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School, market work, and household chores

A day of Guatemalan children

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Abstract: This paper utilizes a unique dataset on time use to study the determinants of the number of hours allocated to market work, household chores, and school related activities of Guatemalan children between 2000 and 2011. The paper also exploits information on the duration of schooling in order to compute survival probabilities or the probability of dropping out of school conditional on having stayed in school for time *t*. Results suggest that working children are two to four times more likely to drop out of school or to have never enrolled than the rest of the children in the sample. The findings also reveal the traditional gender specialization on market and domestic activities from early ages. While market work increases the likelihood of dropping out of school for both boys and girls, household chores add additional pressure to girls' time allocation and further increase school failure.

Keywords: child labour, school attainment, Guatemala

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1 Introduction

Guatemalan labour market is characterized by three distinct features: high levels of informality, low wages, and a strong participation of children at work (primarily in the agricultural sector). This paper utilizes individual level data from national representative surveys to examine the evolution of child labour, time allocation to domestic chores, and school related activities in Guatemala between 2000 and 2011. It also uses survival analysis to study the effects of child labour on the likelihood of dropping out of school.

Guatemala has made significant improvements to reduce child labour during the last decade; however, this phenomenon is still very common in the country. The estimates from the Guatemalan National Living Standards Surveys (ECOVI) show that 28 per cent of children aged 7-17 years were involved in market work in 2000, 26 per cent in 2006, and 20 per cent in 2011. The situation is more striking if we take into account that working children allocate in average 47 hours per week to work, leaving little time for study or play (ILO). Household chores also eat into children's time. The official statistics show that domestic activities account for 40 hours of work per week. In many contexts, girls take on a heavier workload within household-related duties, such as firewood and/or water collection, childcare, etc., whereas boys are more likely to be involved in unpaid agricultural labour. From a gender perspective, including household chores in the definition of labour shows that girls and boys work in equal proportion rather than boys taking most of the work as it is usually believed. From a more general view, domestic chores along with unpaid work in the family business/farm are different forms of labour that also create pressure on children's time allocation and so, need to be considered in the definition of child work.

Numerous studies around the world show that child labour has negative effects on education. For example, Ersado (2005) found that in Peru, children who combine work with school can have regular absences from school. While still having access to education, low attendance is seen as a precursor to school withdrawals. Colclough et al. (2000) research in Ethiopia and Guinea showed that in both countries, child labour is one of the main reasons for dropping out of school. Similarly, Fentiman et al. (1999) found that child labour was the prime reason for non-enrolment and drop out in Ghana. Psacharopoulos (1997) showed that child labour reduces schooling by two years in Bolivia and Venezuela. Kruger (2007) found that increases in the county-level value of coffee production in Brazil led to poorer children's withdrawal from school in order to work in the coffee plantations. While agricultural work is often seasonal, temporary breaks may lead to permanent withdrawals from school. Buonomo Zabaleta (2011) found that working over three hours a day is associated with school failure in the medium term in Nicaragua.

The school-work trade-off is particularly important since educational attainment is

strongly correlated with future higher formal employment rates, higher wages, and lower probabilities of being poor. In this context, current child labour will perpetuate social inequalities and low levels of well-being by jeopardizing human capital growth.

Most of the existing literature has used single equation models to estimate the probability of school attendance and/or child market work participation (see, Patrinos and Psacharopoulos (1997), Psacharopoulos (1997), Jensen and Skyt Nielsen (1997), Ray (2000). These studies have two main limitations: first, domestic work is not included on the definition of labour and second, they overlook the fact that the decisions are not independent of each other. While more recent studies (see Zapata et al. (2011), Kis-Katos (2012)) have recognized the interdependence of child schooling and child labour decisions, due to data limitations, they are still limited to model only the participation decision rather than the time allocation decisions. As suggested by Rosati and Rossi (2003) the number of hours allocated to work is a measure of child welfare that is important by itself but also for evaluating the cost of work in terms of health and human capital accumulation.

This paper contributes to the empirical literature in a number of ways. First, thanks to a unique dataset on time use, it examines the determinants of the number of hours allocated to market work, domestic chores, and school related activities of Guatemalan children rather than studying the participation decision only. Second, it extends the existing Latin American literature that employs data from the late 90s by incorporating more recent data that covers the period 2000-11; years that have been particularly good in terms of economic performance and social changes for most countries in the region. Third, it exploits information on the duration of schooling in order to compute survival probabilities or the probability of dropping out of school conditional on having stayed in school for time t.

Overall, the empirical analysis suggests that child labour significantly reduces the likelihood of finishing school. Indeed, working children are two to four times more likely to drop out of school or never enroll. The results also reveal the traditional gender specialization on market and domestic activities, with boys allocating in average three hours per day more than girls to market work and three hour less to household chores. The estimation results provide a detailed account of the impact of various factors on children's allocation of time to market work, household chores, and school-related activities and their changes over time.

The rest of the paper is organized as follows: Section 2 gives an overview of the school system in Guatemala. Section 3 discusses the methodology, Section 4 presents the data and descriptive statistics, Section 5 discusses the results, Section 6 presents a number of robustness checks, Section 7 concludes.

2 School system in Guatemala

Official school attendance in Guatemala starts at seven years old. Education is free and compulsory through the sixth grade, or between the ages of seven and fourteen. The educational system is divided into three levels: primary, secondary, and university.

Primary education consists of six years of study and it is divided in two cycles of three years each: the fundamental education cycle and the complementary education cycle. After the completion of primary education children obtain a diploma.

Secondary education consists of five or six years of study. It is also divided in two cycles. The basic education cycle follows primary school and consists of three years of study during which all students follow a common curriculum. The second cycle or diversified education cycle can be completed in two or three years depending on the specialization chosen. The first three years of secondary education (basic education) are also compulsory, while the diversified cycle is optional. Table 1 shows the status of children in the school system in 2000 and 2011. While the statistics reflect big improvements in 2011 compared to 2000, significant efforts to increase the educational level of the population still need to be undertaken.

Table 1: Children status in the school system, by age

		Panel A: 2000				*Panel B: 2011*			
Grade	Age	No school	In grade	Behind	Dropout	No school	In grade	Behind	Dropout
Primary (1-3)	7-9	0.54	0.44	0.00	0.02	0.06	0.93	0.00	0.01
Primary (4-6)	10-12	0.18	0.40	0.35	0.08	0.02	0.63	0.30	0.05
Basic (1-3)	13-15	0.13	0.25	0.34	0.28	0.04	0.39	0.31	0.26
Diversified (4-5)	16-17	0.14	0.14	0.26	0.46	0.06	0.22	0.28	0.44
All	7-17	0.27	0.34	0.23	0.17	0.04	0.58	0.22	0.16

Source: Author's calculations based on ECOVI surveys.

Panel rows add to one.

In 2000, 54 per cent of children aged 7-9 years had not been enrolled in to school. This is a big proportion that deserves a more detailed explanation. Of these children, 25 per cent were seven years old, so it is posible that some of them enrolled the following year with an average late entrance of one year. However, the other 25 per cent were aged 8-9 years, so assuming that they also enrolled the following year, they would be behind 2-3 years. Guatemala went through a long civil war that lasted for 36 years. The peace agreement was signed in 1996, so the numbers we see possibly still reflect consequences of the war.

Table 2: Net enrollment rates

	Primary education			Secondary education		
	Total	Female	Male	Total	Female	Male
Panel A: Guatemala						
2000	86	82	89	27	26	28
2011	93	92	93	46	45	48
Panel B: LAC countries						
2000	93	92	94	61	62	59
2011	93	93	93	74	77	72

Source: World Development Indicators

Share of children in primary/secondary school age attending primary/secondary school

Table 3: Distribution of school attainment by age, 24+

Age	24-25	26-30	31-35	36-40	41-45	46-50	51+	Total
Panel A: 2000								
No school	0.22	0.23	0.30	0.35	0.38	0.45	0.60	0.40
Some primary	0.30	0.32	0.30	0.29	0.29	0.27	0.24	0.28
Primary completed	0.17	0.16	0.15	0.13	0.11	0.11	0.07	0.12
Some secondary	0.12	0.13	0.11	0.10	0.06	0.06	0.04	0.08
Secondary completed	0.10	0.09	0.08	0.07	0.08	0.05	0.03	0.06
Post secondary	0.08	0.07	0.06	0.08	0.07	0.06	0.02	0.06
Panel B: 2011								
No school	0.14	0.18	0.24	0.28	0.33	0.38	0.55	0.34
Some primary	0.27	0.30	0.32	0.33	0.32	0.31	0.28	0.30
Primary completed	0.19	0.19	0.18	0.17	0.15	0.15	0.09	0.15
Some secondary	0.20	0.17	0.13	0.12	0.10	0.07	0.04	0.11
Secondary completed	0.13	0.11	0.08	0.06	0.05	0.06	0.03	0.06
Post secondary	0.07	0.06	0.05	0.04	0.04	0.04	0.02	0.04

Source: Author's calculations based on ECOVI surveys.

Panel columns add to one.

In 2011, net primary school enrollment rates in Guatemala are 93 per cent with equal enrollment of boys and girls. Due to the implementation of several education policies and programs there has been a considerable improvement compared with the year 2000, when these numbers were 89 and 82 per cent for boys and girls, respectively. The net secondary school enrollment rate has also increased between these years passing from 27 per cent in 2000 to 46 per cent in 2011. While these numbers show a significant improvement, the net secondary school enrollment rate in Guatemala is still below the regional average of 74 per cent (Table 2). Without a doubt the transition between primary and secondary education is a priority. The sixth and ninth grades are the common exit points of children from the school system, with very few of them completing secondary education and even fewer going to university. In this context, the majority of Guatemalan children will attain at the most only primary school education just like their parents did.

Table 3 shows the school attainment level of older individuals. In general, younger cohorts are better educated than the older ones. However, just 40 per cent of individuals aged 24-25 have gone through further primary education.

3 Empirical strategy

3.1 *Time allocation decisions*

The estimation strategy is based on a simple model of household decisions regarding child labour and schooling. Child labour is divided in market work and household chores. Decisions are assumed to be guided by a trade-off between cost and benefits for the parents, the children, and the family as a whole.

In order to account for the interrelationship between market work, domestic work, and schooling, I model these time allocation decisions in a simultaneous equations framework. In order to deal with the presence of 'zero observations', a common problem of time use data, I use a Tobit model which is specified as follows:

$$Y_i^* = \alpha_i + X_i \beta_i + \varepsilon_i, \tag{1}$$

where $Y^* = [S\,DL]'$ are the number of hours spent in school, domestic chores, and market work, X_{ji} is a vector of sociodemographic characteristics, and ε_i is the error term.

3.2 *Educational attainment*

In order to estimate which factors most affect the likelihood that children will remain in school, I use survival methods which, unlike ordinary regression models, correctly incorporate information from both censored and uncensored observations in estimating the model parameters. In particular, the Cox proportional hazards regression model allows to handle the censoring of observations coming from individuals with zero schooling and from the right censoring of the individuals that are still enrolled in school. The hazard function is specified as follows:

$$\lambda_i(t) = \lambda_0(t) + \exp\left(\sum_{i=1}^{p} x_i\,\beta_i\right), \tag{2}$$

where, t is the duration of schooling in years/the time in years until a person drop out of school (survival time), x_i, $i = 1, ..., p$ are the explanatory/predictor variables, and $\lambda_0(t)$ is the baseline hazard. The hazard $\lambda_i(t)$ of an individual i, is the probability of dropping out of school conditional on having stayed in school for time t.

One of the main advantages of the the Cox model is that the effects of the covariates on survival can be obatined without having to estimate $\lambda_0(t)$, and therefore, the form of the baseline hazard does not need to be specified.

A test of proportional hazards, a required assumption of the Cox regression model, was conducted for each covariate and globally using the Grambsch and Therneau (1994) test based on the Schoenfeld residuals. In addition, a graphical assessment of proportional hazards was also made using log-log survival curves. The test is reported in Tables A.1-A.4 on the Appendix for different population groups. The first column reports the simple correlation between the risk-weighted Schoenfeld residuals against the time variable (grade attainment). The log-log survival curves are available from the author upon request. All estimations were carried out using the Efron method to handle tied failures.

4 Dataset

The data used in this study comes from the Guatemalan National Living Standards Survey ECOVI (Encuesta Nacional de Condiciones de Vida) for 2000 and 2011, conducted by Guatemala National Statistics Institute INE (Instituto Nacional de Estadistica Guatemala). The ECOVI is a cross-sectional survey representative of the Guatemalan population.

The survey collected detailed information on household demographics, health, education, occupations and labour force participation, housing and asset ownership, household food and non-food expenditures, and income. It also collected information on whether the individual has participated in paid market activities for a private and/or family business, in unpaid productive activities in a farm or family business, and in household chores such as childcare, house cleaning, food preparation, collection of firewood/water, etc. This module has been carried out within the framework of the Statistical Information and Monitoring Programme (SIMPOC) of the ILOs International Programme on the Elimination of Child Labour (IPEC). Other than register the participation decision, the module gives information on time use, so the number of hours/minutes allocated to each of the above activities can be recovered.

The surveys recorded information from 38,000 individuals and 7,276 households in the year 2000, and 68,500 individuals and 13,482 households in the year 2011, at the national, regional, and rural-urban levels. The unit of the analysis is children aged 7 to 16 years. This translates in two samples of 10,868 children for the year 2000 and 19,591 for the year 2011. The samples are composed of 5,534 and 9,977 boys and 5,333 and 9,614 girls, respectively. Around 40 per cent of children in each sample are from indigenous origins.

4.1 *Main variables*

In this study, the variable of interest is child labour. It acts as a dependent variable when studying the allocation of time to different activities and as an explanatory variable when examining school attainment. The definition of child labour is of particular interest since the most prevalent types of labour among children are unpaid household-related activities and work at a family farm/business. Even though, these types of work have been often neglected in empirical studies, they consume substantial amounts of time, and therefore, influence a child's access to education. Following the standard practice, market work is defined as time spent for paid or unpaid household production for the market, and domestic work as those unremunerated activities usually concerning household chores such as cleaning, childcare, etc.

The vector of explanatory variables for the seemingly unrelated Tobit model includes children's characteristics, such as ethnic origin, gender, and whether the child is first born or last born. At household level I control for: educational attainment of the household head, since not all the children live with their parents and not all household heads live in couple, presence at home of the child's father/mother, civil status of the household head, whether the household head works on the agricultural sector, number of children younger than six years, number of children (other than self) between 6-9, 10-14, 15-17 years. Number of female/male adults in the household. I also include dummy variables

for whether the household has access to pipe water, electricity, and drainage system as proxies for household wealth. Finally, a full set of region dummies and one for urban areas is also added to the specification. Table 4 summarizes these variables over time.

Table 4: Descriptive statistics

	2000				2011			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Child's characteristics:								
Age	11.20	2.85	7	16	11.43	2.81	7	16
Ethnic origin (indigenous=1)	0.42	0.49	0	1	0.40	0.49	0	1
Gender (male=1)	0.52	0.50	0	1	0.51	0.50	0	1
Oldest child in hh (yes=1)	0.45	0.50	0	1	0.46	0.50	0	1
Youngest child in hh (yes=1)	0.30	0.46	0	1	0.30	0.46	0	1
Family structure:								
Mother at home (yes=1)	0.92	0.27	0	1	0.92	0.28	0	1
Father at home (yes=1)	0.77	0.42	0	1	0.74	0.44	0	1
No. children aged 0-5	1.16	1.16	0	8	0.82	0.95	0	7
No. children aged 6-9	0.79	0.79	0	5	0.68	0.75	0	5
No. children aged 10-14	0.96	0.83	0	5	1.00	0.88	0	7
No. children aged 15-17	0.50	0.68	0	4	0.53	0.69	0	5
No. female adults	1.43	0.74	0	6	1.48	0.83	0	8
No. male adults	1.27	0.81	0	7	1.30	0.87	0	7
Household head characteristics:								
Married/couple (yes=1)	0.87	0.34	0	1	0.59	0.49	0	1
Primary education completed (yes=1)	0.14	0.35	0	1	0.13	0.33	0	1
in agriculture (yes=1)	0.47	0.50	0	1	0.56	0.50	0	1
Dwelling characteristics:								
Pipe water (yes=1)	0.57	0.49	0	1	0.64	0.48	0	1
Electricity (yes=1)	0.62	0.49	0	1	0.73	0.45	0	1
Drainage system (yes=1)	0.30	0.46	0	1	0.28	0.45	0	1
Urban (yes=1)	0.39	0.49	0	1	0.34	0.47	0	1
Observations	9,663				17,250			

Source: Author's calculations based on ECOVI surveys.

The logic for using these variables is as follows: indigenous and female children are usually disadvantaged in terms of educational outcomes. Birth order may reflect parent's coping strategies in presence of income/credit constraints. Emerson and Souza (2008) found that in Brazil older children are sent to work in the labour market, because they can command higher wages, while younger children are sent to school. The educational level of the household head serves as a proxy for household income. The lower the educational attainment, the more difficult is for the adults to obtain high enough wages to keep children out of the labour force. Employment of the household head in the agricultural sector acts

as a proxy for the household possession of land, which can increase unpaid child labour if parents see family farm work as a beneficial activity for children. It also captures the role of networks on finding a job. Sectors characterized by seasonal activities, like agriculture, usually increase their demand for labour at certain periods of the year. Having an adult family member already working in one of these sectors may facilitate the hiring of a second one during high demand periods. Family structure captures substitution effects among family members. While the presence of infants may increase the demand for childcare and therefore increase the workload of domestic activities, having more teenage children can reduce the workload by sharing these activities. However, having more children implies higher school costs which can translate in a higher probability of wage child labour. The set of region-area dummy variables captures regional differences such as school availability, schooling costs, local labour market conditions, differences in economic activities, etc.

The vector of explanatory variables for the Cox Proportional Hazard model includes: educational attainment of the household head, labour status of the child, child's gender, household per capita income, dummy variables for urban areas and household head employment in the agricultural sector. The logic behind these variables is similar as above.

Table 5 reports children's participation and time allocation to different activities by age group and gender for 2000 and 2011. School participation decreases with age in both years, while market participation increases with age. Time allocated to work (market and domestic) also increases with age, while the time allocated to school related activities seems to remain constant. These results highligth important time use and substitution patterns. Younger children are less likely to work and more likely to be at school and older children are more likely to work and less likely to be at school. While the distribution may reflect opportunity cost for older children, it can also reflect parents concerns regarding children's safety. Children's participation in domestic chores is not usually perceived as dangerous. Indeed, many parents see it as part of their upbringing. However, the same does not seem to apply to market work, in particular paid work outside the family farm or business.

Looking at the statistics in Tables 1 and 5, it is obvious that older children participate more in work activities and that at the same time they present the highest drop-out rates in the sample. To what extent the child's participation in work activities affects the probability of dropping out of school, is analysed in Section 5.

Table 5: Time allocation and children's participation to different activities

	7-9 years old		10-14 years old		15-17 years old		Boys		Girls		All	
	Participation	Time	Participation	Time	Participation	Time	Participation	Time	Participation	Time	Participation	Time
Panel A: 2000												
School	0.75	5.12	0.75	5.14	0.43	5.41	0.70	5.17	0.66	5.18	0.68	5.17
Market work	0.19	2.55	0.36	4.32	0.53	6.28	0.40	5.65	0.30	3.37	0.35	4.71
Domestic chores	0.61	2.54	0.72	3.31	0.68	3.93	0.54	2.06	0.82	4.08	0.68	3.24
Total work	0.66	3.09	0.83	4.77	0.89	6.72	0.73	4.58	0.85	5.10	0.79	4.85
Panel B: 2011												
School	0.94	5.89	0.86	6.01	0.53	6.37	0.81	6.05	0.79	6.02	0.80	6.03
Market work	0.06	3.06	0.16	4.73	0.36	6.59	0.24	5.91	0.12	4.67	0.18	5.50
Domestic chores	0.41	2.00	0.58	2.92	0.61	3.95	0.39	2.03	0.70	3.60	0.54	3.02
Total work	0.44	2.28	0.65	3.78	0.81	5.93	0.54	4.08	0.73	4.26	0.63	4.18

Source: Author's calculations based on ECOVI surveys.

Time allocation conditional on participation in activity i.

5 Results

5.1 *Tobit regression*

Table 6 reports the results from the simultaneous equations Tobit model. The results are presented for 2000 and 2011, but the analysis is made only for the later one. Complete estimations are found in the Appendix . Columns 2 and 3 reveal the traditional gender specialization on market and domestic activities. In average, boys allocate 3.38 hours per day more than girls to market activities and 2.81 hours per day less than girls to domestic chores. Surprisingly, the gender variable has no-effect on the hours allocated to school activities. This is a positive improvement in Guatemala were vulnerable groups (girls and indigenous children) have been very disadvantaged in human capital outcomes. Since the year 2000, the Government has implemented a series of social programs designed to narrow the gap, targeting in particular the indigenous population.

Turning to household variables, as expected, the time allocated to market and domestic work falls and the time allocated to school rises with household wealth (proxied by the existence of basic services such as electricity, water, and drainage system). This effect is larger for gender specific activities: domestic work for girls and market work for boys. The positive school effect is larger for boys than for girls and for non-indigenous than indigenous children. Given the lower returns to education of women and indigenous population in the adult labour market (mostly due to ethnic and gender disparities), income constraints seem to affect more these groups of children. Regarding the area of residence, there is a strong positive effect on education time for those children living in urban areas, consistent with the idea that cities offer better access to schools and more opportunities to take advantage of good education.

The dummy variable for household head education (more than primary education) reduces the time allocated to market and domestic work, and increases the one allocated to school activities. Living in a household where the household head has completed at least primary education, decreases the average daily market work by 1.5 hours. The reduction in hours is higher for boys (1.58) and indigenous children (2.29). These results are expected, since market work (paid work and unpaid family farm work) is more frequent among boys and indigenous children in general. The type of work of the household head also affects the allocation of time of Guatemalan children. Boys living in families where the household head works in the agricultural sector spend in average 2.33 hours per day more in market work than the rest of the children of the sample.

Household composition also affects the allocation of time to work and school activities. The number of female adults in the household decreases the amount of time allocated to market and domestic work, with a larger effect for gender specific activities. It also

increases the time allocated to school related activities for all children in the sample. A rising number of small children (0-5 years old) all children in the sample allocate more time to domestic work, suggesting that children substitute adults in childcare provision. The rest of controls for number of children yield results consistent with the idea that a larger family means more time allocated to market work and less time allocated to school related activities for all children in the sample.

Table 6: Simultaneous tobit equations

	All			Boys			Girls		
	Market work	Domestic chores	Schooling	Market work	Domestic chores	Schooling	Market work	Domestic chores	Schooling
Panel A: 2000									
Male	2.14	-2.96	0.15	-	-	-	-	-	-
	(0.16)	(0.08)	(0.18)	-	-	-	-	-	-
First born	2.45	0.23	-1.33	3.35	-0.13	-1.63	1.35	0.68	-0.96
	(0.19)	(0.10)	(0.21)	(0.27)	(0.12)	(0.31)	(0.27)	(0.15)	(0.34)
Last born	-2.15	-1.02	-0.26	-2.23	-0.24	-0.73	-1.96	-1.74	0.42
	(0.20)	(0.10)	(0.22)	(0.29)	(0.12)	(0.31)	(0.28)	(0.15	(0.35)
Hh married	-1.82	-0.34	0.41	-1.88	-0.51	0.02	-1.57	-0.21	0.87
	(0.33)	(0.16)	(0.46)	(0.45)	(0.19)	(0.57)	(0.42)	(0.22)	(0.56)
Hh primary edu.	-0.94	-0.55	1.64	-1.07	-0.16	1.41	-0.63	-1.05	1.91
	(0.33)	(0.13)	(0.37)	(0.44)	(0.16)	(0.44)	(0.40)	(0.17)	(0.47)
Hh in agriculture	1.36	-0.03	-0.56	1.80	-0.23	-0.72	0.80	0.14	-0.33
	(0.22)	(0.11)	(0.31)	(0.29)	(0.13)	(0.36)	(0.30)	(0.15)	(0.41)
Urban	-1.28	-0.19	1.10	-1.76	0.04	0.62	-0.69	-0.48	1.64
	(0.28)	(0.13)	(0.36)	(0.37)	(0.15)	(0.42)	(0.35)	(0.18)	(0.46)
Panel B: 2011									
Male	3.38	-2.81	0.08	-	-	-	-	-	-
	(0.34)	(0.12)	(0.09)	-	-	-	-	-	-
First born	3.23	0.75	-1.41	3.81	0.21	-1.25	2.45	1.20	-1.58
	(0.30)	(0.09)	(0.13)	(0.35)	(0.12)	(0.20)	(0.43)	(0.12)	(0.17)
Last born	-2.81	-0.90	0.05	-2.74	-0.31	0.08	-2.75	-1.37	0.04
	(0.29)	(0.10)	(0.10)	(0.35)	(0.13)	(0.12)	(0.41)	(0.13)	(0.16)
Hh married	0.02	-0.21	-0.02	0.17	-0.19	-0.09	-0.12	-0.22	0.06
	(0.32)	(0.08)	(0.13)	(0.33)	(0.14)	(0.17)	(0.40)	(0.08)	(0.15)
Hh primary edu.	-1.46	-0.36	0.36	-1.58	-0.17	0.12	-1.22	-0.55	0.62
	(0.41)	(0.10)	(0.16)	(0.38)	(0.14)	(0.17)	(0.63)	(0.13)	(0.24)
Hh in agriculture	1.66	0.14	-0.70	2.33	-0.20	-0.65	0.59	0.45	-0.77
	(0.36)	(0.11)	(0.13)	(0.33)	(0.13)	(0.16)	(0.51)	(0.13)	(0.16)
Urban	-0.40	-0.05	0.61	-0.83	0.06	0.53	0.23	-0.14	0.69
	(0.28)	(0.10)	(0.17)	(0.29)	(0.14)	(0.21)	(0.45)	(0.08)	(0.17)

Source: author's calculations

Standard errors in parentheses

Finally, birth order has also a significant effect on the hours allocated to work and school activities. In general, children who were born first allocate in average 3 hours more to market activities and 1.5 hours less to school activities than the rest of the children[1]. The effect on domestic work is also positive for all children; however, it is stronger for girls that allocate in average 1.2 more hours to domestic activities than boys.

5.2 *Cox model*

Tables 7 and 8 report the results of the Stratified Cox Proportional Hazard model[2] that examines the effects of child labour on the hazard of dropping out of school conditional on having survived in school for time t. Child labour is defined as a dummy variable that equals 1 if child i has participated in market work (paid or unpaid) or domestic activities, independent on the amount of time that has actually being allocated to these activities. Results using a second definition of child labour (at least two hours of work per day) are presented in Section 6. Results are presented for male and female subsamples separately for both years 2000 and 2011; the analysis, however, concerns only the 2011 sample. All estimations have been carried out by clustering observations at household level in order to allow correlations of residuals among children in the same household. Stratifcation has been done at cohort level.[3]

Separate results for girls and boys show that girls who work are twice more likely to drop out of school than girls who do not work. Also, girls who live in a house where the household head works in the agricultural sector are 63 per cent more likely to drop out of school. Living in urban areas reduces the hazard of dropping out of school; however, this effect changes with time. In fact, for girls attending 3rd-6th grade of primary school, living in urban areas lowers the hazard of leaving school by 42 per cent, while for girls attending 7th to 11th grade (secondary school) living in urban areas reduces the hazard by 27 per cent only. The effect is not significant at lower grades. This suggests that the comparative advantages of big cities, i.e larger availability of schools, reduction of transportation cost and commuting time from home to school, etc., are less important after certain age, basically when the opportunity cost of sending children to school increases. Legal age for work is 14 years, so many of them can obtain higher salaries while working full time.

[1] Note that when controlling for the age of the child, the results remain quite similar. The older the child, the more hours they allocate to work (less hours to school activities).

[2] See Section 6 for different model specifications.

[3] I have used four strata according to the year of birth.

Table 7: Proportional hazard model, stratified by birth cohort (girls)

	2000			2011		
Dependent variable	Haz. Ratio	Std. Err.	z-stat.	Haz. Ratio	Std. Err.	z-stat.
Work	1.87	0.34	3.47	2.28	0.24	7.82
Hh schooling				0.36	0.05	-7.27
Hh schooling; 1st-6th grade	0.22	0.06	-6.03			
Hh schooling; 7th-11th grade	0.70	0.24	-1.03			
Hh in agriculture	1.22	0.11	2.15	1.63	0.11	7.11
Urban	0.38	0.04	-9.72			
Urban; 1st-3rd grade				0.87	0.11	-1.07
Urban; 3rd-6th grade				0.58	0.06	-5.66
Urban; 7th-11th grade				0.73	0.10	-2.25
Family income per capita:						
2nd income quintile	1.05	0.12	0.40	0.95	0.08	-0.56
3rd income quintile	0.82	0.10	-1.64	1.01	0.09	0.09
4th income quintile	0.66	0.09	-3.17	0.83	0.07	-2.10
5th income quintile	0.63	0.09	-3.27	0.65	0.07	-4.14

Source: author's calculations

Table 8: Proportional hazard model, stratified by birth cohort (boys)

	2000			2011		
Dependent variable	Haz. Ratio	Std. Err.	z-stat.	Haz. Ratio	Std. Err.	z-stat.
Work				2.31	0.16	11.85
Work; 1th-3th grade	1.67	0.26	3.29			
Work; 3th-6th grade	1.85	0.29	3.90			
Work; 7th-11th grade	2.90	1.10	2.79			
Hh schooling	0.30	0.06	-6.08	0.42	0.06	-6.38
Hh in agriculture	1.46	0.13	4.21	1.55	0.11	6.26
Urban	0.47	0.04	-7.91	0.72	0.05	-4.48
Family income per capita:						
2nd income quintile	1.12	0.14	0.91	0.90	0.09	-1.15
3rd income quintile	1.00	0.12	0.02	1.13	0.10	1.33
4th income quintile	1.02	0.13	0.13	1.07	0.10	0.70
5th income quintile	0.94	0.13	-0.48	0.75	0.08	-2.82

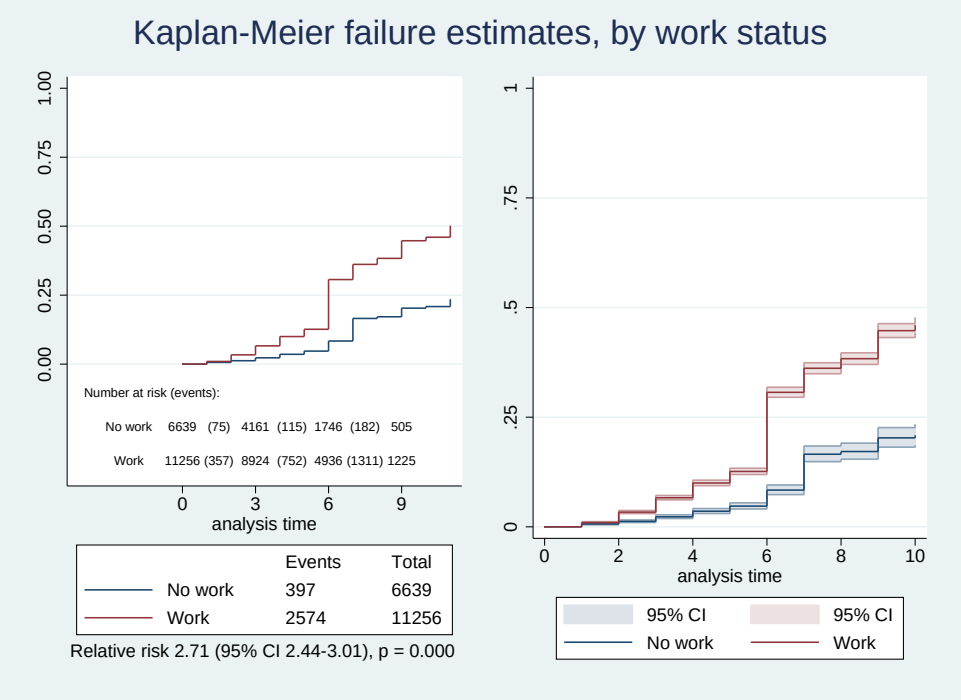
Source: author's calculations

Household income also plays a role in reducing the hazard of dropping out of school. The estimated hazard ratio shows that girls living in households that are on the 4th and 5th quintile of the income distribution are 17 per cent and 35 per cent less likely to drop out of school compared to those on the 1st quintile. For boys, the effect is only significant for the 5th quintile. In this part of the income distribution boys are 25 per cent less likely to drop out school. Income inequality in Guatemala is pretty high. The mean income per capita is 1,435 quetzales per month, while the median income per capita corresponds to 948 quetzales per month. The upper bounds for each quintile are: 454, 756, 1184, 2013, and 12697 quetzales per month.

In 2011, girls living in households where the household head has completed at least primary education are 64 per cent less likely to drop out school. This is an important variable given the low level of education in Guatemala, where just 14 per cent of the children in the sample live in this kind of households. It is also worth noting that this effect is time varying for the 2000 sample. In fact, the effect of the household head education is significant only for girls attending 1st to 6th grade (73 per cent less likely to drop out of school). Household head education has also a positive effect for boys. In fact, boys living with a household head who have completed primary education are 58 per cent less likely to drop out of school. The other variables present similar patterns than those of girls. Living in a house where the household head works in the agricultural sector increases the likelihood by 55 per cent. Contrary to girls, living in urban areas has a proportional effect over the entire baseline hazard for boys. In fact, it reduces the hazard by 28 per cent at any grade level.

The variable of interest, i.e. child labour, shows the biggets effect on the likelihood of dropping out of school. In fact, in both groups, girls and boys who work are twice (2.28 and 2.31 respectively) more likely to drop out of school than those who do not work. In order to have a clearer picture of this, Figure 1 pictures the Kaplan-Meier (KM) estimates of the failure function by work status. From the figure, it becomes evident that working children have a lower probability to finish school. The effect is stronger at traditional exit points of children from the school system: 3rd, 6th, and 9th grades. The larger declines are at the 6th and 9th grades, with the former one being the most significant. Without a doubt, the major challenge is the transition from primary to secondary school. It is worth noting that the KM function only studies the effect of one factor at a time, in this case child labour. For a multivariate analysis, one shall refer to the estimation of the Cox Proportional Hazards model.

Figure 1: Whole sample, 2011



Source: Authors's calculation from ECOVI 2011

6 Robustness checks

The underlying assumption of the Cox Proportional Hazard model is that of a constant relationship between the dependent and the explanatory variables. Basically, the hazard functions for any two individuals at any point in time are proportional. This assumption is known as proportional hazards (PH). If the proportionality assumption does not hold, the coefficients obtained assuming PH are over/underestimating and the power of the corresponding tests is reduced.

The first tests for the variables used in the above specification revealed non-proportionality. I dealt with this problem by using a stratified estimation together with sample segmentation for both boys and girls separetaly. In particular, in the specification used above I have used four strata by year of birth (cohorts) and I have also segmented the sample at common exit points of children from the school system (3rd, 6th, 9th grades)[4]. When a Cox model is stratified on a covariate then different baseline rates are used for each level of

[4]This procedure has been used in the paper by Cox-Edwards and Ureta (2003) that estimates the effects of remittances on schooling.

the covariate but the estimated coefficients are constrained to be the same across all strata. In the case of segmentation, the covariate is allowed to assume different values over time within a subject.

A second approach to deal with non-proportionality is by using interaction terms of the time variying covariates with time. In this section, I present the results obtained using time by covariate interactions whenever needed. This approach is particularly simple to implement within the Cox model; however, its main limitation is that results are strongly dependent on the choice of the functional form of the time function, ln(t) in our case.

Table 9: Proportional hazard model (robustness checks)

	2000			2011		
	Haz. Ratio	Std. Err.	z	Haz. Ratio	Std. Err.	z
Boys						
Time interactions						
Work	1.93	0.22	5.93	2.50	0.18	12.84
With region dummy variables						
Work	1.91	0.21	5.81	2.55	0.18	13.27
Other definitions of labour						
Work at least 2h per day	2.98	0.26	12.31	3.82	0.25	20.84
Market work	2.76	0.24	11.89	3.89	0.24	21.91
Two dummy variables for labour						
Market work	2.71	0.23	11.65	3.86	0.24	21.72
Domestic work	0.83	0.06	-2.50	0.91	0.05	-1.59
Girls						
Time interactions						
Work	2.18	0.40	4.29	2.61	0.27	9.21
With region dummy variables						
Work	2.23	0.41	4.39	2.65	0.27	9.49
Other definitions of labour						
Work at least 2h per day	2.75	0.31	9.12	3.74	0.28	17.90
Market work	1.66	0.13	6.61	2.27	0.14	13.57
Two dummy variables for labour						
Market work	1.66	0.13	6.58	2.30	0.14	13.70
Domestic work	0.98	0.11	-0.19	1.62	0.12	6.41

Source: author's calculations

The first row of each panel in Table 9 presents the results using interaction of time with the variables for which the hypothesis of non-proportionality could not been rejected. The second row uses the same specification but also adds a set of region dummy variables. The third and the fourth rows use different definition of child labour, i.e. children that

have recorded at least two hours of paid or unpaid work per day, and children that have participated only in market productive activities. The last two rows come from the same regression. In this case child labour has been decomposed in two components: market productive activities (dummy variable) and housework chores (dummy variable).

The estimates on the child labour variable are statistically significant for every subsample. These results are robust to different specifications, i.e stratified estimation, time interactions, and different measures of child labour. In sum, the estimates in Table 9 show an adverse effect of child labour on schooling in Guatemala. These results are in line with prior evidence in the literature Maitra and Ray (2002), Rosati and Rossi (2003), Emerson and Souza (2011), and Gunnarsson et al. (2006) among others. It is worth noting that domestic work increases the likelihood of dropping out of school for girls only. The rest of the coefficients follow the same pattern than those in the above specification.

7 Conclusion

Education is a crucial component of any effective action to eliminate poverty and inequality in the world. While by 2015 access to primary education is practically universal, much more effort is needed to reduce and eventually stop the high drop-out rates of children from the school system once that primary education is attained. In Guatemala, as in most developing countries, the majority of children leave school after the completion of 6th grade and 9th grade; basically when the opportunity cost of sending children to school increases. Between 2000 and 2011, net enrollment rates of primary education attained the regional level; however, those of secondary education remained significantly below the mean.

This paper studies the effects of child labour on the educational attainment of Guatemalan children and the allocation of time to market work, domestic chores, and school related activities from 2000 to 2011. The results highlight the importance of including domestic chores in the definition of child labour, they also reveal the traditional gender specialization on market and domestic activities from early ages, but perhaps the most striking result is that child labour significantly reduces the likelihood of finishing school. Indeed, working children are two to four times more likely to drop out of school or to have never enrolled than the rest of the children in the sample. Child labour is a complex problem with many causes and consequences that, in spite of a significant international effort to eliminate it, is still a pervasive phenomenon in most developing countries. It is without a doubt a growing obstacle to formal education and one of the main channels through which social inequalities perpetuate.

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Appendix

Table A.1: Test of proportional-hazards assumption
girls sample, 2000

	rho	chi2	df	Prob>chi2
2nd income quintile	-0.034	1.21	1	0.270
3rd income quintile	-0.029	0.85	1	0.357
4th income quintile	0.007	0.05	1	0.824
5th income quintile	0.004	0.02	1	0.901
Hh in agriculture	-0.056	3.34	1	0.068
Urban	-0.021	0.47	1	0.492
Work	0.044	1.7	1	0.193
Hh schooling; 1st-6th grade	-0.010	0.11	1	0.740
Hh schooling; 7th-11th grade	-0.001	0.00	1	0.988
Global test		12.37	10	0.2613

Source: author's calculations

Table A.2: Test of proportional-hazards assumption
girls sample, 2011

	rho	chi2	df	Prob>chi2
2nd income quintile	-0.022	0.86	1	0.354
3rd income quintile	-0.035	2.27	1	0.132
4th income quintile	-0.014	0.38	1	0.538
5th income quintile	0.027	1.38	1	0.241
Hh in agriculture	0.014	0.43	1	0.512
Hh schooling	0.014	0.34	1	0.558
Work	0.017	0.44	1	0.508
Urban; 1st-3rd grade	0.001	0	1	0.955
Urban; 3rd-6th grade	-0.009	0.14	1	0.706
Urban; 7th-11th grade	-0.016	0.47	1	0.494
Global test		9.14	10	0.519

Source: author's calculations

Table A.3: Test of proportional-hazards assumption
boys sample, 2000

	rho	chi2	df	Prob>chi2
2nd income quintile	0.001	0	1	0.984
3rd income quintile	0.015	0.28	1	0.595
4th income quintile	0.007	0.06	1	0.805
5th income quintile	0.043	2.24	1	0.135
Hh in agriculture	-0.041	2.23	1	0.135
Hh schooling	0.023	0.7	1	0.404
Urban	0.028	0.96	1	0.327
Work; 1st-3rd grade	0.018	0.35	1	0.555
Work; 3rd-6th grade	0.019	0.38	1	0.540
Work; 7th-11th grade	0.002	0	1	0.949
Global test		14.44	13	0.343

Source: author's calculations

Table A.4: Test of proportional-hazards assumption
boys sample, 2011

	rho	chi2	df	Prob>chi2
Work	0.042	2.84	1	0.092
2nd income quintile	0.022	0.85	1	0.357
3rd income quintile	-0.012	0.28	1	0.600
4th income quintile	0.011	0.25	1	0.617
5th income quintile	0.037	2.48	1	0.115
Hh schooling	0.021	0.77	1	0.382
Urban	0.007	0.09	1	0.764
Hh in agriculture	-0.007	0.1	1	0.757
Global test		10.92	8	0.206

Source: author's calculations

Table A.5: Simultaneous tobit equations, 2011

	All			Boys			Girls			Indigenous			Non-indigenous		
	Coef.	SE	P>z	Coef.	SE	P>z	Coef.	SE	P>z	Coef.	SE	P>z	Coef.	SE	P>z
Hours in market work															
Gender (male=1)	3.38	0.34	0.00	-	-	-	-	-	-	2.98	0.40	0.00	3.87	0.38	0.00
Indigenous	0.95	0.48	0.05	0.90	0.38	0.02	1.08	0.71	0.13						
Mother at home	0.84	0.31	0.01	1.27	0.48	0.01	0.13	0.73	0.86	0.15	0.60	0.80	1.41	0.41	0.00
Father at home	-0.26	0.36	0.46	-0.50	0.36	0.17	-0.08	0.53	0.87	-0.05	0.39	0.89	-0.57	0.44	0.20
First born	3.23	0.30	0.00	3.81	0.35	0.00	2.45	0.43	0.00	2.77	0.37	0.00	3.93	0.39	0.00
Last born	-2.81	0.29	0.00	-2.74	0.35	0.00	-2.75	0.41	0.00	-3.12	0.32	0.00	-2.40	0.43	0.00
No. children aged 0-5	-0.17	0.12	0.15	-0.19	0.13	0.15	-0.14	0.13	0.28	-0.32	0.13	0.02	0.11	0.15	0.47
No. children aged 6-9	0.26	0.15	0.08	0.20	0.14	0.14	0.39	0.22	0.08	0.37	0.21	0.08	0.09	0.25	0.72
No. children aged 10-14	1.11	0.10	0.00	1.25	0.12	0.00	0.88	0.14	0.00	1.07	0.14	0.00	1.20	0.14	0.00
No. children aged 15-17	0.98	0.21	0.00	1.21	0.25	0.00	0.63	0.25	0.01	0.73	0.27	0.01	1.33	0.27	0.00
No. female adults	-0.07	0.15	0.62	-0.32	0.18	0.07	0.26	0.19	0.17	0.12	0.27	0.65	-0.33	0.12	0.01
No. male adults	0.11	0.15	0.45	0.24	0.19	0.20	-0.05	0.17	0.75	0.04	0.26	0.89	0.24	0.17	0.16
Hh married	0.02	0.32	0.95	0.17	0.33	0.62	-0.12	0.40	0.76	-0.06	0.27	0.82	0.03	0.48	0.95
Hh primary completed	-1.46	0.41	0.00	-1.58	0.38	0.00	-1.22	0.63	0.05	-2.29	0.71	0.00	-1.20	0.54	0.03
Hh in agriculture	1.66	0.36	0.00	2.33	0.33	0.00	0.59	0.51	0.25	1.32	0.46	0.00	2.07	0.41	0.00
Pipe water	-0.57	0.28	0.04	-0.76	0.28	0.01	-0.27	0.43	0.54	-0.18	0.27	0.50	-0.96	0.42	0.02
Electricity	-0.09	0.38	0.81	-0.01	0.35	0.97	-0.14	0.52	0.79	-0.69	0.46	0.13	0.52	0.55	0.35
Drainage system	-0.80	0.34	0.02	-0.98	0.47	0.04	-0.60	0.48	0.21	-1.16	0.28	0.00	-0.39	0.61	0.52
Urban	-0.40	0.28	0.16	-0.83	0.29	0.00	0.23	0.45	0.60	-0.20	0.35	0.58	-0.91	0.46	0.05
Hours in household chores															
Gender (male=1)	-2.81	0.12	0.00	-	-	-	-	-	-	-3.04	0.14	0.00	-2.65	0.14	0.00
Indigenous	0.57	0.17	0.00	0.56	0.20	0.00	0.53	0.18	0.00	-	-	-	-	-	-
Mother at home	-0.33	0.13	0.01	-0.02	0.19	0.91	-0.54	0.14	0.00	-0.75	0.16	0.00	-0.13	0.17	0.42
Father at home	-0.08	0.06	0.18	0.11	0.14	0.44	-0.20	0.08	0.01	-0.15	0.11	0.15	-0.06	0.09	0.50
First born	0.75	0.09	0.00	0.21	0.12	0.08	1.20	0.12	0.00	0.77	0.15	0.00	0.76	0.10	0.00
Last born	-0.90	0.10	0.00	-0.31	0.13	0.02	-1.37	0.13	0.00	-1.06	0.14	0.00	-0.79	0.11	0.00
No. children aged 0-5	0.19	0.04	0.00	0.18	0.04	0.00	0.20	0.06	0.00	0.21	0.05	0.00	0.18	0.05	0.00
No. children aged 6-9	-0.02	0.05	0.76	-0.03	0.07	0.70	-0.01	0.09	0.93	-0.05	0.06	0.38	0.02	0.07	0.78
No. children aged 10-14	0.08	0.04	0.05	-0.10	0.05	0.06	0.23	0.05	0.00	-0.07	0.06	0.26	0.19	0.05	0.00
No. children aged 15-17	0.13	0.05	0.01	-0.06	0.07	0.46	0.29	0.06	0.00	0.01	0.08	0.93	0.21	0.04	0.00
No. female adults	-0.29	0.05	0.00	-0.12	0.05	0.03	-0.41	0.06	0.00	-0.35	0.07	0.00	-0.22	0.06	0.00
No. male adults	0.03	0.05	0.53	-0.17	0.06	0.00	0.16	0.06	0.01	0.04	0.10	0.69	0.04	0.04	0.29
Hh married	-0.21	0.08	0.01	-0.19	0.14	0.18	-0.22	0.08	0.00	-0.07	0.13	0.56	-0.29	0.09	0.00
Hh primary completed	-0.36	0.10	0.00	-0.17	0.14	0.22	-0.55	0.13	0.00	-0.20	0.24	0.42	-0.40	0.12	0.00
Hh in agriculture	0.14	0.11	0.22	-0.20	0.13	0.11	0.45	0.13	0.00	0.31	0.17	0.07	0.04	0.13	0.73
Pipe water	-0.33	0.09	0.00	-0.36	0.11	0.00	-0.28	0.09	0.00	-0.10	0.12	0.40	-0.52	0.11	0.00
Electricity	-0.46	0.12	0.00	-0.50	0.13	0.00	-0.39	0.15	0.01	-0.50	0.16	0.00	-0.42	0.14	0.00
Drainage system	-0.07	0.17	0.70	0.04	0.25	0.87	-0.14	0.14	0.31	-0.46	0.21	0.03	0.24	0.21	0.24
Urban	-0.05	0.10	0.63	0.06	0.14	0.64	-0.14	0.08	0.07	0.10	0.14	0.46	-0.21	0.15	0.16
Hours at school related activities															
Gender (male=1)	0.08	0.09	0.38	-	-	-	-	-	-	0.22	0.09	0.02	-0.02	0.12	0.90
Indigenous	-0.01	0.29	0.98	0.07	0.32	0.83	-0.08	0.29	0.79	-	-	-	-	-	-
Mother at home	0.23	0.15	0.14	-0.08	0.21	0.69	0.58	0.25	0.02	0.44	0.39	0.26	0.12	0.17	0.48
Father at home	0.37	0.09	0.00	0.28	0.11	0.01	0.41	0.16	0.01	0.54	0.21	0.01	0.28	0.13	0.03
First born	-1.41	0.13	0.00	-1.25	0.20	0.00	-1.58	0.17	0.00	-1.55	0.18	0.00	-1.29	0.17	0.00
Last born	0.05	0.10	0.61	0.08	0.12	0.54	0.04	0.16	0.80	0.08	0.15	0.61	0.03	0.11	0.79
No. children aged 0-5	-0.21	0.05	0.00	-0.13	0.07	0.05	-0.28	0.06	0.00	-0.25	0.07	0.00	-0.16	0.09	0.07
No. children aged 6-9	-0.08	0.07	0.25	0.01	0.08	0.88	-0.16	0.10	0.10	-0.13	0.10	0.21	-0.05	0.07	0.44
No. children aged 10-14	-0.46	0.06	0.00	-0.51	0.08	0.00	-0.43	0.08	0.00	-0.43	0.09	0.00	-0.48	0.08	0.00
No. children aged 15-17	-0.32	0.10	0.00	-0.25	0.11	0.03	-0.39	0.13	0.00	-0.36	0.13	0.01	-0.27	0.17	0.12
No. female adults	0.25	0.06	0.00	0.23	0.09	0.01	0.26	0.06	0.00	0.27	0.08	0.00	0.23	0.09	0.01
No. male adults	-0.14	0.08	0.08	-0.07	0.09	0.44	-0.21	0.11	0.06	-0.22	0.09	0.01	-0.10	0.11	0.37
Hh married	-0.02	0.13	0.88	-0.09	0.17	0.60	0.06	0.15	0.69	-0.05	0.25	0.82	-0.08	0.17	0.65
Hh primary completed	0.36	0.16	0.02	0.12	0.17	0.49	0.62	0.24	0.01	0.46	0.35	0.20	0.41	0.15	0.01
Hh in agriculture	-0.70	0.13	0.00	-0.65	0.16	0.00	-0.77	0.16	0.00	-0.63	0.15	0.00	-0.77	0.16	0.00
Pipe water	0.25	0.12	0.05	0.23	0.14	0.11	0.28	0.15	0.07	0.08	0.23	0.72	0.41	0.18	0.02
Electricity	0.47	0.12	0.00	0.57	0.17	0.00	0.37	0.13	0.00	0.57	0.23	0.01	0.38	0.20	0.06
Drainage system	0.42	0.19	0.03	0.47	0.27	0.08	0.39	0.17	0.03	0.56	0.33	0.09	0.27	0.28	0.32
Urban	0.61	0.17	0.00	0.53	0.21	0.01	0.69	0.17	0.00	0.76	0.28	0.01	0.51	0.19	0.01

Source: author's calculations

Table A.6: Simultaneous tobit equations, 2000

	All			Boys			Girls			Indigenous			Non indigenous		
	Coef.	SE	P>z	Coef.	SE	P>z	Coef.	SE	P>z	Coef.	SE	P>z	Coef.	SE	P>z
Hours in market work															
Gender (male=1)	2.14	0.16	0.00	-	-	-	-	-	-	2.35	0.23	0.00	1.96	0.22	0.00
Indigenous	0.81	0.25	0.00	0.90	0.32	0.01	0.69	0.33	0.03	-	-	-	-	-	
Mother at home	-0.16	0.33	0.63	-0.93	0.46	0.04	0.63	0.43	0.15	0.04	0.48	0.94	-0.30	0.46	0.51
Father at home	0.50	0.30	0.09	0.96	0.39	0.01	-0.11	0.37	0.76	0.27	0.44	0.53	0.63	0.40	0.12
First born	2.45	0.19	0.00	3.35	0.27	0.00	1.35	0.27	0.00	2.23	0.25	0.00	2.69	0.27	0.00
Last born	-2.15	0.20	0.00	-2.23	0.29	0.00	-1.96	0.28	0.00	-2.03	0.28	0.00	-2.22	0.29	0.00
No. children aged 0-5	-0.29	0.09	0.00	-0.22	0.11	0.05	-0.34	0.11	0.00	-0.29	0.12	0.02	-0.30	0.12	0.01
No. children aged 6-9	0.20	0.12	0.11	0.28	0.16	0.10	0.09	0.16	0.58	0.11	0.18	0.55	0.27	0.17	0.11
No. children aged 10-14	0.85	0.10	0.00	1.01	0.13	0.00	0.65	0.13	0.00	0.62	0.15	0.00	1.01	0.14	0.00
No. children aged 15-17	0.92	0.15	0.00	1.20	0.20	0.00	0.53	0.18	0.00	0.76	0.21	0.00	1.09	0.21	0.00
No. female adults	0.00	0.14	0.98	0.22	0.18	0.22	-0.23	0.17	0.17	0.20	0.19	0.31	-0.17	0.20	0.40
No. male adults	0.26	0.13	0.05	0.25	0.18	0.16	0.31	0.16	0.06	0.32	0.19	0.09	0.17	0.18	0.34
Hh married	-1.82	0.33	0.00	-1.88	0.45	0.00	-1.57	0.42	0.00	-2.54	0.52	0.00	-1.44	0.44	0.00
Hh primary completed	-0.94	0.33	0.01	-1.07	0.44	0.02	-0.63	0.40	0.12	-0.27	0.65	0.68	-0.95	0.40	0.02
Hh in agriculture	1.36	0.22	0.00	1.80	0.29	0.00	0.80	0.30	0.01	1.07	0.32	0.00	1.72	0.31	0.00
Pipe water	0.02	0.20	0.93	0.01	0.27	0.98	0.01	0.26	0.98	0.08	0.30	0.79	-0.08	0.28	0.77
Electricity	0.04	0.22	0.87	0.21	0.29	0.46	-0.10	0.28	0.72	0.36	0.31	0.24	-0.18	0.30	0.56
Drainage system	-0.68	0.30	0.03	-1.08	0.39	0.01	-0.24	0.38	0.53	0.28	0.49	0.57	-1.18	0.40	0.00
Urban	-1.28	0.28	0.00	-1.76	0.37	0.00	-0.69	0.35	0.05	-1.78	0.40	0.00	-0.85	0.39	0.03
Hours in household chores															
Gender (male=1)	-2.96	0.08	0.00	-	-	-	-	-	-	-3.52	0.13	0.00	-2.56	0.10	0.00
Indigenous	0.27	0.12	0.03	-0.02	0.15	0.88	0.55	0.17	0.00	-	-	-	-	-	-
Mother at home	-0.38	0.17	0.03	-0.02	0.20	0.93	-0.61	0.24	0.01	-0.63	0.31	0.04	-0.24	0.19	0.20
Father at home	0.16	0.14	0.27	0.36	0.17	0.03	0.01	0.20	0.96	0.01	0.25	0.98	0.28	0.17	0.09
First born	0.23	0.10	0.02	-0.13	0.12	0.29	0.68	0.15	0.00	0.30	0.16	0.06	0.19	0.13	0.14
Last born	-1.02	0.10	0.00	-0.24	0.12	0.04	-1.74	0.15	0.00	-1.09	0.16	0.00	-0.95	0.12	0.00
No. children aged 0-5	0.33	0.04	0.00	0.23	0.05	0.00	0.41	0.05	0.00	0.34	0.06	0.00	0.31	0.05	0.00
No. children aged 6-9	0.00	0.06	0.99	0.00	0.07	0.96	0.01	0.09	0.91	-0.05	0.10	0.61	0.04	0.08	0.60
No. children aged 10-14	-0.07	0.05	0.15	-0.24	0.07	0.00	0.09	0.07	0.23	-0.23	0.09	0.01	0.00	0.06	0.96
No. children aged 15-17	0.02	0.08	0.82	-0.13	0.08	0.12	0.21	0.10	0.04	-0.04	0.12	0.73	0.05	0.09	0.61
No. female adults	-0.33	0.06	0.00	-0.21	0.08	0.01	-0.39	0.08	0.00	-0.25	0.11	0.02	-0.36	0.08	0.00
No. male adults	0.01	0.06	0.86	-0.13	0.07	0.06	0.15	0.08	0.08	0.00	0.10	0.99	0.02	0.07	0.74
Hh married	-0.34	0.16	0.03	-0.51	0.19	0.01	-0.21	0.22	0.35	0.02	0.29	0.94	-0.59	0.19	0.00
Hh primary completed	-0.55	0.13	0.00	-0.16	0.16	0.32	-1.05	0.17	0.00	-0.86	0.32	0.01	-0.49	0.14	0.00
Hh in agriculture	-0.03	0.11	0.79	-0.23	0.13	0.08	0.14	0.15	0.35	0.00	0.17	0.99	-0.13	0.14	0.34
Pipe water	-0.37	0.10	0.00	-0.43	0.12	0.00	-0.27	0.14	0.05	-0.29	0.16	0.07	-0.39	0.12	0.00
Electricity	0.02	0.11	0.83	0.00	0.13	1.00	0.02	0.15	0.87	0.29	0.17	0.09	-0.18	0.14	0.20
Drainage system	-0.15	0.13	0.25	-0.16	0.16	0.30	-0.07	0.18	0.70	0.04	0.24	0.87	-0.23	0.16	0.14
Urban	-0.19	0.13	0.14	0.04	0.15	0.80	-0.48	0.18	0.01	-0.24	0.21	0.25	-0.21	0.16	0.20
Hours at school related activities															
Gender (male=1)	0.15	0.18	0.39	-	-	-	-	-	-	0.60	0.30	0.05	-0.17	0.22	0.43
Indigenous	-0.90	0.34	0.01	-0.68	0.40	0.09	-1.18	0.43	0.01	-	-	-	-	-	-
Mother at home	0.52	0.47	0.27	0.56	0.61	0.36	0.44	0.58	0.45	0.38	0.82	0.64	0.56	0.54	0.31
Father at home	0.22	0.40	0.59	0.63	0.49	0.20	-0.20	0.50	0.69	2.49	0.70	0.00	-0.76	0.47	0.10
First born	-1.33	0.21	0.00	-1.63	0.31	0.00	-0.96	0.34	0.01	-1.65	0.33	0.00	-1.07	0.26	0.00
Last born	-0.26	0.22	0.24	-0.73	0.31	0.02	0.42	0.35	0.23	-0.40	0.35	0.25	-0.11	0.26	0.68
No. children aged 0-5	-0.21	0.12	0.09	-0.16	0.14	0.28	-0.24	0.15	0.11	-0.26	0.19	0.17	-0.21	0.16	0.19
No. children aged 6-9	-0.32	0.18	0.07	-0.52	0.22	0.02	-0.11	0.22	0.63	-0.52	0.28	0.06	-0.16	0.21	0.45
No. children aged 10-14	-0.62	0.16	0.00	-0.61	0.18	0.00	-0.64	0.20	0.00	-0.97	0.24	0.00	-0.45	0.19	0.02
No. children aged 15-17	-0.43	0.22	0.05	-0.48	0.26	0.06	-0.38	0.26	0.15	-0.39	0.34	0.25	-0.36	0.27	0.17
No. female adults	0.01	0.18	0.94	-0.08	0.21	0.72	0.13	0.23	0.58	-0.29	0.28	0.31	0.14	0.22	0.52
No. male adults	-0.12	0.18	0.51	0.07	0.22	0.74	-0.28	0.22	0.19	0.16	0.29	0.59	-0.36	0.22	0.10
Hh married	0.41	0.46	0.37	0.02	0.57	0.98	0.87	0.56	0.12	-0.41	0.85	0.63	0.97	0.53	0.07
Hh primary completed	1.64	0.37	0.00	1.41	0.44	0.00	1.91	0.47	0.00	2.64	0.85	0.00	1.18	0.42	0.01
Hh in agriculture	-0.56	0.31	0.08	-0.72	0.36	0.05	-0.33	0.41	0.42	-0.67	0.48	0.16	-0.62	0.41	0.13
Pipe water	0.12	0.29	0.67	-0.17	0.34	0.62	0.37	0.36	0.30	0.81	0.47	0.09	-0.28	0.35	0.42
Electricity	-0.12	0.31	0.71	-0.38	0.37	0.31	0.11	0.40	0.78	0.05	0.49	0.93	-0.03	0.39	0.94
Drainage system	1.35	0.37	0.00	1.62	0.45	0.00	1.11	0.47	0.02	0.84	0.71	0.23	1.62	0.44	0.00
Urban	1.10	0.36	0.00	0.62	0.42	0.14	1.64	0.46	0.00	0.89	0.61	0.14	1.21	0.45	0.01

Source: author's calculations