

The influence of the mother's power on her child's labor in Mexico

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Abstract

According to the International Labour Organization (ILO), approximately 211 million children between 5 and 14 years old were engaged in some type of economic activity in 2000, accounting for almost 18% of all children in that age group. In order to understand what motivates parents to send their children to work, I apply a collective model of the household to analyze the household's decision regarding the amount of child labor. Using new data from the Mexican Family Life Survey (MxFLS), I estimate the impact of the mother's bargaining power on the number of hours her children work. This data allows me to estimate the mothers' bargaining power separately from the other parameters of the model. I find that an increase in a mother's bargaining power is associated with fewer hours of work for her daughters but not for her sons. For the median household, girls' workweek would be reduced by up to 16 hours, or by 55%, when the mother's bargaining power is at its maximum. This implies that policies that target the mother as the recipient of welfare benefits may in fact have an impact on her children's work, and this impact may be different for boys and girls.

JEL classification: D1, J13, J21

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1 Introduction

According to a March 2002 report of the International Labour Organization (ILO), approximately 352 million children aged 5 to 17 were engaged in some type of economic activity in 2000; over 211 million of these children were less than 14 years old.¹ According to ILO statistics, participation rates in 2000 for children between the ages 5 and 14 were 29% in Sub-Saharan Africa, almost 19% in Asia and 16% in Latin America.

In order to understand what motivates parents to send their children to work I apply a collective household model with child labor. I analyze the household's decision regarding the time allocation of children using a new and very detailed data set: the Mexican Family Life Survey (MxFLS). Specifically, I investigate the relationship between the mother's relative bargaining power and the amount of child labor allocated within the family. This analysis allows me to assess the potential effect of policies, widely used in the developing world, that target the mother as the recipient of welfare benefits. These policies are based on the assumption that the mother cares more about investments in their children than the father.

My work uses the collective household model as its foundation but augments it by introducing child labor. The model provides some clear theoretical predictions about the impact of the mother's bargaining power on her child's labor. One implication of this model is that if the mother obtains higher marginal disutility from child labor than the father, an increase in her bargaining power would lead to a reduction in the amount of her child's work.

¹Children at work in economic activity is a broad concept that includes unpaid, informal and illegal work. ILO distinguishes between child work and child labor, where the latter excludes children 12 years and older working only a few hours a week in permitted light work and children 15 years and above whose work is not considered "hazardous". Around 186 million children ages 5-14 were estimated to fall in this category. I use child work and child labor synonymously. Child labor estimations are taken from ILO (2002).

A difficulty one encounters with this type of analysis is the need to actually estimate the bargaining power within the household, in addition to the other parameters of the model, i.e., the preference parameters. Identification under these circumstances is questionable. To overcome this, I separate the estimation of the bargaining parameters from the estimation of the other parameters of the model. To do so, I use survey information on which member of the household makes certain decisions about some key assets, like the house. The estimation of the bargaining power is a novel feature of this paper, as this kind of data is frequently not available in population surveys. The usual way to proceed is to include exogenous variables, related to the distribution of bargaining power within the household, directly in the outcome equation. In this paper I first estimate the bargaining parameters and then use the estimated bargaining power in a second stage estimation of the child labor. I do so for a variety of definitions of a working child. I find that an increase in a mother's bargaining power is associated with fewer hours of work for her daughters, but not for her sons. This result is consistent with previous literature that suggests that mothers tend to allocate more resources for their daughters.

Although the general opinion is to prohibit child labor, it is not obvious that that is the optimal solution. Indeed, some papers on the subject, as well as non-governmental organizations that work with these children, agree that child labor may be the optimal strategy for poor households. Children's work may be a necessity for the survival of some families. In other cases, children may need to work to afford the costs of attending school. In turn, it might be optimal, at least for some children, to work and not to go to school, given the relative returns of these activities. In this paper I bypass the discussion of its optimality and focus on how child labor is affected by an increase in the mother's bargaining power.

The remainder of the paper is organized as follows. Section 2 summarizes the related

literature. Section 3 presents the theoretical model. Section 4 describes the data. Section 5 presents the estimation strategy and the results and Section 6 concludes.

2 Related Literature

My paper is related to a diverse and wide literature. First, it is related to the literature on the effects of child labor on children's wellbeing.² Second, the paper is related to the literature that studies the impact of the distribution of power within the household on children's outcomes. This literature is based on the collective household model. My paper uses the collective household model as its foundation but improves it by introducing child labor explicitly. In this way I obtain specific predictions about the impact of the mother's bargaining power on her child's amount of work.

This paper improves on the existing empirical literature since it separates the estimation of the bargaining parameters from the estimation of the other parameters of the model. This has not been done before, as the usual way to proceed is to include some exogenous variables related to the distribution of bargaining power within the household directly in the outcome equation. In this paper I am able to identify the effect of the mother's bargaining power on her child's labor separately from the effect of the exogenous variables on the bargaining power. It also contributes to the evidence on gender bias in the allocation of resources in the household.

A key concern about child labor relates to the potential harmful effects on children's health, given the hazardous activities that children are sometimes engaged in. However, data on these children are hardly collected in household surveys and most of the working children are not involved in hazardous activities. Several negative effects of child labor

²For a complete survey of the child labor literature see Bhalotra and Tzannatos (2003)

can still be mentioned. Specifically, the potential negative impact on children's education achievements that could lead to a reduction in their future welfare and perpetuation of poverty. For instance, Psacharopoulos (1997), using data from Bolivia and Venezuela, finds that a working child has on average a reduction of two years of schooling and a higher probability of grade retention. Gunnarsson, Orazem, and Sanchez (2006) analyze nine Latin-American countries, and find that child labor reduces student's achievements. Looking at children's performance on language and math tests, they conclude that child labor has a significant cost in terms of human capital accumulation.

Consistent with the idea that work affects children's educational achievements, the goal of some policies is to cover the cost of education, trying to reduce children's labor without hurting their chances of education. Many of these programs target the mother based on the assumption that mothers tend to invest more in their children than fathers. In Mexico, the program Programa de Educacion, Salud y Alimentacion (PROGRESA) started in 1997. Initially, this program covered rural areas only, targeting the population in extreme poverty. In 2002 PROGRESA was expanded to urban population, with the name of Oportunidades. The goal of the program is to alleviate current poverty through monetary and in-kind benefits, but also to reduce future poverty by stimulating investments in education, health and nutrition. All the benefits go to the mother. The program transfers represented an average increase of 22% in the income of the beneficiary families. Regular attendance of the children to school is one of the key requisites, in order to be eligible for benefits. Skoufias and Parker (2001) analyze the impact of PROGRESA on children's education and work. The results show negative impacts on children's labor market participation. Rubalcava, Teruel, and Thomas (2004) show that the additional resources to the families from PROGRESA are spent on children's goods, better nutrition and investments in small livestock (traditionally managed by women in Mexico).

Several empirical papers, focused on the distribution of power within the household, have found evidence that children are affected differently depending on the gender of the member receiving benefits. In a seminal paper, Lundberg, Pollak, and Wales (1997) exploit a change in UK Child Benefit policy in 1977 that transferred resources from fathers to mothers in two-parent households. They find an increase in the fraction of the budget spent on clothing by women and their children relative to the fraction spent before the policy change. The authors conclude that a higher income held by the mother, holding total income constant, led to a different allocation of household resources. This new allocation tends to be beneficial to the children. Chowdhury, Khandker, Millimet, and Pitt (2003) analyze the impact of participation in group-based credit programs on the health status of children in rural Bangladesh. Women's credit is found to have a large and statistically significant impact on measures of the healthiness for both boys and girls. In contrast, credit provided to men has no impact on children's health. Duflo (2000) examines the impact of the expansion of the benefits and coverage of the South African social pension program to the black population in the early 1990's. She finds positive and significant effects on anthropometric status for girls when the recipient is a woman, but no effect when the recipient is a man. Galasso (1999) is the only paper that I am aware of that study the impact of the intra-household bargaining power on child labor. Using data from Indonesia, she uses transfers at marriage and assets brought to marriage to approximate parents' bargaining power. She finds that an increase in a mother's bargaining power is associated with a lower probability of child labor. Thomas (1990), shows that mother's unearned income has a significant impact on child survival probability. He also finds some evidence of gender preference: mothers prefer to improve the nutrition of their daughters and fathers of their sons. Thomas (1994) analyzes the relationship between relative parents education and child health (using height as an approximation for nutritional status). Relative bargaining power in the household is

approximated with non labor income and the relative education of the parents. Using data from the United States, Brazil, and Ghana, he finds that daughters tend to be favored when mother's relative power increases.

In sum, this literature suggests that the intra-household distribution of decision power is empirically relevant. Consequently, households that may look the same based on their characteristics, such as total income, can have very different allocation of resources. In particular, the relative power between the parents can lead to different decisions about investment in their children. This literature also suggests a possible gender preference: mothers tend to allocate resources in favor of their daughters, while fathers tend to do so in favor of sons.

In the literature, two types of models have been typically used to analyze household's decisions. The most common type are the unitary household models. Unitary models assume that all members have the same preferences or that one of the members makes the decisions for everyone else. In either case there is no role for the intra-household allocation of resources and consequently for the impact of intra-household bargaining power distribution on that allocation. Another class of models, are collective household models.³ These models assume that households (generally conformed by individuals with different preferences) make Pareto efficient decisions. Different decision processes lead to different locations on the Pareto frontier, that correspond to different sets of weights for the household members. These weights summarize the decision process and reflect the relative bargaining power of each member.

In the first group, Basu and Van (1998) propose a model in which children work because they belong to poor families that need child work in order to survive (the Luxury Ax-

³See Chiappori (1992) and Browning and Chiappori (1998) for a complete discussion of the collective model.

iom). In the other group, Basu (2006) concludes that the relation between a woman's power and the amount of child labor is U-shaped. He argues that when one parent has most of the power, child labor is more attractive since the extra income can be allocated to the consumption of the powerful parent's favorite goods. Blundell, Chiappori, and Meghir (2005) extends Chiappori (1992) to include public goods, representing household's expenditures on children. They conclude that an increase in mother's bargaining power will have a positive impact on children's expenditure if and only if the mother's marginal willingness to pay for children goods is more sensitive to increases in private consumption than that of the father.

3 Theoretical Model

3.1 The Collective Model

As the main focus of this paper is the effect of parents' relative power on the amount of child labor, the collective household model provides the appropriate theoretical framework. I augment the model by including child labor in order to obtain theoretical predictions about the impact of the mother's bargaining power on her child's labor.

Browning and Chiappori (1998) argue that for all Pareto efficient allocations, there exists a set of weights such that the household utility function can be represented by a linear combination of all member's utility functions. The weights on each person's utility summarizes the decision process in the household. Given the individual utilities, the budget constraint defines the Pareto frontier and the weights the final location on this frontier. Each weight reflects each member's relative power in the household. This can also be thought of as a two stage process. In the first stage household members pool their incomes and reallocate the total income according to some sharing rule. In

the second stage each member maximizes the individual utility subject to his/her own budget constraint. The share that each individual gets reflects his/her power in the household. The weights can be a function of prices as well as of non labor income and the so-called distribution factors. These factors are defined as variables that can affect household behavior only through their impact on the decision process.⁴

Consider a general household's utility maximization problem, for a household that lives two periods and consists of two parents and one child.⁵ The household makes Pareto efficient decisions.

$$\max_{c_1, c_2, l_f, l_m, h, s} \sum_{t=1}^2 \lambda_t U_{mt}(c_t, l_f, l_m, h, z) + (1 - \lambda_t) U_{ft}(c_t, l_f, l_m, h, z) \quad (1)$$

s.t.

$$c_1 + \tau e + s = \sum_{p=m,f} A_p + \sum_{p=m,f} w_p(1 - l_p) + w_c h \quad (2)$$

$$c_2 = (w - w_c)e + w_c + R s \quad (3)$$

and

$$h + e + l_c = 1 \quad (4)$$

where U_m and U_f denote mother's and father's utility respectively. The term c_t denotes the aggregate consumption in period t . The leisure of parent p is denoted by l_p . Both

⁴For instance, Chiappori, Fortin, and Lacroix (2002) use sex ratio as a distribution factor, Thomas (1990) uses non labor income, Thomas, Contreras, and Frankenberg (2002) wealth at marriage. Other examples that has been used in the literature are: mother relative education, relative earnings, inherited wealth, access to credit.

⁵In the model I present, children do not make decisions, all the decisions in the household are made by the parents. At this stage fertility and living arrangements issues are not considered.

parents care about the child's welfare, affected by the time allocation between education (e), work (h) and leisure of the child (l_c). Specifically, parents get disutility from sending the child to work. Finally, z is a vector containing the individual, household and community characteristics that affect parent's utilities.

In the first period household's income comes from parents non labor income (A_p), parents labor income ($w_p(1 - l_p)$) and from their child's labor ($w_c h$). The price of the consumption goods are normalized to one. The term τ represents the cost of sending the child to school. In the second period the child works and her salary depends on the education received in the first period. The child's wage in the second period is $(w - w_c)e + w_c$. The wage increases with the amount of child's education. For example, if the child doesn't attend school in the first period, her salary remains constant at w_c . The household also gets income from first period savings: s denotes savings and R the gross return on the household wealth.

The intertemporal household budget constraint is obtained by combining the budget constraints for both periods. It is given by:

$$c_1 + \frac{c_2}{R} + \left(\tau - \frac{w - w_c}{R} \right) e = \sum_{p=m,f} A_p + \sum_{p=m,f} w_p(1 - l_p) + w_c h + \frac{w_c}{R} \quad (5)$$

and the time constraint for the child is: $h + e + l_c = 1$

Assumption 1 *Utility functions are increasing in consumption and leisure and decreasing in child labor, concave and twice continuous differentiable. Each parent utility function depends on the other parent's consumption but only additively.*

Assumption 2 *The cross derivative between consumption and child labor, $U_{c_1 h}^p$, is non-negative.*

The intuition of this assumption is that private consumption and sparing the child from work are not complementary goods. A utility function separable in consumption and child labor, a usual feature in the literature, satisfies this last assumption.⁶

It can be shown that the model produces standard demand functions for consumption goods, leisure, education and child labor.⁷ These functions depend on prices, wages, household resources, the distribution of power, and household characteristics (observable and unobservable).⁸ Specifically for child labor:

$$h = h(p, \tau, R, w, w_p, A_p, \lambda) \quad (6)$$

The difference between these demands and those derived from a unitary model is the presence of the bargaining weights. The key empirical issue then, is to identify variables that affect the demand for goods only through the weights (the distribution factors mentioned above). Otherwise, it is not possible to disentangle the direct impact of the variable itself from the impact through the bargaining power.

In this paper the emphasis is on the effect of the mother's bargaining power on her child's labor. The first order condition for child labor equates the effect of child labor on parents utility to the effect of its impact on income, that is,

$$\lambda U_h^m + (1 - \lambda) U_h^f = \mu \left(w_c + \tau - \left(\frac{w - w_c}{R} \right) \right) \quad (7)$$

where U_x^p denotes the marginal utility of parent p with respect to x , and μ is the Lagrange multiplier in (5). The term $\left(w_c + \tau - \left(\frac{w - w_c}{R} \right) \right)$ is positive in order to get an interior

⁶Blundell, Chiappori, and Meghir (2005) for example, assume that leisure and consumption are separable from expenditure on children.

⁷A formal proof is contained in Browning and Chiappori (1998).

⁸See Mazzocco (forthcoming) for a dynamic version of a related model.

solution. Using the first order condition for first period aggregate consumption, it follows that

$$\mu = \lambda U_{c_1}^m + (1 - \lambda) U_{c_1}^f \quad (8)$$

Then, defining the function F :

$$F = \lambda U_h^m + (1 - \lambda) U_h^f - (\lambda U_{c_1}^m + (1 - \lambda) U_{c_1}^f) \left(w_c + \tau - \left(\frac{w - w_c}{R} \right) \right), \quad (9)$$

I apply the Implicit Function Theorem to obtain the effect of the mother's bargaining power on her child's labor; namely

$$\frac{dh}{d\lambda} = - \frac{\frac{dF}{d\lambda}}{\frac{dF}{dh}} = - \frac{U_h^m - U_h^f + (w_c + \tau - \left(\frac{w - w_c}{R} \right)) (U_{c_1}^f - U_{c_1}^m)}{\lambda U_{hh}^m + (1 - \lambda) U_{hh}^f - (w_c + \tau - \left(\frac{w - w_c}{R} \right)) (\lambda U_{c_1 h}^m + (1 - \lambda) U_{c_1 h}^f)} \quad (10)$$

where U_{hh}^p represents the second derivative with respect to child labor and $U_{c_1 h}^p$ the cross derivative with respect to child labor and consumption. From assumptions (1) and (2), the denominator of the previous equation is negative. Consequently, the sign of the derivative is determined by:

$$\text{sign} \left(\frac{dh}{d\lambda} \right) = \text{sign} \left[U_h^m - U_h^f + \left(w_c + \tau - \left(\frac{w - w_c}{R} \right) \right) (U_{c_1}^f - U_{c_1}^m) \right] \quad (11)$$

The impact of the bargaining power on child labor has two components. The first one $(U_h^m - U_h^f)$ is the direct impact on parents utilities. Both U_h^m and U_h^f are assumed to be negative, then the sign of the derivative is negative if mother's marginal disutility for child labor is larger than that of the father's. Therefore, if the parent with larger marginal disutility for child labor has more power, the model predicts that child labor

decreases with this parent's bargaining power.

The second component, $(w_c + \tau - (\frac{w-w_c}{R})) (U_{c1}^f - U_{c1}^m)$, represents the indirect effect through the budget constraint. Both U_{c1}^m and U_{c1}^f are assumed to be positive, thus the sign is negative if mother's marginal utility for consumption is larger than father's marginal utility. Therefore, if the parent with larger marginal utility for consumption also has more power, the model predicts that child labor decreases with this parent's bargaining power.

A negative relationship between mother's bargaining power and child labor, is impacted by these two effects. It could be that child labor hurts the mother more than the father or alternatively, that the mother's marginal utility of consumption is larger than the father's.

4 Data

4.1 The Survey

The data comes from the Encuesta Nacional sobre Niveles de Vida de los Hogares, Mexican Family Life Survey (MxFLS) for 2002. This survey is conducted by Centro de Investigación y Docencia Económicas, A.C. (CIDE), Universidad Iberoamericana (UIA) and INEGI (Mexican Statistical Institute).⁹ This is a new, ongoing, longitudinal survey of individuals, households, families, and communities in Mexico. It covers approximately 8,400 households and 38,000 individuals and it is representative at national, urban and rural levels from all states in Mexico.¹⁰ This multidimensional survey collects detailed

⁹See Rubalcava and Teruel (2004) and www.mxfls.cide.edu

¹⁰All individuals interviewed in the first wave were followed in 2005. This data has not been released yet.

information on asset ownership. Each household member answers questions regarding the ownership of household's assets and the decision making process related to those assets. I use this information to obtain an estimation of intra-household bargaining power.

The survey includes retrospective information about school attendance, and schooling levels of every household member. And crucial for this paper, time allocation and employment information of every household member, including children. It details the time children spend working (outside or at different tasks at home), studying or in leisure activities. In addition, an IQ test is conducted, providing a measure of children and parents' ability.¹¹

4.2 Summary Statistics

I consider children between 10 and 14 years old and I present two different definitions of working children. The first definition, a stricter one, includes only paid workers between 10 and 14 years old. The second definition, called broad, includes also children between 10 and 14 years old that work at least 10 hours per week.¹² The activities in which these children are involved, include agricultural activities, domestic housework, carrying firewood or water, or taking care of siblings or other members of the household. In the estimation reported below I use both definitions. In addition, for robustness checks, I also use a broader definition of child labor, namely children that work any positive amount of hours.

Table 1 shows the summary statistics, it includes the mean and standard deviation of

¹¹The test consists of Raven's Colored Progressive Matrices. This test is a widely used test designed to measure abstract thinking. It has been used as a proxy of intelligence and it is supposed to be gender and education neutral. In each test item, one is asked to find the missing pattern in a series. Each set of items gets progressively harder, requiring greater cognitive capacity to encode and analyze.

¹²This is an arbitrary definition, that seeks to include children with relatively permanent workload.

each variable. There are 4,131 children between 10 and 14 years old in the sample. 12% of the children falls in the strict definition and they work on average 54 hours per week.¹³ 47% of the children are working according to the broad definition, with an average workweek of almost 31 hours. There is a clear positive relationship between age and child labor. In fact, participation rates increase from 33% at 10 years old to almost 60% at 14 years old, using the broad definition.¹⁴ A usual finding is that the distribution of children on different types of activities depend on the child's gender. In this data, there are more working girls when using the broad definition but more boys under the strict one; 59% of the working children are girls under the broad definition compared to 36% under the strict definition. As expected, girls tend to work more at home and boys more outside, as paid workers. Working children (for both definitions) are significantly less able than non-working children; their parents are less educated than the parents of the non-working children. They belong predominantly to households with lower income and to rural households (27% of working children for the broad definition, against 18% in urban households). They are also less likely to attend school as it is also shown in the next table.¹⁵

One of the main concerns regarding child labor is the substitution between current schooling and the consequent effect on future wellbeing. Table 2 shows school attendance and work by gender for both definitions of working children. For this table I divide the children into four categories: work only; work and study; school only, and idle children (children that don't work and don't attend school). According to this table, the children that work outside the home (paid workers) reduce their school attendance. Only 80% of them attends school compared to 96% for the rest. For the broad definition the

¹³These hours include paid work plus all the activities mentioned above.

¹⁴Figure 2 showing participation rates by age and gender is included in the Appendix.

¹⁵The tests for the means always resulted in significant differences.

difference is not so large, since still 90% of them attend school.¹⁶ However, it is important to emphasize that these figures reflect school attendance and not performance. It is reasonable to expect that even when working children attend school, their educational achievements are likely to be lower than non-working children's achievements.

Therefore, this first look at the data suggests that there are significant differences between working and non-working children. In Subsection 5.2 I investigate the source of these differences estimating a child labor equation.

5 Estimation

5.1 Empirical Model

A general problem with this type of analysis is that it is necessary to estimate the bargaining power within the household along with the other parameters of the model. In this paper, I separate the estimation of the bargaining parameters from the estimation of the other parameters of the model. In this way I identify the effect of the bargaining power on the amount of child labor separately from the impact of the exogenous variables on the bargaining power. Some new questions in the data set allow me to do that. As mentioned above, the MxFLS includes questions about which member in the household makes decisions about different assets. There is information provided on who decides in the case of selling key assets like the house, the car, furniture, or appliances, among others. Using those questions, it is possible to know if the mother takes part in important decisions made in the household.

¹⁶Before the age of 13 the differences in years of education between working and non-working children are not significant. Working children aged 13 and 14 have less years of education than non-working children of their same age.

The estimation then consists of two stages. First, I estimate the mother's bargaining power within the household, denoted by λ . Second, I estimate the impact of λ , estimated in the first stage, on her child's labor.

For each asset or decision a , I define the following variable:

$$y_a = \begin{cases} 2 & \text{if the mother decides} \\ 1 & \text{if both parents decide.} \\ 0 & \text{if the father decides.} \end{cases} \quad (12)$$

For each possible value of y_a I define a dummy variable:

$$d_{aj} = \begin{cases} 1 & \text{if } y_a = j \\ 0 & \text{otherwise} \end{cases} \quad (13)$$

for $j = 0, 1, 2$

Then, the individual likelihood function for decision a is given simply by

$$L_h = \prod_{j=0}^2 Pr(Y_{ah} = j)^{d_{ajh}} \quad (14)$$

for every household h

The probability of $y_a = j$ for $j = 0, 1, 2$, depends, among other variables, on the mother's bargaining power. The mother's bargaining power for each household (λ_h) is assumed to be a linear function of the distribution factors, that is,

$$\lambda_h = z_h \theta \quad (15)$$

where z_h represents those variables affecting bargaining power but with no direct effects on the household members' utilities.¹⁷

In order to estimate λ , I need to partition the set of explanatory variables into two distinct sets. Variables contained in z_h , affect the decision through the bargaining power and variables in x_h affect the decision directly.

Using a multinomial logit model, then the individual household likelihood is given by

$$L_h = \prod_{j=0}^2 \left(\frac{\exp(z_h\theta + x_h\beta_{aj})}{\sum_{j=0}^2 \exp(z_h\theta + x_h\beta_{aj})} \right)^{d_{ajh}} \quad (16)$$

In this paper I utilize two decisions, therefore I have two variables: y_a and $y_{a'}$. The simultaneous estimation consists in a pseudo-log likelihood that is a weighted average of the log likelihood functions for each one of the decisions, namely

$$\ln L_h^* = \alpha \ln L_a + (1 - \alpha) \ln L_{a'} \quad (17)$$

The weight (α) is computed using the relative monetary values of the assets involved in each decision. However, as it turns out, the final results are robust to the choice of α .¹⁸

From this estimation I obtain $\hat{\theta}$, an estimation for θ in (16). Then, using equation (15), I construct an estimated value of λ for each household, i.e. $\hat{\lambda}_h = z_h \hat{\theta}$.

In the second stage the household decision regarding child labor is analyzed. In this stage I use the estimated value for λ from the first stage as one of the regressors. In

¹⁷In order to get a better approximation of the bargaining power, I estimate a polynomial function with interactions and squared terms of the distribution factors.

¹⁸In Table 8 below, I include a sensibility analysis for different values of α .

order to estimate the hours equation I use a Heckman selection model.

5.2 Results

For the first stage, I use the questions for two decisions made by the members of the household. The first group includes electronic appliances including radio, TV, computer, VCR, the second regards decisions about the house.¹⁹

Estimating the bargaining power via the decision questions requires variables that are suitable as distribution factors, i.e. variables that affect the distribution of power within the household, but do not have direct effect on the individuals' preferences. Under this assumption, I measure in the second stage the direct impact of the relative bargaining power on child labor. I use the difference between husband's and wife's ages, and sex ratio as distribution factors.²⁰ Although in general wives are younger than husbands, wives are expected to have less power when their partners are much older than them.²¹ Sex ratio captures the relative supply of men and women in the marriage market. If there are more men available, women tend to have more bargaining power.²² I include the mother's education, cognitive capacity and background (measured by her own parents' education) in the estimation, since they may affect her participation in household decisions. I also include a dummy variable taking the value one if the mother works outside the household, because housewives might be more likely to make decisions related to the house.²³

¹⁹I chose the assets with an appropriate number of observations, that represent an important decision, and have no clear gender connotation. The results are similar when using domestic appliances or other big appliances.

²⁰Difference in age is defined as husband age minus wife age. Sex ratio is defined as men over women by states and 5 years age ranges, using data from INEGI. I tried using several other definitions of sex composition and the results are robust to these changes.

²¹The average age of a woman in the sample is about 3.5 years lower than her partner.

²²Chiappori, Fortin, and Lacroix (2002) find that the state of the marriage market, reflected in the sex ratio and divorce laws, is an important determinant of the intra-household decision process.

²³Some of these variables have been used in the literature as reflecting relative bargaining power. However, as it was mentioned above, a key empirical issue is to identify variables that affect child labor

Table 3 presents the estimated effects of the distribution factors on mother’s bargaining power from the first stage regression. The expected negative impact for the age difference implies that mothers who are younger than their partners are less likely to make decisions regarding household assets. In contrast, when there are more men available, women tend to have more bargaining power.²⁴ Using these coefficients I obtain an estimate for mother’s bargaining power in each household; the average estimated bargaining power is 46.1%, with an standard deviation of 13%. Figure 1 shows average participation rates and hours of work by deciles of bargaining power, using the broad definition of working child. It can be seen that participation rates in the labor force and hours of work decrease with the mother’s estimated bargaining power.

Table 4 reports results from the second stage regression. In this stage I estimate a child labor equation using the model in Section 3 as a reference. The hours of child work are therefore regressed on the mother’s bargaining power (estimated in the first stage), parents’ education (approximating labor income) and a series of child, household and community variables.²⁵ These variables are the number of children in the household, birth order, child’s age and gender, a dummy for the participation in PROGRESA and geographical dummies. The final sample consists of 2,886 children.²⁶

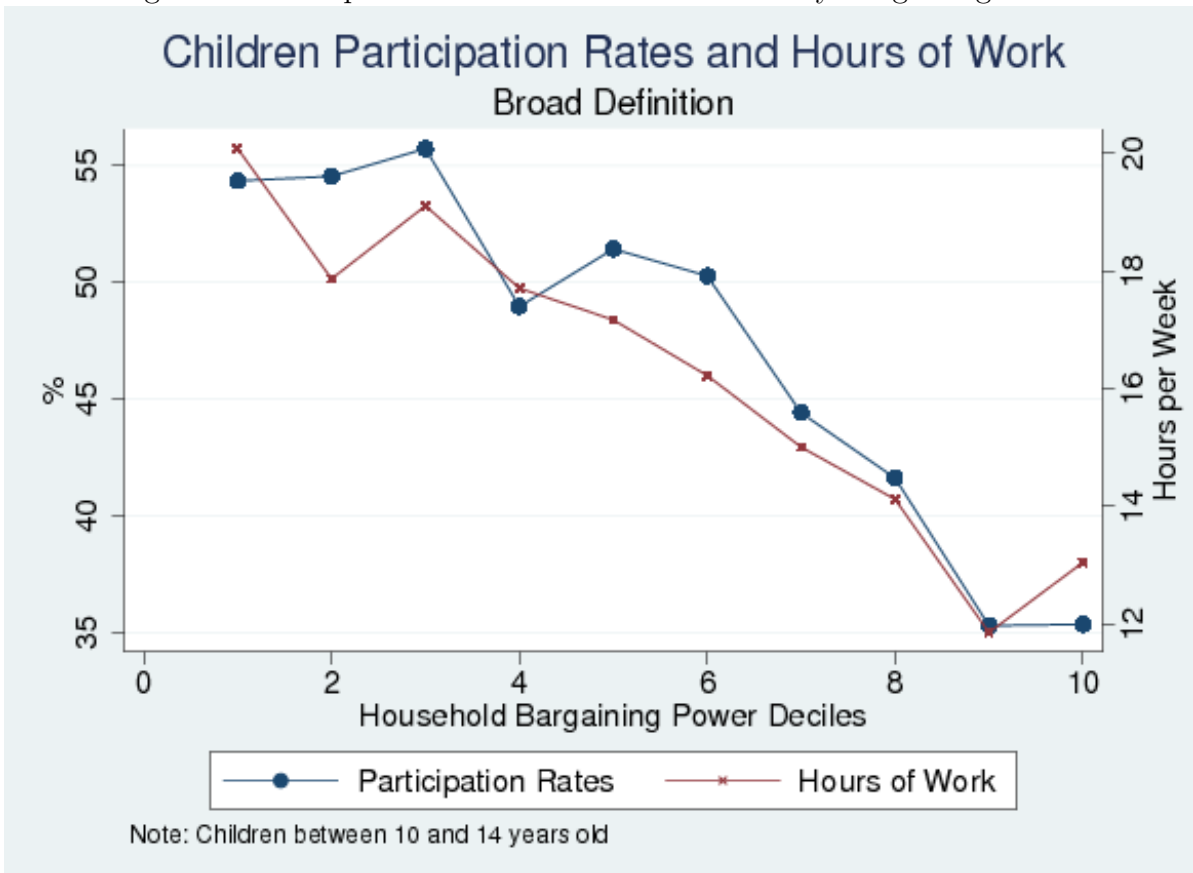
only through the weights. It might be argued that some of these variables may have a direct effect on child labor. Therefore, I am using as distribution factors variables that clearly do not have a direct impact on child labor.

²⁴The effect is computed as the derivative of the bargaining power equation with respect to each distribution factor, evaluated at the average values. The results are robust to the inclusion of other regressors, geographical dummies, to the inclusion of different decisions and their weights in the first stage estimation.

²⁵A regression of household labor income on parents’ education and background and geographical dummies produces an R^2 value of 0.24, and the coefficients of the education variables are significant at 99% of confidence.

²⁶I also considered a few other specifications using distance to school (as a measure of the cost of attending school), number of students in the class (representing school quality), the score in an IQ test (as a measure of ability), fluency in Spanish, indigenous origin, household composition and different income and wealth variables. The results reported do not change qualitatively and those variables were not significant. I also verified that the results are robust when estimating the equation with less regressors in order to be able to use a larger sample.

Figure 1: Participation Rates and Hours of Work by Bargaining Power



I present different estimations, using a Heckman selection model with different selection rules, namely: (a) positive hours of work; (b) broad; and (c) strict definitions of child labor.

The results are consistent across all specifications. The coefficients for bargaining power are always negative. This implies that more bargaining power to the mother is associated with less hours of child labor. However, when using the strict definition of child labor the coefficient on the mother's bargaining power is insignificant. This implies that the distribution of power within the household does not seem to affect those children working for pay outside the household. In other words, when children work for significant number of hours, for pay, outside the home, it is a decision that seems to be made by both parents. Or it is mainly affected by other variables than the distribution of power within the household.

Focusing on Column 2 from Table 4 we can see that older children, and especially when they have more siblings tend to work more. As it was mentioned above, and it is shown in the Appendix, there is a clear increase in child labor with age. PROGRESA participation and education of the parents have, as expected, negative impacts on the amount of children's work. The same conclusions are obtained when looking at Column 1, that defines a child as working if he works a positive amount of hours.

The coefficient obtained for the broad definition of child labor (second column), implies that if a mother with no bargaining power gets all the power in the household, her child's labor is expected to be reduced by about 18 hours per week (recall that the average number of hours these children work is 31). We can see also that mother and father's education coefficients are not significantly different from each other. This does change when I split the estimation by gender.

Table 5 presents the child labor estimation for the broad definition divided by gender.

Different important results are apparent. The effect of the mother's bargaining power is found to be significant only for girls. If a mother with no power gets it all, her daughter's workweek would be reduced by 30 hours. For the median household, with an estimated mother's bargaining power of 46%, daughters' workweek would be reduced by up to 16 hours. This represents about 55% of the average girls' workweek. Additionally, the mother's education is significant in the girls equation, while father's education is significant in the boys equation. This result is consistent with previous literature that suggests that mothers tend to allocate more resources to their daughters, while fathers tend to allocate more resources to their sons.

As a robustness check I compare the children included in the final regression with those excluded for lack of data for the relevant variables that are used in the estimation. About 70% of the working children are included in the final estimation. The summary statistics comparing children, all children and working children under the broad definition, in and out of the final sample are provided in Table 6. The means for all the variables are not significantly different between the two groups. This suggests that the inclusion of the children missing in the final estimation wouldn't change the final results.

As an additional robustness check, for the bargaining power measure, I analyze the correlation between the decision questions and the ratio of husband and wife leisure. This ratio has been used in the literature as a proxy for the distribution of bargaining power. Table 7 shows that when women enjoy relatively more leisure, they also tend to be more active in household decisions, a result that is consistent with the literature.

6 Conclusions

Child labor is pervasive; for example, in Latin America approximately 16% of the children between the ages of 5 and 14 are working. While it may be that child labor is a necessity for the survival of some families, it is generally agreed that it has a large negative effect on the accumulation of general human capital. This is especially important for developing economies in which child labor is widespread, and children's development is crucial for the countries' economic growth. It is therefore vital to understand the effect of the household structure on child labor.

Using the well-known collective model of the household, I analyze the impact of women's bargaining power in the household, on children's amount of work. This allows me to evaluate the possible impact of policies that have been used around the world that direct welfare benefits to the mother. These policies follow the assumption that the mother cares more than the father about investment in the household's children.

A general problem with this type of analysis is that one needs to estimate a measure of the bargaining power within the household along with the other parameters of the model, i.e., the preference parameters. While generally an insurmountable problem, in this study I am able to separate the estimation of the bargaining parameters from the estimation of the other parameters of the model. To do that, I utilize information provided in the data set regarding decision making with respect to several key assets. Using this data, it is possible to first estimate the bargaining parameters and then use the estimated bargaining power in a second stage estimation of the child labor decision.

I find that, in the Mexican case, the more bargaining power the mother has, the fewer hours of child labor. A further examination by disaggregating the estimation by gender reveals differential results for boys and girls.

An increase in mothers' bargaining power has significant impact on their daughters' labor supply, while boys do not seem to be affected by the distribution of power within the household. This result is consistent with previous literature that suggests that mothers tend to allocate more resources for their daughters. These findings have direct implication for policies that provide welfare benefits directly to the mother.

The second wave of MxFLS is expected to be available soon. This will allow me to explore in greater depth the relationship between child labor and the distribution of power within the household.

Table 1: Summary Statistics

	Broad		Strict	
	Working	Non-working	Working	Non-working
CHILD				
Hours of work	30.62 21.05	3.44 3.31	54.17 24.20	11.25 12.65
School Attendance	0.90 0.29	0.97 0.17	0.80 0.40	0.96 0.20
Ability¹	-0.10 1.02	0.09 0.97	-0.13 1.01	0.02 1.00
Number of Children in the Household	3.60 1.66	3.05 1.50	3.63 1.76	3.27 1.57
Age	12.26 1.36	11.71 1.41	12.64 1.31	11.88 1.40
Female	0.59 0.49	0.43 0.50	0.36 0.48	0.53 0.50
HOUSEHOLD				
Mother's background²	2.11 2.71	2.84 3.04	1.97 2.53	2.56 2.95
Father's background²	1.91 2.71	2.73 3.03	1.67 2.50	2.43 2.95
Mother's years of education	5.34 3.28	6.23 3.26	5.02 3.31	5.91 3.28
Father's years of education	5.41 3.47	6.33 3.46	5.11 3.49	6.00 3.48
Household Annual Income	38,216 829	44,479 879	38,138 1,631	41,949 655
Rural Household	0.27 0.45	0.18 0.39	0.27 0.44	0.22 0.42
PROGRESA Participation	0.22 0.41	0.17 0.37	0.17 0.37	0.19 0.39
No of observations	1,945 47%	2,186	480 12%	3,651

Note: Means and Standard Deviations are reported below. Children between 10 and 14 years old.

1 Ability reflects the score on an IQ test. The scores are normalized to has zero mean.

2 Parents background is given by their own parents years of education.

**Table 2: School Attendance and Work by Gender
(10 -14 years old)**

Strict definition			
%	Total	Boys	Girls
Work only	3.73	3.05	4.40
Work and study	9.33	12.34	6.40
Study only	84.64	81.86	87.34
Neither work nor study	2.30	2.75	1.86

80% of working children attend school

96% of not working children attend school

Broad definition			
%	Total	Boys	Girls
Work only	4.12	3.34	4.87
Work and study	37.48	31.66	43.14
Study only	56.48	62.54	50.60
Neither work nor study	1.91	2.46	1.39

90% of working children attend school

97% of not working children attend school

Note: Strict definition includes only paid workers between 10 and 14 years old. Broad definition includes children between 10 and 14 years old that work at least 10 hours per week.

**Table 3: Effect of Distribution Factors on Bargaining Power
using House and Electronic Appliances Decisions**

Age Difference	-0.024
Sex Ratio	11.84
No. Obs.	2,305

Note: The effect is computed as the derivative of the polynomial function with respect to each distribution factor, evaluated at the average values.

Electronic Appliances include radio, TV, VCR, computer. Difference in age is defined as husband's age minus wife's age. Sex ratio is defined as men over women by states and 5 years age ranges, using data from INEGI.

Table 4: Child Labor Equation (Hours of work)
Heckman selection model

	Positive	Broad	Strict
Bargaining Power	-13.93 (5.45)**	-18.40 (9.24)**	-7.34 (15.03)
Number of Children	3.16 (0.42)***	4.06 (1.13)***	1.72 (1.50)
Birth Order	-2.71 (0.63)***	-3.41 (1.36)**	-3.78 (1.76)**
Age	3.32 (0.42)***	4.98 (1.11)***	0.25 (3.52)
Female	1.23 (1.65)	0.11 (2.77)	8.99 (6.71)
PROGRESA participation	-2.28 (1.13)**	-3.33 (1.87)*	-3.83 (4.63)
Mother's Education	-0.41 (0.18)**	-0.62 (0.28)**	-0.69 (0.56)
Father's Education	-0.47 (0.15)***	-0.77 (0.25)***	-1.52 (0.46)***
No. Obs. selection equation	2,886	2,886	2,886
No. Obs. hours equation	2,357	1,356	329

Note: Significantly different than zero at 99 (***) , 95(**), and 90 (*)%. Bootstrap Standard Errors in parentheses. Children between 10 and 14 years old. Positive: defines working child as any child working a positive amount of hours. Broad: defines working child as any child working at least 10 hours per week. Strict: defines working child as paid workers. Bargaining Power estimated from first stage.

**Table 5: Child Labor Equation by Gender (Hours of work)
Heckman selection model**

	Girls	Boys
Bargaining Power	-30.28 (9.75) ^{***}	7.42 (8.66)
Number of Children	3.93 (1.20) ^{***}	2.87 (0.96) ^{***}
Birth Order	-3.85 (1.27) ^{***}	-2.22 (0.72) ^{***}
Age	4.48 (1.37) ^{***}	3.94 (0.92) ^{***}
PROGRESA participation	-2.59 (2.16)	-3.17 (2.48)
Mother's Education	-0.86 (0.37) ^{**}	-0.16 (0.47)
Father's Education	-0.12 (0.28)	-1.35 (0.45) ^{***}
No. Obs. selection equation	1,460	1,426
No. Obs. hours equation	800	556

Note: Significantly different than zero at 99 (***) , 95(**), and 90 (*) percent. Bootstrap Standard Errors in parentheses. Children between 10 and 14 years old, using broad definition of working child.

Table 6: Comparing All Children in the Sample to Children in the Final Estimation

Summary Statistics				
	All Children		Working Children–Broad	
	Whole Sample	Final Estimation	Whole Sample	Final Estimation
Age	11.97 1.41	11.96 1.41	12.26 1.36	12.23 1.36
Female	0.51 0.50	0.51 0.50	0.59 0.49	0.59 0.49
Ability	0.00 1.00	0.01 0.99	-0.10 1.02	-0.08 1.03
Participation Rate	0.47 0.50	0.47 0.50		
Working Hours	16.25 19.96	15.94 19.58	30.63 21.04	29.97 20.75
Mother’s education	5.81 3.30	5.80 3.28	5.34 3.28	5.29 3.29
Father’s education	5.90 3.49	5.88 3.52	5.41 3.47	5.40 3.51
No of observations	4,131	2,886	1,947	1,356
		69.8%		69.6%

Note: See Notes from Table 1

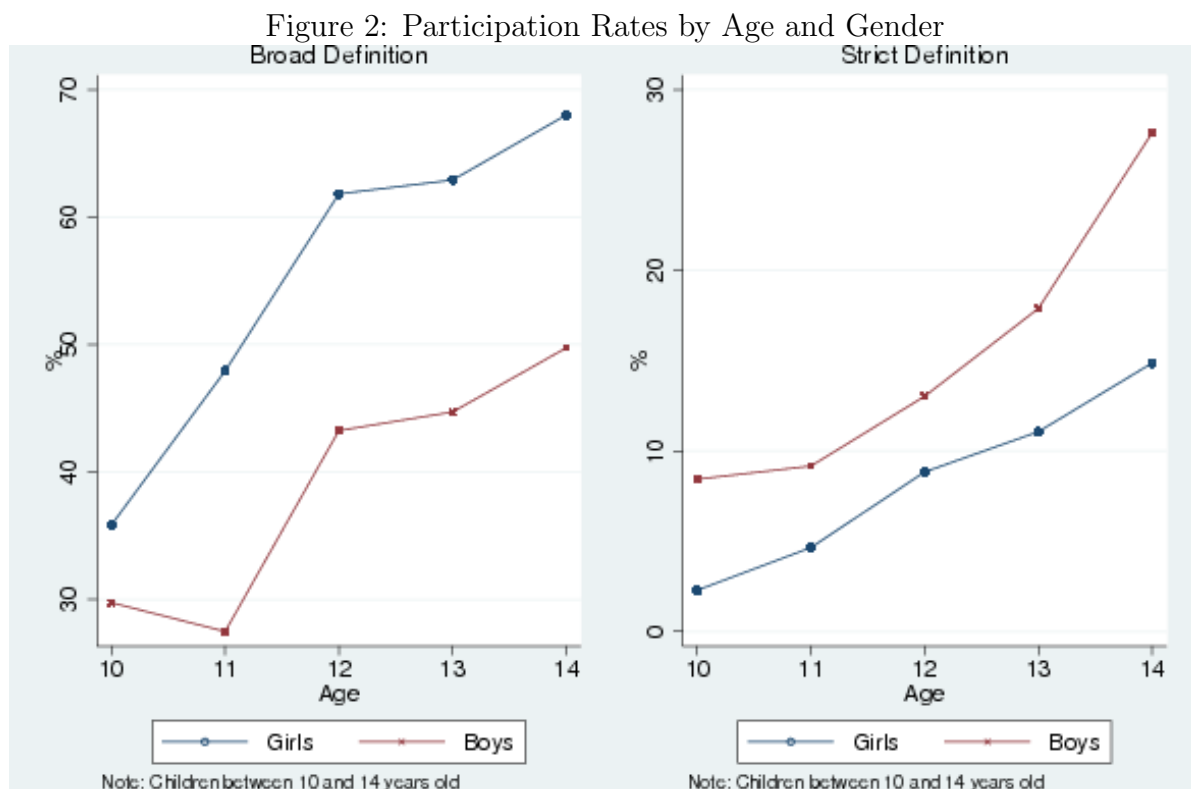
Table 7: Correlation between different measures of bargaining power

	House	Electronic Appliances	Leisure
House	1.000		
Electronic Appliances	0.391*	1.000	
Leisure	0.039*	0.048*	1.000

Note: Significantly different than zero at 99 (***) , 95(**), and 90 (*) percent.

Appendix 1

There is a clear positive relationship between age and child labor. Participation rates, using the broad definition, increase from 33% at 10 years old to almost 60% at 14 years old. Using the strict definition, they increase from 5% to 21% respectively. As expected, girls participate more than boys when we consider household chores. The opposite happens when we consider only paid work.



Appendix 2

In order to check the robustness of the final result to the first stage estimation, I perform a sensitivity analysis. I estimate the impact of mother's bargaining power on child labor for different weights of the decisions used in the first stage.²⁷

Table 8: Bargaining Power Variables Coefficients for Different Weights in the First Stage

α	0.1	0.3	0.5	0.7	1	0.95
Age Difference	-0.023	-0.023	-0.022	-0.021	-0.024	-0.024
Sex Ratio	10.12	11.53	11.70	11.79	11.96	11.84
Bargaining Power	-24.00	-22.66	-18.13	-18.37	-18.39	-18.40
Standard Error	(8.99) ^{***}	(8.77) ^{***}	(8.47) ^{**}	(8.30) ^{**}	(8.11) ^{**}	(7.89) ^{**}

Note: α is the weight assigned to the house decision in the first stage estimation.

Bargaining Power corresponds to the coefficient obtained in the child labor equation for the broad definition, comparable to column 2 from Table 4 ($\alpha = 0.95$).

Age Difference and Sex Ratio show the effect of each variable on the mother's bargaining power in the first stage estimation.

²⁷For brevity I show only some values for α .

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