

## Child work and schooling: the role of domestic activities among girls in Brazil\*

Diana I. Krüger

Pontificia Universidad Católica de Valparaíso  
Escuela de Ingeniería Comercial  
Avenida Brasil 2830, Piso 7  
Valparaíso, Chile

diana.kruger@ucv.cl  
Tel. (56-32) 227 3352  
Fax. (56-32) 227 3484

Matias Berthelon

Pontificia Universidad Católica de Valparaíso  
Escuela de Ingeniería Comercial  
Avenida Brasil 2830, Piso 7  
Valparaíso, Chile

matias.berthelon@ucv.cl  
Tel. (56-32) 227 3355  
Fax. (56-32) 227 3484

December 2007

### Abstract

Using three rounds of Brazilian household surveys, we analyze the role of housework in young children's employment and schooling outcomes. If pure market work is analyzed, we find that girls are more likely to attend school and less likely to work than boys, but if work includes household chores girls are more likely to work and less likely to be in school than boys. Middle income girls are more likely to abandon school in order to work, suggesting that the harmful effects of household domestic work fall upon girls from lower socio-economic levels.

*Keywords:* child labor, schooling, gender, domestic work

*JEL codes:* D13, J22, 012

---

\* D. Kruger is the corresponding author. This paper benefited from the excellent research assistance of Daniela Zapata, and from questions and comments of participants at the 2007 annual meeting of the Sociedad de Economía de Chile (SECHI) and LACEA. Kruger and Berthelon received financial support from the *Comisión Nacional de Investigación Científica y Tecnológica* (CONICYT), Chile, through FONDECYT Project No. 1050436.

## 1. Introduction

Gender biases in detriment of girls have been documented in early childhood outcomes of developing countries, ranging from nutrition to pre- and primary school enrollment.<sup>1</sup> This is particularly worrisome since early childhood achievements have been shown to affect future performance in school as well as other aspects of human development such as earnings, criminal behavior, and child mortality.<sup>2</sup> These biases against girls may have important negative consequences that are reflected later in life as inferior labor market opportunities and outcomes relative to men.

One aspect of human development that has received a lot of attention in recent years is the trade off that many families in developing countries face regarding the decision between sending children to work or to school. Child labor has been identified as an important determinant of the persistence of poverty in developing countries and if it is poor families who send their sons and daughters to work out of economic necessity, then the most vulnerable members of society may find themselves in an inter-generational poverty trap: poor children work today in detriment of their schooling outcomes, only to find themselves working in low productivity, low wage jobs in the future. Recent empirical evidence supports this claim, finding that early entrance into the labor market substantially reduces adult earnings, and that children are more likely to work if their parents were child workers themselves.<sup>3</sup>

The empirical evidence concludes that gender biases exist in parental decisions about which children are sent to school and which are sent to work. The approach in these studies usually consists of including categorical variables for the child or parents' gender (or its interaction with other variables of interest) in a regression on the determinants of work and

---

<sup>1</sup> See, for instance, Behrman (1988), Sen (1984) and King and Hill (1993).

<sup>2</sup> See Garces *et al.* (2002), Currie and Thomas (1999), and Ludwig and Miller (2007).

<sup>3</sup> Emerson and Portela (2006) and Emerson and Portela (2003), respectively.

schooling.. For example, Emerson and Portela (2007) find that Brazilian parents' education and non-labor income increases the likelihood of schooling of boys but not of girls, and that parents' gender has unequal effects: father's characteristics affect the employment status of boys more than girls, and mothers' characteristics have a greater effect on girls' employment status.

Kruger and Berthelon (2003) found that in Nicaragua, the presence of pre-school children in the household reduced the probability that girls attend school but not boys, and Kruger (2007) finds that when local economic opportunities improve—proxied by increases in coffee production—middle-income girls of Brazil's coffee-regions are more likely to work, but boys' employment likelihood does not change.

A less-understood dimension of the bias against girls' schooling is the role that household work plays in time allocation decisions between work and schooling. The studies that have analyzed household work find that domestic chores play an important role in the lives of children in less developed countries, and more so of girls. For instance, Edmonds (2006) finds that in Nepal the presence of younger siblings (brothers or sisters) is correlated with more domestic work for older sisters and more market work of older brothers, and that most of the large differences observed in hours worked by oldest sisters are due to more time spent on domestic work.<sup>4</sup>

The data available for Latin America reveal that girls allocate more time to domestic chores than boys, and they suggest that housework may be as strong a deterrent to schooling as market work since an equal proportion of children that do not attend school report not working in market activities. In this paper we explore this line of research by investigating the role of housework in young children's employment and schooling outcomes in Brazil. Young girls in

---

<sup>4</sup> For instance, he finds that birth order and gender play important roles in the decisions of how to allocate children's time: the oldest girl in a family work 4.2 and 9.8 hours more than the second-oldest girl in families with four and six children, respectively.

Brazil spend 5 more hours per week working domestic chores than boys, and Brazilian data also suggests that domestic chores may be a stronger deterrent to schooling of girls than of boys: 51 percent of boys that do not attend school also do not work (in market activities), compared to almost 70 percent of girls.<sup>5</sup>

Compared to other countries in the region, Brazil has an unusually long and detailed set of national household surveys that have been fielded regularly since the late 1980s. Not surprisingly, many empirical studies have been carried out analyzing the decision of child labor and schooling, yet none of these have analyzed the role of household chores.

This paper aims contribute to the empirical literature on the child labor-schooling tradeoff—and specifically on the role of gender in these decisions—and to the continuing discussion on the definition of *child labor*.<sup>6</sup> First, while recognizing that a large proportion of children who work also attend school the vast majority of empirical work analyzes child labor and schooling decisions as separate, discrete choices.<sup>7</sup> In this paper we analyze the school-work decision as having three possible outcomes: work only, work with school and school only.<sup>8</sup> Furthermore, our empirical specification assumes that choices are ordered in the sense that parents prefer “better” outcomes (schooling only is preferred to school and work, and work with school is preferred to just working) which is a more accurate representation of parental preferences than has been treated in the literature so far.

---

<sup>5</sup> Authors’ estimates using data on children aged 10 to 14 years from Brazil’s household surveys for the years 1993-2003.

<sup>6</sup> See Edmonds (Forthcoming).

<sup>7</sup> Exceptions are Levison *et al.* (2001) and Bourguignon *et al.* (2003), who estimate multinomial logits, and Kruger, *et al.* (2006) who estimate a generalized ordered logit.

<sup>8</sup> We ignore the fourth category of no work and no schooling for two reasons: clarity of exposition, and because we believe that children who are reported in this category are actually doing some kind of work. Indeed, once household chores are incorporated into the definition of “work”, less than 1 percent of our sample falls into this category. See Table 2.

Second, most empirical studies that use Brazil's household surveys analyze urban areas or one year of data.<sup>9</sup> In this paper we analyze children in both urban and rural areas of Brazil and make use of three repeated rounds of household surveys that report hours of domestic chores undertaken by children (2001, 2002 and 2003.) We are the first to explore the relationship between domestic work and schooling among Brazilian children.

Finally, in addition to analyzing the role of housework in girls' decisions, we investigate whether intensity of household work is relevant, and whether these decisions vary according to the family's socio-economic level.

We find that when market work is analyzed girls are less likely to work than boys and more likely to attend school, but that once the definition of work includes household chores they are more likely to work and less likely to be in school. Furthermore, while girls of all income levels are more likely than boys to combine work and school vs. just school, only middle-income girls are more likely to drop out of school and specialize in work. This finding suggests that the harmful effects of household domestic work fall upon girls from lower socio-economic levels.

The remainder of the paper is organized as follows. In section 2, we provide background information about the incidence of market work, household work and schooling among young Brazilian children. In section 3, we discuss our empirical specification, as well as our data and variables constructed. Section 4 presents a discussion of the empirical results, and we conclude the paper in section 5.

## **2. Market and domestic work in Brazil**

The vast majority of studies that analyze child labor and schooling decisions focus on market work. Nonetheless, omitting household duties from the analysis underestimates the

---

<sup>9</sup> An exception is Kruger (2007).

incidence of a more holistic concept of work, and this mis-measurement is greater for girls than for boys. Furthermore, if household work is left out of the analysis then so are its potentially negative effects on children's schooling.

Previous studies have incorporated domestic activities into their analysis of the work-school tradeoff. Levison and Moe (1998) analyzed the determinants of hours that children dedicate to household chores and schooling in Peru by estimating separate Heckman regressions to correct for selection bias. They found that family income reduces the probability that a girl performs chores and that conditional on performing chores, better socioeconomic variables reduce the number of hours spent on chores and increase the number of hours spent on school.

Levison *et al.* (2001) estimated multinomial logit regressions of the determinants of all four work-schooling outcomes of youth in Mexico. The authors found that if only market work is considered girls are more likely to specialize in schooling relative to boys, but that once household domestic work is included in the definition of work, girls are more likely to specialize in work than boys.

Meanwhile Zapata *et al.* (2006) estimated bivariate probit regressions on the determinants of market work, school enrollment, and total work (that includes domestic activities) using household data from Bolivia. The bivariate nature of the estimation procedure accounts for the correlation of the error term of the two decisions, and it provides an estimate of the correlation coefficient between the two outcomes. The authors found that market and total work are significant deterrents to school enrollment for all children, and that young boys and girls aged 7 to 14 years are just as likely to be enrolled in school and to be working in the market, but once domestic activities are included in the concept of work children are just as likely to attend school but girls are more likely than boys to be working.

Although household surveys have been fielded regularly in Brazil since the late 1980s, the most recent years of data provide a unique opportunity to analyze the role of housework in child outcomes because the surveys contain information on hours that children spend working on domestic chores, in addition to the usual measures of labor market participation and activities. Table 1 reveals that 58 percent of young children aged 10 to 14 years reported spending time on household chores during the previous week, and that domestic activities are more common among girls: 77 percent of them did chores compared to 41 percent of boys. Furthermore, girls spent more time doing chores than boys: 13.8 versus 8.9 hours per week on average.

Table 1 also shows that conditional on performing chores, young children spend many hours per day on domestic tasks: 60 percent of all children work more than one hour per day on chores and 28 percent report working more than two daily hours. Time allocation to domestic tasks is distributed unevenly across gender lines: while the majority of boys—57 percent—spend one hour per day or less performing chores, 68 percent of girls work more than one hour per day on domestic activities and 36 percent of them work more than two hours per day.

Four possible outcomes are possible in the time allocation decisions of children: only school, school and work, exclusive work, and not working or going to school. The incidence of these four outcomes will differ according to what one defines as “work.” Table 2 presents the number of children that fall into these four categories based on the traditional definition of market work and based on a wider definition of total work that includes both market-related and domestic activities.

Almost 17 percent of boys aged 10 to 14 years worked in labor market activities between 2001 and 2003 in Brazil, and most of them worked while going to school at the same time. This work rate is almost twice as large as that of girls: almost 9 percent worked in market activities during the period, mostly while going to school.

When domestic work is included in the definition of work, many children who were previously classified as not working become workers, so one would expect the incidence of work to increase—both exclusive work and concurrent with schooling. As Table 2 reveals, the incidence of work increases from 13 percent for all children with the market definition, to slightly more than 63 percent with the new definition that includes chores. However, the change in the work rate is larger for girls than for boys: 49 percent of boys work, compared to 78 percent of girls.

A priori, Table 2 suggests that defining domestic activities as work will have a different impact on girls' vs. boys' schooling. In section four we estimate whether differences exist between the outcomes of boys vis-à-vis girls based on how work is defined and controlling for household socio-economic and demographic characteristics, according to the empirical strategy laid out in the following section.

### **3. Empirical Strategy, Data and Variables**

#### **3.1 Empirical Strategy**

Unlike most of the literature that considers the schooling and working decisions separately, we treat them as one decision with three possible states, following closely the model developed in Kruger *et al.* (2006). In their model, households derive utility from consumption and from the human capital of the child. Human capital is generated with an individual a production function that is determined by family and individual characteristics and by a random error component  $\varepsilon$ . The vector of family and individual characteristics could include a wide range of factors such as education of parents, family demographics, occupation or personal ability, and since they may affect the productivity of investments in human capital then the final



decision of the household regarding child labor and schooling depends on the trade off between investments in human capital (schooling) and the value of child labor.

Their model produces a straightforward empirical specification where the household faces a discrete choice with three possible options in relation to the child: work and no schooling, work and schooling, and schooling and no work.<sup>10</sup> An interesting property of their specification is that it is an ordered discrete choice: if the random term  $\varepsilon$  is below a threshold then the household chooses state 0; if it has sufficiently high values above a larger threshold then the household chooses state 2; and if it has intermediary values between the two thresholds then the household chooses state 1. Furthermore, the thresholds are not constant but rather, they are determined by the explanatory variables of each child, which differentiates this from standard ordered models. Thus, the empirical analysis facilitates identifying the effects of personal and family characteristics on the decision of the family to move children from one state to another, such as that the child is only working to working and going to school, or from working and going to school to going to school exclusively, and vice versa.

Following Kruger *et al.* (2006), we define the discrete dependent variable  $Y_i$  that represents the choice made by the household regarding child  $i$  with  $i \in I = \{1, \dots, n\}$ , where  $n$  is the number of observations in the sample. There are three possible states or outcomes regarding the child, which we index by  $j$  where  $j \in J = \{0, 1, 2\}$ . Furthermore, the child's school-work decision is ordered according to what may be regarded as increasingly "better" outcomes in terms of allocation of time.<sup>11</sup> The "worst" outcome is when the child works exclusively ( $Y_i = 0$ ). An "intermediate" state occurs when the child works and goes to school simultaneously ( $Y_i = 1$ ),

---

<sup>10</sup> The fourth alternative—no work and no school—is ignored for ease of exposition, and because it is unlikely that children spend their time doing nothing.

<sup>11</sup> This assumption may not be appropriate in all cases, especially in a context in which the child allocation of time is just one of the variables affecting the utility of the family. For a discussion on this issue see Kruger *et al.* (2006).

the “best” outcome arises if the child goes to school exclusively ( $Y_i = 2$ ). We believe that this ordering is an accurate representation of parental preferences.

Assuming a logistic distribution for the error term, we estimate a generalized ordered logit model that can be written as:<sup>12</sup>

$$P(Y_i > j) = g(X\beta_j) = \frac{\exp(\alpha_j + X_i\beta_j)}{1 + \exp(\alpha_j + X_i\beta_j)} \quad (1)$$

where  $X_i$  is a vector of demographic characteristics of the household and child characteristics. Thus, the probabilities of children being in a particular state, or that  $Y_i = j$  for  $j \in J = \{0,1,2\}$  can be expressed as:

$$\begin{aligned} P(Y_i = 0) &= 1 - g(X_i\beta_0) \\ P(Y_i = 1) &= g(X_i\beta_0) - g(X_i\beta_1) \\ P(Y_i = 2) &= g(X_i\beta_1) \end{aligned} \quad (2)$$

Therefore, the estimated coefficients can be interpreted as how different child and household characteristics change the likelihood of being in a particular state, and the estimated equations can be interpreted as transition equations from one state the other.

### 3.1 Data and Variables

To implement our estimations we used data from the three most recent rounds of Brazilian household surveys (the *Pesquisa Nacional por Amostra de Domicilios* or PNADs), available through the Brazilian Statistical Bureau, IBGE.<sup>13</sup> The survey contains information on characteristics of all household members and it is conducted nationally throughout Brazil during

---

<sup>12</sup> We assume a logistic instead of a normal distribution because it facilitates the mathematical implementation of the estimation. We use the commands and routines developed by Williams (2006) for *STATA*.

<sup>13</sup> *Instituto Brasileiro de Geografia e Estatística*. [www.ibge.gov.br](http://www.ibge.gov.br)

the month of September. Given that we are interested in comparing how the incidence and intensity of household work affects children's work-schooling outcomes, we limit our time frame to the years 2001, 2002 and 2003 because only for those years did the PNAD questionnaire provide information on hours spent on domestic chores.

Our dependent variable reflects the possible combinations of children's time between school and work. Children are defined as in school if they reply that they are currently enrolled in school. We generate two variables measuring work of children first, we consider only a market based definition which uses two questions in the PNADs that ask households whether the child worked last week or at any point during the past 12 months. If the answer is yes for either of those two questions the child is considered working. Second, we incorporate market *and* household work performed by the child into a more general definition of total work. For household work we use a question that asks whether the child performed household chores during the last week.<sup>14</sup> Our variable of total work equals one if the child reports performing market work or if he dedicated any amount of time to chores.

Given that the work (market and household) and schooling decisions of children interact with parents labor supply decisions we attempt to minimize those interactions by restricting the sample to observations where the head of the household is employed full-time and by introducing additional control variables for household wealth. Adult full-time employment is defined as working at least 30 hours per week. In our sample, we define the head of the household as the spouse with the highest hourly wage in households where both spouses work, in contrast to the PNAD, which classifies the head of the household according to self-reporting. All

---

<sup>14</sup> Regarding household chores, the PNADs do not ask about child involvement during the year in these tasks.

characteristics of the head of the household refer to our definition.<sup>15</sup> The sample is further restricted to families where the head of the household is aged between 18 and 65 years.

In terms of characteristics of the head of the household, we include the following variables: hourly wage, years of education, and whether the head of the household is female, as they can be considered important factors affecting investments in education of the children. Parental income and education have been found to have a positive effect on children's schooling outcomes, and a negative effect on working. The effect of female headship of the home is ambiguous *a priori*, because although the literature has found that mothers invest more resources on their children's human capital, families headed by women are more often poor and if they are single mother households there is a greater demand for child care for pre-school aged children by older siblings.<sup>16</sup>

In terms of children's characteristics we restrict the sample to ages 10 to 14 to adhere to the International Labour Organization's definition of a child laborer (persons aged 14 or younger),<sup>17</sup> and to children who are sons or daughters of the head of the household. These sample selection criteria are applied to focus on a more homogeneous group and to avoid including children who are treated differently within the family unit. For child specific variables we included child's gender, race, and age, along with rural/urban location of the household.

We also include a set of variables capturing the household's wealth, which is expected to have a positive relation to children's schooling and a negative one with work. The variables we included were: parent's tenure in the current job, other income of the household, number of bedrooms per person, and possession of durable goods that can indicate differences in

---

<sup>15</sup> In our sample 81 percent of self-reported heads of households remained classified as head of the household with our definition.

<sup>16</sup> Indeed, Connelly *et al.* (1996) found that in Brazil girls were more likely than boys to participate in domestic child care chores when their mother was working.

<sup>17</sup> Although we would like to include children younger than 10 years in our analysis, the PNADs ask employment (and household chores) questions only to household members aged 10 and older.

socioeconomic status (access to electricity, fixed telephone line, television set, refrigerator, and washing machine.)

We also wanted to control for the role of intra-household substitution of labor and dilution of family resources across different children. Thus, we constructed several variables related to family demographics, which included: dummy that account for the presence of siblings of different age groups in the household (aged 5 and below, aged 6 to 9, and between 15 and 18.) We also included a variable that measured the total number of siblings, and categorical variables for whether both parents work and whether the head of the household is a single parent. It is common for extended families to live together in Latin America, so we controlled for the presence of a person above 60 years of age in the household, probably a grandparent. Brazil's pension system underwent a major reform in 1991 where pension amounts doubled and the age of retirement was reduced, which had an important positive income effect on the elderly. Thus, we expect the presence of a grandparent to have a positive effect on children's school enrollment and a negative effect at least on domestic work.<sup>18</sup> Summary statistics of all variables are presented in Table 3.

#### **4. Results**

We estimated equation (2) above as a generalized ordered logit model for both definitions of work: market work only, and total work that includes household chores.

---

<sup>18</sup> Carvalho (2000) finds that Brazilian children living with an elderly were more likely to enroll in school and less likely to work.

## ***Baseline Results***

Table 4 presents the main results of our estimations. The first two columns contain the estimated parameters for the two “transition” equations for the market based definition of work. The coefficients refer to the effects of the explanatory variables on the likelihood of working only compared to going to school and working (columns titled “Work/Work & School”), and on the likelihood of going to school and working compared to just school (columns titled “Work & School/School”). The estimated coefficients measure the effect of the independent variables on the likelihood of higher-valued outcomes, so that a positive and significant coefficient on the first transition equation means that increases in the independent variable are associated with higher-valued outcomes of dependent variable, in other words, with a higher likelihood that the child goes to school and works or just goes to school, compared to only working. Similarly, a positive and significant coefficient in the second transition equation means that increases in the independent variable are associated with a higher probability that the child only goes to school vs. working and going to school simultaneously or just working.

As the first two transition equations of Table 4 reveal, if the definition of work considers only market activities, girls are more likely to be simultaneously going to school and working than just working compared to boys with similar household characteristics; in other words, boys are more likely to specialize in pure market work than girls (column 1.) Girls are also more likely than boys to be exclusively attending school than doing both activities concurrently, in other words, they are more likely to specialize in pure school activities than boys (column 2.)

Once the definition of work is extended to include domestic chores, the results are reversed: compared to boys, girls are *less* likely to be going to school and working vis-à-vis just working, in other words they are more likely to specialize in work only compared to boys (column 3), and they are *less* likely to be in school only vs. concurrent work and school than

boys (column 4.) Our findings are consistent with others in the literature: ignoring household work underestimates measures of girls' work, and furthermore, the negative impact of domestic work on girls' education is altogether missed.<sup>19</sup>

Perhaps the most pressing policy concern is the extent to which work displaces school enrollment. We estimated the predicted probability of working only (in other words, no school attendance) for both definitions of work for boys and girls according to their age. As Figure 1 reveals, as children get older they are more likely to just be working regardless of the definition of work. Nonetheless, ignoring household duties is a more serious omission in the case of girls than boys, and the gap grows as girls mature. By the time they reach age 14, the market work rate is 7.0 and 3.7 percent for boys and girls, respectively, which would imply that boys are twice as likely as girls to be just working and that boys' schooling is in greater danger of being displaced by work than girls'. When work includes domestic chores, however, the predicted work rate becomes 8.4 percent for boys and 7.9 percent for girls: since they are just as likely to be working as boys, their educational attainments are just as threatened by the negative effects of work.

The control variables in our estimations have the expected effects, and almost all of the effects are consistent for both definitions. Households with higher parental wages and education levels are correlated with higher probabilities that children are in school: both concurrently with work (relative to just working) and exclusively (relative to work and school or just working).

When the market based definition of work is considered, gender of the head of the household has no effect on children's time allocation outcomes. However, when household work is included we find that in female-headed household children on the margin between just school

---

<sup>19</sup> Levison *et al.* (2001) and Zapta *et al.* (2006).

and concurrently working/going to school are more likely to specialize in school than children whose father is the head of the household (column 4).

Regardless of the definition that is used (market or total work), we find that children whose both parents work or who live in a single-parent family are less likely to go to school than children in homes with two parents or where one of them stays home. This reflects substitution from parents to children in the responsibilities related to household tasks, such as child care, cleaning, and others.

A related finding reveals that the presence of siblings aged 0 to 5 years in the household is also correlated with an increased likelihood that children on the margin between dropping out and working/schooling dedicate their time to just working (columns 1 and 3). The presence of older school-aged siblings (6 to 9 and 15 to 18 years), on the other hand, has the opposite effect: children are more likely to dedicate time to school and work concurrently (versus just working), and the effect is stronger and more significant for the definition of work that includes domestic chores. This suggests that school-aged siblings share domestic responsibilities, which facilitates attending school.

Children of larger families (measured by the total number of siblings) are less likely to be just in school if the market definition of work is used (column 2), whereas if we define work to include domestic chores, children are more likely to be just working (column 3). This is probably because larger families demand more time dedicated to household activities. Indeed Edmonds (2006) finds that children dedicate substantially more hours to domestic work as number of siblings increases.

The presence of an elderly family member (aged 60 or more) has two effects: contrary to what we expected, it is more likely that children on the margin between work only and work with school drop out of school when a grandparent lives with them (columns 1 and 3); this could



reflect additional resources required to care for elderly relatives if they are sick, for instance. Children may need to spend time looking after their grandparents, which increases the likelihood of specializing in total work (column 3), or to work in the market to earn additional income (column 1).

On the other hand, when domestic duties are included in work, children on the margin between work with school and just school are more likely to stop working and to specialize in schooling (column 4), which reflects that an elderly relative can also help alleviate some of the domestic tasks that children are required to perform, or provide additional family income through their pension receipts (see Carvalho 2000).

### ***Robustness checks***

It is possible that our definition of domestic work is lax in the sense that a child is defined as a domestic worker if he dedicates any positive amount of time to domestic chores. The intensity of domestic activities is what may eventually displace schooling, so we performed robustness checks of our estimations by making the definition of domestic work more demanding. We classified a child as working in domestic activities if he spent at least seven weekly hours performing chores (one hour per day on average), and if he spent at least 10 weekly hours (approximately 1½ hours per day on average). The results for all definitions of household work are found in Table 5, including the baseline result (for comparison).

The original results are maintained with stricter definitions of work: if domestic activities are considered, we find that among children on the margin between dropping out of school to work and doing both activities, girls are more likely than boys to abandon school and dedicate their time exclusively to work (column 1) and they are less likely to specialize in school activities (column 2.) This effect increases in magnitude and significance as the intensity of time

devoted to chores increases. Our results reveal that any amount of time dedicated to household chores is a deterrent to girls' human capital accumulation, and that this harmful effect is greater the more time that they spend on household duties.<sup>20</sup>

### ***Results by Household Income***

We also explored whether decisions regarding the time allocation of girls varied according to the family's socio-economic level. As described above, households were classified into low, middle or high income categories according to the educational attainment of the head of the household. A family was considered low income if the head of the household completed between zero and four years of schooling; they were classified as middle-income families if the head of the household obtained five to eleven years of schooling, whereas high income families were those where the head of the household completed twelve or more years of schooling.

Our results in Table 6 reveal that girls on the margin between just school and school with work are more likely to specialize in only schooling if the market definition of work is employed, regardless of their income level. Once household work is considered they are less likely to specialize in just school and are more likely to go to school and work concurrently.

Among children on the margin between dropping out of school and jointly working and attending, girls from middle-income families were more likely to drop out and specialize in work when domestic activities were included in the definition of work. In other words, the negative impact of domestic activities on girls' education is concentrated on girls from middle income families.

---

<sup>20</sup> The results are also robust to other specifications that measure intensity of domestic work, such as different cutoffs in the number of hours that define household work, and including dummy variables for hours of chores performed.

Figure 2 illustrates the predicted probabilities of only working for both definitions of work and according to the education level of the head of the household. The difference between the two definitions is smaller for boys than for girls, confirming that household work is predominantly a female activity. Furthermore, as the level of education and income of the family increases, the probabilities of work diminish for boys and girls, but the gap between the definitions disappears, revealing that it is poorer children who undertake household chores.

## 5. Concluding Remarks

An area of growing concern among developing countries' policy makers is ensuring that opportunities are equally enjoyed by women and men. Despite this concern, huge gender disparities have been documented throughout the different stages of men and women's productive lives: in early childhood outcomes, in the long period of formal educational training, and continuing onto unequal access to employment opportunities. The large empirical literature has confirmed the existence of gender discrimination in the labor market, not only in wages but in the hiring process as well.<sup>21</sup>

Families in poor countries must often decide between sending their children to school or sending them to work, and although domestic work is mostly carried out by girls and women in traditional societies, relatively little is known about the effects of disproportionately assigning domestic responsibilities to girls instead of boys. Descriptive evidence suggests that although domestic work is usually considered benign by parents and society and does not carry the negative stigma that market work often does, it may be just as strong a deterrent to educational activities as work done in the labor market. Making use of three years of data with detailed

---

<sup>21</sup> See Petersen and Togstad (2004), Petersen *et al.* (2004), and Killingsworth and Heckman (1986).

information on both market and domestic activities, we analyzed the extent and intensity of domestic chores among young, primary school-aged children in Brazil, and whether a disproportionate effect exists on the schooling outcomes of girls vis-à-vis boys.

Consistent with findings in the child labor literature, we find that girls are less likely to work and more likely to attend school when using a traditional, market based definition of work. However, when we expand the definition of work to include both market and domestic activities we find that compared to boys, girls are less likely to be in school and more likely to be working. This result is robust to different definitions of domestic work, and our findings reveal that even a small amount of time dedicated to domestic chores may be enough to cause young Brazilian girls to drop out of school. Furthermore, our study reveals that it is middle-income girls that are more vulnerable to the negative effects of domestic responsibilities.

Domestic work is seldom measured and thus invisible to researchers and it is universally accepted by society that children perform household chores. Nonetheless, our findings reveal that the burden of domestic work is carried out disproportionately by girls and that this aspect of traditional roles that are engendered by girls may be harming their early human capital accumulation.

Family structure plays a key role in children's outcomes. Families where both parents work or with only one parent present, and families with preschool aged children more likely to have primary school aged children who drop out of school and specialize in work. In these families greater demand is placed on children to take over some of the domestic responsibilities that would otherwise be held by adults, which is supported by the finding of a positive effect of other school-aged children on the likelihood of schooling. When siblings can share domestic duties they can dedicate more time to school activities.

These results point to possible avenues for policy action. In some cases the presence of an elderly family member may drive children to specialize in work, probably because additional resources (both time and money) are required to look after the elderly. If the elderly population of Brazil suffers from high rates of morbidity and if the responsibility and costs are borne by extended family then public health programs for the elderly may be indirect avenues that would have positive effects on children's outcomes.

A strong deterrent to children's schooling appears to be the need to care for preschoolers. This suggests that public investments in pre-school programs would have not only positive and high returns on the preschoolers themselves, but they would have positive externalities on older school-aged children who would otherwise have to stay home and care for them.

## References

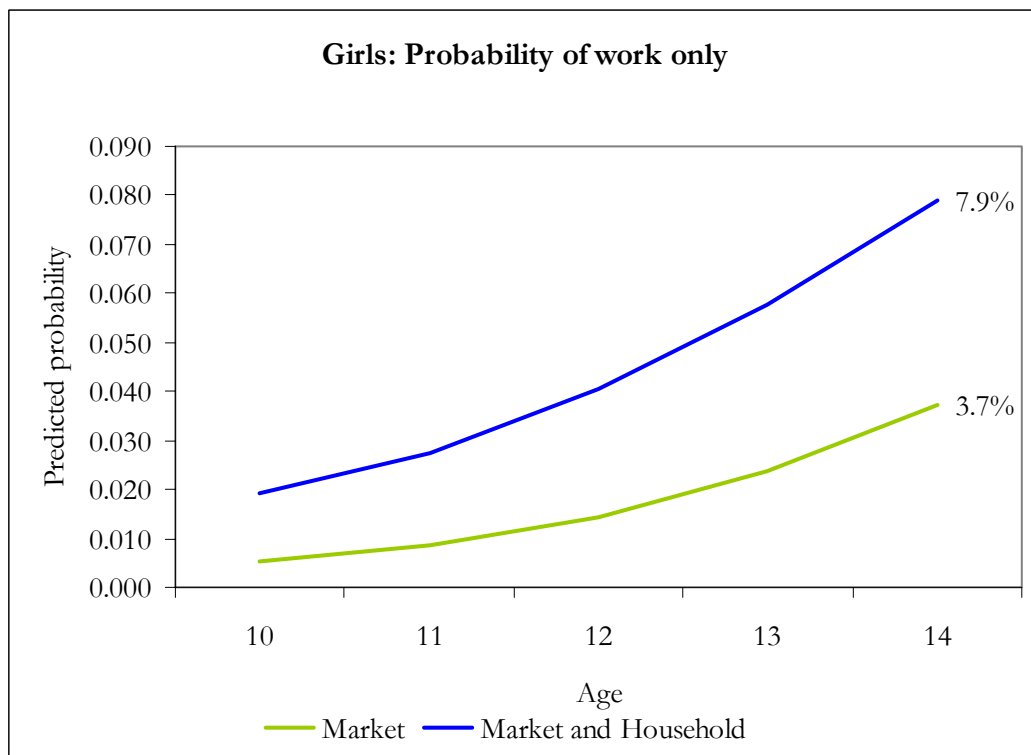
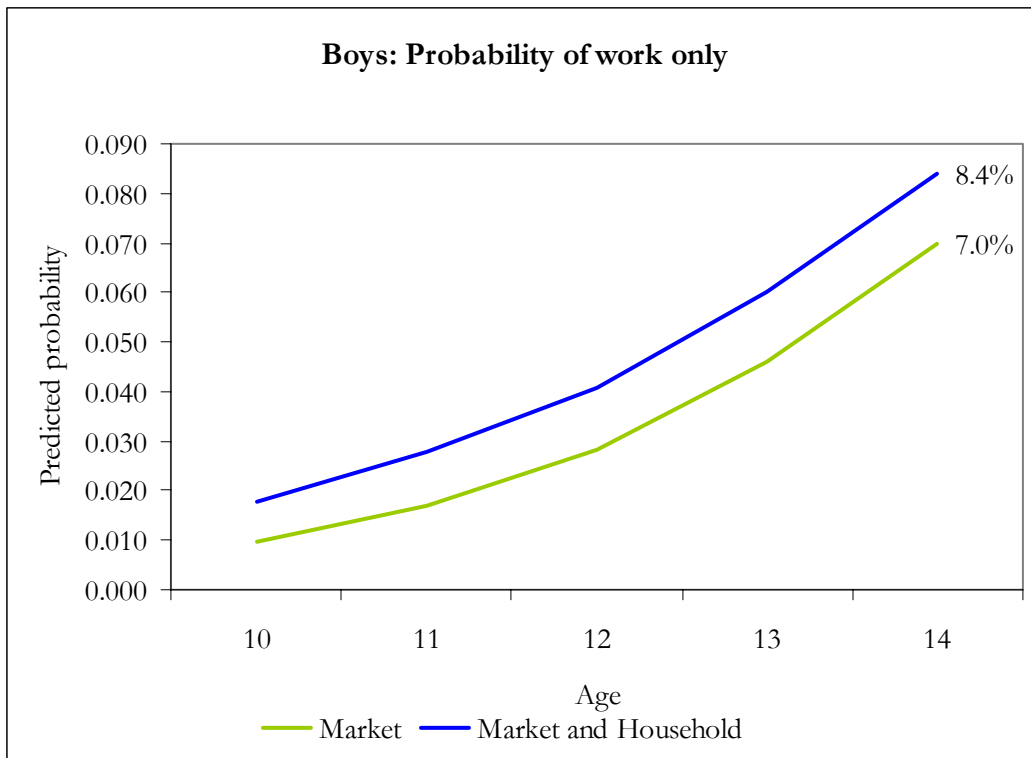
- Behrman, J. (1988) Intra-household Allocation of Nutrients in Rural India: Are Boys Favored? Do Parents Exhibit Inequality Aversion? *Oxford Economic Papers*, 40, pp. 32-54.
- Bourguignon, F., Ferreira, F.H.G. and Leite, P.G. (2003) Conditional Cash Transfers, Schooling, and Child Labor: Micro-Simulating Brazil's *Bolsa Escola* Program. *World Bank Economic Review*, 17(2), pp. 229-254.
- Carvalho, I.E. (2000) Household Income as a Determinant of Child Labor and School Enrolment in Brazil: Evidence from a Social Security Reform. Mimeo. Available at SSRN: <http://ssrn.com/abstract=252289>
- Connelly, R., DeGraff, D.S. and Levison, D. (1996) Women's Employment and Child Care in Brazil. *Economic Development and Cultural Change*, 44, pp.619-656.
- Currie, J. and Thomas, D. (1999) Does Head Start Help Hispanic Children? *Journal of Public Economics*, 74(2), pp.235-262.
- Edmonds, E.V. (2006) Understanding Sibling Differences in Child Labor. *Journal of Population Economics*, 19(4), pp.795-821.
- \_\_\_\_\_. (2007) Child Labor, in T. P. Schultz and J. Strauss, eds., *Handbook of Development Economics*, Volume 4 (Elsevier Science, Amsterdam, North-Holland), forthcoming.
- Emerson, P.M. and Portela, A. (2003) Is There a Child Labor Trap? Intergenerational Persistence of Child Labor in Brazil. *Economic Development and Cultural Change*, 51(2), pp. 375-398.
- Emerson, P.M. and Portela, A. (2006) Is Child Labor Harmful? The Impact of Working Earlier in Life on Adult Earnings. Mimeo.

- Emerson, P.M. and Portela, A. (2007) Child Labor, School Attendance and Intra-household Gender Bias in Brazil. *World Bank Economic Review*, forthcoming.
- Garces, E., Thomas, D. and Currie, J. (2002) Longer-Term Effects of Head Start. *American Economic Review*, 92(4), pp.999-1012.
- Killingsworth, M., Heckman, J.J. 1986. "Female Labor Supply: A Survey," in: Handbook of Labor Economics, Ashenfelter, O., Layard, R. (Eds.), Vol. 1, North-Holland, Amsterdam pp.103-204.
- King, E.M., Hill, M.A. (Eds.), 1993. *Women's Education in Developing Countries*, The Johns Hopkins University Press, Baltimore.
- Kruger, D.I. and Berthelon, M. (2003) How Household Economic Opportunities Affect Child Labor and Schooling in Nicaragua: Differential Effects by Gender. *The Georgetown Public Policy Review*, 9, pp. 1-16.
- Kruger, D.I., Soares, R., and Berthelon, M. (2006) Household Choices of Child Labor and Schooling: A Simple Model With Application to Brazil. Mimeo. Available at SSRN: <http://ssrn.com/abstract=960949>
- Kruger, D.I. (2007) Coffee Production Effects on Child Labor and Schooling in Rural Brazil. *Journal of Development Economics*, 82, pp. 448-463.
- Levison, D. and Moe, K.S. (1998) Household work as a Deterrent to Schooling: An Analysis of Adolescent Girls in Peru. *Journal of Developing Areas*, 23(spring), pp.339-356.
- Levison, D., Moe, K.S., and Knaul, F.M. (2001) Youth Education and Work in Mexico. *World Development*, 29(1), pp. 167-188.

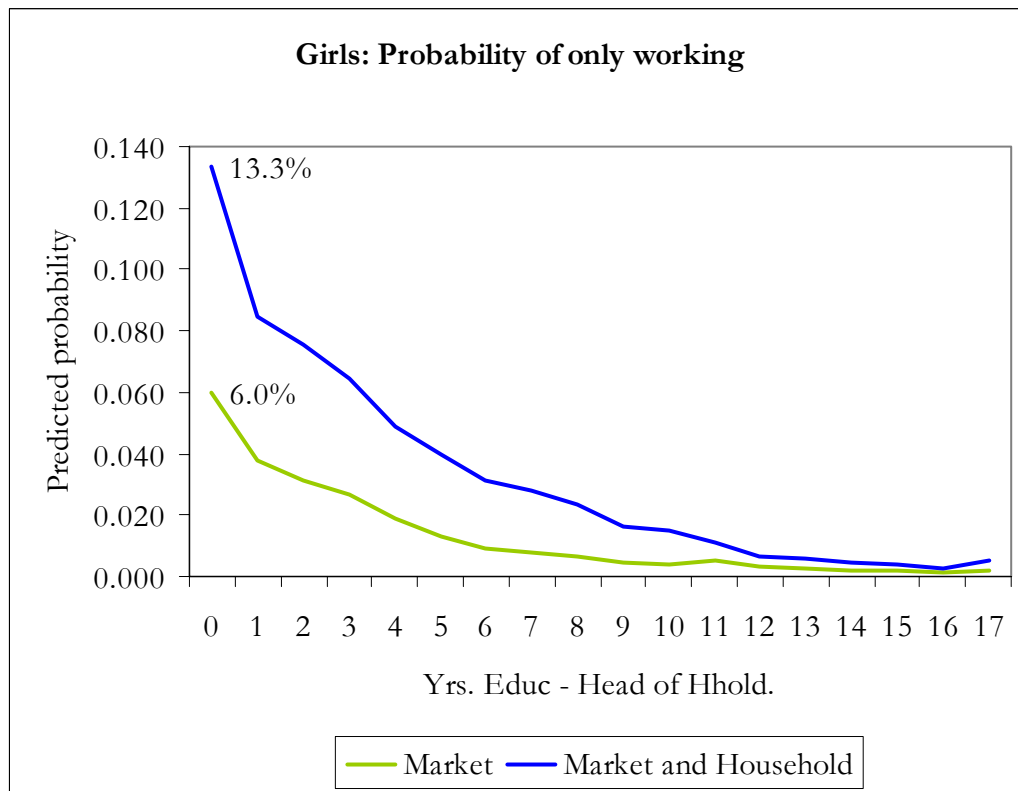
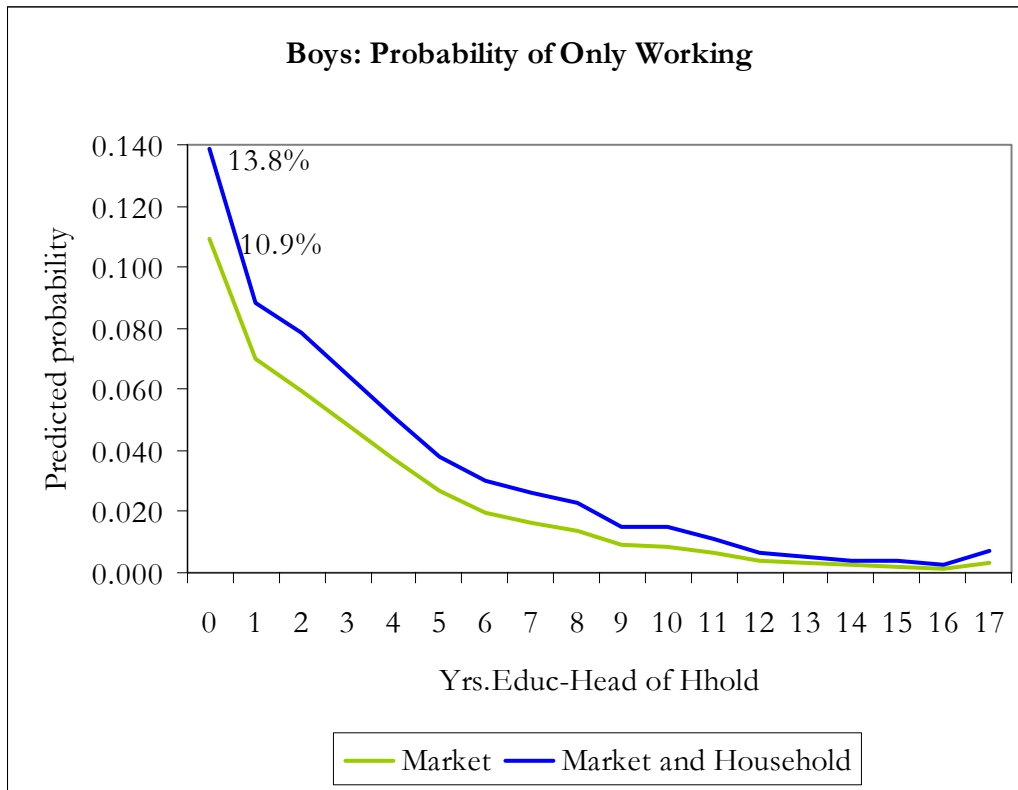
- Ludwig, J. and Miller, D.L. (2007) Does Head Start Improve Children's Life Chances? Evidence from a Regression Discontinuity Design. *Quarterly Journal of Economics*, 122(1), pp.159-208.
- Petersen, T., and Togstad, T. (2004) Getting the Offer: Sex Discrimination in Hiring. Institute of Industrial Relations Working Paper Series, Working Paper No. 104-04.
- Petersen, T., Saporta, I. and Seidel, M.L. (2004) Getting Hired: Race and Sex Differences. Institute of Industrial Relations Working Paper Series, Working Paper No. 105-04.
- Sen, A. (1984) Family and Food: Sex Bias in Poverty, in: A. Sen (eds.), *Resources, Value and Development* (London: Blackwell).
- Williams, R. (2006) Generalized Ordered Logit/Partial Proportional Odds Models for Ordered Dependent Variables. *The Stata Journal*, 6(1), pp. 58-82.
- Zapata, D., Contreras, D., and Kruger, D. (2006) Child labor and schooling in Bolivia: Who's Falling Behind? The roles of gender and ethnicity. Mimeo.



**Figure 1**



**Figure 2**



**Table 1. Incidence and intensity of household work in Brazil, by gender**

<i>Performed chores?</i>	<b>Boys</b>	<b>Girls</b>	<b>Total</b>
<b>No</b>	<b>24,536</b>	<b>9,459</b>	<b>33,995</b>
<i>Row %</i>	72	28	100
<i>Column %</i>	59	23	42
<b>Yes</b>	<b>16,702</b>	<b>30,803</b>	<b>47,505</b>
<i>Row %</i>	35	65	100
<i>Column %</i>	41	77	58
<b>Total</b>	<b>41,238</b>	<b>40,262</b>	<b>81,500</b>
<i>Row %</i>	51	49	100
<i>Column %</i>	100	100	100
 <b><u>Conditional on performing chores</u></b>			
<i>Weekly hours spent on chores (mean)</i>	8.7	13.8	12.1
<i>% of children who work on chores:</i>			
1 to 7 hours weekly	57%	32%	40%
8 to 14 hours weekly	29%	33%	32%
15 to 21 hours weekly	10%	22%	18%
More than 21 hours weekly	4%	14%	10%

Authors' estimates based on PNADs 2001, 2002, 2003. Includes children aged 10 to 14 who are sons/daughters of head of household, with fully employed head of household.

**Table 2. Incidence of children's outcomes in Brazil: school and work – by gender**

<i>Outcomes</i>		<b>Total work</b>				<b>Total</b>	
		Work only	Work & school	School only	No work/No School	Num. Obs.	%
		<i>All children</i>					
<b>Market Work</b>	Work only	652	0	0	0	652	0.8%
	Work & school	0	9,867	0	0	9,867	12.1%
	School only	0	40,211	29,264	0	69,475	85.2%
	No work/No School	731	0	0	775	1,506	1.8%
	Total (Num. Obs.)	1,383	50,078	29,264	775	81,500	100%
	Total (%)	1.7%	61.4%	35.9%	1.0%	100%	
		<i>Boys</i>					
<b>Market Work</b>	Work only	438	0	0	0	438	1.1%
	Work & school	0	6,481	0	0	6,481	15.7%
	School only	0	13,114	20,419	0	33,533	81.3%
	No work/No School	217	0	0	569	786	1.9%
	Total (Num. Obs.)	655	19,595	20,419	569	41,238	100%
	Total (%)	1.6%	47.5%	49.5%	1.4%	100%	
		<i>Girls</i>					
<b>Market Work</b>	Work only	214	0	0	0	214	0.5%
	Work & school	0	3,386	0	0	3,386	8.4%
	School only	0	27,097	8,845	0	35,942	89.3%
	No work/No School	514	0	0	206	720	1.8%
	Total (Num. Obs.)	728	30,483	8,845	206	40,262	100%
	Total (%)	1.8%	75.7%	22.0%	0.5%	100%	

Authors' estimates based on PNADs 2001, 2002, 2003. Includes children aged 10 to 14 who are sons or daughters of fully-employed heads of households. Market work considers only market related activities. Total work includes children who perform either market activities or any amount of household chores.

**Table 3. Summary Statistics**

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Female	0.496	0.500	0	1
HH-Hourly wage	1.75	3.35	0.00	258
HH-Log hourly wage	0.064	0.989	-4.55	5.55
HH-Age	41.5	8.1	18	65
HH-Years of education	7.2	4.5	1	17
Female head of household	0.303	0.459	0	1
Both parents work	0.341	0.474	0	1
Single parent	0.134	0.340	0	1
Rural location	0.183	0.387	0	1
Sibling aged 0-5 yrs present	0.281	0.450	0	1
Sibling aged 6-9 yrs present	0.368	0.482	0	1
Sibling aged 15-19 yrs present	0.350	0.477	0	1
Total number of siblings	1.278	1.235	0	13
Elderly member present	0.039	0.194	0	1
Age 10	0.200	0.401	0	1
Age 11	0.197	0.398	0	1
Age 12	0.200	0.400	0	1
Age 13	0.201	0.401	0	1
Age 14	0.203	0.402	0	1
Number of Observations	77,355			

Source: PNAD 2001, 2002, 2003. Includes children aged 10 to 14 who are sons/daughters of head of household, with fully employed head of household.

**Table 4. Child work and schooling - market and total work, gender effects  
Generalized Ordered Logits, Brazil**

Coefficient	Market work		Total work	
	Work/ Work & School (1)	Work & School/ School (2)	Work/ Work & School (3)	Work & School/ School (4)
Female	0.7048*** (0.0989)	0.8460*** (0.0322)	-0.1049* (0.0595)	-1.4166*** (0.0286)
<i>Head of the Household:</i>				
Wage (log)	0.1625** (0.0678)	0.2551*** (0.0314)	0.0979* (0.0514)	0.2427*** (0.0179)
Years of education	0.1231*** (0.0159)	0.0502*** (0.0053)	0.1111*** (0.0107)	0.0332*** (0.0032)
Is female	-0.0716 (0.1164)	-0.0432 (0.0361)	0.0398 (0.0847)	0.0531** (0.0229)
<i>Household demographics:</i>				
Both parents work	-0.3308*** (0.1031)	-0.4926*** (0.0376)	-0.0321 (0.0812)	-0.1384*** (0.0238)
Single parent	-0.4414*** (0.1474)	-0.1078* (0.0566)	-0.5892*** (0.1055)	-0.2029*** (0.0350)
Rural	-0.5906*** (0.1327)	-1.1579*** (0.0607)	-0.0951 (0.0967)	-0.4931*** (0.0521)
Siblings aged 0-5	-0.4171*** (0.1183)	-0.0678 (0.0501)	-0.3646*** (0.0827)	-0.0404 (0.0319)
Siblings aged 6-9	0.1669 (0.1160)	0.0086 (0.0382)	0.3728*** (0.0826)	0.0029 (0.0306)
Siblings 15-18	0.1939* (0.1116)	-0.0380 (0.0369)	0.3112*** (0.0829)	0.0111 (0.0295)
Total siblings	-0.0899 (0.0553)	-0.0779*** (0.0226)	-0.1169*** (0.0383)	-0.0202 (0.0174)
Elderly family member	-0.6254*** (0.1855)	0.1093 (0.0713)	-0.6480*** (0.1510)	0.2624*** (0.0479)
Observations	76,654		77,355	
Pseudo R <sup>2</sup>	0.209		0.141	
Log-likelihood	-25,785		-48,702	

Source: PNAD 2001, 2002, 2003. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Other controls include state and year effects, child's race and age, dummy variables for whether the family has access to electricity, a telephone, a TV, washing machine, a refrigerator, tenure of head of the household, and other adult household income. Market work considers only market related activities. Total work includes children who perform either market activities or any amount of household chores.

**Table 5. Child work and schooling - market and total work, by intensity of domestic chores  
Generalized Ordered Logits, Brazil**

Coefficient of Female:	Total work	
	Work/ Work & School (1)	Work & School/ School (2)
Baseline results (at least 1 weekly hour)	-0.1049* (0.0595)	-1.4166*** (0.0286)
<b>Intensity of domestic chores</b>		
At least 7 weekly hours	-0.1203* (0.0649)	-1.3303*** (0.0243)
At least 10 weekly hours	-0.1336** (0.0675)	-1.1785*** (0.0248)

Source: PNAD 2001, 2002, 2003. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Other controls include state and year effects, child's race and age, dummy variables for whether the family has access to electricity, a telephone, a TV, washing machine, a refrigerator, tenure of head of the household, and other adult household income. Total work includes children who perform either market activities or any amount of household chores.

**Table 6. Child work and schooling - market and total work, gender effects by income level  
Generalized Ordered Logits, Brazil**

<b>Coefficient of Female:</b>	<b>Market work</b>		<b>Total work</b>	
	Work/ Work & School (1)	Work & School/ School (2)	Work/ Work & School (3)	Work & School/ School (4)
Baseline results	0.7048*** (0.0989)	0.8460*** (0.0322)	-0.1049* (0.0595)	-1.4166*** (0.0286)
<b>Household Income Level:</b>				
Low	0.7735*** (0.1171)	1.0180*** (0.0425)	-0.0672 (0.0697)	-1.4770*** (0.0417)
Middle	0.6856*** (0.1514)	0.7234*** (0.0397)	-0.1927** (0.0876)	-1.4978*** (0.0304)
High	0.5945* (0.3093)	0.6877*** (0.0725)	-0.1127 (0.1582)	-1.0898*** (0.0343)
Observations	76,654		77,355	
Pseudo R <sup>2</sup>	0.209		0.116	
Log-likelihood	-25,760		-50,123	

Source: PNAD 2001, 2002, 2003. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10.

Income level defined on head of household's education (low = 0-4 yrs, middle = 5-11 yrs, high=12 or more yrs.)  
Other controls include state and year effects, child's race and age, dummy variables for whether the family has access to electricity, a telephone, a TV, washing machine, a refrigerator, tenure of head of the household, and other adult household income. Market work considers only market related activities. Total work includes children who perform either market activities or any amount of household chores.