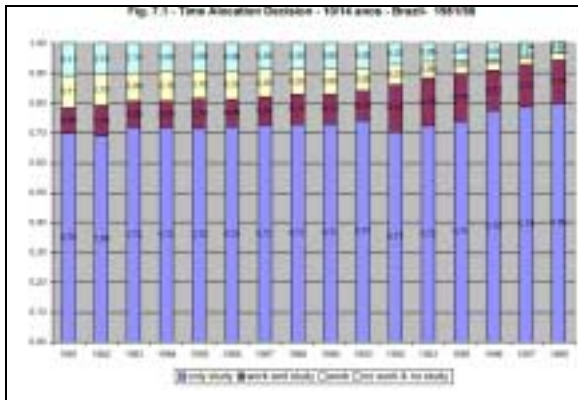
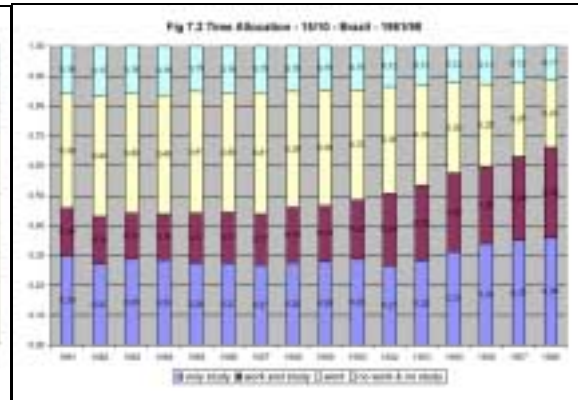


FIGURE 4.2



When the data is analyzed by income decile, the gains in terms of increased school attendance are higher for the poorest in the 1st decile than for the richest in the 10th, as might be expected. For the first group of children between the ages of 10 and 14 years in the 1st decile, the percentage of those studying increased from 63% in 1981 to 90% in 1998 due to both an increase of 14 percentage points in the category only study and an increase of 13 percentage points in the category work and study. In the 10th decile these figures are, respectively, 90% and 99%, due mainly to an increase in those only studying. For the older age group, those between 15 and 19 years old in the 1st decile, the proportion of people

studying increases from 28% to 43%, due mainly to an increase in the category work and study and a decline in only work, which still shows a very high figure of almost 40%. In the 10th decile, there is an increase in the category only study from 55% to 65%, and also in work and study from 18% to 24%.

FIGURE 5.1

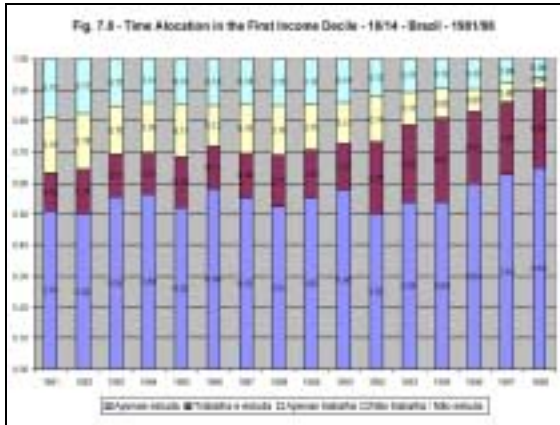


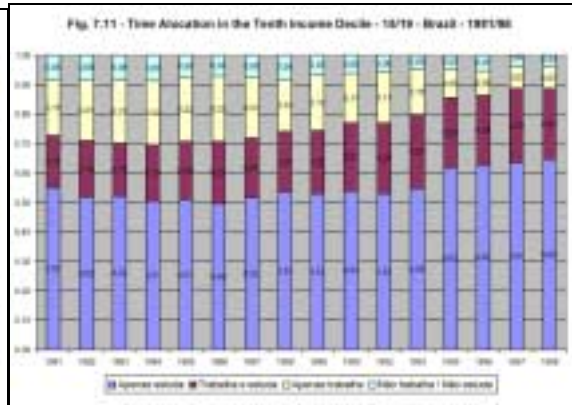
FIGURE 5.2



FIGURE 5.3



FIGURE 5.4



Analyzing all deciles in 1996, the results are as expected: for the youngest group, the category only study increases directly with the income decile while the percentage of those working and studying falls, as well as the percentage of those who only work or don't work or study. For the oldest group, we also observe an increase in the proportion of those only studying with income, and this increase is more accentuated in the 10th decile. On the other hand, the percentage of those working and studying is not monotonic with income and is lower in both extremes of the distribution.

FIGURE 6.1

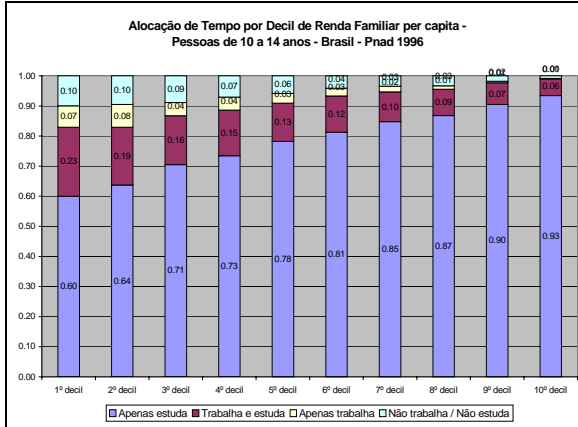
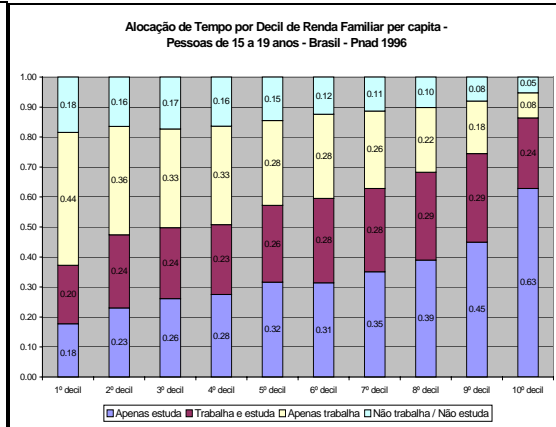


FIGURE 6.2



3. Determining the factors of time allocation decisions

The time allocation decision model considers that family $i=1,2,\dots,N$ makes the choice $j=0, 1, 2, 3$ determined by the regressors $p=1, \dots, P$. Therefore we have a linear predictor for family i , $X_i\beta_j$ and the probability that family i chooses allocation j is given by

$$\Pr(Y_i = j)P_{ij} = \frac{\exp(X_i\beta_j)}{1 + \sum_{k=0}^j \exp(X\beta_k)} \quad (1)$$

The estimation equation gives a set of probabilities for the $J+1$ choices for the individual/family with characteristics X_i .

$$\Pr(Y = j)P_j = \frac{\exp(X\beta_j)}{1 + \sum_{k=0}^j \exp(X\beta_k)} \quad (2)$$

The coefficients of this model are based on hard interpretation, but by differentiating (2) we get the marginal effect of attribute j in the probability:

$$\frac{\partial P_j}{\partial X_i} = P_j[\beta_j - \bar{\beta}] \quad (3)$$

In particular, note that X_k , $\partial P_j / \partial X_k$ do not necessarily present the same sign as β_{jk} . (Greene, 1997). It is more correct to compute the mean predicted probabilities instead of computing the probabilities in the mean values of the regressors. The mean of individual probabilities was computed:

$$\bar{P}_j = \frac{1}{N} \sum_{i=1}^N \hat{P}_j$$

where \hat{P}_j is computed for each family using the regressors' values. To compute the marginal effect of the regressor X_p , we fixed the other variables in their values and imputed several values for X_p from the sample. Those computations allow us to determine the probability of each choice associated to each variable conditioned on the others.

To estimate this multinomial logit model, data was used from Brazilian Household Surveys (PNADS) from 1981 to 1998. For each individual, the following information was collected for people between 10 and 19 years of age. The following allocations were defined:

Allocations:

- 0 = the person is not studying and is not in the labor force
- 1 = the person is studying and is not in the labor force
- 2 = the person is not studying and is in the labor force
- 3 = the person is studying and is in the labor force

Regressors:

- Sex = 1 if male
= 0 if female
- Age
- Urban = 1 if living in an urban area
= 0 if living in a rural area
- Head of family's occupation = 1 if self-employed or an employer
= 0 if otherwise

This variable was included to verify the importance of available work in the family business.

- Number of children = number of children less than 8 years old
This variable was included to capture home labor.
- Number of adults = number of members in the family more than 8 years old
- Parents' education
- Family income = net of the salary of the young
This is to capture the financial constraint for human capital investment.

4. Results of the model for all ages estimated for 1981 and 1996.

Before presenting the results of the estimation, we show the unconditional probabilities of each allocation, for all ages, in 1981 and 1996:

Unconditional Distribution		
Allocations	1981	1996
Not Working / Not Studying	13,3	9,0
Not Working / Studying	50,3	56,4
Working / Not Studying	24,3	15,2
Working / Studying	12,2	19,4

As we can see, the category not working/studying showed the highest frequency and increase from 1981 to 1996, working/not studying was the second highest in 1981, but not

in 1996 when studying/working took its place. Not working/not studying, in the third position in 1981, dropped to the last position in 1996.

The probabilities computed with the results from the multinomial logit estimates presented in the graphics, were the following:

a) Sex – In 1981 as well as in 1996, the most likely allocation for women was only study. For men, in 1981, the probabilities of studying without working and working without studying were close. In 1996 the probability of only study became the highest. For women, an important difference between 1981 and 1996 was the reduction of not working and not studying that probably reflected work at home. For men, it was the change of position of not studying and working, the highest in 1981, with working and studying, that increased in 1996. In general, we can say that the differences between genders declined in the period.

FIGURE 7.1

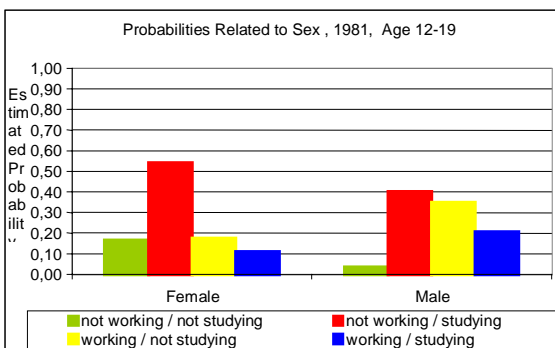
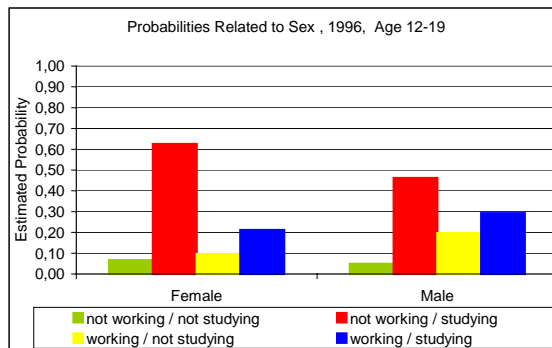


FIGURE 7.2



b) Age – The probability of studying and not working strongly declined with age and increased its opposite: working and not studying. On the other hand, age had a minor role in the probability of not studying and not working, as well as in working and studying. These results are observed in both years, but mainly in 1981. Age also lessened the probability for all ages of working without studying, and increased doing both between the two years. It is interesting to note that only study was no longer the most likely allocation for ages higher than 15 in 1981, and that this cut off age increased to 18 in 1986, becoming less likely than working and studying.

FIGURE 8.1

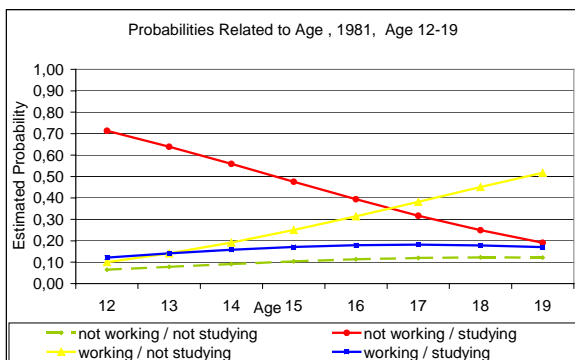
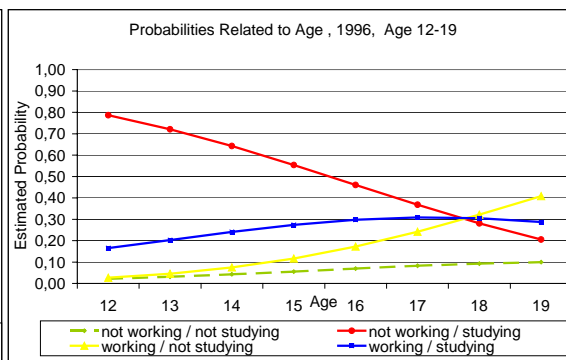


FIGURE 8.2



c) Urban – In 1981, to live in a city implied in higher probability of studying, working or not, while in the rural area, the chances of only work or only study were high and similar. Between 1981 and 1996, the differences in allocations between rural and urban areas declined significantly for all allocations, and working and studying that was higher in urban areas in 1981 increased and became equal in both by 1996.

FIGURE 9.1

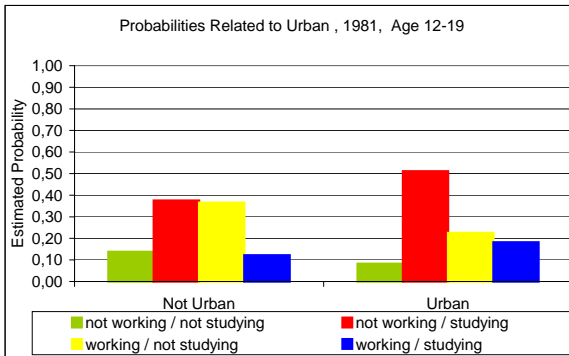
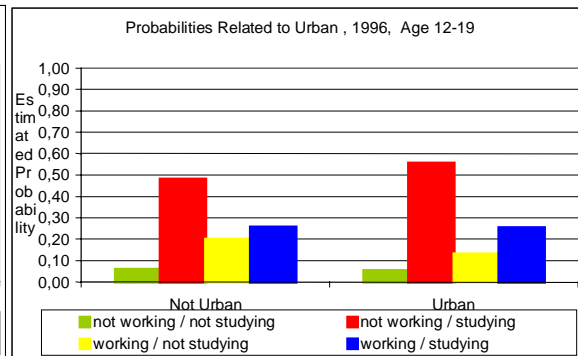


FIGURE 9.2



d) Head of family's occupation – In both years, the head of family's occupation did not seem to make a big difference in time allocation, since the figures were very close to each other. In any case, there were the same differences between the two years: not working and studying was higher among families where the head was self employed or an employer in 1981, and became higher in 1996; working and studying that had the same probability in 1981, became higher for those families in 1996.

FIGURE 10.1

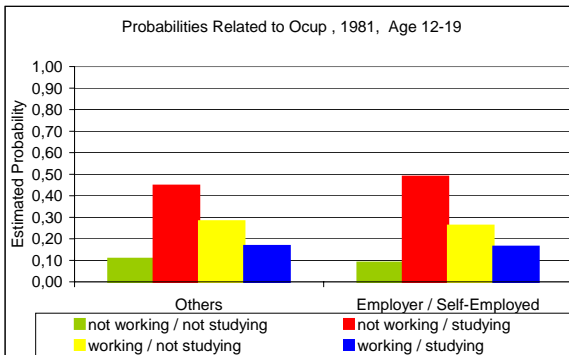
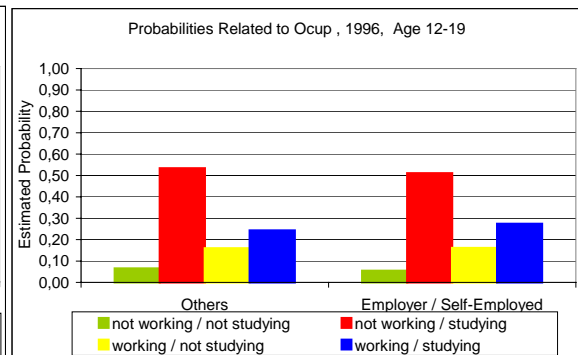


FIGURE 10.2



e) Number of children – This variable had the expected result and showed little change between both periods. As the number of children below 8 increased, the chance of studying (mainly without working) was less, and the chance that the individual would not study or work was greater, possibly to take care of the smaller children. On the other hand, this variable seemed to have become more important in 1996 than in 1981 where the differences were less marked.

FIGURE 11.1

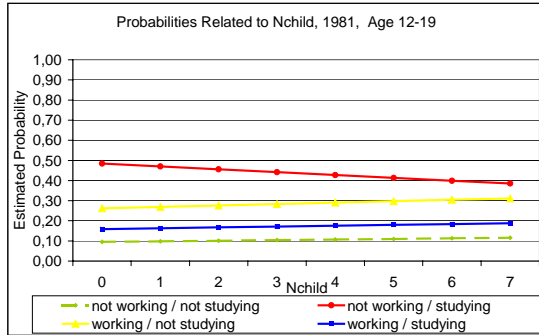
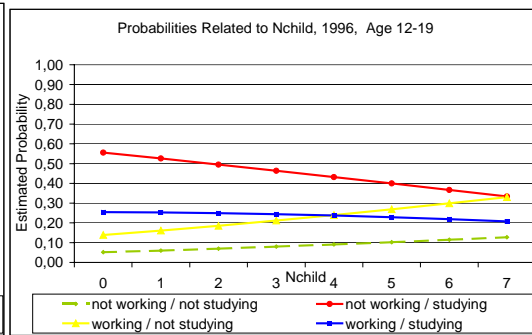


FIGURE 11.2



f) Number of adults – The number of members above 8 years old has a less clear effect and is harder to understand. In 1981, it increased the probability of working, but in 1996 increased the probability of studying without working.

FIGURE 12.1

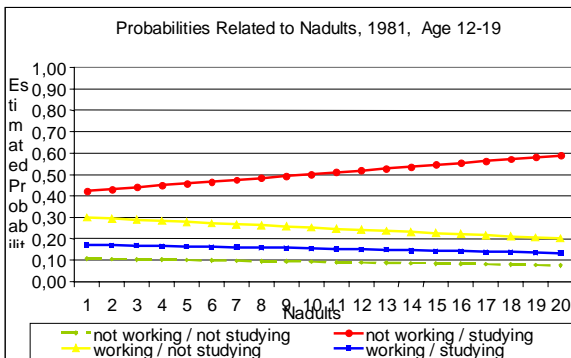
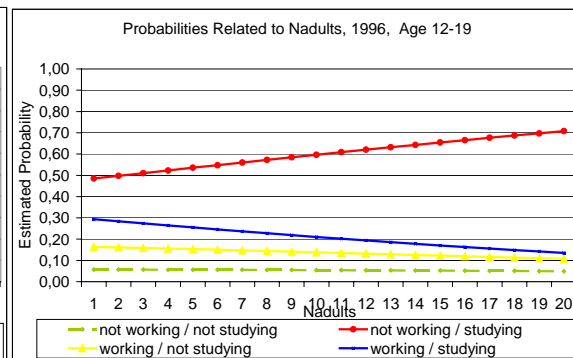


FIGURE 12.2



g) Parents' education – The more educated the parents, the higher the probability of studying and the lower the probability of the other allocations. In both years the behavior was very similar, but in 1996 for any level of the parents' education, there was an increase in the probability of only study and decline of only work.

FIGURE 13.1

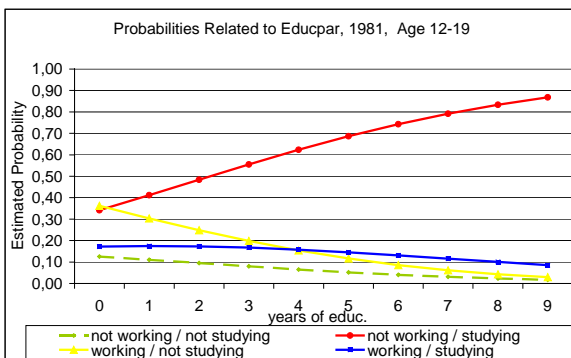
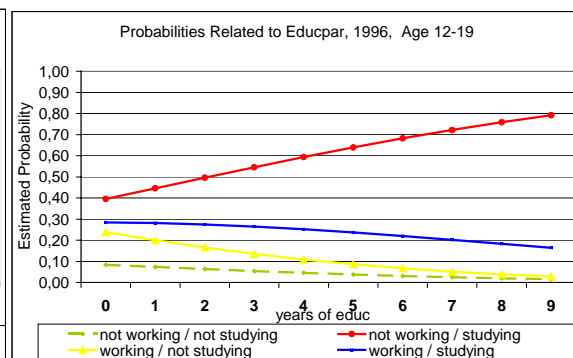


FIGURE 13.2



h) Family Income – This variable also has the expected effect: positively on the probability of studying mainly without working, and negatively on the probability of only working and doing neither. There was almost no change between the two periods.

FIGURE 14.1

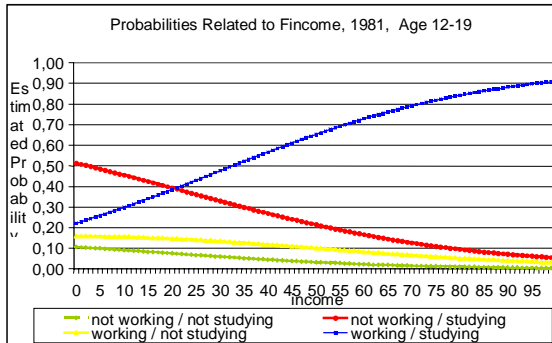
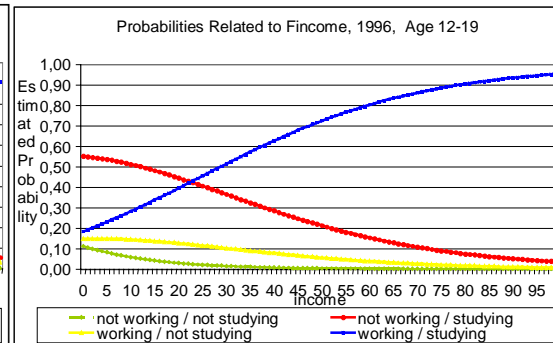


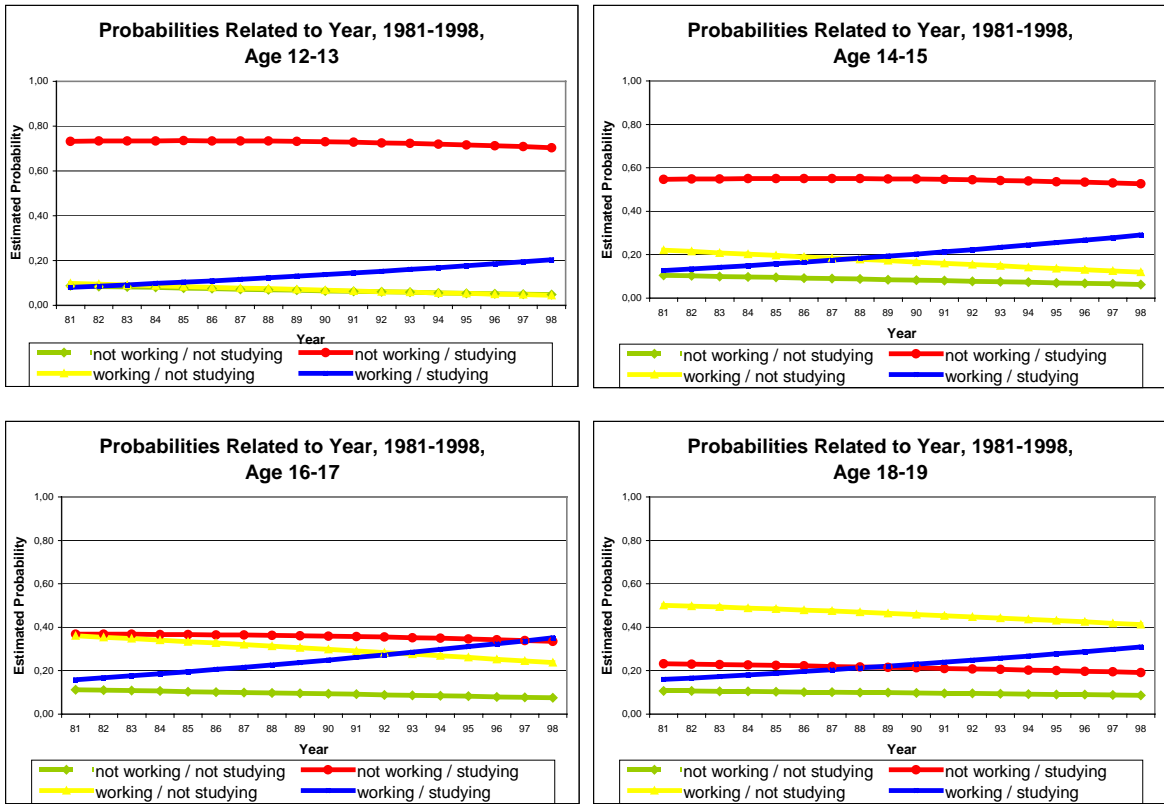
FIGURE 14.2



Regressions were estimated also for the 1981 to 1998 period for four age groups: 12 to 13 years, 14 to 15 years, 16 to 17 years, and 18 to 19 years. Obviously, for all variables, the results were somewhat modified, but we will present the results only for the most significant variables: sex and living area.

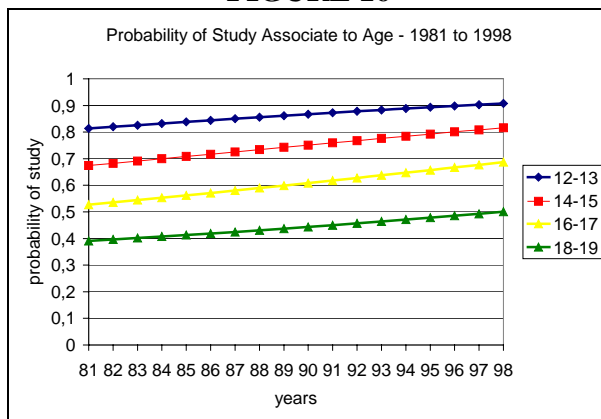
The figures below show that, while for the 12 to 13 year old group (and to a lesser degree for the 14 to 15 year old group) the most likely allocation was only study, for the 16 to 17 year olds, this allocation had a probability similar to the other allocations. For the 18 to 19 year old group, at the beginning of the 80's, it was the second preferred allocation and, after 1988, it became the third. For all age groups, the probability of this allocation was quite steady during the whole period. After 1986, it fell for all groups at an increasing rate, greater for the older groups. We also observe an increase in the probability of working and studying for all age groups, but more of an increase for the intermediate ages: 14 to 15 and 16 to 17. For this last group it became the most likely allocation in 1998. For the 18 to 19 year old group, only work presented the highest probability, but with a decline during the period, so that the tendency was a rise toward working and studying. This allocation also fell for all age groups, also at increasing rates, but greater for the younger age groups.

FIGURE 15
Probabilities Related to Year, 1981-1998



As we can see, the probability of not working and not studying fell for all age groups at an increasing rate, and the younger the group, the greater the decline. When we sum the probability of only study with the probability of working and studying to have the probability of studying, working or not, we get the following picture:

FIGURE 16



There is an increase in the probability of studying for all age groups except for the 18-19 year old group. The increase is at a decreasing rate. In all the groups and for all cases, we do not notice any change in the pattern of behavior that could be associated with some kind of public policy. For instance, there is no noticeable change after 1995 that could be associated with the new government that took charge that year.

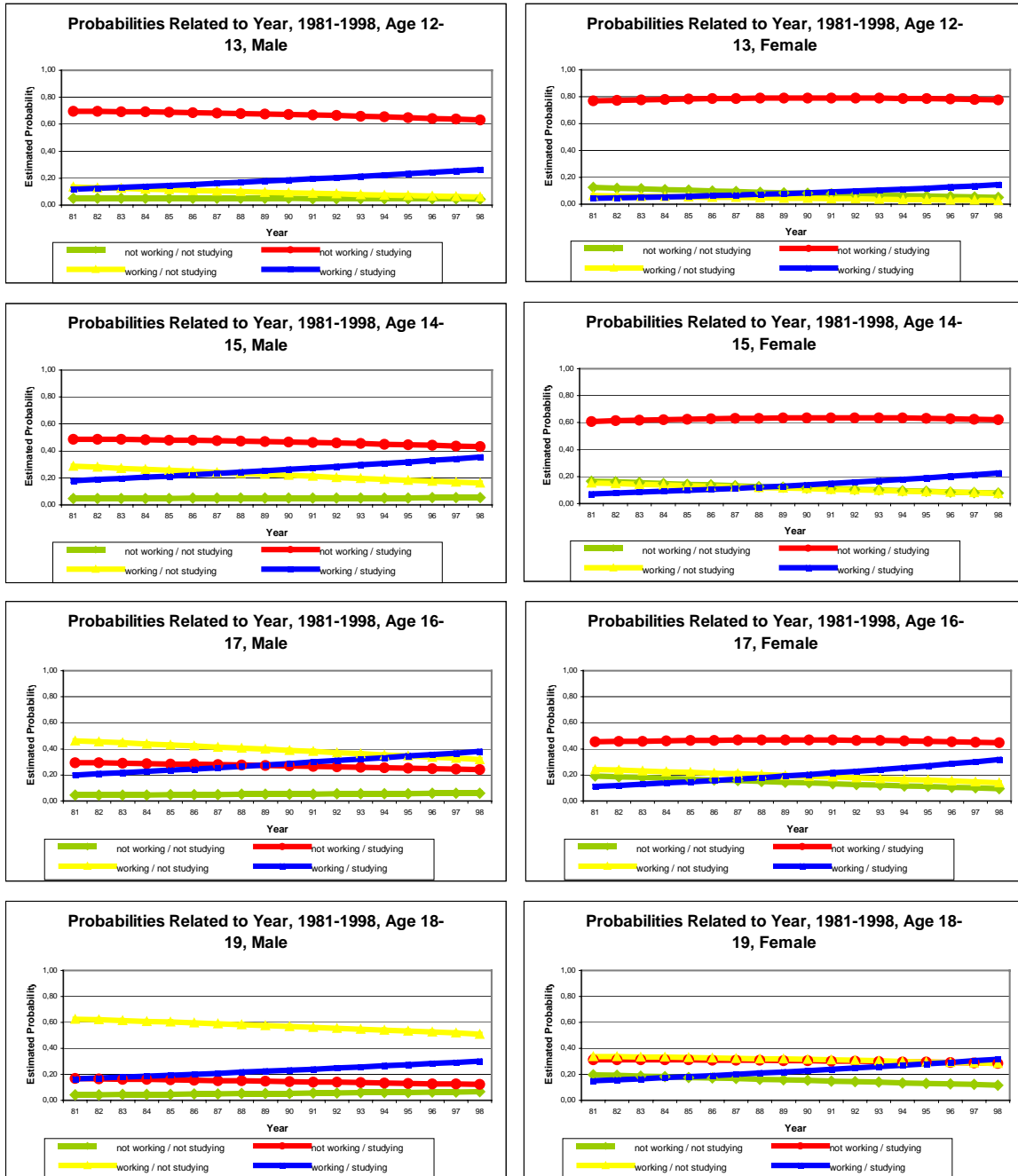
The effects of sex on the allocations' probabilities are the following: for the younger group, there was a decline for boys in the only study category which was relatively constant for girls, and an increase in working and studying that also increased for girls but to a lesser degree. For girls, the decline was in not working and not studying that may be associated with domestic labor and with working and not studying.

FIGURE 17

Probabilities Related to Year by Sex

Male

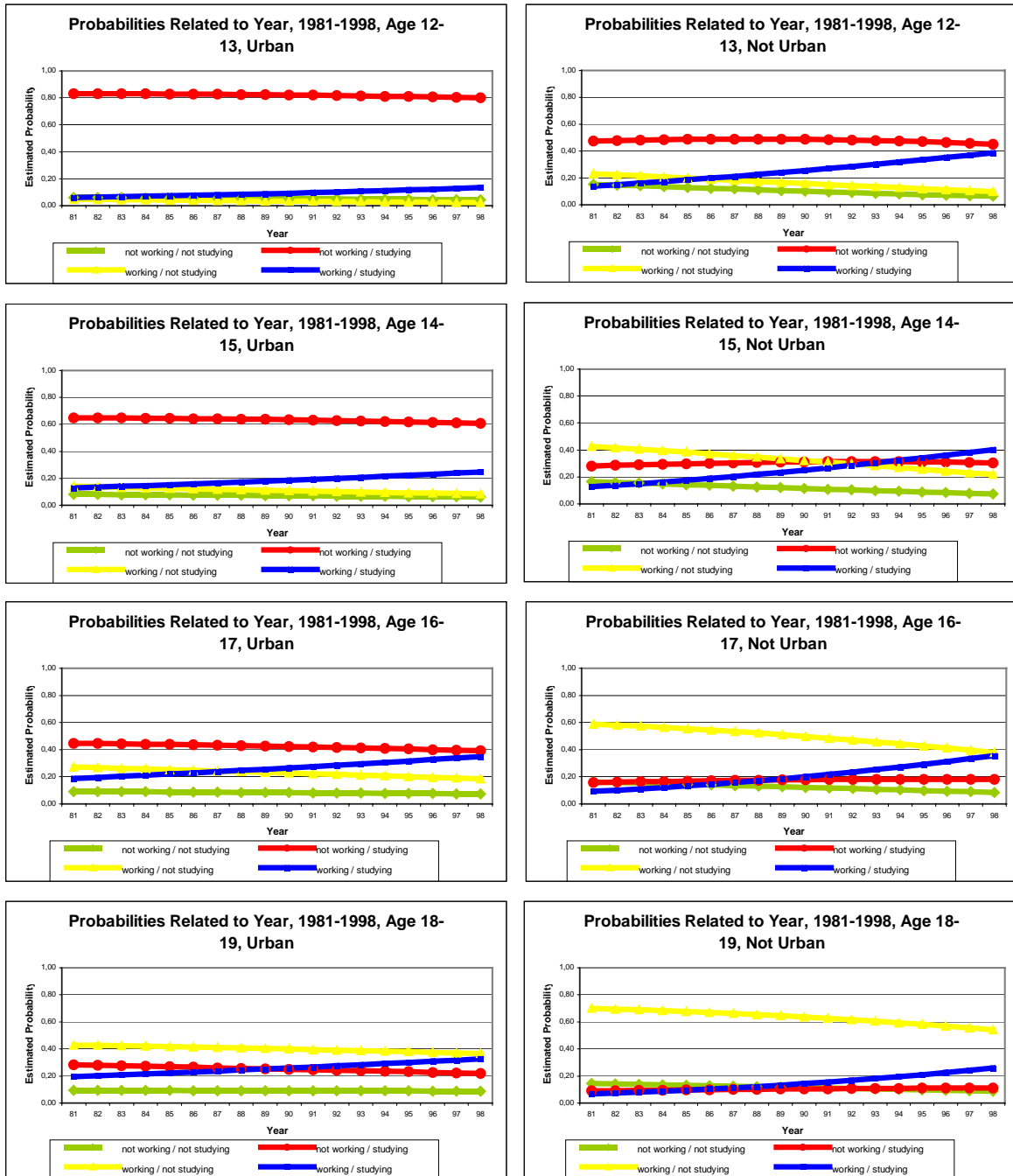
Female



For the 14 to 15 year old group, we observe a similar picture. There was a decline in the probability of only studying for boys and a constancy for girls, and an increase accentuated more for boys in the probability of working and studying.

With respect to the area where the person lives, rural or urban, we get the following picture:

FIGURE 18
Probabilities Related to Year by Urbanization
Urban Not Urban



As we discussed before, there was a big difference between allocations in the urban and non-urban areas. In the urban area, the most likely allocation until age 17 was only study, while in the rural area, this was the most likely allocation only for those in the 12 to

13 year old group. For the remaining ages, until 1993, it was only work. After that year, for the group between the ages of 14 and 15 years, work and study became more likely. But for all groups, the only allocation that systematically grew was work and study. In the rural area, this allocation increased 25 percentage points for the 12 to 13 year old group, 27,5 percentage points for the 14 to 15 age group, 26 percentage points for the 16 to 17 group, and 19 percentage points for the 18 to 19 year old group. Therefore, for all groups, it became the second most likely allocation, except for the 14 to 15 year old group where it was the first. The same phenomena were observed in the urban area, but the changes were much smaller. It is interesting that not working and not studying was in the last position for all age groups except for the 12 to 13 year olds in urban areas, and this result is probably associated with labor at home.

5. Conclusions

Although Brazil is behind many Latin American countries, it has improved its educational record in the last twenty years. On the other hand, labor force participation rates were quite stable during that period suggesting that the relevant change was in the growth of the proportion of those studying and working simultaneously. The analysis for the years 1981 and 1996, taking into account individual and family characteristics, allows us to verify which variables had a differentiated impact on time allocation. For the decision of only study, the more important variables are, as suggested by the literature, parents' education and family income: better-educated parents and more prosperous families increase the probability of school attendance without working. This relationship was stable in the two years of analysis and less important for the youngest children. The number of children in the family and the sex of the individual also affected the probability of Only study: being male and having many children at home lowered this probability for all ages in the two years analyzed. Those same variables have a strong effect, but with an opposite sign, on the decision to only work. The allocation that increased more in the period, work And Study, responded strongly to the location of the family in the rural area. In 1981, this was the least likely option and became the second option in 1986. Not working and not studying had a higher probability for girls in families with a larger number of children. This seems to indicate time dedicated to domestic work and to taking care of younger family members.

The analysis for all years, 1981 to 1988, shows that time had a small effect on the probability of only study, while the probability of only work also declined. On the other hand, it confirmed the increase of the allocation work and study. This behavior is especially great for the poorest and youngest and in rural areas. Therefore, it is possible to characterize the increase in education that has taken place in Brazil in the last twenty years to be the result of the generalization of elementary education, particularly in rural areas, that allowed teenagers who were only working to combine school and economic activities.

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