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How Much Are We Willing to Pay to Send Poor Adolescents to School? Simulating Changes to Mexico's *Oportunidades* in Urban Areas

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Abstract[*]

Although Mexico's Conditional Cash Transfer Program *Oportunidades* has increased overall school enrollment, many adolescents do not attend school, especially in urban areas. This paper simulates the effects of changes in program design using a simple parametric method based on a simultaneous probability model of school attendance and child labor. The paper also provides alternative non parametric simulation results by extending Todd and Wolpin's (2006) method to incorporate changes in working hours when attending school. The results indicate that eliminating or reducing school subsidies for primary education and increasing transfer for older students is a cost-effective way to raise overall school enrollment in urban areas. Increasing school attendance of 16-year-olds to 80 percent or more, however, would require a quadrupling of scholarships. This suggests that complementary interventions are needed.

JEL Classification: I20; J22
Key words: School attendance and work, Conditional cash transfers, Simulation, Oportunidades

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1. Introduction

Conditional Cash Transfers (CCT) Programs have been successfully implemented in many Latin American countries. The main goal of CCTs has been to enhance human capital formation over the longer term by increasing school attendance and improving the health status of children, among other considerations. One of the earliest and most successful CCT programs is Mexico's *Oportunidades*, which started in rural areas in 1997. As the program expanded its coverage to urban areas in 2002, new challenges have emerged. Currently, the implementation of *Oportunidades* in urban areas faces two main obstacles. The first is the need to expand the program's coverage and improve its targeting. A second obstacle is the need to increase the take-up rate of adolescents belonging to *Oportunidades* households whose main conditionality is school enrollment and attendance.

Improving the effectiveness of the *Oportunidades* education conditionality and of other interventions to increase adolescent's school attendance in urban areas is a policy priority for Mexico. Presently, only 78 percent of adolescents between 12 and 18 years old attend school in urban areas of the country,[1] a rate that falls to only 70 percent among those belonging to poor households that do not receive the *Oportunidades* monetary educational transfer. While *Oportunidades* has had a sizable impact on retaining adolescents in school, the dynamism of the labor market in urban areas, which offers adolescents the chance to contribute to household income, increases the opportunity costs of attending school. Evidence from Mexico's household surveys (ENIGH-2006 and ENCELURB-2004) indicates that school dropout rates start to increase at age 14, while labor market participation also increases. This has important implications for program design, as it suggests there is scope for re-calibrating Program rules with the aim of increasing school enrollment among adolescents.

This paper simulates how school attendance responds to changes in *Oportunidades* monetary transfers, paying particular attention to secondary and high school students. For this, several features of the labor market, related to the opportunity cost of attending school, are analyzed under parametric and non-parametric frameworks. Most previous simulations with this purpose for the Mexican case have followed the Bourguignon, Ferreira and Leite (2003) parametric method. We derive and carry out a simpler parametric method based on a simultaneous model of school attendance and child labor that is estimated using bivariate

[1] Urban areas are defined as those localities with more than 15,000 inhabitants.

probability models. The paper also extends Todd and Wolpin's (2006) non-parametric methodology by allowing changes in the number of working hours. Different transfer schemes are used to analyze the program's role in adolescents' school attendance.

The paper is structured as follows. The next section briefly describes the features of the *Oportunidades* program in urban areas, devoting particular attention to its educational component. Section 3 briefly reviews the literature on child labor, determinants of school attendance, and simulation in the context of conditional cash transfer programs. Section 4 explains the methodology, and Section 5 describes the data used in the empirical analysis, presenting some descriptive statistics. Section 6 presents the main empirical results, and Section 7 concludes.

2. The Urban *Oportunidades* Program

The *Oportunidades* program (previously known as *Progresa*) was first implemented in 1997 in rural areas of Mexico. The program aims to break the vicious cycle of poverty by increasing children's human capital through investment in health, education and improved nutrition rates. The program conveys cash to poor households under the condition that they engage in behaviors that are consistent with the accumulation of human capital. The largest transfer of the program is the educational one. Grants are paid to poor mothers (targeted by proxy means testing) if their school-age children enroll and attend school regularly.[2]

The educational grants consist of three parts. The first part requires every school-age child enrolled in the Program to attend at least 85 percent of the classes per month from the third grade of primary school to the end of secondary; the student then receives a scholarship for 10 months of each year.[3] The transfer increases with the school year and is adjusted to avoid drop-outs; for example, the scholarship is higher for girls than for boys after secondary school. The second sub-component is a one-time cash transfer received upon high school completion. Finally, the third sub-component is related to school supplies. Primary school students receive two installments (at the beginning of the term and at half term), while secondary and high school students receive one installment upon registration.

[2] For further details about the *Oportunidades-Progresa* program refer to Skoufias (2001); Skoufias and Parker (2001); Attanasio, Meghit and Santiago (2005), and Angelucci and Attanasio (2006), among others.
[3] More details on the amounts of transfers by grade and gender are presented in Section 4.1

In 2002 the program expanded its benefits to urban areas. The expansion and incorporation processes in urban areas were very different from those implemented in rural areas. First, allocation across geographic areas was not random. Second, a census to establish eligibility was not feasible;[4] therefore, registration offices were set up in areas with high concentration of poor households and potential beneficiaries had to visit these local offices in order to apply to the program. Given this implementation scheme, many potentially eligible households did not apply on time for several reasons: (i) not knowing about the existence of the program; (ii) uncertainty regarding eligibility status; and (iii) the program as it was designed was not attractive to some households (Attanasio et al., 2005). It is noteworthy to mention that the structure and amount of educational grants were the same as those implemented in rural areas, despite the fact that living and working conditions in urban areas are completely different.

The fact that many eligible households did not sign up for the program because its current design is not sufficiently attractive has important implications for the effectiveness of the urban *Oportunidades* program. With this in mind, our research pretends to shed light on how the program can re-design its educational transfer schemes in order to increase the take-up rate of households in urban areas, particularly, among poor adolescents.

3. Related Literature

The decision of whether a child attends school, works or does both is an outcome of the parent's inter-temporal household utility maximization. Parents weigh the benefits of the economic contribution of the children to the household and compare it to the current and future benefits of investing in the child's education. The decision to invest in children's education has been extensively modeled and discussed in the literature (Becker and Tomes, 1986; Card, 1999; and Sackey, 2007). The expected returns to education, after controlling for family background, environment, personal characteristics, and the quality of education, can be reflected in higher future earnings (Russell, 1981; Card, 1999). Greater economic returns, together with the expectations of parents for future intra-generational income transfers, can be important variables in the decision to send children to school.

[4] Once a rural locality had been targeted, based on the index of marginalization and access to certain basic services (schools and health centers), a census of all households living in the locality was taken. Based on some variables observed in this survey, each household was designated as beneficiary or not (Angelucci and Attanasio, 2006).

The determinants and consequences of child labor have been also widely studied in the literature (Basu and Van, 1998; Brown, Deardorff and Stern, 2002; and Kruger, 2006). Child labor is highly associated with the intergenerational transmission of poverty and inequality. Prevalence of child labor hinders human capital accumulation, as time allocated to attending school is constrained if the child works (Patrinos and Psacharopoulos, 1995; Khanam and Ross, 2005). Empirical analysis based on household surveys in Bolivia and Venezuela, demonstrated that child labor reduces educational attainment by about two years (Psacharopoulos, 1997). Long-term consequences of child labor are lower productivity levels and wages, which finally reinforce poverty traps.

The income a child can earn in the labor market is an important variable in the decision to work. This income is a function of the child age, gender, and also labor market conditions. The literature highlights that, conditional on family wealth, during periods of economic growth, child labor increases and school attendance declines. The rationale is that the opportunity cost of going to school becomes too high and some households choose to maximize current household income. After controlling for household characteristics, Duryea and Arends-Kuenning (2003), in the case of Brazil, and Kruger (2006a and 2006b), in the case of Brazil and Nicaragua, find that the incidence of child labor is higher and children are more prone to leave school during periods of economic expansion, when labor market opportunities improve.

The empirical evidence also shows that child labor increases and school attendance decreases in the offset of an economic crisis, due to a recession or external shock. Analzying agricultural shocks in Tanzania, Beegle (2006) finds that child labor increases and school attendance decreases in response to negative shocks, after controlling for household wealth. There is also evidence that the incidence of child labor varies across regions in the same country and is surprisingly higher in relatively wealthier urban areas. Evidence for Brazilian metropolitan areas suggests that the highest incidences of urban child labor are concentrated in more economically active areas (Barros, Mendonça and Velazco, 1994). Even though the analysis of the determinants of child labor is beyond the scope of this paper, it is important to note that household income and liquidity constraints are important determinants of the decision to send a child to school.

Within this context, the evidence highlights the importance of conditional cash transfer programs, as they can lower the opportunity cost of child labor and foster school attendance

(Schultz, 2000a and 2000b; Ravallion and Wodon, 2000; Skoufias and Parker, 2001). Improvement in household economic status (via transfers or wages) tends to decrease child labor and increase school attendance (Edmonds, 2005 and 2006; Cardoso and Souza, 2004; Bourguignon, Ferreira and Leite, 2003). The rationale is that the household opts for child labor (instead of investing in education) if its income level is low. However, if children's education is "subsidized" through an income transfer or higher wages, households may decide to send their children to school (Neri and Thomas, 2001; Filmer and Prichett, 1998; Bedi and Marshall, 1999; and Handa, 1996).

Conditional cash transfer (CCT) programs aim at improving the welfare of the poor and reducing poverty and inequality. In the short run CCTs alleviate poverty by transferring income to households that comply with various program conditionalities (as the name indicates). Conditionality varies by program, but usually includes school attendance and visits to health clinics with the objective of reducing poverty in the long run through human capital accumulation and better living standards. The transfers are intended to offset (at least partially) the opportunity cost families face when deciding whether to sending their children to school or work. There is abundant empirical evidence on CCTs and their impact on the educational component, especially for Brazil and Mexico, which are pioneers in implementing large-scale CCT programs in Latin America.

In Brazil, Cardoso and Souza (2004) find that income transfer programs had a positive and significant impact on school attendance; however they do not find a statistically significant reduction on the incidence of child labor. For the Mexican case, Skoufias and Parker (2001) and Buddelmeyer and Skoufias (2003) show that the *Oportunidad*es CCT program has had a positive effect on school attendance of both boys and girls in primary and secondary school and a small but negative impact on children's labor market participation (especially for boys). Their results indicate that the decrease in child labor is smaller than the increase in schooling; the adjustment seems to be happening through decreases in leisure time or domestic work (largely for girls).[5] The lower impact on child labor could be due to the fact that households decide to combine school attendance with work, as transfers might be too small to provide an incentive to completely forgo labor income.

[5] In the case of Brazil, Cardoso and Souza (2004) find that income transfer programs had a positive and significant impact on school attendance, but they do not find a statistically significant reduction in the incidence of child labor,

Constant evaluations of the Mexican *Oportunidades* program indicate that there is scope for improvements in its design. Schultz (2000b) points out that the program's impact on primary school enrolment has been small. This might be due to the fact that primary school enrollment rate was already high (around 90 percent) when the program was implemented. Using data from the Progresa randomized experiment in rural areas of Mexico, de Janvry and Sadoulet (2006) analyze whether better targeting of qualifying poor households and better calibration of the levels of cash transfers can help increase the program's efficiency. They conclude that achieving efficiency gains requires focusing on children who have high probability of not enrolling in school without a conditional transfer. These children are particularly concentrated in secondary and high school levels.

Todd and Wolpin (2006) also analyze how changes in the structure of the educational transfer can modify school attendance among children between 12 and 15 years old. They perform non-parametric ex-ante simulations and compare them to experimentally estimated program impacts using the baseline survey administered in rural areas in 1997 and the follow-up survey administered in 1998. They find that, on average, the program increased school attendance by 6 percent for both girls and boys. More recently, Attanasio et al. (2008) analyze the impact of changes in *Oportunidades* transfers on urban school enrollment. They show that transferring the funds to children attending secondary levels and above can increase participation from a peak of 7.5 percent to 9 percent (disaggregated by age). In addition, by transferring all resources to high school students alone, the increase in participation for them can be as high as 19 percent.

Parker (2003) finds that the program affected dropout rates negatively (keeping students enrolled) mainly in rural and semi-urban areas, being this impact higher for girls. Her conclusions point out an increase of 23 percent in secondary school attendance in rural areas and 10 percent in semi-urban areas. She does not find an impact in secondary school attendance in urban areas, which she attributes to the small size of the program in these areas. According to estimates presented by Schultz (2000b) the increase of secondary education levels are around 11 percent for girls and 7.5 percent for boys in rural areas after just two years of the program (Schultz, 2000b).

In order to assess the impact of potential changes on the current design of safety net programs researchers have increasingly turned to techniques that enable them to simulate the

impacts of policies. Ex-ante evaluations models include an array of possibilities and aim primarily at simulating the effects of policy interventions (before they take place) to quantify their impact. As mentioned by Wolpin (2007) there is no consensus of what constitutes the best model of ex-ante policy evaluation, actually finding a balance between the model's structural complexity and feasibility of an empirical application is the challenge for the achievement of a successful ex-ante evaluation. The non-experimental approach that constitutes an ex-ante evaluation must rely on parametric as well as behavioral assumptions. In this paper we apply two types of ex-ante simulation, a parametric simulation based on a bi-probit model of school attendance and child labor and a semi-parametric simulation based on matching techniques.

4. Methodology

4.1 Parametric Simulations

4.1.1 Model

To motivate our parametric empirical simulation, we build on the simple model of school and work decisions proposed by Ravallion and Wodon (2000). In the model, parents allocate children's time according to the household utility function:

$$U = U(c, s, h; x, \varepsilon)$$

where c is current consumption, s is child school attendance, h is child leisure, x is a vector of observed household characteristics that affect household preferences and ε is an unobserved shifter of household preferences. Parents allocate total child time t into school, work (l) and leisure, so that $s + h + l = t$.

Assuming that household income (y) is a function of observable household characteristics (x) and that parents receive a transfer (b) from the government for child school attendance (s), and a child wage of w if the child works (l), then the household budget constraint can be written as:

$$c = wl + bs + y(x)$$

If we solve the utility maximization problem subject to this budget constraint we can derive the household's demands for child schooling, labor, and leisure:

$$s = s(w, b, wt + y(x), x, \varepsilon)$$
$$l = l(w, b, wt + y(x), x, \varepsilon)$$
$$h = h(w, b, wt + y(x), x, \varepsilon)$$

4.1.2 Estimation

In our data we only observe school and work choice of children, so we focus on these two choices for estimation. In particular, we are interested in measuring how *Oportunidades* affects the probability of school attendance among adolescents. We parameterize the previous demand equation for child *i* as follows:

$$s_i^* = x_{1,i}\beta_1 + \gamma_1 G_i + \eta_1 Y_i + \alpha_1 T_i^{Op} + \varepsilon_{1,i} \qquad (1)$$
$$l_i^* = x_{2,i}\beta_2 + \gamma_2 G_i + \eta_2 Y_i + \alpha_2 T_i^{Op} + \varepsilon_{2,i}$$

We will observe the child attending school if $s_i^* \geq 0$, and we will observe the child working if $l_i^* \geq 0$. The vector of controls $x_{.,i}$ includes personal and household characteristics. The vector G_i includes geographic dummies and state characteristics related to the labor market and migration. The vector Y_i includes income variables at the household level excluding any income coming from the *Oportunidades* transfers.

The variable $T_{i,t}^{Op}$ is the education transfer that child i would receive if she were to comply with the Program education conditionality. As educational grants vary with the gender and grade in which the child is enrolled and are capped, this potential transfer is calculated assuming that the household would maximize educational grants and child labor income taking into account the number of children it has, their age, enrollment grade, and program ceilings on these grants (T^{Max}). Thus, the potential transfer per child is given by:

$$T_i^{Op} = MIN[T_i(G_i), T^{Max} - \sum_{age_j \leq age_i} T_j(G_j)] \qquad (2)$$

if the child i is enrolled in grade G_i and her younger sibling in grades G_j, and she belongs to an *Oportunidades* eligible household ($T_i^{Op} = 0$ otherwise).

It is important to emphasize at this point, however, that in the ENIGH data we only observe beneficiaries and non-beneficiaries, and we do not know if any of the households in our

non-beneficiary data were offered the program. Thus, we cannot control for auto selection in our sample, a common limitation in parametric simulations based on non-experimental data. The ENCELURB data have the same limitations, as noted in Section 2.

To estimate the probabilities of working and attending school from the demand system we assume that $\varepsilon_{1,i}$ and $\varepsilon_{2,i}$ are jointly normally distributed with:

$$\begin{aligned} &E[\varepsilon_{1,i} \mid x_{1,i}, x_{2,i}] = E[\varepsilon_{2,i} \mid x_{1,i}, x_{2,i}] = 0 \\ &Var[\varepsilon_{1,i} \mid x_{1,i}, x_{2,i}] = Var[\varepsilon_{2,i} \mid x_{1,i}, x_{2,i}] = 1 \\ &Cov[\varepsilon_{1,i}, \varepsilon_{2,i} \mid x_{1,i}, x_{2,i}] = \rho \end{aligned} \qquad (3)$$

We then estimate a bivariate probit MLE (Maximum likelihood estimation) for the simultaneous probability of attending school and working:

$$\Pr(\varepsilon_{1,i} < -x_{1,i}\beta_1 - \gamma_1 G_i - \eta_1 Y_i - \alpha_1 T_i^{Op}, \varepsilon_{2,i} < -x_{2,i}\beta_2 - \gamma_2 G_i - \eta_2 Y_i - \alpha_2 T_i^{Op}) = \qquad (4)$$

$$\int_{-\infty}^{-x_{1,i}\beta_1 - \gamma_1 G_i - \eta_1 Y_i - \alpha_1 T_i^{Op}} \int_{-\infty}^{-x_{2,i}\beta_2 - \gamma_2 G_i - \eta_2 Y_i - \alpha_2 T_i^{Op}} \phi_2(z_1, z_2, \rho) dz_1 dz_2$$

where $\phi_2(z_1, z_2, \rho)$ is the bivariate normal density function with correlation parameter ρ.

Once we estimate the model we can focus on the effects of the educational transfer on school attendance. The unconditional probability of child i attending school is given by:

$$\Pr[S_i = 1 \mid x_{1,i}, x_{2,i}, T_i^{Op}] = \phi(x_{1,i}\hat{\beta} + \hat{\gamma}_1 G_i + \hat{\eta}_1 Y_i + \hat{\alpha}_1 T_i^{Op}) \qquad (5)$$

and with this probability we can simulate the effects of changes in the grant structure by changing the value of T_i^{Op} in the previous equation.

4.2 Non-Parametric Simulations

The model that motivates our non-parametric estimation also follows a simple household utility maximization problem as presented by Todd and Wolpin (2006). Consider a one-period setting in which the household makes the decision to enroll a child in school. The household solves the standard maximization problem:

$$Max\ U\ (c,\ s) \qquad subject\ to \qquad c = y + w\ (1\text{-}s)$$

where c is household consumption, y is household income net of the child's contribution, w is the observed wage and s is an indicator function of school attendance.

In the presence of the *Oportunidades* program, a beneficiary household receives an income subsidy denoted by τ for school attendance. The problem faced by the beneficiary household then becomes:

$$Max\ U\ (c,\ s) \qquad subject\ to \qquad c = y + w\ (1\text{-}s) + \tau s$$

Furthermore, the budget constraint can be re-written as:

$$c = (y + \tau) + (w - \tau)\ (1 - s)$$

Under this simple setting, a matching estimator of average program effects is used to analyze the average effects of the program. Specifically, the intent to treat (ITT) estimator is defined as:

$$\hat{\alpha} = \frac{1}{n} \sum_{\substack{j=1 \\ j,i \in S_p}}^{n} \left\{ E\left(s_i \mid w_i = w_j - \tau_j, y_i = y_j + \tau_j, z_i = z_j, t_i = t_j\right) - s_j\left(w_j, y_j, z_j, t_j\right) \right\}$$

where S_j is an indicator for whether child j is attending school, w_j is the wage for child j, y_j is household income net of the child's contribution, and τ_j is the program subsidy. In addition, we include household structure variables z_j and t_j which represent the number of children above 14 years old and the size of the household, respectively.

We propose an alternative way to calculate the ITT estimator that takes into account the wage an adolescent (that is currently working) would receive if he/she decided to attend school. For this, we estimate the number of hours the adolescent would work if attending school. This implies regressing working hours (h) over the sample of children that both attend school and work, taking into consideration their personal, household and geographic characteristics (X),

$$h_i = \alpha + \beta X_i + \varepsilon_i \qquad (6)$$

After estimating equation (6), we obtain the predicted number of working hours of children if enrolled in the program (i.e., attending school) and working $(\hat{h})$. We then calculate the potential wage $(\hat{W})$ assuming that the hourly wage currently observed (w) will not change:

$$\hat{W}_i = \hat{h}_i * w_i$$

The procedure explained above can provide a more precise measure of the income loss adolescents experience when deciding to participate in the program. In addition, it acknowledges that attending school and working are not mutually exclusive. Our assumption is that the household adjusts the number of working hours to comply with the school conditionality. The opportunity cost of attending school and working a smaller number of hours is then denoted as

$$b_i = w_i - \hat{w}_i$$

and the intent to treat estimator is re-defined as

$$\hat{\alpha} = \frac{1}{n} \sum_{\substack{j=1 \\ j,i \in S_p}}^{n} \left\{ E\left(s_i \mid w_i = w_j - b_j, y_i = y_j + \tau_j, z_i = z_j, t_i = t_j\right) - s_j\left(w_j, y_j, z_j, t_j\right) \right\}$$

The estimator matches children with wage w_j and household income y_j to a group of children that receive a wage $w_i=w_j- \tau_j$ and with household income $y_i=y_j- \tau_j$. It also considers household's demographics, including household size and the number of children older than 14. The intention to treat estimator matches households that belong to the control group only, allowing for the estimation of the program's impact. The matched outcomes are estimated non-parametrically using a standard four-dimension kernel regression estimator defined as (Greene, 2003):

$$E\left(s_i \mid w_i = w_0, y_i = y_0, z_i = z_o, t_i = t_o\right) = \frac{\sum_{\substack{i=1 \\ i \in S_P}}^{n} s_i K\left(\frac{w_i - w_0}{h_n^w}\right) K\left(\frac{y_i - y_0}{h_n^y}\right) K\left(\frac{z_i - z_o}{h_n^z}\right) K\left(\frac{t_i - t_o}{h_n^t}\right)}{\sum_{\substack{i=1 \\ i \in S_P}}^{n} K\left(\frac{w_i - w_0}{h_n^w}\right) K\left(\frac{y_i - y_0}{h_n^y}\right) K\left(\frac{z_i - z_o}{h_n^z}\right) K\left(\frac{t_i - t_o}{h_n^z}\right)}$$

where $w_0=w_j- \tau_j$, $y_0=y_j+ \tau$, $K(.)$ is the kernel function and h is the bandwidth parameter.

5. Data

5.1 Data Sources

We use data from two Mexican household surveys, the Mexican National Household Income and Expenditure Survey (Encuesta Nacional de Ingresos y Gastos de los Hogares, henceforth ENIGH) for the year 2006 and the Oportunidades Urban Household Evaluation Survey (ENCELURB) for the year 2004. Both surveys contain detailed information, at the household and individual level, on demographic characteristics, education, labor force participation, earnings, and non-labor income. These data sets also include information on *Oportunidades* transfers, which allows for the identification of children and households that are enrolled in the Program.[6] In addition, we incorporate information from the Count of Population and Housing 2005 (Census update). In particular, we include information on labor market characteristics and migration at the state level.

The ENIGH is a nationally representative household survey conducted by the National Institute for Statistics, Geography, and Informatics (Instituto Nacional de Estadística, Geografía e Informática, INEGI) based on a stratified random sample. Carried out once every two years since 1992 and including detailed information on household income and expenditure, the ENIGH represents the main source of information for official poverty estimates at the national level.

The ENCELURB is the official database of the *Oportunidades* program, aimed at and designed to monitor and evaluate the Program in urban areas. Carried out annually between 2002 and 2004, the ENCELURB survey was first applied randomly to a sample of urban households that entered the program in 2002. As the evaluation of the program required comparison between treatment and control areas at two points in time, the ENCELURB also includes a control group.

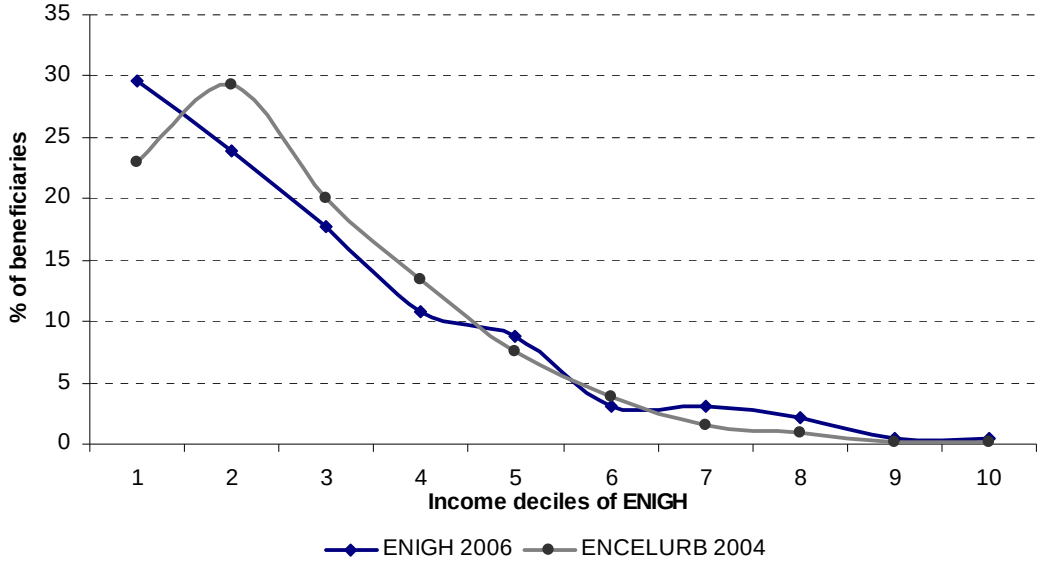
The sample for our study is composed of individuals between 12 and 18 years old living in urban areas of Mexico. The ENCELURB (2004) has a sample of 8,572 individuals, and of those, 3,760 belong to households that participate in the Program (44 percent of the total sample). The ENIGH (2006) has a sample of 7,020 individuals aged 12-18 years old living in urban areas. Among these, only 877 belong to households that receive any of the benefits of *Oportunidades* (12 percent of the total sample). The latter shows the low participation of urban

[6] We make a clear distinction between those that belong to a household that participates in the *Oportunidades* program and those that do not. Being a member of a household that participates in the program does not necessarily imply that the adolescent enrolls in the education grant component.

households in the program. In comparison to rural areas, this could be due to a lower concentration of poor households in urban areas, lack of information about the program's existence, and higher opportunity costs faced by households when facing the conditionalities imposed by *Oportunidades* (Attanasio et al. 2008).

Even though the ENCELURB and ENIGH surveys focus on different populations, their data show a similar distribution of beneficiaries by age groups and income deciles. Figure 1 shows the distribution of beneficiaries in both surveys by income deciles (calculated with the ENIGH sample). Beneficiaries of the *Oportunidades* program are concentrated in the first three deciles of the income distribution. In the case of the ENCELURB, there is a slightly higher concentration of beneficiaries in the lowest deciles of the distribution of its sample.

Figure 1. Distribution of *Oportunidades* Beneficiaries by Income Deciles in ENIGH 2006 and ENCELURB 2004



Source: Calculations based on ENIGH 2006 and ENCELURB 2004

5.2 Descriptive Statistics

Table 1 displays the sample means for both data sets distinguishing between beneficiaries and non-beneficiaries of the Program as well as poor and non-poor households in urban areas. While Mexico has three official poverty levels,[7] this paper considers only the capacities-based poverty level, which is defined as the cut-off point that reflects the minimum level of income deemed necessary to be able to afford not only the basic basket of food but also basic health and education needs.

Table 1. Educational and Labor Characteristics of Adolescents in Urban Areas of Mexico (12-18 years old)

Variables	ENIGH 2006 (URBAN AREAS)					ENCELURB 2004				
	Poor		Non poor		Total	Poor		Non poor		Total
	Benef	No Benef	Benef	No Benef		Benef	No Benef	Benef	No Benef	
Number of adolescents	359,344	1,106,634	449,087	7,466,829	9,381,894	2,482	2,804	1,335	2,078	8,699
Porcentual distribution	3.83	11.80	4.79	79.59	100	28.53	32.23	15.35	23.89	100
EDUCATION										
% Attend school	77.11	69.89	74.09	79.66	78.14	77.8	68.37	69.74	60.11	69.3
Labor participation										
• *Work*	6.62	7.58	15.43	8.88	8.96	6.27	8.56	13.32	14.49	9.79
• *Do not work*	93.38	92.42	84.57	91.12	91.04	93.73	91.44	86.68	85.51	90.21
% Not attending school	22.89	30.11	25.91	20.34	21.86	22.2	31.63	30.26	39.89	30.7
Labor participation										
• *Work*	50.84	33.33	68.27	50.92	49.02	43.74	38.33	70.3	63.21	52
• *Do not work*	49.16	66.67	31.73	49.08	50.98	56.26	61.67	29.7	36.79	48
LABOR PARTICIPATION										
% Work	16.75	15.34	29.12	17.35	17.65	14.59	17.97	30.56	33.93	22.75
Monthly labor income	613.96	775.06	1486.01	1528.88	1414.72	1128.01	1162.38	1914.84	1982.12	1614.22
Hours worked in a week	34.22	37.6	42.37	38.39	38.47	41.02	40.74	46.63	46.79	44.15

Source: Own calculations based on ENIGH 2006 and ENCELURB 2004

Note: We consider poor of capacities

Note 2: We present the information of ENIGH 2006 considering expansion factors

The second row of Table 1 indicates that the program covers only one of every four poor adolescents in urban areas, using the nationally representative ENIGH data. Although this paper does not focus on targeting issues, the number of non-poor program beneficiaries is notable (more than have of all beneficiaries according to ENIGH and around one third according to the ENCERLUB). The analysis of main characteristics of program beneficiaries in this subsection concentrates on the ENIGH survey since this sample is representative at the national level. The ENCELURB descriptive statistics are presented for comparison and are broadly consistent with the ENIGH data.

[7] Mexico has 3 poverty lines: (a) The food poverty line, which is defined as the cut-off that reflects the minimum level of income deemed necessary to buy a basic basket of food; (b) the capacities poverty line, which represents the minimum level of income deemed necessary to be able to afford a basket of food and basic health and education needs; and (c) the asset poverty line, which incorporates clothing needs, house infrastructure needs and transport needs to the previously defined poverty lines.

Another distinctive feature of the data is that school attendance is relatively low for the age group under consideration (third row of Table 1). [8] According to the ENIGH, about 78 percent of urban adolescents attend school. Among the poor, school attendance is about 7 percentage points higher for *Oportunidades* beneficiaries than for non-beneficiaries, suggesting that participation could be having a positive impact on school enrollment. The ENCELURB presents similar patterns, with the exception of the "no beneficiary non-poor" category, which exhibits the lowest school attendance rates. This result is expected as this survey covers primarily poor households; therefore, higher income levels could be due to increased participation of children in the labor market. It is noteworthy that half of the adolescents who do not attend school are not working either. As de Janvry and Sadoulet (2006) mention, important reasons for not attending school are that the child does not like school, does not learn, or that school is too far away. In urban areas, it might be also related to the child's engagement in risky behaviors, such as drugs and alcoholism; this, however, is beyond the scope of this paper.

The last row of Table 1 presents employment indicators. Among the poor, labor market participation ranges from 14 percent to almost 18 percent according to the ENCERLUB. The ENIGH survey reports similar estimates. Among the non-poor, program beneficiaries participate more actively in the labor market—around 30 percent report having a job according to the ENIGH. The descriptive statistics presented above suggest that the decisions to attend school and to work are not mutually exclusive. Given income restrictions at the household level, some poor adolescents will adjust their working hours in order to attend school. The next two figures detail school attendance and labor market participation by age group.

Figure 2 displays school attendance by age considering a broader age range (5 to 18 years old). The first three sets of bars include all children from 5 to 14 years old (subgroups: 5-8, 9-11and 12-14) and show that most children are enrolled in school (around 90 percent) irrespective of their economic situation or participation in the program. As expected, children from non-poor households attend school more frequently than children from poor households. Among poor children, program participation is correlated with school enrollment, as the group of children that are beneficiaries of the program have higher enrollment rates across all subgroups.

[8] In fact, it is even lower than in comparable Latin and Caribbean countries.

Figure 2. School Attendance in Urban Areas:
Beneficiaries and Non-Beneficiaries of *Oportunidades*

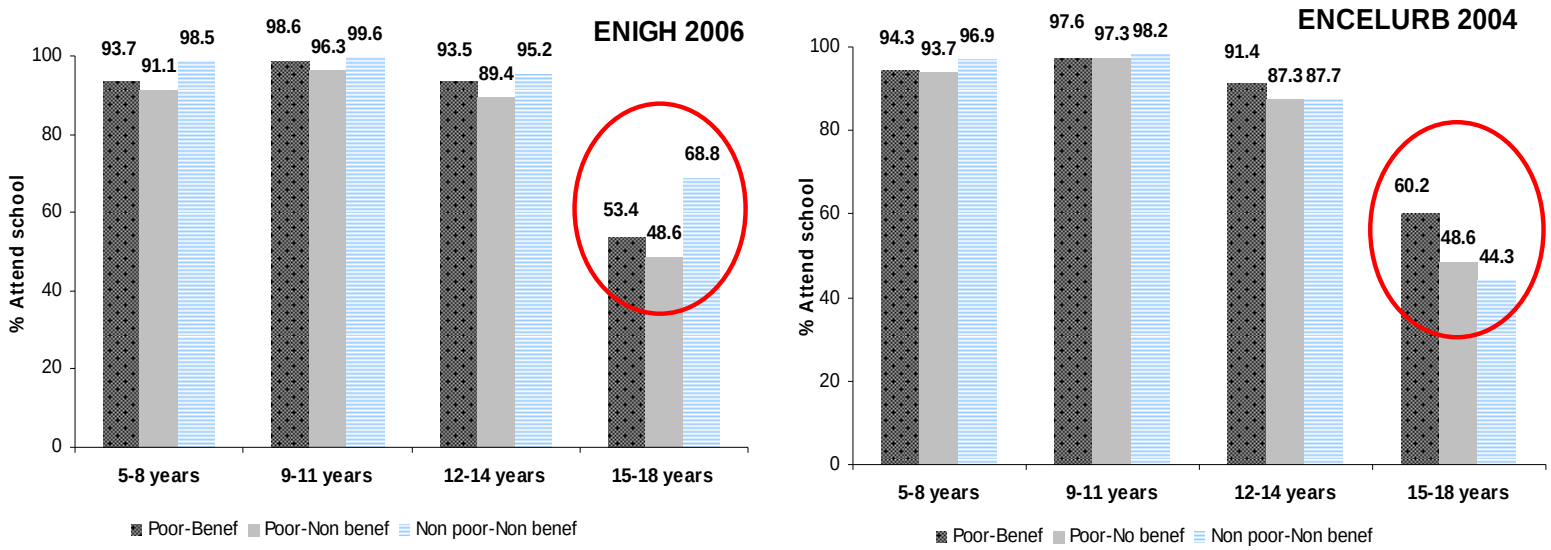
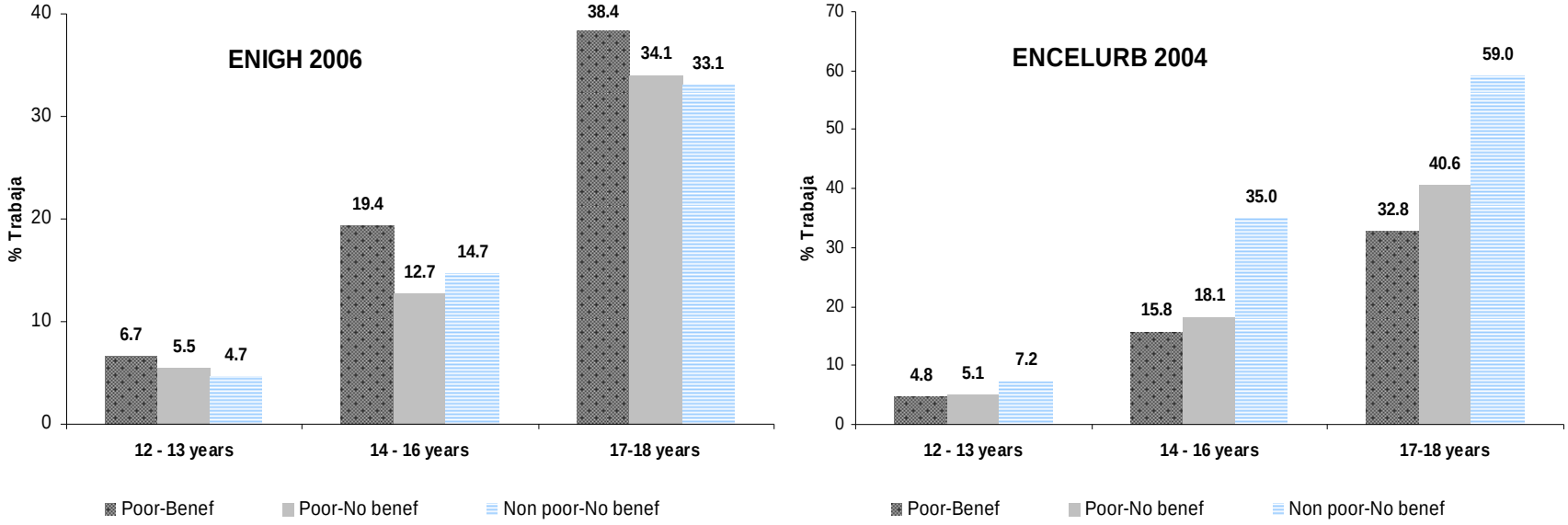


Figure 3. Labor Force Participation in Urban Areas: Beneficiaries and Non-Beneficiaries of *Oportunidades*



The decrease in school attendance for children 15 to 18 years old is notable. According to ENIGH, only around 69 percent of 15 to 18 year old non-poor adolescents attend school. Rates are even lower for poor households: about 53 percent for program beneficiaries and 49 percent for non-beneficiaries. Even though the program seems to have an impact on school attendance rates of poor beneficiaries when compared with poor non-beneficiaries (around five percentage points higher), there is still a sizable gap with respect to the non-poor. It can be argued that the impacts of *Oportunidades* may be better captured with the ENCELURB data, as they include a larger sample of both poor and non-poor beneficiaries. However, ENCELURB includes only early urban program beneficiaries.[9]

Figure 3 displays labor market participation by age groups. The national-level data (ENIGH) clearly indicate a notable rise in labor market activities for the age group 14-16 years old. As age increases, labor market participation also increases; the labor force participation rate doubles for the next age group (17-18 years old) as compared to those 14-16 years old. Given the dynamism of the labor market in urban areas of Mexico, adolescents face a high opportunity cost of attending school. This, in turn, poses a challenge to the *Oportunidades* program, as one of its main objectives is to increase school attendance by mitigating the opportunity cost of attending school by transferring income to poor households.

The urban mean labor income of working adolescents between 12 and 18 years old is significantly higher than the *Oportunidades* cash transfer. Table 2 details the information on the program's educational transfer and the average wage of adolescents. The *Oportunidades*' transfer for students attending grades 10 to 12 is on average only one-half to one-third of the average wage received by adolescents in urban areas. The transfer allowance is higher for girls than for boys, a measure first implemented to increase female school attendance.

[9] It is important to highlight that the target sample of the ENCELURB survey is poor households (beneficiaries and control group) of the Program *Oportunidades* and is not representative at the national level.

Table 2. Average Wages in Urban Areas and *Oportunidades* School Transfers (monthly)

School level	Grade	Monthly Payment	
		Male	Female
Primary	3	120	120
	4	140	140
	5	180	180
	6	240	240
Secondary	7	350	370
	8	370	410
	9	390	450
EMS	10	585	675
	11	630	715
	12	665	760
Maximum amount of transfer per household			
With children in primary/secondary		915	
With children in EMS		1675	
Mean labor income in urban areas			
12 - 14 years		793.0	733.9
15 - 18 years		1991.7	1486.7

Source: SEDESOL Information and ENIGH 2006

Note: Amounts presented are from the second semester of 2006

6. Empirical Results

6.1 Parametric Simulations

In this section we first show the estimates for the bivariate probit model (equation 4) which makes explicit the relationship between the decisions to attend school and to work. The vector of controls $x_{.,i}$ includes the age and gender of the child, number of children under 12 in the household, number of adolescents between 12 and 17, and number of youths 18 or above living in the household. In addition, we include the parents' education and age, geographical dummies, labor and non-labor income variables at the household level and variables at the state level, such as unemployment rate and GDP variation, which is correlated with employment opportunities. The mean labor income of unskilled workers in each state is also incorporated into our estimation, as proposed by Duryea and Arends-Kuenning (2003); this variable can be a good proxy for the average wage of working children, reflecting the opportunity costs of attending school.

The bivariate probit estimation results, shown in Table 3, are in line with the discussion carried out in the previous sections: as age increases, the probability of attending school

decreases and the probability of entering to the labor market increases. The coefficients on the gender dummy variable indicate that boys have a smaller probability of attending school and a concomitant greater probability of working outside the household. This result should be interpreted with care, since the data do not contain information on household chores, which are often assigned to girls.

The results are broadly consistent across the surveys used in our estimation (ENIGH and ENCELURB). Particularly noteworthy is the significant negative correlation between the decisions to attend school and to work. This highlights the importance of designing an empirical model that takes into account the opportunity costs households face when deciding to send their children to school. More educated parents positively influence the odds of attending school, as the increase in the number of years of education of the parents raises the likelihood of children attending school.

The results, particularly those obtained with ENCELURB data, confirm that school transfers have a positive impact on school attendance and a negative impact on the probability of working. We also consider the *Oportunidades* transfers of older and younger siblings. The results indicate that transfers to other siblings do not have a statistically significant effect on the probability of working. In addition, as GDP growth rates increase by state, and more working opportunities become available, the probability of working increases. As expected, poverty increases the probability of working and reduces the chances of attending school. Finally, the risk of dropping out of school increases when adolescents complete primary education (grade 6) or secondary education (grade 9).

To shed light on how increasing and reducing the conditional income transfers could affect school attendance decisions, simulations that change the current structure of the educational transfer are carried out. We present two sets of simulations. The first set implements changes in the monetary values of the transfer that are the same across all grade levels and gender. The second set proposes changes to the current scheme of the educational transfers.

Table 3. Bivariate Probit Model Estimation Results

Variables	ENIGH 2006 (urban areas)				ENCELURB 2004			
	Attends to school		Works		Attends to school		Works	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
13 years	-0.680	[0.146]***	0.293	[0.099]***	-0.565	[0.082]***	0.333	[0.083]***
14 years	-1.301	[0.152]***	0.494	[0.097]***	-1.098	[0.080]***	0.796	[0.079]***
15 years	-1.657	[0.157]***	0.648	[0.101]***	-1.397	[0.082]***	1.117	[0.079]***
16 years	-2.169	[0.157]***	1.007	[0.098]***	-1.812	[0.083]***	1.507	[0.080]***
17 years	-2.392	[0.159]***	1.289	[0.097]***	-2.206	[0.085]***	1.775	[0.081]***
18 years	-2.859	[0.159]***	1.559	[0.099]***	-2.574	[0.091]***	2.064	[0.085]***
Male	-0.107	[0.041]***	0.506	[0.039]***	-0.100	[0.034]***	0.530	[0.035]***
Age of head	0.021	[0.002]***	-0.007	[0.002]***	0.007	[0.002]***	0.004	[0.002]*
Years of education of head	0.057	[0.007]***	-0.030	[0.006]***	0.051	[0.006]***	-0.027	[0.006]***
Years of education of spouse	0.058	[0.007]***	-0.027	[0.006]***	0.044	[0.006]***	-0.013	[0.006]**
Oportunidades school transfer of the child	0.001	[0.000]***	0.000	[0.000]	0.002	[0.000]***	-0.001	[0.000]***
Oportunidades school transfer of younger brothers	0.000	[0.000]	0.000	[0.000]**	0.000	[0.000]	0.000	[0.000]
Oportunidades school transfer of older brothers	0.000	[0.000]	0.000	[0.000]	0.000	[0.000]**	0.000	[0.000]
Other Oportunidades transfers*	-0.001	[0.001]	0.000	[0.000]	-0.002	[0.001]***	0.000	[0.000]
Dependency rate	-0.024	[0.033]	0.002	[0.030]	-0.050	[0.022]**	0.028	[0.021]
Members <1 year	-0.288	[0.120]**	-0.170	[0.132]	0.032	[0.102]	0.089	[0.103]
Members 1-5 years	0.007	[0.050]	0.065	[0.047]	-0.118	[0.029]***	0.055	[0.030]*
Members 6-12 years	0.049	[0.032]	0.043	[0.029]	0.020	[0.020]	0.004	[0.019]
Member 13-18 years	-0.024	[0.025]	0.036	[0.023]	0.012	[0.019]	-0.008	[0.018]
Members >18 years	-0.105	[0.028]***	0.027	[0.025]	-0.026	[0.023]	-0.082	[0.024]***
Labor income members>18 years	0.000	[0.000]***	0.000	[0.000]**	0.000	[0.000]	0.000	[0.000]***
Non-labor income ex. Oportunidades income	0.000	[0.000]*	0.000	[0.000]*	0.000	[0.000]**	0.000	[0.000]**
Migration rate by estate 2005	-3.156	[1.889]*	-4.153	[1.640]**	0.988	[3.624]	2.129	[4.034]
GDP variation by state (2000-2006) (2000-2004)	0.007	[0.006]	0.011	[0.005]**	-0.014	[0.004]***	0.019	[0.004]***
Unemployment rate by estate (2006) (2004)	-0.077	[0.033]**	0.011	[0.033]	0.039	[0.024]*	-0.018	[0.024]
Log wage non-qualified worker by estate	0.000	[0.000]*	0.000	[0.000]	0.000	[0.000]*	0.001	[0.000]***
Localities with 15000- 99999 people	0.041	[0.045]	0.074	[0.041]*	0.068	[0.041]*	-0.143	[0.041]***
North West	-0.140	[0.092]	0.053	[0.086]	-0.305	[0.247]	-0.112	[0.242]
North East	0.071	[0.102]	-0.186	[0.101]*	0.075	[0.122]	-0.816	[0.131]***
North	-0.312	[0.088]***	-0.234	[0.087]***				
Centre west	-0.239	[0.077]***	0.206	[0.070]***	-0.240	[0.067]***	-0.054	[0.072]
Federal District	0.109	[0.145]	-0.415	[0.127]***				
South	-0.085	[0.096]	0.057	[0.091]	0.273	[0.102]***	-0.121	[0.104]
Poor Oportunidades	-0.407	[0.074]***	0.055	[0.072]	-0.184	[0.040]***	0.115	[0.039]***
Grade 6	-0.958	[0.075]***	0.230	[0.061]***	-0.848	[0.043]***	0.417	[0.043]***
Grade 9	-0.561	[0.050]***	0.241	[0.048]***	-0.568	[0.047]***	0.173	[0.047]***
Constant	1.481	[0.239]***	-1.518	[0.214]***	2.125	[0.295]***	-3.541	[0.301]***
Rho	-0.484				-0.521			
p	0.000				0.000			
athrho	-0.528	[0.030]***			-0.577	[0.026]***		
Number of observations	7020				8572			

* p<0.1, ** p<0.05, *** p<0.01

*Note: Other Oportunidades transfers include transfers for food and in the case of ENIGH 2006 it also includes transfers for older adults

Table 4 displays the results of the simulations and its impact on school attendance. The first row is the baseline and shows that the current school attendance rate among program beneficiaries is around 77 percent with both surveys. Within the first set of simulations, the first line "No transfer" demonstrates that the program is relevant, since in the absence of the transfer school attendance would be reduced by more than 10 percent. Reducing the transfer in half also reduces school attendance. These simulations confirm that poor households do respond to the financial incentives provided by the program. As expected, doubling and tripling the transfer increases school attendance. The simulation that eliminates the maximum allowance per household is also included—"without cap" and the results are very similar to the baseline

situation. This result suggest that the removing the transfer cap would not have a significant impact. This result should be interpreted with caution, as removing the maximum allowance, could create incentives to increase family size, leading to an increase in fertility rates.

The second set of parametric simulations explore changes in the structure of the education allowance, reducing transfers for primary education (grades 1 to 6) and increasing transfer for secondary education (grades 7 to 9) and high school education (grades 10-12). We simulate the following alternatives: (a) an increase in the secondary school allowance by 15 percent and a 100 percent increase in the allowance for high school students; (b) a 100 percent increase for high school male students; (c) a 100 percent increase for female high school students; and (d) eliminating the primary school transfer and doubling the current allowance for secondary and high school.

The impacts obtained with scenario (a), where the transfer is increased for secondary school (by 15 percent) and for high school (by 100 percent), is of the magnitude of 4.8 percentage points with the ENIGH data and on the order of 6.2 percentage points with the ENCERLUB data. The impact of an increase in high school only under scenarios (b) and (c) is somewhat smaller, on the order of 2.4 and 1.7 percentage points, respectively. These results suggest that gender differences do not seem significant. Scenario (d)—doubling the transfer for secondary and high school students and not paying the transfer for primary school—raises school attendance by 7.8 percentage points (using the ENIGH data). The results obtained with ENCELURB data show similar patterns and somewhat higher effects of transfers on school enrollment.

It is important to note, however, that even though our simulations show that on average effectiveness gains can be obtained by changing the structure of scholarships, very high scholarship increases are needed to promote school attendance for children older than 15. For example, to increase school attendance of 16 year old children to rates at or above 80 percent, scholarships would need to be quadrupled. This suggests that other interventions are needed to promote school attendance at the high school level.

Table 4. Simulations Results with the Sample of Beneficiaries

Microsimulation	ENIGH 2006 (Urban areas)				ENCELURB 2004			
	Attend school	Sample	Diff	Std. Err.	Attend school	Sample	Diff	Std. Err.
Original/Baseline	0.78	877			0.76			
No transfer	0.67	877	-11.13	[0.003]***	0.57	3760	-19.50	[0.002]***
Transfer*0.5	0.73	877	-5.20	[0.002]***	0.67	3760	-9.05	[0.001]***
Transfer*1.15	0.79	877	1.39	[0.000]***	0.79	3760	2.30	[0.000]***
Transfer*1.5	0.82	877	4.32	[0.001]***	0.83	3760	6.85	[0.001]***
Transfer*2	0.86	877	7.75	[0.003]***	0.88	3760	11.51	[0.002]***
Transfer*3	0.90	877	12.36	[0.004]***	0.93	3760	16.52	[0.003]***
Transfer*4	0.93	877	15.00	[0.006]***	0.95	3760	18.73	[0.003]***
Without cap	0.78	877	0.38	[0.001]***	0.77	3760	0.68	[0.001]***
(a) Transfer*1.15 + Transfer*2 EMS	0.83	877	4.82	[0.003]***	0.83	3760	6.18	[0.002]**
(b) Transfer girls EMS*2	0.80	877	2.42	[0.002]***	0.79	3760	2.18	[0.001]***
(c) Transfer boys EMS*2	0.80	877	1.78	[0.002]***	0.79	3760	2.88	[0.001]***
(d) Transfer Sec and EMS*2 and No Transf Prim	0.86	877	7.82	[0.003]***	0.85	3760	9.10	[0.002]***

* p<0.1, ** p<0.05, *** p<0.01

As a robustness check for the estimations presented above, we compare the predictions on school attendance with both samples (ENIGH and ENCELURB) with those actually observed. As it is shown in the top panel of Figure 4, our predictions follow closely the actually observed data.[10] Figure 4 also presents the simulations results disaggregated by age. This demonstrates that the impacts of changes in the *Oportunidades* transfer on school attendance vary by age, the effects being higher for older adolescents. This result is related to the fact that school attendance rates are already very high for those below 14 years old, which leaves less scope for improvement.

While removing or reducing primary school payments to increase enrollment in the secondary and high school levels can be a cost-effective strategy, it is also a controversial one. Concerns based on the poverty-reduction objective of the program may agree that primary school transfers are creating positive externalities in the household that go well beyond the school attendance of children. Recent findings however, presented by Attanasio and Rubio-Codina (2009), indicate there are no direct significant effects of the primary school grant on other outcomes, such as child health, household consumption and secondary school enrolment.

[10] This result is somewhat expected for the nationally representative ENIGH data but not necessarily for the ENCELURB. This serves as a robustness check for our estimations.

Figure 4. Simulation Results on School Attendance by Age

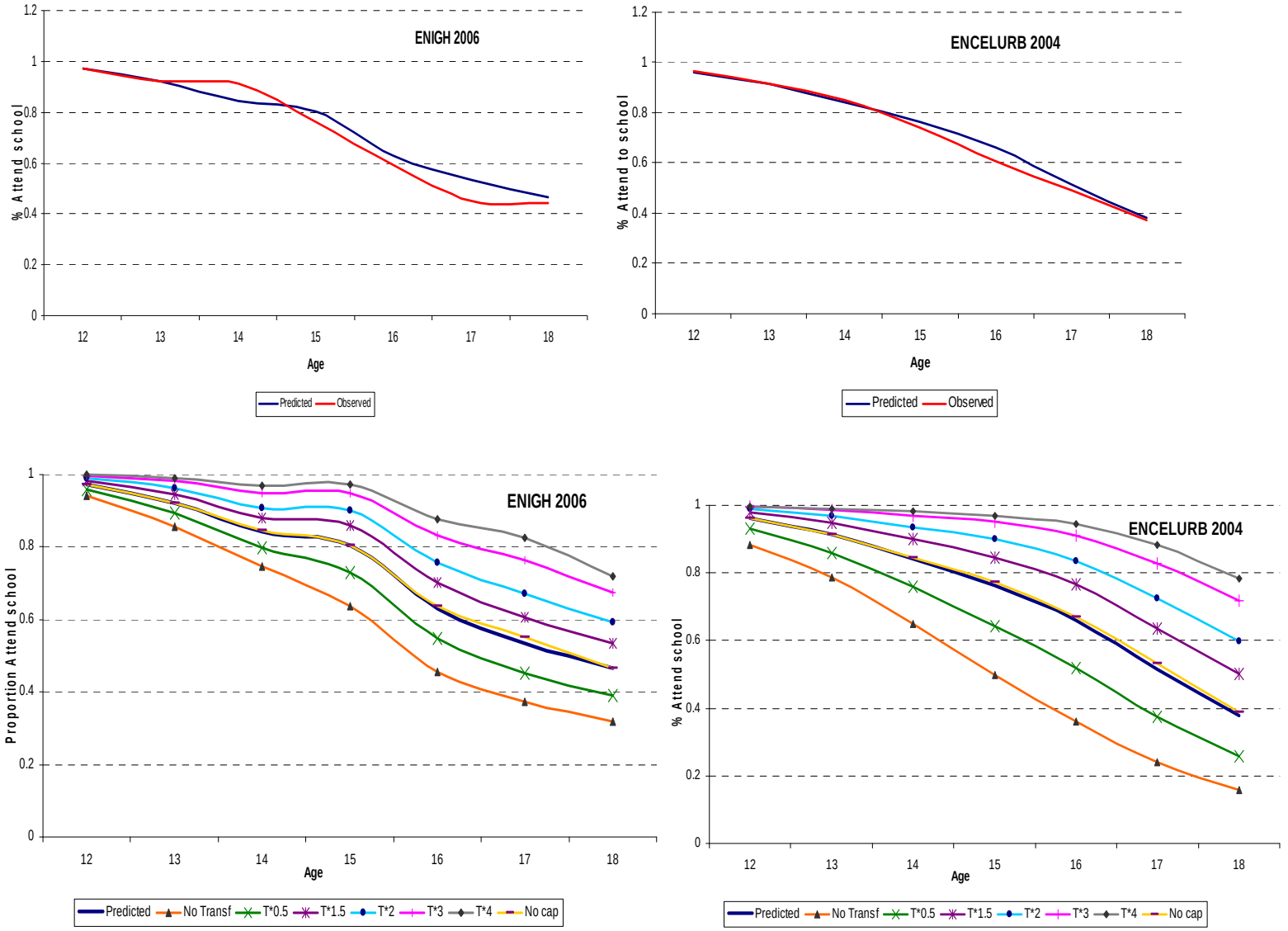
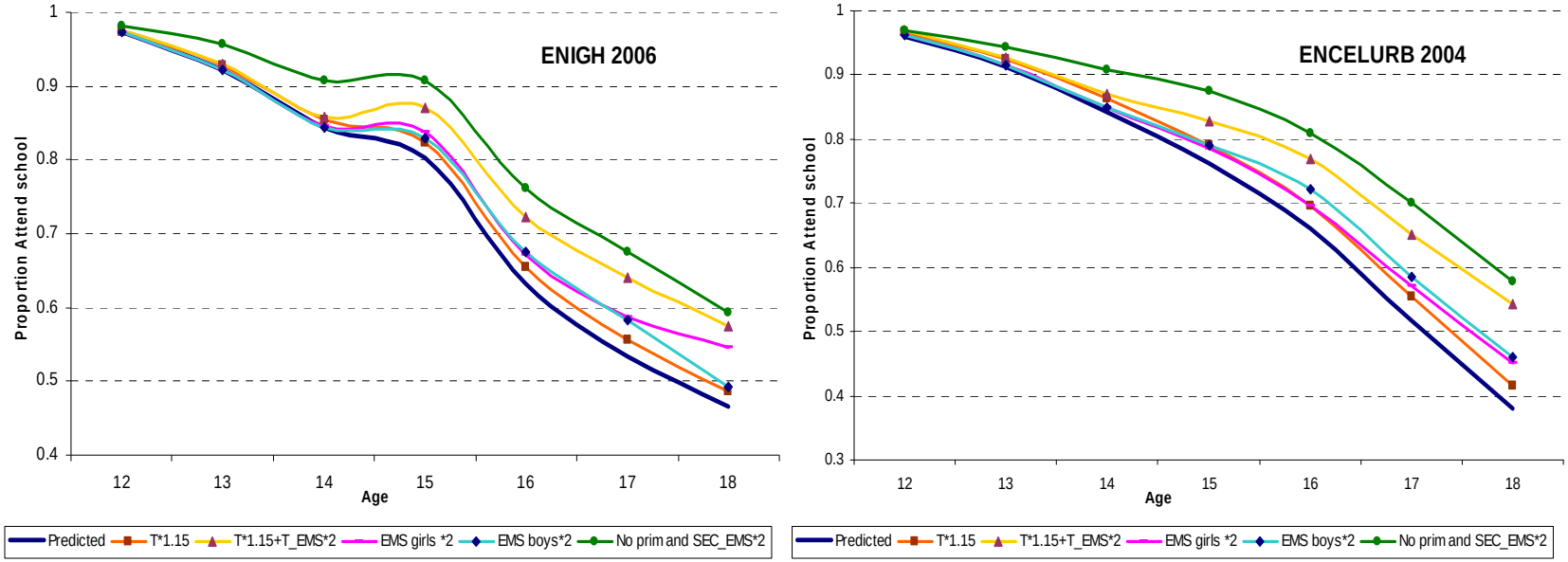


Figure 4., continued



6.2 Non-Parametric Simulations

The non-parametric simulations are carried out using only the ENIGH data, since we need a sample of non-beneficiaries with high income levels to perform this matching exercise.[11] As described in Section 4 (methodology), simulations are carried out considering the opportunity cost of sending children to school as well as without taking into account such costs. The cost of attending school is measured as the difference between observed labor income and the potential labor income the adolescent would receive in case he/she decided to attend school and does not work or works fewer hours.

The scenarios under consideration are similar to the ones carried out in Section 6.1 (Table 4, Set No. 1 of results). The first line (Baseline/Transfer) presents the impact of giving the educational *Oportunidades* transfer, as it is currently structured, to the sample of poor adolescents not participating in the program. The empirical exercise that underlies our non-parametric procedure requires matching this group, in terms of the variables specified in the kernel regression estimator,[12] to the non-poor non-beneficiary category. To increase our common support region, we work with the tercile of poor households that is closest to the poverty line.

The next five simulations reduce to half the current amount of the transfer and increase the transfers by 50, 100, 200 and 300 percent respectively. Table 5 below displays the predicted impacts of each simulation as well as other relevant statistics.

Table 5. Predicted Impacts of Changing the Amount of the *Oportunidades* Transfer: Non-Parametric Simulation

Microsimulation	Not considering the opportunity cost					Considering the opportunity cost				
	Predicted Impact	Sample	% Sp	t-stat	p-value	Predicted Impact	Sample	% Sp	t-stat	p-value
Baseline/Transfer	1.7	234	0.622	0.519	0.604	0.7	215	0.572	0.200	0.842
Transfer*0.5	-5.3	180	0.479	-1.400	0.165	-5.8	170	0.452	-1.480	0.140
Transfer*1.5	6.8	266	0.707	2.372	0.018	3.7	242	0.644	1.162	0.247
Transfer*2	9.8	284	0.755	3.459	0.001	3.3	262	0.697	1.118	0.265
Transfer*3	9.4	302	0.803	3.573	0.000	3.8	264	0.702	1.353	0.177
Transfer*4	10.4	312	0.830	3.860	0.000	4.02	272	0.723	1.498	0.135

Note 1: %Sp indicates the region of common support. Predicted impacts are measured in percentage points.

Note 2: The sample is composed by urban children between 12 and 18 years old that do not participate in the Program

[11] As mentioned before, the ENCELURB sample is mainly composed of poor households.

[12] As explained in the methodology, these variables include: (i) the wage children receive if working; (ii) the household income excluding children's economic contribution; (iii) household size; and (iv) the number of children older than 14 years old in the household.

The impacts that take into account the opportunity cost of attending school (i.e., that takes into account the wage forgone to attend school) are lower than those that only subtract the amount of the transfer. This is closely related to the information presented in Table 2, which showed that the mean labor income in urban areas for adolescents is much higher than the *Oportunidades* transfer. As expected, raising the current transfers always yields a positive impact on school attendance and lowering the transfer results in negative impacts.[13] Given that the sample consists of non-beneficiaries of the program, the region of common support increases as transfers increases, which implies that more matches (with high income levels) are found in the sample when performing this exercise.

The predicted impacts presented in Table 5 are measured in percentage points. Raising the *Oportunidades* transfer by 50 percent will result in an increase of 6.8 percentage points in school attendance. If we take into account the opportunity costs that adolescents face when deciding to go to school, the impact is reduced to 3.7 percentage points. These results are fairly close to those presented by Todd and Wolpin (2006) for rural areas. They find a 9 percentage points (on average) increase in school enrolment, among the sample of adolescents between 12 and 15 years old, when increasing the transfer by 50 percent.

The lower impacts observed when taking into consideration the opportunity cost of attending school are consistent. The decision to attend school implies working fewer hours or exiting the labor market. This in turn leads to a loss of income that may be well above the amount received from the *Oportunidades* transfer, reducing the incentives to attend school. According to the simulation results, when transfers are cut in half, school attendance declines on the order of 5.3 percentage points, and as transfers are quadrupled school attendance increases about 10.4 percentage points. Unfortunately, due to sample restrictions, this simulation does not permit decomposition by age group, and thus we cannot separate the impact on the specific group of 15 to 18 year old children.

7. Concluding Remarks

Recent studies suggest that the *Oportunidades* program has a small impact on primary school attendance of poor children in Mexico (de Janvry and Sadoulet, 2006; Parker, 2003; Schultz, 2004, for rural areas; and Behrman et al., 2006, for urban areas). In part this can be explained by

[13] As Todd and Wolpin (2006) mention, this estimation procedure does not constraint results to be positive.

the already high levels of school attendance at the primary school level. In light of this, paying subsidies for primary school attendance may not be the best use for public resources aimed at improving education outcomes of poor children.

Increasing school attendance rates for adolescents is a challenge for Mexico. The data indicate that school dropout starts to increase at age 14, and is higher for poor adolescents who are not beneficiaries of Oportunidades. Shifting resources from grants for primary school attendance towards grants for secondary and high school attendance may increase the impact of public transfers on overall human capital accumulation of poor children.

In this paper we perform some simulation exercises to explore the potential impacts of different transfers schemes on adolescents aged 12 to 18 years old in urban areas. Most existing evidence for the Mexican case has followed the Bourguignon, Ferreira and Leite (2003) parametric method. We derive and carry out a simpler parametric method based on a simultaneous model of school attendance and child labor, and we estimate this model using a bivariate probability model. We also provide alternative non-parametric simulation results by extending Todd and Wolpin's (2006) method to incorporate variable hours of work and labor income.

The results of these simulations indicate a positive monotonic relationship between school attendance and the value of the educational transfer. These results are in line with the simulations exercises that follow Bourguignon, Ferreira and Leite (2003), including Bornhorst (2004), Hernández-Licona, Alcalá and Salomón (2005), and Azevedo and Robles (2008), as well as results that comes from structural models (Attanasio et al., 2008).

The simulations indicate that doubling the transfer for secondary and high school students—and not paying the transfer for primary school—raises school attendance by 7.8 percentage points (using the ENIGH data). The results obtained with ENCELURB data show similar patterns and somewhat higher effects of transfers on school enrollment. It is important to note, however, that very high scholarship increases are needed to promote school attendance for children older than 15. For example, to increase school attendance of 16-year-old children to rates at or above 80 percent, scholarships would need to be quadrupled. This suggests that other interventions are needed to promote school attendance at the high school level.

The simulations also indicate that the ceiling of the transfers imposed by the program does not seem to have an impact on school attendance, but the elimination of the ceilings may have implications for family planning decisions.

Further is needed to explore other interesting features of the program that the simulations carried out in this paper do not allow us to explore. These include incentives for finishing an educational cycle (primary, secondary or high-school) or a special transfer based on school achievement. Preliminary evidence from Colombia evaluating variants of the transfer schemes indicates that subsidizing access to higher education increases attendance and participation, generating positive impacts on school progression beyond high school (Barrera-Osorio et al., 2007).

Another policy priority should be to reduce education grade-for-age gaps. Our calculations for urban areas (ENIGH, 2006) indicate that program beneficiaries 15 to 17 years old have a schooling gap of about 1.4 years. The comparable non-poor, however, display a much smaller schooling gap of only 0.6 years, while the poor that are not beneficiaries of *Oportunidades* have a schooling gap of about 1.1 years.

References

Angelucci, M., and O. Attanasio 2006. "Evaluating the Urban Component of Oportunidades: Which Methods for which Parameters?" Tucson, United States and London, United Kingdom: University of Arizona and University College London. Available at: http://www.econ.berkeley.edu/users/webfac/bgraham/242_sp06/attanasio.pdf

Attanasio, O., C. Meghir and A. Santiago. 2005. "Education Choices in Mexico: Using a Structural and a Randomized Experiment to Evaluate Progresa." EWP05/01. London, United Kingdom: Institute of Fiscal Studies, Centre for the Evaluation of Development Policies.

Attanasio, O., and M. Rubio-Codina. 2008. "Re-evaluating Conditional Cash Transfers: Is the Oportunidades Primary School Stipend Necessary?" London, United Kingdom: University College of London and Institute for Fiscal Studies. Mimeographed document.

Attanasio, O. et al. 2008. "Better Coating for the Silver Bullet: Improving Conditional Cash Transfers in Urban Mexico." London, United Kingdom and Washington, DC, United States: University College of London, Institute for Fiscal Studies and Inter-American Development Bank. Mimeographed document.

Azevedo, V., and M. Robles. 2008. "Simulating Policy Changes in Mexico's Progresa-Oportunidades." Washington, DC, United States: Inter-American Development Bank, Research Department. Mimeographed document.

Barrera-Osorio, F. et al. 2007. "Testing Alternative Approaches to Conditional Cash Transfer Programs in Education: Evidence from Colombia." Washington, DC, United States: World Bank. Mimeographed document.

Barros, R., R. Mendonça and T. Velazco. 1994. "Is Poverty the Main Cause of Child Work in Urban Brazil?" Texto para Discussão 351. Rio de Janeiro, Brazil: Instituto de Pesquisa Econômica Aplicada.

Basu, K., and P.H. Van. 1998. "The Economics of Child Labor." *American Economic Review* 88(3): 412-427.

Becker, G., and N. Tomes. 1986. "Human Capital and the Rise and Fall of Families." *Journal of Labour Economics* 4(3): S1–S39.

Bedi, A.S., and J. H. Marshall. 1999. "School Attendance and School Achievement: Evidence from Rural Honduras." *Economic Development and Cultural Change* 47(3): 657-682.

Beegle, K., R.H. Dehejia and R. Gatti. 2006. "Child Labor and Agricultural Shocks." *Journal of Development Economics* 81: 80-96.

Behrman, J. et al. 2006. "Impacto de Oportunidades sobre la educación y el trabajo en niños y jóvenes urbanos en México después de dos años de participación en el Programa." In: *Evaluación Externa de Impacto de Oportunidades* 2006. Volume 1. Cuernavaca, Mexico: Instituto Nacional de Salud Pública.

Binder, M. 1999. "Schooling Indicators during Mexico's 'Lost Decade.'" *Economics of* Education Review, 18, 183–199.

Bornhorst, F. 2004. "Experimental Methods and Simulation Techniques: What Can be Learned about Trust, Schooling Decisions and Exchange Rates?" San Domenico di Fiesole, Italy: European University Institute. Doctoral dissertation.

Bourguignon, F., F. Ferreira and P. Leite. 2003. "Conditional Cash Transfers, Schooling and Child Labor: Micro-Simulating Brazil's Bolsa Escola Program." *World Bank Economic Review* 17(2): 229-254.

Brown, D., A. Deardorff and R. Stern. 2002. "The Determinants of Child Labor: Theory and Evidence." Research Seminar in International Economics Discussion Paper 486. Ann Arbor, United States: University of Michigan.

Buddelmeyer, H., and E. Skoufias. 2004. "An Evaluation of the Performance of Regression Discontinuity Design on PROGRESA." World Bank Policy Research Working Paper 3386 and IZA Discussion Paper 827. Washington, DC, United States and Bonn, Germany: World Bank and Institute for the Study of Labor (IZA).

Card, D. 1999. "The Causal Effect of Education on Earnings." In: O. Ashenfelter and D. Card, editors. *Handbook of Labour Economics.* Volume 3a. Amsterdam, The Netherlands: Elsevier.

Cardoso, E., and A.P. Souza. 2004. "The Impact of Cash Transfers on Child Labor and School Attendance in Brazil." Department of Economics Working Paper 0407. Nashville, United States: Vanderbilt University.

De Janvry, A., F. Finan and E. Sadoulet. 2006. "Can Conditional Cash Transfers Serve as Safety Nets to Keep Children at School and Out of the Labor Market?" *Journal of Development Economics* 79(2): 349-373.

De Janvry, A., and E. Sadoulet. 2006. "Making Conditional Cash Transfers More Efficient: Designing for Maximum Effect of the Conditionality." *World Bank Economic Review* 20: 1-29.

Duryea, S. and M.P. Arends-Kuenning. 2003. "School Attendance, Child Labor and Local Labor Market Fluctuations in Urban Brazil." *World Development* 31(7): 1165-1178.

Edmonds, E. 2005a. "Does Child Labor Decline with Improving Economic Status." *Journal of Human Resources* 40(1): 77–99.

----. 2006. "Child Labor and Schooling Responses to Anticipated Income in South Africa." *Journal of Development Economics* 81: 386-414.

Filmer, D., and L. Prichett. 1998. "The Effect of Household Wealth on Educational Attainment. "Policy Research Working Paper 1980. Washington, DC, United States: World Bank.

Greene, W. 2003. *Econometric Analysis*. Fifth edition. Upper Saddle River, United States: Prentice Hall.

Handa, S. 1996. "The Determinants of Teenage Schooling in Jamaica: Rich vs Poor, Males vs Females." *Journal of Development Studies* 32(4): 554-580.

Hernández Licona, G., E. Alcalá and T. Salomón. 2005. "Impact Evaluation of Conditional Cash Transfers on School Attendance in Mexico: An Econometric Analysis of Microsimulation." Mexico City, Mexico: Instituto Tecnológico Autónomo de México. Mimeographed document.

Khanam, R., and R. Ross. 2005. Child Work and Other Determinants of School Attendance and School Attainment in Bangladesh. MPRA Paper 9397. Munich, Germany: University Library of Munich.

Knaul, F. 2001. "The Impact of Child Labor and School Dropout on Human Capital: Gender Differences in Mexico." In: E.G. Katz and M.C. Correia, editors. *The Economics of Gender in Mexico: Work, Family, State and Market*. Washington, DC, United States: World Bank.

Kruger, D. 2006. "Child Labor and Schooling During a Coffee Sector Boom: Nicaragua 1993-1998." In: L.F. López-Calva, editor. *Trabajo Infantil: Teoría y Evidencia desde Latinoamérica.* Mexico City, Mexico: Fondo de Cultura Económica de México.

---.2007. "Coffee Production Effects on Child Labor and Schooling in Rural Brazil." *Journal of Development Economics* Published 82(2): 448-463.

Levison, D., K. Moe and F. Knaul. 2001. "Youth Education and Work in Mexico." *World Development* 29(1): 167–188.

Neri, M., and M. Thomas. 2001. "Household Responses to Labor Market Shocks in Brazil, 1982-1999." Washington, DC, United States: World Bank. Mimeographed document.

Parker, S. 2003. "Evaluación del impacto de Oportunidades sobre la inscripción escolar: Primaria, secundaria y media superior." Documentos de Investigación 6. Mexico City, Mexcio: Secretaría de Desarrollo Social.

Patrinos, H.A. and G. Psacharopoulos. 1995. "Educational Performance and Child Labor in Paraguay." *International Journal of Educational Development* 15(1): 47-60.

Psacharopoulos, G. 1997. "Child Labor versus Educational Attainment: Some Evidence from Latin America." *Journal of Population Economics* 10: 377-386.

Ravallion, M., and Q.T. Wodon, 2000. "Does Child Labour Displace Schooling? Evidence on Behavioural Responses to an Enrollment Subsidy." *Economic Journal* 110(462): 158-175.

Russell, C. 1981. "Education and Earnings: A Review of the Evidence." *Economics of Education Review* 1(4): 403-420.

Sackey, H.A. 2007. "The Determinants of School Attendance and Attainment in Ghana: A Gender Perspective." AERC Research Paper 173. Nairobi, Kenya: African Economic Research Consortium.

Schultz, T.P. 2000a. "Impact of Progresa on School Attendance Rates in the Sampled Population." Washington, DC, United States: International Food Policy Research Institute. Available at www.ifpri.org/themes/progresa/pdf/Schultz_attend.pdf

----. 2000b. "Final Report: The Impact of PROGRESA on School Enrollments." Washington, DC, United States: International Food Policy Research Institute. Available at: http://www.ifpri.org/themes/progresa/pdf/Schultz_enroll.pdf

----.. 2004. "School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program." *Journal of Development Economics* 74(1): 199-250.

Skoufias, E. 2001. "PROGRESA and its Impacts on the Human Capital and Welfare of Households in Rural Mexico: A Synthesis of the Results of an Evaluation by IFPRI." Washington, DC, United States: International Food Policy Research Institute. Available at: www.ifpri.org/themes/progresa/pdf/Skoufias_finalsyn.pdf

Skoufias, E. and S. Parker. 2001. Conditional Cash Transfers and their impact on child work and schooling: Evidence from the Progresa Program in Mexico. FCND Discussion Paper 123. Washington, DC, United States: International Food Policy Research Institute, Food Consumption and Nutrition Division. Available at: http://www.ifpri.org/divs/fcnd/dp/papers/fcndp123.pdf

Sosa Escudero, W., and M. Marchionni. 2000. "Household Structure, Gender, and the Economic Determinants of School Attendance in Argentina." Working Paper, Report 37583. Washington, DC, United States: World Bank.

Todd, P.B., and K.I. Wolpin. 2006. "Assessing the Impact of a School Subsidy Program in Mexico: Using a Social Experiment to Validate a Dynamic Behavioral Model of Child Schooling and Fertility." *American Economic Review* 96(5): 1384–1417.

Wolpin, K.I. 2007. "Ex Ante Policy Evaluation, Structural Estimation and Model Selection." *American Economic Review* 97(2): 48-52.