Effects of Economic Shocks on Children's Employment and Schooling in Brazil

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Abstract:

In this paper we analyze employment and schooling patterns of urban Brazilian children and youth from 1982 to 1998 using data from Brazil's Monthly Employment Survey (PME). We document substantial declines in the proportion of boys and girls who are working, with most of the decline occurring in the 1990s. We take advantage of the longitudinal structure of the PME to estimate transition rates in and out of employment for young workers. The results indicate relatively high volatility in employment, with both higher exit rates and lower entry rates responsible for the decline in youth employment in the 1990s. We estimate bivariate probit regressions in order to analyze the extent to which economic shocks to the household affect both labor force entry and grade advancement of children. We find that the male household head becoming unemployed tends to increase the probability of labor force entry and decrease the probability of grade advancement for girls age 10-14, although the magnitude of the effects are relatively small. The estimated effects for boys are even smaller and not statistically significant. The results suggest that children's time allocation to work and school are not a major source of adjustment by households to short-run economic shocks, although there do appear to be negative effects on girls.

Introduction

Does economic volatility have negative long-term consequences for children in developing countries? It is often argued that households feeling the pinch of financial crises or structural adjustment and stabilization policies will reallocate their resources to best weather the negative economic shock. In the case of poor urban households, the time allocation of family members may be the primary, if not the only, resource available for adjustment. Our concern is with whether such households reallocate the time of children in ways that have consequences for children's current and future well-being. In particular, do households under economic stress transfer children's time out of school and studying and into labor force work?[1] If households are not able to buffer short-term economic downturns then children who were previously not employed may be sent to work, with interruptions to their education or reduced progress in school among the potentially damaging implications of child labor.

In addition to direct policy concern over the effects of economic shocks on child labor, researchers may be interested in whether such effects exist because of what they reveal about the ability of households to smooth transitory economic shocks. If an adult becoming unemployed leads to increased work activity by children, this suggests that households are not able to fully insure against short-term income volatility. The extent to which households can buffer against short-run shocks is an important issue in thinking about the policy implications of economic crises such as those experienced in Latin America during the 1980s or more recently in East Asia.

In this paper we analyze the relationship between household economic shocks and child employment in Brazil's six largest metropolitan areas. Brazil has had relatively high levels of child employment, especially considering the country's relatively high per capita income. As we will see below, employment rates for 14 year-old boys were around 20% in the 1980s. Concern that high rates of youth employment may be competing with schooling are reinforced by Brazil's poor schooling performance in recent decades (Birdsall and Sabot 1996). Brazil's case is also

[1] It is possible that households might reallocate children's time out of school or study into non-labor-force household work. While the results of studies of children's work and school interactions are sensitive to whether or not household chores are counted as "work" (e.g., Levison, Moe, and Knaul 2001; Assaad,

interesting because of the substantial economic volatility experienced during the 1980s and 1990s. After two decades of rapid economic growth in the 1960s and 1970s, the country experienced an economic crisis in the early 1980s, followed by large fluctuations that left per capita income in 1990 at roughly the 1980 level. Brazil's economic performance was somewhat better in the 1990s, although it continued to be characterized by considerable volatility.

Our analysis exploits an extremely rich source of data on youth employment spanning most of two decades in Brazil. The data include a longitudinal component that allows us to observe month-to-month transitions in and out of employment by all household members ages ten and over. We take advantage of this component to investigate our question of primary interest: do negative economic shocks at the household level cause children to move into employment or impede their educational attainment? On the way to answering that question, we document important descriptive patterns. First we describe trends in child and youth employment levels from 1982 to 1998. Although this has been done using annual surveys (Duryea and Arends Kuenning 2001), our data come from monthly surveys and thus capture seasonal patterns. Next, we estimate transitions in and out of employment over the same time period. We then use these entry and exit rates to try to understand the declining levels of employment over time, demonstrating the extent to which such trends are attributable to changing patterns of entry into employment or exits from employment. These results help to motivate our interest in the effects of transitory shocks, as does a brief discussion of the literature. A methodological section explains our use of regression analysis to estimate the effects of a father becoming unemployed on the employment status and educational progress of the children in his household. Finally, we present and discuss our results and the degree to which they show sensitivity or are robust.

We use the International Labour Organization's definition of a "child": a person under age 15. We have information on household members for ages 10 and over, so our focus is on the 10-14 age group. In addition, we also consider 15 and 16 year olds. These ages are transitional times for many youth, as they begin to take on adult responsibilities, and are thus especially interesting. These older adolescents are considered children under the United Nation's

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Levison and Zibani 2000), our data does not include measures of household work that would allow us to address this possibility.

Convention on the Rights of the Child, which broadens the definition of child to include those up to age 18.

Brazil's Monthly Employment Survey

The empirical analysis in this paper uses Brazil's Monthly Employment Survey, the *Pesquisa Mensal de Emprego* (PME). This survey is collected monthly by Brazil's national statistical agency, the *Instituto Brasileiro de Geografia e Estatística* (IBGE); the PME is the country's primary source of information on employment and unemployment. The PME survey is organized with a panel structure similar to the United States Current Population Survey. Respondent households are surveyed once per month for four consecutive months, rotate out of the sample for eight months, and then rotate back in for four final months. Beginning in February 1982, the PME includes questions on earnings, hours, education, economic activity during the previous week, occupation, job search, and relationship to household head for everyone in the household ages 10 and over. The employment and job search questions are quite detailed, including questions on length of unemployment spells, reason for leaving last job, and receipt of unemployment compensation.

The PME is a random sample of households in six major metropolitan areas of Brazil: São Paulo, Rio de Janeiro, and Belo Horizonte in the Southeast; Porto Alegre in the South; and Recife and Salvador in Northeast Brazil. The PME surveys about 35,000 households each month, with 4,500 to 7,500 households in each of the six metropolitan regions included in the sample. Our analysis is based on PME surveys from February 1982 through August 1998. The samples are large enough to allow us to look at males and females for single years of age, a valuable feature of the data given potentially large differences in child employment by age and gender. In any given month between 1982 and 1998 we observe about 800-900 14-year-olds of each sex. While these numbers are not large enough to eliminate volatility in monthly estimates, they give us a good picture of trends in education and labor force outcomes and provide a sound basis for the regression analysis presented below.

Trends in Youth Employment in Brazil, 1982-1998

We begin by documenting the overall trends in youth employment in Brazil. Figure 1 shows the employment rates for 14 year-old and 16-year-old males and females for the population-

weighted average of the six Brazilian cities included in the PME from 1982 to 1998.[2] Anyone doing labor force work is considered to be employed; we do not distinguish between employees, employers, self-employed workers, or family workers.[3] The 14-year-olds are especially interesting since they are the oldest age group still considered to be children under most international definitions. Elsewhere we show that employment levels increase substantially with each year of age starting at about age 12 (Levison, Duryea, Hoek and Lam 2000). Figure 1 shows that employment rates of 14 year-olds in Brazil have been relatively high, with over 20% of boys and over 10% of girls working in the early 1980s. Employment rates for 16 year-olds reach levels as high as 50% for boys and 30% for girls in the 1980s.[4] During the 1980s there is relatively little decline in youth employment rates, and even evidence of rising employment rates in the mid-1980s. Analysis for separate cities suggests that this is especially true in São Paulo, where youth employment rates reach a peak in the second half of the eighties. There are, however, substantial declines in employment rates for males and females in both age groups from the early 1980s to the late 1990s. In most cases employment rates in 1998 are about half what they were in 1982.

Figure 2 divides the sample of 14-year-olds according to one simple measure of socio-economic status, the education of the mother. Mother's education is non-missing for a high proportion of children, since mothers are much less likely to be absent than fathers, and using education avoids the large reduction in sample size from using income measures with more frequently missing information. Given the high correlation in mother's and father's schooling and

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[2] Since monthly estimates for a single year of age are fairly volatile, the figures show three-month moving averages. The estimates use the sample weights provided by IBGE.

[3] Individuals are classified as employed based on the answer to a question about their principal activity during the week before the survey. In the case of individuals indicating more than one activity (such as work and school), interviewers were instructed to mark the activity that appears first on the questionnaire, with working being the first activity listed. Children involved in both work and school will be classified as employed according to this measure. A separate set of questions about schooling is used to determine educational enrollment and grade advancement.

[4] Separate analysis by cities show that the highest employment rates are often in São Paulo, with rates of 60% for 16-year-old boys in the 1980s (Levison et al. 2000). The fact that São Paulo's employment rates are higher than those in much poorer cities such as Salvador suggests that demand-side effects of greater employment opportunities may be more important than labor supply effects resulting from low income levels. This is consistent with the argument of Barros et al. (1996) that poverty alone cannot explain Brazil's high child employment rates in Brazil, given the regional pattern in child labor.

the high explanatory power of schooling in explaining both men's and women's earnings in Brazil (Lam and Schoeni 1993), mother's education is an attractive variable to use for descriptive analysis of socioeconomic differentials in child employment. Figure 2 shows employment rates for two groups – those whose mothers have less than 4 years of schooling, and those who have more than 4 years of schooling. This roughly divides the sample in half at the beginning of the period. Not surprisingly, children with less educated mothers are more likely to work. For both boys and girls, the employment rates are about twice as high for those with less educated mothers in the 1980s. Employment rates for all groups decline in the 1990s, with somewhat faster decline for those with less educated mothers. For girls, the gap between the two education groups is fairly small by the end of the 1990s, with even the more disadvantage group dropping below 10% employment rates. The narrowing of the gap between the two socioeconomic status groups may be related to increased school enrollment rates in the 1990s (Levison, Duryea, Hoek and Lam 2000), since the increase is likely to be occurring among children from poorer families.

Transitions In and Out of Employment

Thus far we have used the PME as a repeated cross-section. Now we take advantage of the unusual longitudinal dimension of the data, which makes it possible to follow month-to-month labor force transitions. Figure 3 shows estimates of monthly transitions in and out of employment for 14 year-old males and females in the six PME cities. For each month the data are used to calculate the proportion of children who change status from being employed in one month to being non-employed in the following month.[5] We define the exit rate for month t as the number of children who change from the category "employed in month t" to "non-employed in month $t+1$," divided by the number of children who were employed in month t. The entry rate is defined analogously based on those who move from "not employed in month t" to "employed in month $t+1$." As above, the figures show three-month moving averages. For 14 year-olds, we see that in the early 1980s the probability that a boy who is not working in a given month is subsequently observed working in the next month is about 10%, while the entry rate for girls is about 5%. The

[5] Here we classify all individuals as either working (in the labor force) or not. We do not distinguish between being unemployed (looking for work but not working) and being out of the labor force.

probability that a working boy leaves employment by the next month is around 25%, with fairly similar estimates for girls.[6]

It is interesting to consider whether the fact that girls' employment rates are roughly half those for boys, as noted in Figure 1, appears to be attributable more to differences in entry rates or differences in exit rates. Looking at Figure 3, it appears that the lower employment rates for girls are explained almost entirely by the fact that girls have entry rates that are half those for boys. Exit rates for boys and girls are fairly similar, suggesting that girls who do enter employment have similar job attachment as boys.

The large decline in employment rates over time, shown in Figures 1 and 2, appears to result from both decreasing entry rates and increasing exit rates. Exit rates rise to levels around 30% by the end of the 1990s for both males and females. In other words, about one-third of the children who are working in a given month are not working in the following month, a high degree of labor force mobility.[7] While all of these estimates may be subject to measurement error, it seems unlikely that measurement error can explain either the large increases in exit rates over time or the differences in entry rates by gender and socioeconomic status.

Table 4 shows entry and exit rates for 14 year-old boys by socioeconomic status, again proxied by mother's education. Entry rates are roughly twice as high for boys whose mothers have less education, reaching levels around 15% in the mid-1980s. Looking at exit rates, a dominant feature of the figure is the high volatility in estimated exit rates for the higher education group. This is the result primarily of the low numbers observed working in the sample in any given month, and probably does not represent actual higher volatility of exit rates compared to entry rates. Abstracting from this monthly volatility, the exit rates appear to be relatively similar for the two groups. This suggests that the large differences in employment levels are driven heavily by the differences in the rate of entry into employment between the two groups. Taking the less volatile estimates for the early eighties, for example, the probability of leaving

[6] The large monthly variations in Figure 3 reflect both seasonal movements and monthly volatility due to small sample sizes. The volatility is especially large in exit rates because of the small number of 14 year-olds observed working in any single month in the sample.

[7] We explore this phenomenon further in Levison, Duryea, Hoek and Lam (2000).

employment is roughly the same for children in both socio-economic groups. The fact that boys with less educated mothers have roughly twice the employment rates of those with more educated mothers is almost entirely due to the fact that the disadvantaged boys are twice as likely to enter employment each month. Once they take a job, the estimates suggest that boys in the two groups are about equally likely to stay employed.[8]

The high degree of mobility in and out of employment suggests that the percentage of children who work at some point during the year may be much higher than the rates estimated for any particular month. The PME data allow us to confirm this empirically. Levison et al. (2000) use the PME panels to construct a measure of whether a child works at any point during a consecutive four-month period. These results indicate that the proportion of 14-year-old girls who work at least once in a four-month period is roughly twice as high as the one-month employment rates shown in Figure 1. For 14-year-old boys, calculating employment on this four-month basis raises the employment rate about 15 percentage points in the 1980s, and about 10 percentage points in the 1990s, bringing the employment rate in 1998 to around 20%.

Effects of Economic Shocks on Work and School Transitions

The above results demonstrate that child and youth employment is not a rare event in Brazil's cities, and that this employment is characterized by a high degree of volatility. We have seen that this volatility varies by gender and socio-economic status, with differences in the probability of entering employment appearing to be the most important determinants of differences in observed levels of employment. Boys are roughly twice as likely as girls to move into employment in a given month, and boys whose mothers have less than four years of schooling are roughly twice as likely to enter employment as those whose mothers have at least four years of schooling.

We now turn to a more detailed analysis of these transitions by estimating bivariate probit regressions that include (1) movements into employment and (2) grade advancement of youth as the dependent variables. In addition to looking at the effects of relatively permanent household

[8] We are unable to address duration of employment in particular jobs. Employed children who change jobs but report being employed in two consecutive (monthly) interviews are counted as continuously employed here.

characteristics such as parents' education, we are particularly interested in the effects of transitory economic shocks to the household on these work and school transitions.

Since there are very few longitudinal data sets from developing countries that provide data on short-term work and school transitions, previous research in this area is quite limited. Brazil and Mexico have what may be the most interesting data for these purposes. Parker and Skoufias (2000) and Cunningham and Maloney (2000) have used the Mexico National Urban Employment Survey (ENEU) to analyze issues related to those we consider here. The ENEU survey follows households for five consecutive quarters. Cunningham and Maloney look at males and females ages 12-17 in the ENEU from 1987-1997, analyzing whether job loss by the mother or father causes children to leave school and enter employment. Using probit regressions for entering work and leaving school, they find very weak evidence of an effect of parental job loss, with some evidence that girls are more affected than boys. Parker and Skoufias use the ENEU panels from 1995 to 1997, a period of economic crisis in Mexico, to look at the effects of adult job loss, divorce, and marriage on the time allocation of both adults and children. Parker and Skoufias find some evidence that job loss by the head leads to an increase in work activity of girls, though they find no significant effect on time allocated to school or leisure. They find no significant effects of job loss on the time allocation of boys, and conclude that children appear to be largely unaffected by household economic shocks.

In research using the Brazil PME, Duryea (1997) finds that children are less likely to advance to the next grade in Brazil if their father experiences unemployment during the school year. Also using the PME, Neri et. al. (2000) consider changes in the child's labor force and schooling status over a one year interval, using transitions from positive to zero income by the household head as the idiosyncratic shock. They find evidence that the complete loss of income by the head between the fourth interview and eighth interview (one year later) of the panel is associated with increased probability that the child enters the labor force and decreased probability that the child advances in school.

As in Duryea (1997), an important focus of our analysis will be on the timing of shocks and potential adjustments. An important issue in looking at the effects of household economic shocks is that the observation of a shock such as unemployment or income loss may simply be a proxy for household characteristics that are correlated with outcomes such as grade repetition or child

employment. In other words, the observed child outcome may not be causally linked to the shock itself, but will be correlated with the shock in the data. The panels we are working with make it possible to separate the effect of shocks that occur during the school year from shocks that occur after the school year, allowing us to control, at least to some extent, for household heterogeneity that may cause spurious correlations between shocks and negative child outcomes. A potential problem with the Neri et al. (2000) results, for example, is that they analyze the effect of a decline in income from Year 1 to Year 2 on grade advancement from Year 1 to Year 2. Since the income decline is observed after the end of the school year in which the schooling outcome is determined, the timing is not be consistent with a causal effect of income loss on grade advancement.

Effects of the head becoming unemployed on labor force entry and grade advancement could occur for a number of reasons. If the household is credit constrained, short-run negative shocks to household income may force adjustments in the labor supply of other household members, including children. If some children are pushed into employment as a result of the shock, this may in turn affect their probability of grade advancement, even if they do not drop out of school entirely. School effort may be disrupted even if there is not an increase in work activity. Children may be pulled out of school, even temporarily, because of problems paying direct schooling expenses, such as school fees, cost of school supplies, or transportation costs. Some children, especially girls, may be pulled into increased domestic responsibilities if the mother increases employment in response to the job loss of the father. Increased stress in the household associated with the head's job loss may disrupt the child's school performance even in the absence of direct effects on enrollment. Although we cannot isolate all of the potential mechanisms through which job loss affects work and school transitions, our results will give us a relatively clean test of whether there is in fact an effect of the head's job loss on the probability that children enter employment and the probability that they advance in school.

Empirical Model

The time that children spend on various activities such as work and school is likely to be simultaneously determined. Whether child time use is determined by an adult decision-maker, by the child, or by a negotiation between family members, there are only 24 hours in a day. It is true that urban Brazilian children have a certain amount of flexibility due to the fact that many school days are only 4 to 5 hours long. In crowded schools, children may attend school in shifts, leaving

a considerable number of hours free for leisure, studying, working, and the necessities of life such as sleeping and eating. Still, children who are employed tend to work substantial numbers of weekly hours (Levison 1991). In general, it is reasonable to expect that increased hours of employment will reduce time for other activities. Even if they do not, we expect children's time spent on educational activities and on labor force work to be affected by the same observable and unobservable factors. We thus model the allocation of time toward school and studying, on the one hand, and labor force work, on the other hand, as simultaneously determined decisions. We estimate child transitions into employment and child grade advancement using bivariate probit regressions, which allow us to analyze the correlation of the error terms in the school advancement and work entry equations.

Taking advantage of the panel nature of the PME data, we follow male household heads and the children living with them over the first four months in which they are interviewed. The sample used for the regressions consists of children ages 10-14 who are enrolled in school and are not working at the time of the first interview. The sample is restricted to children who live in households with a male head present – we refer to this male head as the "father," although in practice he may be some other relationship to the child. We restrict the analysis to children who are sons, daughters or other relatives of the household head; we exclude children who are themselves classified as household heads or spouses of household heads. We further limit the sample by eliminating children for whom the first four interviewed months include the long break between the end of a school year and the beginning of the next school year. The reasons for these restrictions are discussed below.

The dependent variable capturing school advancement, *S*, is set equal to 1 if the observed child passed the grade he or she was attending as of the first interview and advanced to the next grade as of the month 13 interview, one year later. *S* equals 0 if the child does not advance to the next grade. Note that while the four months we observe occur in one year, evidence of the successful completion of the grade is not observed until the next year, given the eight-month gap between the fourth and fifth interviews. For example, if the child is attending grade 5 in March through June 1994, evidence that the child passed grade 5 is not observed until the child is re-interviewed in the following year (in the household's fifth interview, in March 1995), at which time the child is reported to have the same or an additional year of completed schooling.

More formally, achievement in school is assumed to be a function of the child's effort spent on schoolwork with a stochastic component:

$$S_{it}^{*} = X_i'\theta + Y_i'^{p}\sigma + T_{it}'\ \delta + m_t\ + a_t\ + \mu_{it}$$

$$S_{it} = \begin{cases} 1 \text{if } \mu_{it} \geq -X_i'\theta - Y_i'^{p}\sigma - T_{it}'\delta - m_t - a_t \\ 0 \text{ otherwise} \end{cases} \qquad (1)$$

Assume that *S** in equation (1) represents the child's effort on schoolwork over the year which is a function of child and family characteristics. X_i represents a vector of demographic characteristics for the child and his or her family. Y_i^p represents a vector of permanent income variables for the family. The vector T_{it} is an indicator of transitory shocks to household income. Month dummies m_t are included to control for seasonality. To control for intertemporal changes we include period-specific constant terms a_t representing the different year-to-year panels from 1982-83 to 1997-98. The stochastic component μ_{it} is a normally and independently distributed error term; it reflects the fact that parents and children cannot perfectly predict the amount of effort necessary to pass a grade. Since we do not observe actual effort on schoolwork, *S** is treated as a latent variable and the probability of grade advancement is modeled as a probit such that if *S** exceeds an unobservable threshold the child is promoted to the next grade.

The dependent variable capturing entry in labor force employment, *L*, is set equal to one if a child who was not employed in the first interview reported being employed in either the second, third, or fourth monthly interview. If that child remains non-employed, then *L* equals zero. Children's employment status (*L**) is also modeled as a latent variable such that the child is employed if the market wage $w^{m}{}_{it}$ exceeds the reservation wage $w^{r}{}_{it}$ at time *t*. The reservation wage is a function of current labor market conditions, as well as on child and family characteristics:

$$w_{i,t}^{r} = f\,(Y_{i,t}^{T}, Y_i^{P}, X_i\,)$$

$$w_{i,t}^{m} = f\,(X_i\,, \mathrm{m}_t, \mathrm{a}_t, \mathrm{m}_t)$$

$$L_{i,t}^{*} = w_{i,t}^{m} - w_{i,t}^{r}$$

Equation (2) represents the reduced form specification suggested by a simple reservation wage model:

$$L_{it}^{*} = X_i'\theta + Y_i'^{p}\sigma + T_{it}'\ \delta + m_t\ + a_t\ + v_{it}$$
$$L_{it} = \begin{cases} 1 \text{if } v_{it} \geq -X_i'\theta - Y_i'^{p}\sigma - T_{it}'\ \delta - m_t - a_t \\ 0 \text{ otherwise} \end{cases} \qquad (2)$$

The variables in equations (2) are the same as those described above for equations (1).

Operationalizing the transitory household shock is a difficult task. Ideally we would want to measure deviations from the lifetime income profile of the household head to capture the existence and magnitude of a negative income shock. However, since the PME is a short panel of eight interviews over a period of 16 months, it is impossible to know whether a decline in earnings is signaling a return to the respondent's long run income path or a short run deviation from the long run path. An additional complication is that earnings are reported as zero in the survey if, in the month for which earnings are reported (the month prior to the interview), the respondent did not hold the same job as the job held at the time of the interview (that is, the reference periods for earnings and for jobs differ; potentially generating missing information on earnings.) This mismatch of earnings and jobs happens when the respondent changes jobs between monthly interviews. Job changes are a frequent occurrence in Brazil, with its large informal labor sector.

Given the difficulties presented by changes in earnings, we use transitions to unemployment as the proxy for a negative income shock, thereby assuming that employment by the male household head is part of the long run path. Capturing the transitory nature of the shock is only a sufficient step in our estimation strategy. If one then finds that the father's move into unemployment affects a child's entry into the labor force or advancement in school, there are at least two possible explanations for the correlation. The first is that the income shock is unanticipated and affects children's work and schooling. The second is that there is some permanent characteristic of the family related to the unemployment that affects work and school transitions. In other words, it is possible that unemployment is adversely associated with children's work and school outcomes because the behavior is driven by persistent unobserved heterogeneity. For example, fathers with low ability and many labor force changes may have children with unsteady performance in school and frequent transitions in and out of employment,

even if there is not a direct causal relationship between one particular shock and the child's work and school transitions.

The unemployment variables have been constructed with the aim of testing whether a transitory, unanticipated shock affects children's behavior or whether persistent unobserved heterogeneity drives behavior. One sample restriction is that the male household heads must be employed in the first interview. Table 1 shows four cases in which the father is observed to be employed in the first monthly interview and subsequently becomes unemployed sometime in the next 4 interviews (in months 2, 3, 4, or 13). The omitted category for the father's employment transition is remaining employed for all 5 interviews, which is presented as case 1. Case 2 gives an example of the variable of interest in which the father is employed in the first interview and then becomes unemployed during the school year. Suppose the child was in grade 5 in March 1994, and the father became unemployed April through May 1994. We examine whether the child becomes employed in April, May, or June, and, simultaneously, whether the child successfully passes grade 5.

Case 3 of Table 1 provides an example of an ex-post unemployment shock which occurs after the school year in question and presumably should only affect the time allocation of the child in the previous year if the unemployment were anticipated by the family. In other words, since the shock occurs in March of 1995 this should have no bearing on the child's behavior during the previous school year. The significance of the ex-post unemployment shock is a test of the correlation of unobservables with permanent income after controlling for characteristics of the family.

The last case in Table 1 is an example in which the timing of the shock is indeterminate due to the nature of the school year. I.e., if the first interview is at the very end of the school year, or in the summer vacation, the timing is off for the purposes of our test. Thus observations starting their interviews in September through December are excluded from the regressions. There are two other categorizations of the father's employment transition which are used to keep the distinction between the two types of shocks (during the school year and after the school year). We control for the father being unemployed both during the school year and after the school year in order not to contaminate the variable of interest (unemployment during the school year). As noted by Thomas and Neri (2000), exiting the labor force in Brazil is associated with

advantageous changes including early pension eligibility but can also be associated with more negative changes including disability status and discouraged workers. These transitions are not of interest themselves but are dummied out to keep the main contrasts clean. Thus, if unemployment precedes leaving the labor force, the father is categorized as unemployed.

In summary, the sample is restricted to 10-14 year olds who are attending school but are not employed in the first interview. Furthermore, the male household head (who is either the father or a relative of the child) must be employed in the first interview; if not, the child is excluded from the sample. A male household head is required to be present so that we can measure the shock to a primary income earner with high labor force attachment. A dummy variable indicates whether the child is not the son or daughter of the head but another relative. We also control for the age of the child and whether the child is already more than two years behind schedule in school. To control for household's permanent income, we include the age of the household head as well as dummies for different levels of completed schooling, with no schooling acting as the omitted category. To control for local conditions, we include dummies for the metropolitan area with Salvador the omitted area. We include dummies for month to control for seasonal patterns, and we include dummies for year pairs to capture time trends.[9] Since girls and boys may face different demand for their time within the household, as well as in the labor market, we run the models separately for males and females.

Table 2 shows the number of children age 10-14 in the four possible combinations of work and school status across all the years in our sample. The first line shows that 91% of the children are both working and in school in the first month they appear in the survey. This is the group we will use for our analysis. Of the 87,180 children in this category, 4% of them begin working over the next three months, and 68% of them advance a grade in school by one year later. Comparing these to the other groups, we see that the first group is less likely to enter employment than the sample of children who are not working and not in school in the first month. Children in the first group are also somewhat more likely to advance in school than the children who are both working

[9] The rotation scheme of the PME operates on two-year cycles, with most new households entering in even-numbered years. We identify the households by the two-year cycle in which they first enter the sample, and include dummy variables for each two-year cycle to flexibly capture time trends and generalized period effects that affect all households.

and in school when first interviewed. The table suggests that in restricting our analysis to those who are enrolled in school and not working in month 1, we are probably not looking at the most vulnerable children. Our reason for focusing on this group is that it provides a clean test of the effect of an unemployment shock to the head, and allows us to examine whether such shocks play an important role in disrupting what might be considered the normal life of a child.

Table 3 presents mean characteristics for the samples we use in our bivariate probit regression. Looking at the means of our dependent variables, shown in the first two rows, we see that 71% of girls and 65% of boys pass their current grade in school, while 2.4% of girls and 5.8% of boys enter the labor force after the first month. Recall that our analysis will be based on a sample in which the male household head is employed in the first month the household appears in the PME survey. Table 3 shows that 88.8% of these men remain continuously employed over the subsequent four interview rounds (month 2, 3, 4, and 13), 3.0% are unemployed in month 2, 3, or 4 (which coincide with the child's current school year), 1.8% are unemployed in month 5 (after the child's current school year), and 6.1% leave the labor force.

Bivariate Probit Regression Results

Tables 4 and 5 present the bivariate probit results for the separate samples of and girls and boys. Looking at the effect of unemployment shocks for girls in Table 4, we see that an unemployment shock to the male head during the three months after the first interview has a statistically significant negative effect on the probability of grade advancement, and a significantly positive effect on the probability of labor force entry. These are the effects we might predict if households were credit constrained and used the time allocation of girls as a way to buffer a transitory income shock. The results in Table 4 show that an ex-post unemployment shock (taking place after the end of the school year) does not have a significant effect on either the probability of entering employment or the probability of grade advancement.

Large and statistically significant effects of the male head's education are observed on both outcomes, with increases in the head's education leading to large increases in the probability of grade advancement and decreases in the probability of labor force entry. Significant differences across cities and across years are also observed for both sets of outcomes. These effects will be discussed in more detail below when we calculate predicted probabilities. Evidence of the tradeoff between school and work is found in the significant negative correlation of error terms in

the work and school equations, reported at the bottom of Table 4. This suggests that unobserved factors which are negatively associated with schooling achievement are positively associated with labor market entry. This is consistent with there being a tradeoff between work and school, with increases in one outcome tending to be associated with decreases in the other.

Looking at the results for boys in Table 5, the effects of both ex ante and ex post unemployment shocks are not statistically significant in either the grade advancement or labor force entry regressions. The point estimates for the effect of an unemployment shock on boys are roughly 1/3 as large as the point estimates for girls in both equations. The results on unemployment shocks suggest that the time allocation of girls in both work and school is more sensitive to household economic shocks than is the time allocation of boys. We will discuss this in more detail below. The effects of permanent characteristics such as head's education continue to be highly significant in the regressions for boys, with the directions of the effects similar to those in the regressions for girls. The correlation in the error terms of the two equations is estimated at -0.09, almost identical to the correlation from the regressions for girls.

The interpretation of the bivariate probit regression results is simplified in Tables 6 and 7, which present marginal effects of changes in key variables, given the regression coefficients in Tables 4 and 5. The marginal effects are calculated using a baseline probability in which the probability of grade progression and labor market entry are predicted for a child age 14, less than two years behind in schooling, living in a household in which they are listed as the son or daughter of the male head who is age 40 with no schooling in Salvador in January 1982. Starting from this baseline, predicted probabilities are calculated using the different values for each of the categorical variables. Comparing the baseline predicted values for girls and boys between Tables 6 and 7, note that girls have a higher predicted probability of passing the grade and a lower probability of entering the labor force, confirming the gender differences seen in simple comparisons of means between boys and girls.

Considering the effect of an unemployment shock to the head that occurs during the school year, Table 6 indicates that for girls this shock causes the baseline probability for passing the grade to fall by 3.3 percentage points (from 0.645 to 0.612), while it causes the baseline probability of entering employment to increase by 2.9 percentage points (from 0.102 to 0.131), compared to the father remaining employed for the following 4 interviews. Regarding our test for

unobserved heterogeneity, the father's unemployment in the following year does not have a significant effect on girls work or school transitions. This suggests that it is not permanent unobserved characteristics that are driving girls behavior but that our measure of unemployment during the school year is capturing an unanticipated transitory shock. Looking at the effects for boys in Table 7, the point estimates from the regressions imply much smaller effects of the head's unemployment on both grade advancement and labor force entry. A boy's probability of grade advancement drops from 55.5% to 54.2%, and the probability of entering the labor force rises from 20.5% to 22.1% if the head becomes unemployed. The effect on boy's school advancement is only about one-third as large as the effect for girls. The effect on boy's labor force entry is only about one-half as large as the effect for girls. The larger effects of the head's unemployment appear to be quite robust to alternative specifications, and raise interesting questions. The difference is somewhat surprising given that girls do not in general appear to be disadvantaged in either work or school outcomes, having much lower probabilities of labor market work and somewhat higher probabilities of advancing in school. It is also important to note that boys would appear to have plenty of room for adjustment. As seen in Figures 1 and 2, employment rates for 14-year-old boys rarely exceed 35% in any given month, leaving most boys available to enter employment in response to the head's unemployment.

Looking at the effects of other child characteristics, Table 6 shows substantial effects of age, with the probability of school advancement declining from 70% to 64% for girls between ages 10 and 14, and the probability of labor force entry rising from 2% to 10%, given the other baseline characteristics. Larger effects of age are seen for boys in Table 7, with the probability of labor force entry rising from 4% to 20% from age 10 to age 14. Being behind in school is associated with a lower probability of completing the grade and a higher probability of entering work for both boys and girls. Already being behind in school for one's age reduces the probability of passing by about 7 percentage points for both boys and girls, suggesting that shocks leading to failure in the short run can lead to lower schooling attainment in the long run.

Being a relative other than the son or daughter of the household head has a negative effect on school advancement for boys and girls of similar magnitude, with the baseline probability of grade advancement being reduced by about 4 percentage points. Although being a relative who is not a son or daughter of the head has similar negative effects on boys and girls' grade advancement, this

variable has different effects by gender on labor force entry. While boys are more likely to enter the labor market if they are not the head's son, girls are less likely to enter if they are not the head's daughter. This does not necessarily imply that girls with lower status in the household are being treated more favorably than boys, or more favorably than girls who are daughters. A more likely explanation is that these young female relatives have been absorbed into households with a large demand for domestic work.

Looking at other characteristics of the household, the substantial effects of the male head's schooling on both outcomes are worth emphasizing. As seen in Table 6, increasing the head's schooling from zero to four years increases the probability of grade completion by 5 percentage points for girls. The effects for boys in Table 7 are significantly larger, with an increase in head's education from zero to four years raising the probability of grade advancement by 7 percentage points. Changing from a head with zero years of schooling to a head with 15 or more years of schooling (completion of university) raises the probability of a boy passing the grade by 39% (22 percentage points), and lowers the probability of labor force entry by 90% (18 percentage points).

As noted by Barros and Lam (1996), there are large differences in passing rates between regions in Brazil, with a change from São Paulo to Salvador associated with a 16 percentage point drop in grade completion for both boys and girls. The large time trends shown graphically above are also confirmed in the regressions. The patterns across years in Table 6 and 7 show large changes over the mid to late 1990s, with about a 10 percentage point increase in grade progression rates for both girls and boys from 1990-91 to 1996-97. Regarding the time trend in labor market entry rates, it is clear that the reduction in employment rates of boys was achieved in large part from a reduction in entry rates. The probability of entering employment for boys fell by 7 percentage points from 1990-91 to 1996-97.

Conclusion

Using Brazil's rich monthly employment survey data, we have documented a high degree of volatility in youth employment rates during the 1980s and 1990s. Looking at the probability that a child who is not working in one month enters employment in the following month, we find large differences by gender and socioeconomic background, differences that play an important role in explaining the differences in the level of employment of different groups. While it is natural to expect that short-run economic shocks to the household may help explain this high degree of volatility in youth employment, our bivariate probit regressions indicate relatively small effects of the household head becoming unemployed on the probability that children enter the labor force. The effects are statistically significant for girls, resulting in an increase in the probability of entering employment of about 3 percentage points for a 14-year-old girl in Salvador in 1982. We also find that the head becoming unemployed decreases the probability that the same girl will advance a grade in school, lowering that probability by about 3 percentage points. In the case of boys we get smaller point estimates that are not statistically significant.

While a reduction in the schooling progression rate of girls by 3 percentage points is relatively modest, it is important to note that this may have important long run effects in that it contributes to being behind in school, which is found to ultimately have serious consequences. Also, while it is well established that parent's schooling is the most important determinant of schooling attainment in Brazil, increasing the father's education from 4 to 8 years also only increases the probability of passing by a few percentage points. Though the head becoming unemployed is a relatively rare shock in Brazil (especially before the 1990s), our carefully constructed shock measure is intended to be a proxy for a negative income shock, and unexpected income variation is anything but unusual in Brazil. Therefore it is quite reasonable to be concerned that frequent short-run income fluctuations can cumulate over time and ultimately lead to lower schooling attainment.

Our result that girls appear to be more negatively affected than boys by short-run economic shocks is consistent with results from some other studies. The magnitude of our shock for girls in Brazil is similar to results found in rural Mexico of a few percentage point changes in work and school attendance probabilities after families receive approximately 20% more in household income from the Progresa program (Skoufias and Parker, 2001). In their work with Mexico's

ENEU labor force panel survey, Parker and Skoufias (2000) find that adult unemployment affects schooling progress of girls, but do not find evidence that the decline in school performance is linked to increases in labor force participation. While we do not find strong effects on boys, we do find evidence that girls' time allocation appears to be used to buffer transitory shocks to household income in Brazil. The evidence suggests that young girls are altering their school and labor force behavior in response to an unexpected, transitory shock to the household, with their increased participation in the labor market linked to a decline in their performance in school.

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Figure 1. Proportion of 14-year-old and 16-year-old males and females working, 6 metropolitan areas, 1982-1998, Brazil, 3-month moving averages

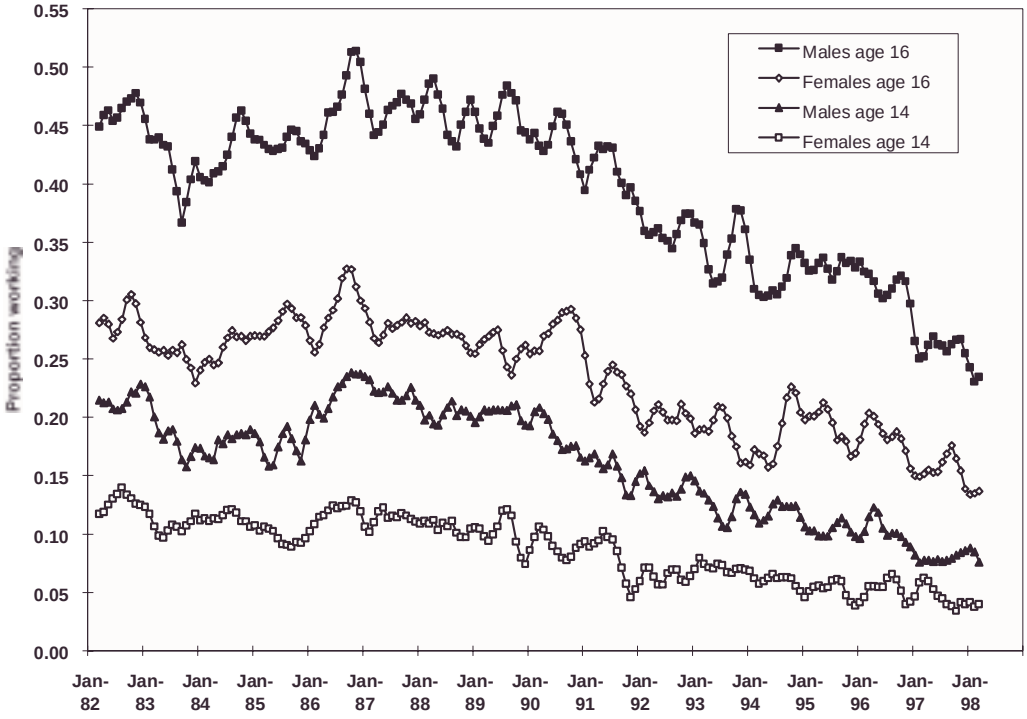

Figure 2. Proportion of 14-year-old males and females working by mother's education, 6 metropolitan areas, 1982-1998, Brazil, 3-month moving averages

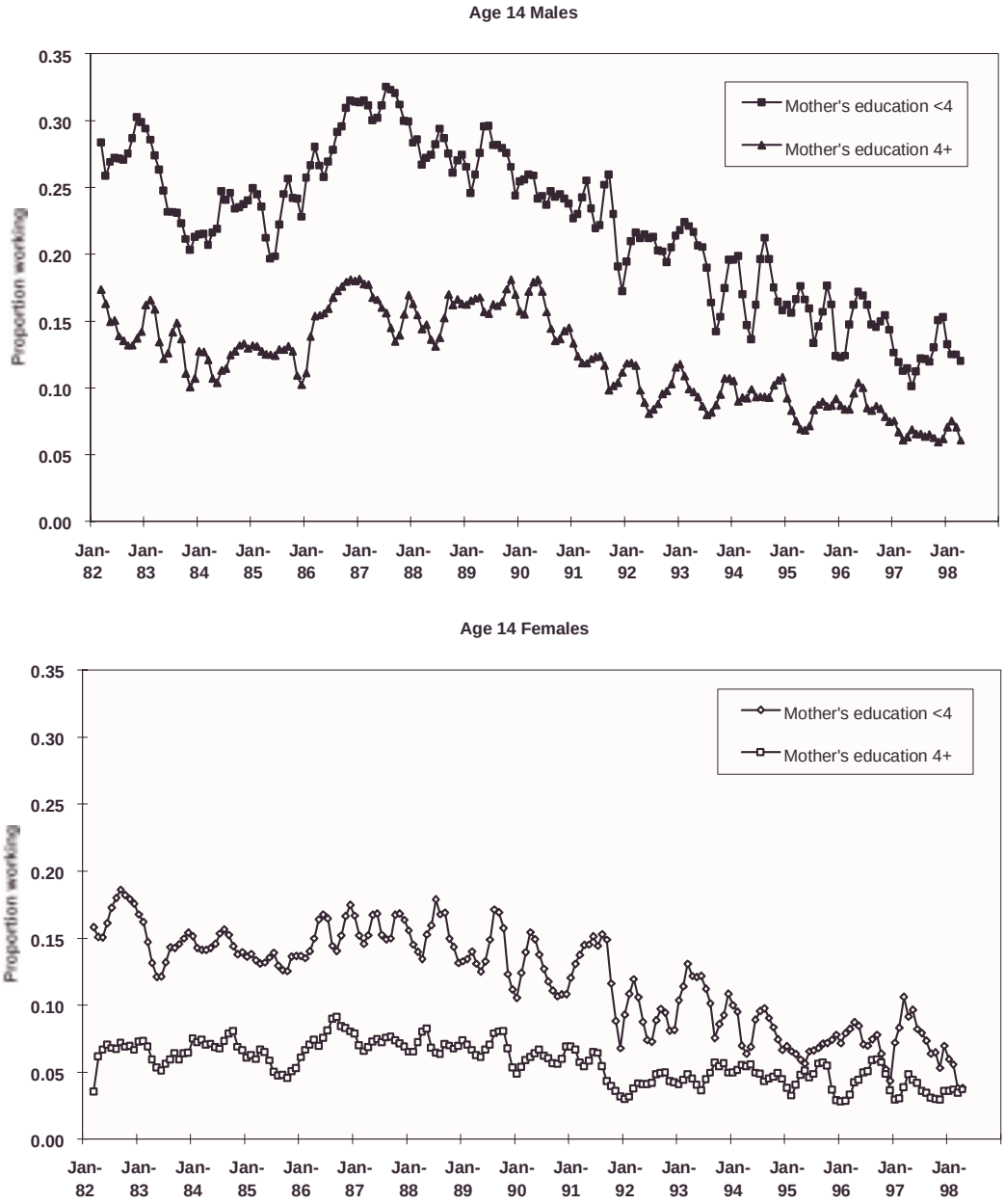

Figure 3. Labor force entry and exit rates for 14-year-old males and females, 6 metropolitan areas, 1982-1998, Brazil, 3-month moving averages

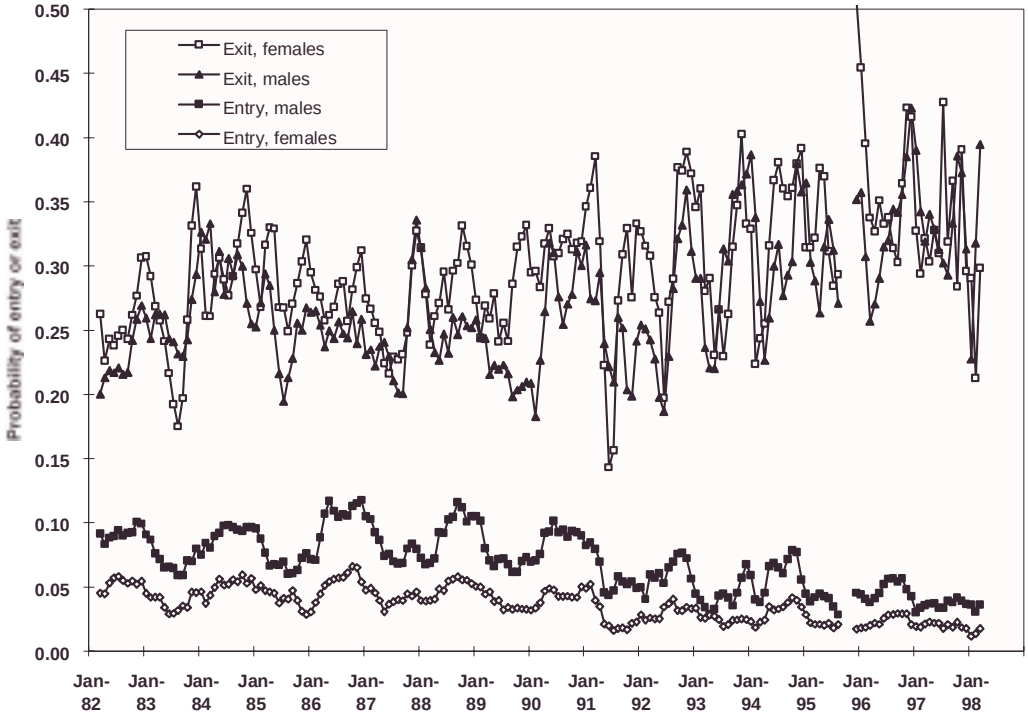

Figure 4. Labor force entry and exit rates for 14-year-old males by mother's education, 6 metropolitan areas, 1982-1998, Brazil, 3-month moving averages

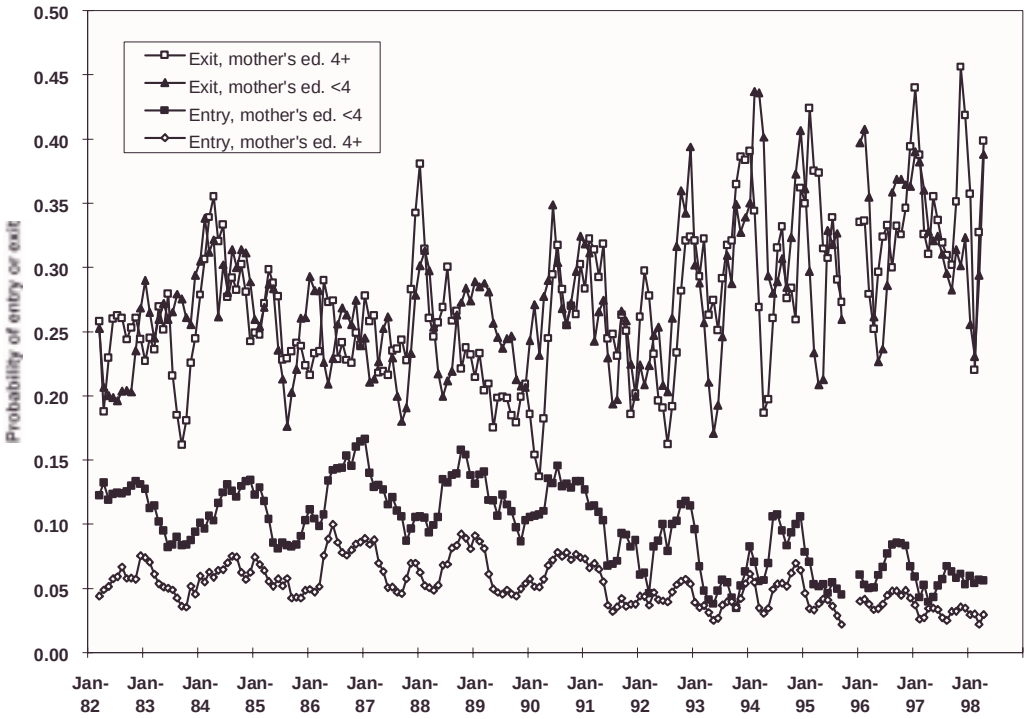

Table 1. Timing: The latent variable is the child's effort in interviews 2,3 and 4

Classification	Case	March, 1994	April	May	June	July	August	September	October	November	December	January	February	March, 1995	April	May	June	July	August	September	October	November
Stable Employment *(omitted category)*	1	Child is attending school, not employed in March (first interview) Father remains employed next 3 months AND is also employed in March of the next year																				
		E	E	E	E										E							
Unemployed During School year *(transitory shock)*	2	Child is attending school, not employed in March (first interview) Father begins unemployment spell in the second interview (April) but is employed 1 year later																				
		E	U	U	E										E							
Unemployed After School year *(persistent heterogeneity)*	3	Child is attending school, not employed in March (first interview) Father becomes is employed the next three months but is unemployed one year later																				
		E	E	E	E										U							
Throw Out	4	Child attending school, not employed in Nov. (first interview at vacation time or end school year) Father becomes unemployed in the second interview (December) but is employed 1 year later																				
											E	U	E	E								E

Table 2. Bivariate Distribution of School and Work

Children Ages 10-14 from 6 Metropolitan Regions of Brazil, 1982-1997

Sample is restricted to children 10-14 years old, with male household head present, children listed as children or non-first degree relative* of the head, January through August interviews, no missing schooling or work variables.

Initial Status	Frequency	Share of Total	Share Become Employed (enter)	Share Advance in School
not employed, in school	87,180	0.91	0.04	0.68
employed, in school	3,485	0.04	na	0.57
employed, out of school	1,348	0.01	na	na
not employed, out of school	3,278	0.03	0.20	na
Total N	95,291			

Notes: Child is not the household head or spouse of the household head.

Table 3. Sample Means

	Girls and Boys N=87,189		*Girls Only N=43,498*		*Boys Only N=43,682*	
Variable	*Means*	*Std. Dev.*	*Means*	*Std. Dev.*	*Means*	*Std. Dev.*
child passes the grade	0.683	0.465	0.714	0.452	0.652	0.476
child enters the labor market	0.041	0.198	0.024	0.154	0.058	0.233
female child	0.499	0.500	1.000	0.000	0.000	0.000
male head continuously employed	0.888	0.315	0.888	0.316	0.888	0.315
male head unemployed during school	0.030	0.170	0.029	0.168	0.030	0.171
male head unemployed after school	0.018	0.133	0.018	0.133	0.018	0.132
male head unemployed both periods	0.003	0.054	0.003	0.052	0.003	0.056
male head leaves labor force	0.061	0.240	0.062	0.241	0.061	0.239
child's age	11.871	1.394	11.884	1.397	11.857	1.390
child more than 2 years behind in school	0.180	0.384	0.151	0.358	0.209	0.406
child less directly related to male head	0.024	0.152	0.025	0.157	0.022	0.147
age of male household head	42.485	7.466	42.554	7.541	42.415	7.390
years of schooling male hh head	5.635	4.329	5.578	4.300	5.692	4.357
Salvador	0.134	0.341	0.137	0.344	0.131	0.338
Belo Horizonte	0.193	0.394	0.195	0.396	0.191	0.393
Recife	0.136	0.343	0.137	0.343	0.135	0.342
Rio de Janeiro	0.186	0.389	0.184	0.388	0.188	0.391
Porto Alegre	0.136	0.343	0.132	0.339	0.140	0.347
Sao Paulo	0.215	0.411	0.215	0.411	0.215	0.410
mean year	1988.451	4.551	1988.450	4.554	1988.452	4.547

Table 4. Bivariate Probit for Girls: Probability of advancing to next grade and probability of beginning employment.
Results for 10-14 year old girls in the six metropolitan areas of Brazil.
Sample is conditional on the children attending school and not working in the first interview.
The male household head is required to be present in the household and employed in the first interview.

	Pass the Grade in which attending month 1		Enter Labor Force by month 4	
Variable	*Coefficient*	*Std. Error*	*Coefficient*	*Std. Error*
Head's transitions (continuously employed omitted)				
male head unemployed during school	-0.09 **	0.04	0.15 **	0.07
male head unemployed after school	-0.02	0.05	-0.03	0.10
male head unemployed both periods	-0.28 **	0.12	-0.17	0.30
male head leaves labor force	-0.09 *	0.03	0.02	0.05
Child's age (age 14 omitted)				
Child age 10	0.15 *	0.02	-0.73 *	0.05
Child age 11	0.10 *	0.02	-0.54 *	0.04
Child age 12	0.05 *	0.02	-0.39 *	0.04
Child age 13	-0.01 *	0.02	-0.24 *	0.04
Child 2+ years behind in school	-0.18 *	0.02	0.21 *	0.03
Child less related to male head	-0.10 *	0.04	-0.20 **	0.10
Age of Male Household Head	0.00	0.00	0.00	0.00
Head's schooling (0 years omitted)				
Male head 1-3 years schooling	0.06 **	0.02	-0.12 *	0.04
Male head 4 years schooling	0.14 *	0.02	-0.30 *	0.04
Male head 5-7 years schooling	0.17 *	0.03	-0.42 *	0.07
Male head 8 years schooling	0.27 *	0.03	-0.43 *	0.06
Male head 9-10 years schooling	0.38 *	0.05	-0.67 *	0.14
Male head 11 years schooling	0.40 *	0.03	-0.69 *	0.07
Male head 12-14 years schooling	0.45 *	0.06	-0.51 *	0.14
Male head 15 years schooling	0.55 *	0.03	-0.99 *	0.11
Metro Area (Sao Paulo omitted)				
Salvador	-0.40 *	0.02	-0.08 ***	0.05
Belo Horizonte	-0.13 *	0.02	0.10 **	0.04
Recife	-0.27 *	0.02	-0.05	0.05
Rio de Janeiro	-0.24 *	0.02	-0.30 *	0.05
Porto Alegre	-0.20 *	0.02	-0.12 **	0.05
Year (1982 omitted)				
Year 1984	0.13 *	0.02	-0.04	0.05
Year 1986	-0.02	0.02	0.07	0.05
Year 1988	0.01	0.03	-0.06	0.06
Year 1990	-0.05 **	0.02	-0.04	0.05
Year 1992	0.07 *	0.03	-0.20 *	0.06
Year 1994	0.13 *	0.03	-0.13 **	0.06
Year 1996	0.21 *	0.03	-0.20 *	0.06
Month of first observation (January omitted)				
February	0.13 *	0.03	-0.05	0.06
March	0.14 *	0.03	-0.02	0.06
April	0.07 *	0.03	-0.02	0.06
May	0.17 *	0.03	-0.05	0.06
June	0.17 *	0.03	-0.01	0.06
July	0.18 *	0.03	0.03	0.06
August	0.16 *	0.03	-0.04	0.06
constant	0.33 *	0.06	-1.32 *	0.11
rho	-0.10 *	0.02		
Likelihood ratio test of rho=0	chi2(1)=32.22	Pr > chi2 = 0.0000		
Number of observations	43498			
Log likelihood = -29704.527	Prob > chi2 = 0.0000			

Notes: * significant at .01; ** significant at .05; *** significant at .10.; Huber-white standard errors are reported

Table 5. Bivariate Probit for Boys: Probability of advancing to next grade and probability of beginning employment.
Results for 10-14 year old boys in the six metropolitan areas of Brazil.
Sample is conditional on the children attending school and not working in the first interview.
The male household head is required to be present in the household and employed in the first interview.

	Pass the Grade in which attending month 1		Enter Labor Force by month 4	
Variable	*Coefficient*	*Std. Error*	*Coefficient*	*Std. Error*
Head's transitions (continuously employed omitted)				
male head unemployed during school	-0.03	0.04	0.05	0.06
male head unemployed after school	-0.03	0.05	0.04	0.07
male head unemployed both periods	-0.02	0.11	0.06	0.16
male head leaves labor force	-0.05 **	0.03	0.02	0.04
Child's age (age 14 omitted)				
Child age 10	0.20 *	0.02	-0.88 *	0.04
Child age 11	0.13 *	0.02	-0.70 *	0.03
Child age 12	0.08 *	0.02	-0.46 *	0.03
Child age 13	0.07 *	0.02	-0.30 *	0.03
Child 2+ years behind in school	-0.19 *	0.02	0.14 *	0.02
Child less related to male head	-0.11 *	0.04	0.12 ***	0.07
Age of Male Household Head	0.00 *	0.00	0.00 **	0.00
Head's schooling (0 years omitted)				
Male head 1-3 years schooling	0.08 *	0.02	-0.07 **	0.03
Male head 4 years schooling	0.18 *	0.02	-0.18 *	0.03
Male head 5-7 years schooling	0.22 *	0.03	-0.35 *	0.05
Male head 8 years schooling	0.26 *	0.03	-0.38 *	0.05
Male head 9-10 years schooling	0.38 *	0.05	-0.52 *	0.09
Male head 11 years schooling	0.42 *	0.03	-0.65 *	0.05
Male head 12-14 years schooling	0.49 *	0.05	-1.30 *	0.21
Male head 15 years schooling	0.60 *	0.03	-1.22 *	0.09
Metro Area (Sao Paulo omitted)				
Salvador	-0.41 *	0.02	0.07 **	0.03
Belo Horizonte	-0.17 *	0.02	0.16 *	0.03
Recife	-0.31 *	0.02	0.12 *	0.03
Rio de Janeiro	-0.26 *	0.02	-0.33 *	0.04
Porto Alegre	-0.23 *	0.02	-0.14 *	0.04
Year (1982 omitted)				
Year 1984	0.10 *	0.02	-0.02	0.03
Year 1986	-0.07 *	0.02	-0.01	0.03
Year 1988	-0.06 *	0.03	-0.10 **	0.04
Year 1990	-0.08 *	0.02	-0.09 **	0.04
Year 1992	-0.01	0.03	-0.34 *	0.04
Year 1994	0.03	0.03	-0.44 *	0.05
Year 1996	0.17 *	0.03	-0.39 *	0.05
Month of first observation (January omitted)				
February	0.15 *	0.03	-0.01	0.05
March	0.18 *	0.03	0.03	0.04
April	0.19 *	0.03	0.00	0.04
May	0.25 *	0.03	0.00	0.04
June	0.20 *	0.03	0.03	0.04
July	0.22 *	0.03	0.08 ***	0.04
August	0.23 *	0.03	0.01	0.04
constant	0.03	0.06	-0.71 *	0.09
Number of observations	43682			
Log likelihood = -35753.897	Prob > chi2 =	0.0000		

Notes: * significant at .01; ** significant at .05; *** significant at .10. Huber-White standard errors are reported.

Table 6. Marginal Effects for Girls based on bivariate probit regression in Table 4.

Baseline values in bold type: Male head is age 40, zero schooling, continuously employed, Sao Paulo, January 1982; Child is 14 years of age, less than 2 years behind in school and is listed as the child of the head.

	Pass the Grade			Enter Labor Force		
Variable	*Predicted probability*	*Absolute change*	*Percentage change from baseline*	*Predicted probability*	*Absolute change*	*Percentage change from baseline*
male head continuously employed	0.645			0.102		
male head unemployed during school	0.612	-0.033	-0.052	0.131	0.029	0.284
male head unemployed after school	0.637	-0.008	-0.013	0.096	-0.006	-0.057
male head unemployed both periods	0.538	-0.108	-0.167	0.075	-0.027	-0.263
male head leaves labor force	0.613	-0.032	-0.050	0.106	0.004	0.036
Child age 10	0.700	0.055	0.085	0.023	-0.079	-0.777
Child age 11	0.682	0.037	0.058	0.035	-0.067	-0.657
Child age 12	0.663	0.017	0.027	0.048	-0.054	-0.528
Child age 13	0.642	-0.003	-0.005	0.065	-0.037	-0.361
Child age 14	0.645			0.102		
Child not behind in school	0.645			0.102		
Child 2+ years behind in school	0.575	-0.070	-0.109	0.145	0.043	0.419
Child listed as the head's child	0.645			0.102		
Child less related to male head	0.607	-0.038	-0.059	0.070	-0.032	-0.310
Male household head Age 40	0.645			0.102		
Male head 0 years schooling	0.645			0.102		
Male head 1-3 years schooling	0.666	0.021	0.033	0.083	-0.019	-0.187
Male head 4 years schooling	0.694	0.049	0.076	0.058	-0.044	-0.433
Male head 5-7 years schooling	0.706	0.061	0.095	0.045	-0.057	-0.558
Male head 8 years schooling	0.740	0.095	0.147	0.045	-0.057	-0.561
Male head 9-10 years schooling	0.773	0.127	0.197	0.026	-0.076	-0.742
Male head 11 years schooling	0.779	0.134	0.208	0.025	-0.077	-0.757
Male head 12-14 years schooling	0.795	0.150	0.233	0.038	-0.064	-0.631
Male head 15 years schooling	0.821	0.175	0.272	0.012	-0.090	-0.884
Sao Paulo	0.645			0.102		
Salvador	0.488	-0.157	-0.243	0.088	-0.013	-0.132
Belo Horizonte	0.597	-0.049	-0.075	0.120	0.018	0.178
Recife	0.541	-0.104	-0.162	0.094	-0.008	-0.077
Rio de Janeiro	0.551	-0.094	-0.145	0.059	-0.043	-0.425
Porto Alegre	0.566	-0.079	-0.122	0.083	-0.019	-0.189
Year 1982	0.645			0.102		
Year 1984	0.693	0.048	0.074	0.095	-0.007	-0.068
Year 1986	0.639	-0.006	-0.009	0.115	0.013	0.127
Year 1988	0.649	0.003	0.005	0.091	-0.011	-0.105
Year 1990	0.625	-0.020	-0.031	0.095	-0.007	-0.065
Year 1992	0.671	0.026	0.040	0.070	-0.031	-0.309
Year 1994	0.691	0.046	0.071	0.081	-0.021	-0.202
Year 1996	0.719	0.074	0.115	0.070	-0.032	-0.309

Note: Month dummies are included in predictions but marginal effects are not shown.

Table 7. Marginal Effects for boys based on bivariate probit regression in Table 4.

Baseline values in bold type: Male head is age 40, zero schooling, continuously employed, Sao Paulo, January 1982; Child is 14 years of age, less than 2 years behind in school and is listed as the child of the head.

	Pass the Grade			Enter Labor Force		
Variable	*Predicted probability*	*Absolute change*	*Percentage change from baseline*	*Predicted probability*	*Absolute change*	*Percentage change from baseline*
male head continuously employed	0.555			0.205		
male head unemployed during school	0.542	-0.013	-0.023	0.221	0.016	0.077
male head unemployed after school	0.545	-0.010	-0.018	0.217	0.012	0.056
male head unemployed both periods	0.547	-0.008	-0.015	0.224	0.019	0.091
male head leaves labor force	0.535	-0.020	-0.036	0.211	0.006	0.027
Child age 10	0.634	0.079	0.143	0.044	-0.161	-0.786
Child age 11	0.606	0.051	0.092	0.063	-0.142	-0.692
Child age 12	0.587	0.032	0.057	0.100	-0.106	-0.516
Child age 13	0.581	0.026	0.047	0.131	-0.074	-0.360
Child age 14	0.555			0.205		
Child not behind in school	0.555			0.205		
Child 2+ years behind in school	0.479	-0.076	-0.137	0.247	0.042	0.204
Child listed as the head's child	0.555			0.205		
Child less related to male head	0.512	-0.043	-0.078	0.242	0.037	0.179
Male household head Age 40	0.555			0.205		
Male head 0 years schooling	0.555			0.205		
Male head 1-3 years schooling	0.588	0.033	0.060	0.186	-0.020	-0.095
Male head 4 years schooling	0.625	0.070	0.125	0.158	-0.048	-0.232
Male head 5-7 years schooling	0.641	0.086	0.156	0.121	-0.084	-0.409
Male head 8 years schooling	0.654	0.098	0.177	0.114	-0.091	-0.445
Male head 9-10 years schooling	0.698	0.143	0.258	0.090	-0.116	-0.563
Male head 11 years schooling	0.713	0.158	0.284	0.070	-0.135	-0.658
Male head 12-14 years schooling	0.736	0.181	0.325	0.017	-0.188	-0.917
Male head 15 years schooling	0.771	0.216	0.389	0.021	-0.185	-0.900
Sao Paulo	0.555			0.205		
Salvador	0.392	-0.163	-0.294	0.227	0.022	0.106
Belo Horizonte	0.487	-0.068	-0.122	0.254	0.048	0.236
Recife	0.434	-0.122	-0.219	0.240	0.035	0.170
Rio de Janeiro	0.450	-0.105	-0.189	0.125	-0.080	-0.391
Porto Alegre	0.462	-0.093	-0.168	0.169	-0.037	-0.178
Year 1982	0.555			0.205		
Year 1984	0.592	0.037	0.067	0.199	-0.007	-0.033
Year 1986	0.527	-0.028	-0.050	0.202	-0.003	-0.016
Year 1988	0.531	-0.024	-0.044	0.179	-0.026	-0.127
Year 1990	0.524	-0.031	-0.055	0.182	-0.024	-0.115
Year 1992	0.551	-0.004	-0.007	0.123	-0.082	-0.399
Year 1994	0.566	0.011	0.019	0.103	-0.103	-0.500
Year 1996	0.622	0.067	0.121	0.112	-0.094	-0.455

Note: Month dummies are included in predictions but marginal effects are not shown.