

# Conflict and Child Labor: Evidence from Poor Households in Colombia

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## Abstract

Colombia suffers from one of the longest civil conflicts in the world, which is believed to have had several consequences on the country's economic and development performance. This study uses measures of central government deterrence effort as instruments of conflict to estimate the impact of conflict on children's time allocation to two different types of work: housework and work performed outside the household for poor families living in small municipalities in Colombia. I find that conflict significantly increases the amount of time children allocate to work. Both housework, for girls, and work outside the household, for boys, increase with Guerrilla attacks. However, the later effect is the opposite for Paramilitary attacks.

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# 1 Introduction

The social, economic and political consequences of violent conflict are tremendous. It can destroy infrastructure and capital; it displaces people, endangers civil liberties, disrupts schooling, and affects health (Justino 2011). Therefore, conflict is likely to change households decisions in several angles such as labor allocation and human capital accumulation. The later is a fundamental mechanism through which conflict can affect long-term development and economic growth. Human capital destruction during childhood is a well documented mechanism leading to poverty traps, due to the severe long-run effects it can have on individual and household welfare via future labor market outcomes and economic performance of the affected children (Becker 1962, Mincer 1974, Shultz 1961). Negative effects of violent conflict on individual and household's education level, labor and health outcomes can be observed decades after the conflict ended (Alderman et al. 2006, Akresh et al. 2009, Shemyakina 2011).

Schooling and child labor are usually the two options between which parents allocate their children's time. Although they are not necessarily exclusive, there may still be substantial consequences of work for schooling attainment and performance. Several studies have found a negative correlation between working and grade advancement, years of completed education and test scores for Latin America (Orazem and Gunnarsson 2004, Psacharopoulos 1997). Moreover, even taking into account the endogeneity issue, there is evidence of a negative relation between child labor and school attainment (Boozer and Sari 2001, Beegle et al. 2004). Then, conflict may have and impact on both schooling and child labor decisions, if it can change households' decisions.

This study adds to the existing literature by estimating the effect of armed conflict on two types of child labor for poor households in Colombia. To do so, I use two panel data sets that allow me to link households' time allocation decisions with armed conflict intensity at the municipality level. The identification strategy is the variation of conflict exposure both across time and space. I estimate the effect of conflict (differentiating between Guerrilla and Paramilitary attacks) on the intensity of child labor, distinguishing between two types of child labor: housework and work performed outside the household.

I use tow different approaches to estimate the causal link between conflict and child labor. The first one exploits the panel structure by estimating an individual fixed effects model to control for a possible omitted variable bias <sup>1</sup>. The second and preferred strategy estimates the previous model instrumenting conflict with central government deterrence measures, this allows to control for the potential endogeneity issue coming from forced recruitment. Later on, I add a gender heterogeneity level to account for the possible gender differences in time allocation between each job type. Under this last approach, I find that conflict increases the intensity of child labor. For housework, conflict (as measured by Guerrilla attacks) significantly increases the amount of time children, especially girls, dedicate to it. Finally, while Guerrilla Attacks significantly increase the amount of time boys dedicate to work outside the household, Paramilitary attacks significantly reduce it.

The rest of this document is divided as follows: Section 2 presents a brief literature review, Section 3 explains the data, Section 4 gives the econometric approach, section 5

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<sup>1</sup>Families could self-select themselves into specific types of municipalities (on conflict) depending on their risk taking preferences.

shows the results, and Section 6 concludes.

## 2 Literature review

There are three main channels through which conflict can affect child labor: indirectly by creating negative income shocks, and changing returns to education, and directly through soldiering.

Low household income levels have been seen as a determinant of child labor ever since the seminal theoretical paper of Basu and Hoang Van (1998). This model shows that child labor can occur assuming altruistic parents if household income is lower than a subsistence level, i.e. children are used as an economic security mechanism, as reported in the development economics literature (Dasgupta 1993, Nugent and Gillaspay 1983). There is empirical evidence relating negative income shocks to increases in child labor (Beegle et al. 2006, Duryea et al 2007, Jacoby and Skoufias 1997, Thomas et al. 2004). Now, there are at least three ways in which conflict can create negative income shocks: lost of property or increased probability of loosing property<sup>2</sup>, job loss<sup>3</sup>, and changes in family structure.<sup>4</sup>

Conflict can also change returns to education, affecting households' child labor decisions through three channels. First, education is a risky investment (Becker 1964, Levhari and Weiss 1974) because of future labor markets uncertainty and the likelihood of young adult death. Estevan and Baland (2007) develop a theoretical model that shows how high young adult mortality rates can lead to inefficiently high levels of child labor due to uncertainty of education's returns. Loretzen et al. (2005) find that increases in life expectancy are associated with higher human capital investments. Since conflict affects mortality rates, it also increases this uncertainty. Second, conflict can reduce the quality of education by creating an unsafe environment for teachers and students leading to low school attendance rates, and destroying infrastructure. Finally, conflict is believed to affect economic performance in general, which can reduce labor opportunities for educated workers.

Although there are some cross-country studies on the consequences of violent conflict with mixed findings (Chen et. al 2007, Collier 1999, Stewart and Fitzgerald 2001), this country-level perspective has been criticized because of its insufficient attention to the impact of armed conflict on households and individuals (Verwimp, Justino and Brück 2009). Using micro-level data for Tajikistan, Shemyakina (2011) finds that the probability of completing mandatory schooling was significantly reduced for women. Akresh and de Walque (2008) investigates the impact of the 1994 Rwanda genocide on schooling outcomes of children, using a difference in differences approach they find that children exposed to the genocide experience a decline in school attendance and are less likely to complete fourth grade.

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<sup>2</sup>For example, guerrilla and paramilitary groups use to charge a "security tax" to vast populations depending on specific characteristics.

<sup>3</sup>Camacho and Rodriguez (2010) find that a one standard deviation in the number of guerrilla and paramilitary attacks in a municipality increases the probability of firm exit in 8.1 percentage points.

<sup>4</sup>Death or displacement of some relatives may induce an "added worker effect". It can be directly, increasing child labor supply in the market, or indirectly, increasing child housework. Justino (2011) points out that households in conflict affected countries tend to replace dead, injured or physically and mentally disabled adult workers with children, in order to compensate for income unexpected reductions.

For Colombia, Angrist and Kugler (2008) find that boys labor supply increased due to the shift of production of coca paste from Bolivia and Peru to Colombia. Dueñas and Sanchez (2007) find that the activities of illegal armed groups increase the risk of dropout for all individuals, and this effect is stronger for the poorest households. Rodriguez and Sánchez (2011) show that conflict induces children to drop out and to enter the labor market too early. Barrera and Ibañez (2004) find a negative relationship between the probability of school enrolment and contemporaneous homicide rate. However interesting these results are, these studies use cross-section data, which has the usual limitations. Moreover, the present study also differs from the previous ones because it studies the effect of conflict on two different types of child labor, housework and work performed outside the household, and separates the effect of Guerrilla Attacks from those of Paramilitary ones.

### 3 Data and Descriptive Statistics

I use two different panel data sets for this study. The one for Conflict is a unique dataset from 1994 to 2012, and the one for Child Labor comes from a social program intended for poor households in small municipalities<sup>5</sup>.

#### 3.1 Household Data

This data comes from *Familias en Accion*<sup>6</sup>, a social program implemented in Colombia in 2002. This data set offers information about families' characteristics, decision process and expectations, which allows getting insights about child labor decisions. The household survey data coming from the Familias en Acción dataset includes information on 57,764 individuals living in 9,526 poor households in 122 municipalities. Although the surveys were designed mainly to evaluate the program, they collected information on household living arrangements, economic conditions (income, assets, transfers to and from the household, detailed family expenditures, external shocks and how the family responded financially to these shocks). For individuals 10 and older, there is rich information on education and employment history, type and amount of payments, work arrangements and conditions, time allocation per day, and expected and desired years of schooling.

To be eligible for the program, households had to live in an eligible municipality. Those municipalities were required to have at most 100000 inhabitants by 2002, access to health services and basic education, a bank, and not be in the coffee zone. Within each municipality, households registered with SISBEN (System for the Selection of Beneficiaries of Social Programs) were eligible<sup>7</sup>. A random and stratified selection of 55 treated municipalities and 67 control municipalities, matched on geographic location, population,

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<sup>5</sup>Population not larger than 100000 inhabitants by 2002.

<sup>6</sup>Families in the program were given subsidies, conditional upon nutrition and health check-ups for children younger than 7 years old, and gives incentives for children to go to elementary school.

<sup>7</sup>Given that we are dealing with poor households, this database provides a perfect setting for this study, since the channels through which conflict can affect child labor suggested by the literature work almost exclusively for this type of households that can not afford to migrate or take any other alternative to mitigate the consequences of conflict.

and indices of quality of life, and school and health structure availability.<sup>8</sup> Therefore, it is feasible to assume that child labor trends would have been parallels had all municipalities been equally affected by conflict.

I focus on the time use data on children between 10 and 17 years old. The sample consists of 15314 children in 2002, 15198 in 2003, and 14102 in 2005. Around 53.7% of the children are boys, 47.9% live in a rural area, 81.8% have at least one younger child living in the same household, 82.5% of them live in a household whose head has some kind of paid job, and live in a household with 2.77 adults on average.

The child labor variables used come from the time use data in this database. There are three types of work: housework, work done outside of the household, and the sum of both of them<sup>9</sup>.

Table 4 shows household and municipality controls descriptive statistics. Children work, on average, around 113 minutes a day<sup>10</sup>, 68.9 minutes of housework and 44.533 of work outside the household but there is a considerable variation (a standard deviation of 148.3, 97.5, and 128.9 respectively). Moreover, child labor seems to decrease from 2002 to 2005, but this is coming mainly through a reduction on work outside the household. Table 5 shows individual level controls' descriptive statistics<sup>11</sup>. Older children, with younger relatives within the household, living with unemployed head of the household are expected to be more likely to work. Moreover, the more adults a household has, the less it should need extra work supply, *ceteris paribus*. Attrition is a concern for this database. Contact rate was 93.8% of the initial sample for the first follow-up, and 83% for the second follow-up. This can cause problems if conflict is related to this sample lost, more specifically if households living in highly affected by conflict municipalities decided to migrate because of conflict.<sup>12</sup> However, since more risk averse households are more prone to both child labor and migrating due to conflict, the estimates presented in this study can be seen as a lower bound of the actual impact of conflict on child labor.

### 3.2 Conflict Data

Colombia has experienced one of the longest internal conflicts in the world. It began by the creation of two left wing guerrilla groups in the 1960s, the Revolutionary Armed Forces of Colombia (FARC) and the National Liberation Army (ELN) (Guigale et al. 2002). Landowners and drug lords started right wing paramilitary groups, United Self-Defense Forces of Colombia (AUC), to protect themselves against these groups. By the second half of the 1980s violence related to the narcotics business had increased. The guerrilla became involved in this business as well, which intensified the ongoing conflict (Harker and Meléndez 2008). Both guerrilla and paramilitary groups have committed all kinds of violent attacks against the state armed forces, national infrastructure, and the

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<sup>8</sup>Most of the control municipalities were towns without a bank, hence they were not eligible for the program's first wave.

<sup>9</sup>All of them are measured as the number of minutes dedicated to each type of work on the last business day.

<sup>10</sup>This might be a lower bound, specially for work outside the household because families might under-report this type of work more than housework, since it can be perceived as more harmful.

<sup>11</sup>Covariates to estimate conflict suggested by the literature on Colombia.

<sup>12</sup>A first approach shows that conflict seems to decrease the likelihood of a household being found both in 2003 and 2005.

civil population through kidnappings, population displacement, forced recruitment and homicides (Rodríguez and Sánchez 2012).

Álvaro Uribe was elected president of Colombia in 2002. “Democratic Security”, his most popular policy, aimed to regain state control over the country’s territory. In order to achieve this goal, military spending increased, expanding police presence to all municipalities, trying to eradicate coca cultivation, fighting the guerrilla and demobilizing the AUC. This policy had mixed results, even though the number of kidnappings and homicides decreased significantly, some of the AUC members formed the so-called *bandas criminales* continue to participate in drug production and trafficking and attack civil population.

The data set used in this study comes from a balanced panel of detailed event-based data from the Center for the Study for Armed Conflict (CERAC), updated by Universidad del Rosario. For every event the conflict dataset records its type, the date, location, perpetrator, and victims involved in the incident<sup>13</sup> from 1988 to 2012. Instruments are taken from the Center of the Studies for Economic Development (CEDE) at Universidad de los Andes.

Table 4 reports the descriptive statistics of the conflict variables and the instruments for municipalities present in the household database. There are three conflict variables in this study: total number of attacks, Guerrilla attacks and Paramilitary Attacks. Specifically, the total number of attacks is the sum of political terrorist attacks, illegal road blocking, route blocking, explosive terrorist attacks, arsonist terrorist attacks, private property assaults, entity terrorist attacks, armed contact, ambushes, harassing, population incursions, land piracy, and other terrorist attacks. Table 4 shows that there is enough variation of conflict measures both within municipalities thought time.

### 3.3 Simple difference

Table 2 displays a simple mean difference between children’s time allocation to labor for those living in municipalities highly affected by conflict and those living in more "peaceful" ones.<sup>14</sup> There is no statistically significant difference for the complete sample. However, on average, children in highly affected by conflict municipalities in 2005 did more child labor, specially work outside of the household, but the situation was the opposite in 2002. In 2003, on average, children in High Conflict municipalities dedicated less time to housework than those in Low Conflict municipalities.

Even though these results can not be interpreted as a causal effect, they do show the difference that might exist from one kind of child labor to the other.

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<sup>13</sup>The dataset is described thoroughly by Restrepo, Spagat, and Vargas (2004).

<sup>14</sup>High Conflict Exposure municipality is defined as one where the attack rate per 100000 inhabitants is at least the median of the hole sample for a given year.

Table 1: Child Labor by Exposure to Conflict

	Low Conflict Exposure	High Conflict Exposure	Difference
<b>2002</b>			
<i>clabor</i>	129.084 (153.963)	124.033 (152.492)	5.050 (3.046)
<i>house</i>	73.627 (97.001)	77.712 (106.361)	-4.085* (2.083)
<i>outh</i>	55.716 (141.531)	46.404 (130.330)	9.313*** (2.649)
<i>N</i>	9943	3191	13134
<b>2003</b>			
<i>clabor</i>	106.195 (142.341)	105.907 (149.144)	0.288 (3.206)
<i>house</i>	62.245 (88.458)	56.582 (85.976)	5.663** (1.872)
<i>outh</i>	44.085 (113.690)	49.325 (127.548)	-5.240 (2.903)
<i>N</i>	10394	2571	12965
<b>2005</b>			
<i>clabor</i>	102.971 (144.774)	115.180 (152.348)	-12.21*** (3.498)
<i>house</i>	70.539 (104.683)	73.369 (105.869)	-2.830 (2.447)
<i>outh</i>	32.525 (113.690)	41.844 (127.548)	-9.319** (2.903)
<i>N</i>	9703	2224	11927
<b>Total</b>			
<i>clabor</i>	112.726 (147.508)	115.734 (151.557)	-3.007 (1.866)
<i>house</i>	68.690 (96.873)	69.700 (100.517)	-1.010 (1.236)
<i>outh</i>	44.191 (128.270)	46.074 (131.715)	-1.883 (1.622)
<i>N</i>	30040	7986	38026

Source: DNP, National Planning Department, CERAC/UROSARIO

## 4 Econometric Approach

As mentioned above, this study uses two different approaches to estimate the effect of conflict on parent's decisions<sup>15</sup> to make their children work and the amount of time they do so (measured by number of minutes children dedicate to work in a given day), differentiating the effects by gender, by two types of work, and by two types of Attacks (Guerrilla and Paramilitary).

Given that this panel comes from a social program intended to improve health status of the children in the household and to give incentives for parents to send their children to elementary school, all regressions have as a control a dummy for the household receiving this aid, since treated households should be more prone to send their children to school, this should decrease the likelihood and amount of child labor.

The first approach exploits the Panel setting of the data by using a fixed effects

<sup>15</sup>Assuming parents decide their children's time allocation might not be entirely realistic, especially for older children, but given the empirical nature and the scope of this study, this assumption is not problematic.

specification. This allows to isolate the effect of conflict on child labor from that of the differences in municipalities' unobserved characteristics that do not vary with time, such as culture<sup>16</sup>. Then, not taking this issue into account can lead to misleading results, such as overestimating the effect of conflict on child labor when what's actually making the difference is something else. Then, this approach also allows to get rid of the possible self-selection of households into more "peaceful" municipalities according to risk preferences, which is a potential omitted variable bias that can double causality problem. Families could self select into more peaceful municipalities due to their risk aversion which also determines child labor and is unobserved.<sup>17</sup> More risk averse households would then live in municipalities less affected by conflict and send their children to work more, since it is shown in the literature that education and child labor are two possible and usually opposed ways to allocate children's time; causing a potential underestimation of the effect of conflict on child labor. Hence, using a fixed effects approach takes care of this issue given that risk aversion is an unobserved but fixed characteristic of households.

I estimate two types of models for this first approach. The first one will regress the endogenous variable Child labor, (Total, Housework, Work outside the household) for child  $i$ , living in municipality  $m$  in year  $t$  against a conflict variable (Number of attacks: Total, Guerrilla, and Paramilitary) and a set of individual and municipality level controls:

$$Cl_{i,m,t} = \alpha_i + \delta_t + \lambda_1 Conflict_{i,m,t} + \lambda_2 M_{i,m,t} + \epsilon_{i,m,t}$$

where  $Cl_{i,m,t}$  is a measure of child labor (the amount of time this child dedicated to each type of work on a typical day).  $\alpha_i$  and  $\delta_t$  are individual and year fixed effects.  $M_{i,m,t}$  is a set of individual controls such as child's age, whether or not he has younger relatives living in the same household, chief of the household employment status, and number of adults living in the household; and municipality level controls: Geographic, Population, Institutional, Fiscal, and Royalties.<sup>18</sup>

The second type adds a gender heterogeneity level to the former model, which allows for a deeper study of the effect of conflict on time use decisions by taking into account the potential effect of the traditional sex roles that still remain in Colombia.

$$Cl_{i,m,t} = \alpha_i + \delta_t + \lambda_3 Conflict_{m,t} + \lambda_4 Sex * Conflict_{i,m,t} + \lambda_3 M_{i,m,t} + \epsilon_{i,m,t}$$

Where  $\lambda_4$  captures the effect of conflict on child labor for boys.

The second approach adds instrumental variables. This is done because of the potential endogeneity of the conflict variables due to high participation of children in war. It is well established that both paramilitary groups and guerrillas recruit children for combat<sup>19</sup>. Then, if parents are being forced to send their children to do this kind of "work",

<sup>16</sup>Different societies can have different points of view regarding child labor. For example, some might value formal education more than others.

<sup>17</sup>Risk aversion can affect both households' child labor/education decisions and their choices on the type of municipality (more or less conflict) to live in. As the literature (See Grootaert & Kanbur (1995), and Belzil & Leonardi (2007)) suggests, especially for poor households, high risk aversion induces households to use their children's labor force as a way to reduce the risk of falling below a subsistence level of income.

<sup>18</sup>Population, rainfall, an Erosion index, number of Courts, number of Prosecutor Offices, number of Attorneys Office, Oil, Coal, Gold, Nickel, Emerald Royalties, and a Fiscal index.

<sup>19</sup>According to Human Rights Watch (2003), over 11,000 children were fighting in Colombia's armed conflict at that time

the exogeneity of the conflict measure would be compromised, and the coefficients would overestimate the effect of conflict on households child labor decisions’.

The instruments used in this study are measures of central government deterrence effort: weapons seized and laboratories dismantle<sup>20</sup>. These have been suggested by the literature<sup>21</sup> on Colombian conflict as being strongly correlated with conflict measures such as number of attacks. This also holds for the database used in this study, first stage results are analysed later on. Intuitively, these two variables should be strongly and positively correlated with conflict variables because they indicate the presence and effectiveness of the central government to neutralise illegal armed groups’ actions. Moreover, these instruments are believed to be exogenous to child labor, as it’s unlikely that households decide their time use based on these central government decisions, which are usually classified and take place in environments not easily detected by the civil population. Likewise, most schooling policies are decided at the regional level, and even those determined at the country level, are not taken by the same ministry than those of deterrence effort, hence households’ decisions are not likely to be affected by the instruments through any other channel than conflict.

The models I estimate here are based on a two least squares procedure. The first stage regress the endogenous variable (Conflict dummy) for child  $i$ , living in municipality  $m$  in year  $t$  against the instruments (weapons seized and laboratories dismantle) and a set of municipality level controls:

$$Conflict_{i,m,t} = \alpha + \beta_1 D_{i,m,t} + \beta_2 X_{i,m,t} + \varepsilon_{i,m,t}$$

The second stage is described by:

$$Cl_{i,m,t} = \alpha_i + \delta_t + \lambda_1 \widehat{Conflict}_{i,m,t} + \lambda_2 M_{i,m,t} + \epsilon_{i,m,t}$$

Where  $D_{i,m,t}$  is the set of central government deterrence effort, weapons seized and laboratories dismantled for child  $i$ , living in municipality  $m$  in year  $t$ .

Once again, I also add the gender heterogeneity to the former model. The difference here is that the interaction between sex and the instruments is also added to the first stage, and it is also instrumented. The first stage is described by the following set of equations:

$$Conflict_{i,m,t} = \alpha_1 + \beta_{11} D_{i,m,t} + \beta_{21} Sex_{i,m,t} * D_{i,m,t} + \beta_{31} X_{i,m,t} + \varepsilon_{i,m,t}$$

$$Sex * Conflict_{i,m,t} = \alpha_2 + \beta_{12} D_{i,m,t} + \beta_{22} Sex_{i,m,t} * D_{i,m,t} + \beta_{32} X_{i,m,t} + \varepsilon_{i,m,t}$$

And the second stage is described by:

$$Cl_{i,m,t} = \alpha_i + \delta_t + \lambda_3 \widehat{Conflict}_{m,t} + \lambda_4 Sex * \widehat{Conflict}_{i,m,t} + \lambda_3 M_{i,m,t} + \epsilon_{i,m,t}$$

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<sup>20</sup>Controlling for geographical variables are included because they determine whether or not coca leaf can be produced there. Institutional variables are added as a proxy of state institutional presence. These variables are included because they are not affected by conflict.

<sup>21</sup>For example Camacho and Rodriguez (2010) use laboratories dismantle, and Lemus (2014) uses these two as well.

where the outcome (time allocated to labor by child  $i$ ) is explained by the predicted values of the endogenous variables of interest from the first stage.

Table 7 presents the first stage regressions of the instrumental variable (IV) approach to check how appropriate these instruments are. Column 1 shows the results for Total Attacks, column 2 for Guerrilla Attacks, and the third displays the results for Paramilitary Attacks. Panel A shows results for the no interactions approach and Panel B for the one with interactions. For both specifications, both instruments significantly increase the measure of conflict. Furthermore, the F-test shows that instruments are not weak, given that all of them are greater than 10.

## 5 Results

This section presents the results for both of the approaches already explained and differentiating by work type, and type of illegal group attack. It analyses the results without the sex heterogeneity issue first, and then it shows the results when this interaction is added.

The first differentiation adds to the existing literature by taking into account housework as well as work done outside the household. This can be done due to the time use nature of the child labor variables, and it is interesting to study since literature states that conflict can create negative income shocks and child labor can be used as a coping mechanism in two ways: children can be sent directly to some kind of paying job or they can replace their parents or adult relatives in household chores when these later are forced to work more than they used to. Hence, taking housework as a type of child labor can help to capture one of the mechanisms through which conflict can affect child labor decisions.

The second differentiation, between both types of illegal groups attacks, could be interesting to study since it has been well established that both groups were supposed to have different ideologies and operated in different ways.

### 5.1 Basic Results

Table 2 presents the results for time allocated to labor by children. Panel A shows basic model results (no IV), and Panel B displays IV results. This table has information for any kind of child labor first, and then it distinguishes between housework and work outside the household. Moreover, I use three conflict variables: Number of Attacks (of any kind), Number of Guerrilla Attacks, and number of Paramilitary Attacks.

Conflict reduces child labor, although this effect is small. For the no IV estimations, an additional guerrilla attack reduces almost 3 minutes of child labor in general, and almost 2 minutes of work outside the household. When adding the IV approach, the result is statistically significant both for total attacks and guerrilla ones, but only for work outside the household. Moreover, even though the sign of the coefficient is the same (negative), the effect of guerrilla attacks is slightly larger. The fact that this is only significant for work outside the household could be explained by the forced recruitment: being outside the household can increase the likelihood of recruitment, then households might be scared to send their children to work.

Table 2: Effect of Conflict on Child Labor

Variables	Total Attacks	Guerrilla At	Paramilitary At
Panel A: No IV Results			
Child labor	-1.280 (1.129)	-2.602** (1.1182)	0.860 (5.226)
House labor	-0.617 (0.759)	-1.162 (0.882)	1.757 (4.500)
Outside labor	-0.688 (0.506)	-1.459** (0.558)	-0.908 (1.507)
Observations	38026	38026	38026
Children	20216	20216	20216
Panel B: IV			
Child labor	0.861 (2.395)	0.880 (2.779)	14.088 (35.013)
House labor	2.656 (2.881)	3.034 (3.274)	36.652 (46.157)
Outside labor	-1.833** (0.773)	-2.197** (0.881)	-23.167 (16.040)
Observations	30178	30178	30178
Children	12368	12368	12368

All regressions include municipality and individual level fixed effects and controls (not reported). Robust standard errors in parentheses clustered at the municipality level. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . *Source*: CERAC/UROSARIO; CEDE; IGAC, Geographic Institute Agustin Codazzi; DANE, National Administrative Department of Statistics; CSJ, Superior Court of the Judiciary; DNP, National Planning Department.

## 5.2 Gender Heterogeneity

Table 3 presents results for time allocated to both types of child labor adding the sex interaction. This allows to study if and how conflict affects children's time allocation decisions depending on children's gender.

Once again, Panel A presents results without instrumental variables and panel B shows second stage estimation coefficients. Given the possible endogeneity of the conflict variables, it is interesting to compare Panel A and Panel B results.

Overall, conflict increases child labor: an additional attack of any kind increases the amount of any type of labor a child does by 3.4 minutes. However, an additional attack reduces by 10 minutes the amount of work outside the household boys do. These results are statistically significant in the 2SLS specification but not in the no IV one.

The strongest effects are shown when Guerrilla attacks are studied on their own. Conflict significantly changes both housework and work outside the household decisions. When dealing with housework, an additional guerrilla attack increases by 14 minutes the amount of housework children do. However, this increase is significantly higher for girls than for boys. Boys actually do less housework when conflict increases, so girls's time al-

located to this kind of job increases a lot. This increase on housework intensity of for girls may be due to the fact that conflict forces older women in the household to find a paying job, hence girls replace them in their previous duties. Now, the situation with work done outside the household is quite the opposite. In this case there is no effect of guerrilla attacks on the amount of time children of both genders allocate to it, but only on the time boys allocate to it. One additional guerrilla attack increases by almost 19 minutes the amount of time boys allocate to this type of job. It is also interesting to notice that Panel A results show the opposite sign and the coefficients are smaller. Hence, it is worth noting that 2SLS specifications not only make conflict's coefficients significant, but they also change their sign. This can be reflecting the endogeneity problem of conflict measures.

Finally, for Paramilitary Attacks, there is a large and significant reduction on time boys allocate to work outside the household when this kind of attacks increases. Boys reduce their work outside the household by 48 minutes a day. Non-instrumented results show a small reduction on the time boys allocate to any type of job due to these kind of attacks.

It is also worth noting that not only results change sign and are stronger from non-instrumented approach to the IV one, but also that results are more conclusive when adding the gender level heterogeneity. This shows that the channels through which conflict affects child labor decisions are different for both genders, which might explain why the basic results are quite small and non-significant. Hence, I am able to find evidence of the persistence of traditional gender specific roles where women take care of household chores and men work outside and provide for the household. This is not surprising specially when taking into account that these are low-income, poorly educated households<sup>22</sup> living on relatively small municipalities.

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<sup>22</sup>Only 13.3% of head of the household's had at least some secondary education.

Table 3: Effect of Conflict on Child Labor: Gender Heterogeneity

Variables	Total Attacks	Guerrilla At	Paramilitary At
Panel A: No IV Results			
Child labor	-0.636 (1.419)	-2.285 (1.837)	4.667 (5.579)
Child labor*Sex	-1.244 (1.363)	-0.593 (2.019)	-7.724** (3.776)
House labor	-1.233 (0.964)	-3.595*** (1.198)	3.154 (5.717)
H_labor*Sex	1.193 (0.800)	4.554*** (1.081)	-2.847 (3.707)
Outside labor	0.568 (0.875)	1.287 (1.033)	1.471 (1.767)
O_labor*Sex	-2.430 (1.578)	-5.141*** (1.803)	-4.853 (4.271)
Observations	38056	38056	38056
Children	20216	20216	20216
Panel B: IV Results			
Child labor	3.366** (1.391)	1.526 (2.985)	52.753 (57.105)
Child labor*Sex	-7.469 (5.641)	9.708 (7.663)	-38.315 (26.545)
House labor	2.703 (3.280)	13.968*** (5.406)	-28.983 (68.069)
H_labor*Sex	0.099 (10.128)	-8.147** (3.836)	9.837 (22.211)
Outside labor	-1.432 (1.224)	-1.145 (0.895)	23.189 (17.006)
O_labor*Sex	-9.796*** (2.549)	18.157* (9.728)	-48.124*** (8.305)
Observations	30178	30178	30178
Children	12368	12368	12368

All regressions include municipality and individual level fixed effects and controls (not reported). Robust standard errors in parentheses clustered at the municipality level. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . *Source:* CERAC/UROSARIO; CEDE; IGAC, Geographic Institute Agustin Codazzi; DANE, National Administrative Department of Statistics; CSJ, Superior Court of the Judiciary; DNP, National Planning Department.

## 6 Conclusion

Colombia has one of the longest ongoing civil conflicts in the world. Moreover, this phenomenon has been well documented. The panel of conflict at the municipality level has detailed information which combined with a panel from a social program for poor families allows to study the effect of conflict on child labor. Using a fixed effects approach combined with an instrumental variable one to account for possible endogeneity of conflict measures, I find that conflict increases the amount of time children allocate to doing some kind of work, but it decreases the amount of time boys allocate to doing some kind of job outside the household. More specifically guerrilla conflict increases the the intensity

of housework girls do, and work outside the household boys do, but paramilitary attacks decrease this last one.

The present study goes one step forward from previous studies in three ways: by differentiating between housework and work outside the household, and guerrilla and paramilitary attacks, by exploiting the panel setting of the database <sup>23</sup>, and by adding the gender level heterogeneity to this setting. I find that conflict increases the amount of child labor. This comes mainly through increases in boys working outside the household, and girls doing more housework in municipalities more affected by guerrilla attacks. These gender differences are consistent with traditional sex roles in Colombia. However, paramilitary attacks significantly reduce the amount of work outside the household boys do, which can explain the small results when the gender heterogeneity is not exploited. This could be explained by parents being afraid of forced recruitment.

These results contribute to the understanding of the consequences of conflict on households' decisions, showing that there is yet another negative effect of this issue that should be taken into consideration when estimating the social cost of conflict and the possible gains from the end of it. They can also enrich the knowledge of governments to help them design suitable policies to reduce the negative impacts of conflict on poor households, and hence on economic development.

This is a relatively new research question and therefore further research, both theoretical and empirical, is needed to understand the effect of conflict on child labor and the channels through which it acts. Moreover, it would be interesting to find better instruments and to address the possible attrition problem that could be making the present results underestimate the effect of conflict on child labor.

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<sup>23</sup>Hence dealing with the potential omitted variable bias, risk aversion.

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## 6. Appendix

Table 4: Descriptive Statistics

Variable	Year			
	2002	2003	2005	Total
<i>Child Labor</i>				
mean	128.016	106.146	104.932	113.272
sd	153.662	143.521	146.080	148.254
<i>Housework</i>				
mean	74.491	61.275	70.994	68.874
sd	99.064	88.061	104.876	97.545
<i>Work outside the household</i>				
mean	53.746	44.981	34.022	44.533
sd	139.284	128.591	116.074	128.903
<i>Total Attacks</i>				
mean	1.380	1.373	1.006	1.136
sd	3.313	3.317	2.725	2.939
<i>Guerrilla Attacks</i>				
mean	1.038	1.034	0.822	0.763
sd	2.558	2.563	2.174	2.119
<i>Paramilitary Attacks</i>				
mean	0.159	0.156	0.069	0.114
sd	0.631	0.628	0.428	0.517
<i>Weapons seized</i>				
mean	0.255	0.256	0.44	0.356
sd	0.728	0.732	1.049	0.923
<i>Laboratories dismantled</i>				
mean	0.349	0.349	0.675	0.415
sd	1.885	1.897	2.364	1.825
Observations	13134	12965	11927	38026

Source: DNP, National Planning Department; CERAC/UROSARIO; CEDE.

Table 5: Descriptive Statistics: Individual Controls

Variable	Year			
	2002	2003	2005	Total
<i>Children younger than 5</i>				
mean	0.849	0.84	0.835	0.819
sd	0.358	0.366	0.371	0.386
<i>Adult labor</i>				
mean	0.798	0.801	0.825	0.825
sd	0.402	0.399	0.38	0.38
<i>Sex (male)</i>				
mean	0.531	0.541	0.536	0.537
sd	0.499	0.498	0.499	0.499
<i>Number of Adults</i>				
mean	2.920	2.799	2.829	2.774
sd	1.483	1.375	1.405	1.368
<i>Age</i>				
mean	13.212	13.173	13.22	13.235
sd	2.252	2.235	2.23	2.231
Observations	13134	12965	11927	38026

Source: DNP, National Planning Department.

Table 6: Descriptive Statistics: Municipality-Level Controls

Variable	Year			
	2002	2003	2005	Total
<i>Population</i>				
mean	27157.290	26932.48	26978.88	27095.73
sd	21400.180	21343.31	21441.06	21571.3
<i>Total Court</i>				
mean	1.909	1.892	1.865	1.889
sd	2.333	2.315	2.26	2.246
<i>N prosecutoroff</i>				
mean	0.099	0.095	0.089	0.092
sd	0.383	0.374	0.362	0.369
<i>N attorneyoff</i>				
mean	1.288	1.268	1.27	1.265
sd	2.182	2.169	2.191	2.183
<i>Erosion</i>				
mean	1.805	1.809	1.817	1.815
sd	0.871	0.87	0.871	0.87
<i>Rainfall</i>				
mean	1718.397	1723.764	1712.228	1712.877
sd	890.522	895.242	888.368	887.651
<i>Oil</i>				
mean	1.63E+08	1.65E+08	2.33E+08	2.14E+08
sd	3.37E+08	3.39E+08	5.00E+08	4.63E+08
<i>Coal</i>				
mean	1.89E+08	1.84E+08	2.56E+08	2.96E+08
sd	1.10E+09	1.09E+09	1.45E+09	2.06E+09
<i>Gold</i>				
mean	4.46E+07	4.50E+07	6.13E+07	6.39E+07
sd	2.78E+08	2.80E+08	3.15E+08	3.50E+08
<i>Nickel</i>				
mean	2.71E+07	2.72E+07	6.85E+07	6.30E+07
sd	1.47E+08	1.47E+08	3.61E+08	3.73E+08
<i>Emerald</i>				
mean	1.26E+06	1260728	1.65E+06	1.35E+06
sd	1.07E+07	1.07E+07	1.33E+07	1.17E+07
<i>Fiscal</i>				
mean	9.791	9.982	3.049	5.003
sd	20.959	21.485	3.199	12.873
Observations	13134	12965	11927	38026

Source: CERAC/UROSARIO; CEDE; IGAC, Geographic Institute Agustin Codazzi; DANE, National Administrative Department of Statistics; CSJ, Superior Court of the Judiciary; DNP, National Planning Department.

Table 7: Descriptive Statistics: First Stage Results

Variables	Total Attacks	Guerrilla At	Paramilitary At
Panel A: No interactions			
Laboratories dismantled	2.635** (1.007)	2.117** (0.831)	0.223 (0.135)
Weapons seized	1.613*** (0.280)	1.396*** (0.299)	0.116 (0.073)
F-excluded	16.800	11.15	1.600
Endogeneity test (p-value)	0.000	0.000	0.207
Observations	38026	38026	39026
Panel B.1: Interactions (Conflict)			
Laboratories dismantled	2.737** (1.092)	2.156** (0.874)	0.239 (0.015)
Weapons seized	1.591*** (0.296)	1.364*** (0.318)	0.111 (0.076)
F-excluded	24.570	24.45	1.95
p-value	0.000	0.000	0.108
Panel B.1: Interactions (Sex Interaction)			
Laboratories dismantled*sex	0.002 (0.141)	0.002 (0.139)	0.390* (0.219)
Weapons seized*sex	0.720** (0.344)	0.717** (0.342)	0.352** (0.168)
F-excluded	2.88	2.84	4.58
Endogeneity test (p-value)	0.026	0.028	0.002
Observations	30178	30178	30178

All regressions include municipality and individual level controls (not reported). Robust standard errors in parentheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1. Source: CERAC/UROSARIO; CEDE; IGAC, Geographic Institute Agustin Codazzi; DANE, National Administrative Department of Statistics; CSJ, Superior Court of the Judiciary; DNP, National Planning Department.