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# Determinants of child and adolescent labour in Chile

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# **DETERMINANTS OF CHILD AND ADOLESCENT LABOUR IN CHILE**

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### ***Abstract***

This study aims to contribute to the literature available on child labour in Chile. The study will show that while the rate of child labour is low compared to other countries, its composition is such that 9 out of 10 children work in the worst forms of labour. To contribute to the available studies, this paper examines and describes the current situation and, through the use of a probit model, finds the key determinants of child labour by using new data.

The results show that the major determinants are age, gender, rural or urban residence, school attendance and natural disasters.

***Keywords:*** *Child labour, Poverty, Chile, Labour Economics, Convention No. 138 and Convention No. 182.*

### ***Abstracto***

Este estudio busca contribuir a la literatura disponible sobre trabajo infantil para Chile. Se mostrará que el porcentaje de trabajo infantil es bajo comparado a otros países, pero la composición es tal que 9 de cada 10 niños trabaja en las peores formas de trabajo infantil. Para contribuir a los estudios existentes se examina y describe la situación actual y los determinantes clave del trabajo infantil en el país, usando una base de datos nueva existente en Chile.

Se encuentra que los determinantes claves son la edad, el sexo, vivir en áreas rurales o urbanas, asistir al colegio y haber vivido un desastre natural.

***Palabras clave:*** *Trabajo Infantil, Pobreza, Chile, Economía Laboral, Convención No. 138 y Convención No. 182.*



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## INTRODUCTION

In discussion about working children and adolescents, some confusion may arise around the term; in particular, the line between where a chore or activity becomes labour is sometimes blurry. Children and adolescents carry out all sorts of activities; there are some that may be detrimental to them, in terms of physical and mental health, or in terms of depriving them of their childhood, potential and dignity. Other activities, however, can be positive and even improve their own development (certain tasks can provide the child with new skills and labour experiences that can be useful in their future integration into the labour market) and families' wellbeing when they do not interfere with schooling, i.e. helping around the house or in the family business for specific and limited amounts of time. "Child labour" is understood as the first type of activities described above: all those activities that pose a threat to children and teenagers.

The International Labour Organization's (ILO) conventions nos. 138 and 182, the International Conference of Labour Statisticians (ICLS) <sup>1</sup> resolution at its 18<sup>th</sup> conference and the Chilean Government establish two main elements for the definition of child and adolescent labour: (i) age; and (ii) the productive activities carried out, in consideration of the nature, conditions and duration of these activities. The first point considers every person less than 18 years of age as a child, but the target population for measuring child and adolescent labour is the age group from 5 to 17 years old (this can vary across countries but in Chile's case is accurate). In this paper, I acknowledge a distinction between children and adolescents and subsequently I further divide the target population into four age groups that will be analysed in the following chapters. For now, separating adolescents makes sense with respect to point (ii).

The second point considers a child (as defined in point "i") to be working if he/she is engaged in any productive activity included in the general production boundary, as stated in the System of National Accounts (SNA)<sup>2</sup>. Within the activities classified in the SNA, there can be children in employment and also in other productive activities.

Children in employment are considered to be those who, during the reference period, are employed or engaged in productive activities for at least one hour, and also those who have a job to return to. They include:

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<sup>1</sup> Authoritative body that sets the global standards in labour statistics.

<sup>2</sup> The System of National Accounts is the internationally agreed standard set of recommendations on how to compile measures of economic activity. The SNA describes a coherent, consistent and integrated set of macroeconomic accounts in the context of a set of internationally agreed concepts, definitions, classifications and accounting rules.

- any<sup>3</sup> child working below the minimum age, which is 15 in Chile
- children and adolescents working in “the worst forms of child labour”
- children working in hazardous unpaid activities in the household<sup>4</sup>

Nevertheless, in order to avoid confusion throughout the paper, it is important to highlight that the term “child labour” is thus a subset of “children in employment”. Therefore, I will treat these groups as different henceforth, but I will not make a distinction between a child labourer and a working child.

Children in other productive activities include unpaid family members, i.e., those who work in their own households producing goods and services for consumption within their own household. Those who provide household services, paid or unpaid, in a third-party household are considered part of the production boundary of the SNA.

"The worst forms of child labour" (WFCL) are not just one part of the definition of child labour but a specific major concern. Even though the aim of the International Programme on the Elimination of Child Labour (IPEC)<sup>5</sup> is the progressive elimination of child labour worldwide, the main priority is to eradicate the worst forms of child labour. The worst forms of labour are defined in detail in Article 3 of ILO Convention No. 182 as:

*(a) all forms of **slavery** or similar to slavery such as: sale and trafficking of children, debt bondage and serfdom and forced or compulsory labour, including forced or compulsory recruitment of children for use in armed conflict; (b) the use, procuring or offering of a child for **prostitution**, for the production of pornography or for pornographic performances; (c) the use, procuring or offering of a child for illicit activities, in particular for the **production and trafficking of drugs** as defined in the relevant international treaties; (d) work which, by its nature or the circumstances in which it is carried out, **is likely to harm the health, safety or morals of children**.*

Although it is clear that the worst forms of labour are detrimental to minors and must be eliminated, what about other activities? In the literature available it is possible to find studies describing and measuring the effects and possible effects of each kind of activity. According to Bacolod and Ranjan (2008), a child who works is sacrificing human capital accumulation; this will have long-term effects, meaning that the child will grow up to be poor, which in turn will increase the probability of having to send his/her children into the labour market, perpetuating the poverty cycle. Ravallion and Wodon (1999) add that this could also have an impact on a country's development, given that future

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<sup>3</sup> Except those with permission from their legal representative or the respective Family Court, who have a contract with persons or entities involved in theatre, film, radio, television, circus or other similar activities.

<sup>4</sup> In Chile unpaid domestic work is considered hazardous if it is done for 21 or more hours a week.

<sup>5</sup> IPEC is part of a broad-based effort throughout the ILO that combats child labour. For more information, see [www.ilo.org/ipecinfor/product/viewProduct.do?productId=1333](http://www.ilo.org/ipecinfor/product/viewProduct.do?productId=1333).

productivity depends on the investment in human capital. If children work, their education decreases; hence, poverty will persist in future generations. To support this “theory” that more child labour means less child education, Canagarajah and Coulombe (1997) studied the case of Ghana, and found a negative and significant relation between attending school and working. Khanam (2008) also found that child labour has a negative effect on education when he analysed the case of Bangladesh; he added that there is not only a decrease in school attendance but also lower school performance.

Among the empirical studies that trace a decrease in academic performance for children who work, Psacharopoulos (1997) argued that a child who works reduces his/her academic performance by repeating grades; this is common in Latin America and is closely associated with child labour. Akabayashi and Psacharopoulos (1999) stated that child labour is related negatively to reading and math skills, because of the reduction in human capital discussed above.

In terms of health, besides fatigue, stress and physical injuries that can be easily observed, Satyanarayana et al.(1986) found that children who work in rural India are shorter than those who attend school. In the long run, child labour can cause health problems during adulthood if the child is exposed to pesticides, chemicals, dust and carcinogens, which increase the risk of developing lung diseases, cancer and various other diseases, according to Rosati and Straub (2007). Among the psychological effects, the ILO and the National Institute of Statistics of Guatemala (2002) found that having major responsibilities at a young age and doing chores which involve high risks is related to depression, anxiety and low self-esteem, a loss of interest in assisting at school and in learning.

Although in the *Global child labour trends 2008 to 2012* report by the ILO we can see a declining trend in child labour, the size is still large in absolute terms. According to the global report there were 168 million children between the ages of 5 to 17 in child and adolescent labour in 2012 (10.6%). This is 47 million fewer than in 2008. In the case of child labour (5 to 14 years old), the percentage went from 153 million (12.6%) to 120 million (9.9%) and the number of adolescents in the WFCL went from 62 million (16.9%) to 48 million (13%). The number of children in hazardous work in the world declined by 30 million in 2008 to 85.3 million in 2012.

In the same report, the Asia-Pacific region had the largest amount of children working (77.7 million) in absolute terms as compared to 59 million in Sub-Saharan Africa and 12.5 million in Latin America and the Caribbean. In relative terms, the Sub-Saharan Africa region has the highest percentage with one in five children working, followed by the Asia-Pacific region with 8.3% and Latin America and the Caribbean with 7.2%.

Table 1 shows that Chile's rate of child and adolescent labour is 6.6% and the world average is 10.6%. Although child labour in Chile represents a smaller percentage compared to other countries and thus seems less relevant, it does still exist. Child labour has been overlooked in the country, specifically in terms of relevant studies, because it represents a low percentage in relative terms and because there are other major concerns in Chile (high inequality, weakness in the social protection system, problems in the education system, etc.). Considering that there are 219,624 children working, the topic should not be disregarded, and even more so given that the composition of that child labour means that 90% of the work falls under what is considered the worst forms of labour.

Despite the growing abundance of research elsewhere, studies on child labour in Chile are limited. During the literature revision, 3 studies were found for the country. Silva de la Luz (1981) was found in a book published by the ILO in 1981. It discusses family, education, laws, children's relation to work, economic causes of child labour, and characteristics of paid and unpaid child work in general terms focusing on Chile.

**Table 1.** Estimates of the number of children in child labour and hazardous work 2012 (1,000s).

		<b>Child population</b>	<b>Child labour</b>	<b>Hazardous work</b>	<b>Child population</b>	<b>Child labour</b>	<b>Hazardous work</b>
		<b>Global</b>			<b>Chile</b>		
<b>5 to 17</b>	Number	1,585,566	167,956	85,344	3,328	220	198
	(% of age group)	100%	10.6%	5.4%	100%	6.6%	5.9%
<b>5 to 14</b>	Number	1,221,071	120,453	37,841	2,506	94	72
	(% of age group)	77%	9.9%	3.1%	75%	3.8%	2.9%
<b>15 to 17</b>	Number	364,495	47,503	47,503	822	126	126
	(% of age group)	23%	13.0%	13.0%	25%	15.3%	15.3%

Source: Own calculations using EANNA 2012 and *Global child labour trends 2008 to 2012* report.

Sapelli and Torche (2004) wrote a paper whose title refers to the double decision to drop out of school and enter into youth employment<sup>6</sup>. They assessed whether studying and working were two different decisions but still connected. Using a bivariate probit model with data from the 1996 socio-economical characterization survey and descriptive statistics, they found that these decisions can be considered

<sup>6</sup> It actually studies the decision to work or not of adolescents aged between 14 and 17, so it does not really address child labour nor youth employment according to current statistical classifications.

related: many of those who drop out of education do start working, but there are different groups, as not all young people who drop out go into the labour market. The results of the bivariate probit show that parental education has a significant impact on both decisions, together with demographic characterization of household variables; they also found income has an effect on the decision to drop out which appeared to be statistically significant but small.

Cumsille and Del Rio (2008) analysed the justifications of parents for sending their children to work. They did a logistic regression using the first national survey on child labour in 2003, and found that economic needs are the main reason for child labour. Cultural preferences are also important and adolescent participation in the decision-making process has increasing importance. According to what was described previously, the definition of child labour used in Cumsille and Del Rio (2008) was not accurate, given that it does not include children who work in the household as child labourers. It does not differentiate between one's own household and other households, nor the amount of time dedicated to the activity. This probably resulted in underreporting and bias in the justifications given by parents. The scope of that paper is different to mine because it looks at the justifications of parents for sending (or letting) their children to work and not the actual causes which may not only depend on the parents. Furthermore, the parents in some cases do not know that their children are working.

Thanks to the literature available we know some of the factors that seem to determine child labour, but the specific determinants in consideration of our culture, income and labour market structure are unclear. Using recent household level micro-data, this study examines the impact of various household characteristics on child and adolescent labour in the country, making a special reference to natural disasters. As Chile is a country that has suffered many catastrophes in recent years, it would be interesting to see if the presence of an earthquake, a fire, etc. which is known to increase poverty, has an impact on child labour, even when controlling household income. As far as my own knowledge goes, this would be one of the first studies to include natural disasters as a control variable in determining child labour determinants.

This document is made up of 5 sections including this introduction. The first chapter includes details of the survey used and the main results obtained from it. The second chapter contains the literature review and methodology. It discusses some of the different studies already carried out to study child labour and describes the model used in this paper to study the determinants, based on the second chapter and the data available. The results of the models are discussed in the third chapter and these are followed in the fourth and final part of the document by the conclusions drawn from them.

## CHAPTER I

### Data and Descriptive Statistics

In 2012, the International Labour Organization (ILO), the Ministry of Labour (*Ministerio del Trabajo - MINTRAB*) and the Ministry of Social Development (*Ministerio de Desarrollo Social - MDS*) of Chile developed the National Survey of Children and Adolescent Activities (*Encuesta Nacional sobre Actividades de Niños, Niñas y Adolescentes - EANNA*). This survey interviewed a subsample of households from the 2011 National Socioeconomic Survey of Chile (*Encuesta Nacional de Caracterización Socioeconómica - CASEN*). CASEN is the main instrument used to measure the socioeconomic characteristics of the Chilean population and is used to design and evaluate social policies. Since EANNA is connected to the Socioeconomic Survey, it expands the possibilities of analysing the determinants by adding data from it.

The main aim of this survey is to investigate the everyday life and activities of boys, girls and adolescents between the ages of 5 and 17 in order to measure and estimate the working dimension of these activities<sup>7</sup>. In this regard, EANNA provides answers to the requests for information and monitoring of the United Nations' Convention on the Rights of the Child, ratified by Chile in 1990, ILO Conventions nos. 138, ratified in 1999, and 182, ratified in 2000.

The 2012 EANNA is composed of 4 questionnaires: the first one is for small children between 5 and 8 years old, the second one for children between 9 and 17 years old. The third one is called self-applied (12 to 17 years old) and there is a questionnaire for parents.

The questionnaire for smaller children is composed of 8 modules to obtain information about the use of their time: household chores; economic activities; health and safety; education and awareness; recreational activities and sport. The questions were simplified and were accompanied by drawings for the children to understand better. The second part for children older than 9 years old is also in 8 modules which look at subjects like household chores; self-reported activities; economic activities; health and safety; job search and employment history; education and awareness; and recreational activities and sports. The self-applied questionnaire for adolescents covered 3 parts seeking to get information about sensitive issues like sex and drugs. The parent's part consisted of 6 modules: household residents; household chores; work; children; adults and events.

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<sup>7</sup> It excludes children living in residential care homes or on the street.

The first two are the main questionnaires and only differ in language used and number of questions. Both seek to learn about the activities of children and adolescents and try to collect information as closely as possible about their activities and daily routine. In the case of children who are employed, the questions are devised with the objective of getting them to separate the activities that fall into child labour and hazardous work and afterwards recording all the information related to duration, conditions, characteristics and opinions on them.

The sample survey includes 7,837 households which represent 9,978 children and adolescents interviewed between February and March 2012. The parents or guardians of the children were also interviewed with the objective of completing important variables and comparing answers.

The division of the sample by age group can be observed in table 2 together with the average child labour by group. Clearly the highest share is in the older group, 15.3% of adolescents are involved in a job classified as hazardous. For the other 3 age groups the proportion of child labourers is smaller but still above zero and with more than half of the jobs classified as the WFCL. In the youngest group, 0.9% might be considered negligible but it represents more than 8,500 children, of whom 5,000 work in hazardous jobs.

Table 2. Population and child labour by age groups.

	<b>Population</b>	<b>Child Labour</b>	<b>Child labour percentage by age group</b>	<b>Labour under the minimum age</b>	<b>Hazardous work as percentage of child labour</b>
<b>Age 5 - 8</b>	983,416	8,654	0.9%	8,654	58.2%
<b>Age 9 - 11</b>	748,377	34,050	4.5%	34,050	76.2%
<b>Age 12 - 14</b>	774,114	51,321	6.6%	51,321	80.2%
<b>Age 15 - 17</b>	822,032	125,599	15.3%	0	100.0%
	<b>3,327,939</b>	<b>219,624</b>	<b>6.6%</b>	<b>94,025</b>	<b>90.0%</b>

Source: Own calculations using EANNA 2012.

As in the overall estimates, boys continue to have greater involvement in employment than girls. We can see in table 3 that 9.5% of boys work and that 3.9% of girls and female adolescents work. In other words, 69.2% of all child labour is performed by boys.

Table 3. Percentage of child labour in each category and average of each category in the “child labour” and “non-child labour” groups

Group	Category	Child NOT in labour	Child in labour
<i>Percentage in each group</i>			
	Male	90.5	9.5
	Female	96.1	3.9
	Indigenous	91.2	8.8
	Migrant	84.3	15.7
	Urban	93.9	6.1
	Rural	90.3	9.7
	Poor	90.5	9.5
<i>Average by group</i>			
	Income from main occupation (CLP)	\$633,166	\$413,582
	Years of education of mother	11.1	9.3
	Years of education of father	11.1	9.9
	Number of people in household	4.9	5.3
	Number of younger siblings	0.7	1.1
	Household dependence rate	3.4	3.8

Source: Own calculations using EANNA 2012.

Out of the children who live in rural areas, 9.7% are part of the labour force, whereas the percentage is 6.1% of those who live in urban areas and work.. If we look only at the children who are considered child labourers in table 4, we can see that 18.7% live in rural areas. We will see later on that in general in developing countries, the largest number of child labourers is found in rural areas, so this statistic for Chile could be due to the high urbanization rate (87.3%).

If we look at the immigrant population of the sample we can see that 15.7% work. In the case of indigenous children, we can see that 8.8% are in work. Looking only at children who are working we can see that 15.2% are indigenous.

Two very important categories as we will see in the next chapter are poverty and school attendance. For the former, we classify children as *over the poverty line* and *under the poverty line*. We can see in table 3 that of those who are under the line, 9.5% work and if we take only child labourers, 36.6% live under the poverty line. For the second variable, we see in table 3 that 85.7% of children who work declare they attend school: this is 8.9 percentage points lower than the attendance of children who do not work.

In table 3 we can analyse the differences in the average of some variables for both groups. The first important difference is in income: children who work come from homes with lower incomes (34.7% lower), with a lower average education of both parents, that have more members and where the proportion of those members is such that the share of dependents by each employed adult is higher.



Table 4. Child labour breakdown (%).

	Percentage
Male	69.2
Age 5-14	42.8
Rural	18.7
Poor	36.6
Attend	85.7
Migrant	0.8
Indigenous	15.2
Disaster	39.2
<i>Distribution of child labour by quintiles</i>	
Quintile 1	45.9
Quintile 2	23.6
Quintile 3	13.1
Quintile 4	13.5
Quintile 5	3.9
<i>Distribution of child labour by macro-zones</i>	
North	10.1
Centre	29.1
South	20.9
Metropolitan	39.9

Source: Own calculations using EANNA 2012.

It seems that working children in general come from poorer households. Looking at the division by quintiles in table 4 we can conclude that the largest share of child labour comes from the poorer quintiles: the first 2 quintiles constitute almost 70% of child labourers and only 3.9% come from the richest quintile.

The division by zones, also in table 4, shows that the biggest group of working children lives in the metropolitan area (refer to annex 2 and table 10 to see the distribution in the country) and the smallest is in the north (39.9% and 10.1% respectively).

In general terms, male adolescents from urban areas are in child labour more often than other groups. This is parallel to the fact that the most common work children do in Chile is related to wholesale activity: 43.3% of children work in wholesale and retail trade and the next main group, which is less than half of this, works in agriculture (table 5).

Table 5. Child labour breakdown by industry.

	<b>Total</b>	<b>%</b>
Agriculture, forestry and fishing	45,352	20.60%
Manufacturing	11,862	5.40%
Construction	19,366	8.80%
Wholesale and retail trade; repair of motor vehicles and motorcycles	95,118	43.30%
Other community, social and personal service activities	28,970	13.20%
Others	18,956	8.60%

Source: Own calculations using EANNA 2012.

We see that 90% of children work in hazardous jobs. Table 6 displays the most common things they state they do when working in these WFCL. In all the main industries, we notice that over 70% of children declared they are working in dangerous occupations, and more than half of the children declared that they work with heavy loads. We later find that approximately 45% of children and adolescents work with dangerous machinery and tools and 13% in dangerous places. Adolescents also declared that they work during the night and/or long hours.

Table 6. Most common types of hazardous jobs (Frequency and percentage).

<b>Hazardous work</b>	<b>Age 5-14</b>	<b>%</b>	<b>Age 15-17</b>	<b>%</b>
Dangerous work in hazardous occupation (outdoor, ergonomic risk, machinery use, chemicals use).	55,309	76.7%	99,844	79.5%
Work that involves manual handling or transport of heavy loads.	41,839	58.0%	75,247	59.9%
Work with dangerous machinery, equipment and tools.	27,265	37.8%	62,409	49.7%
Work for long hours.	-	-	36,548	29.1%
Work underground, under water, at dangerous heights or in confined spaces.	6,978	9.7%	19,006	15.1%
Work during the night.	-	-	14,266	11.4%

Source: Own calculations using EANNA 2012.

Note: One child labourer can choose more than one hazardous type of work, so the percentages are calculated over the total of child labour classified as WFCL for each age group and add up to more than 100%.

The dataset used and described is representative of the country, is complete in terms of variables related to children, their activities and their families and because it is recent, one of the innovations of this paper is that -to my knowledge- it is the first quantitative study that uses this new database.

## CHAPTER II

### **Literature Review and Methodology**

In general, the study on working children was carried out by reviewing the supply side and not so much the demand: why would a family send their children to work instead of school? In looking for the reasons, many papers study the decision to work and/or study side by side as they compete for the available time of the child. These studies relate to school assistance, fertility, school performance and child labour using bivariate and multivariate models (Ray, 2000a; Grootaert and Kanbur, 1995; Akabayashi and Psacharopoulos, 1999) and they find that these decisions are, in fact, interdependent and negatively correlated. Child labour can reduce educational attainment by 2 years of schooling according to a study on Bolivia and Venezuela by Psacharopoulos (1997). According to Haile and Haile (2012), who studied children aged between 7 and 15 from Ethiopia, poorer households have higher rates of child labour, lower enrollment rates in education and higher fertility rates.

Another example is Ravallion and Wodon (1999): they studied the substitution effect between the labour force participation of children and school attendance. To do this, they used a bivariate probit model and analysed the effects of an enrolment subsidy given in Bangladesh on both equations, to see if child labourers moved into education after the subsidy. To control bias, they used the cost of going to school instead of attending. For the child labour part of the model, the probit was done by gender and it found that the subsidy, parental education, land ownership and the number of adults in the household were significant variables in decreasing the probability of child labour for girls and boys, as well as the number of adults who worked. Canagarajah and Coulombe (1997) carried out a similar study on children aged between 7 and 14 in Ghana. They also concluded that increasing the demand for education diminishes the amount of working children and that the father's education is of great importance.

Other types of studies try to determine the factors that increase the probability of being a working child using probit and logit models (Patrinos and Psacharopoulos, 1997; Jensen and Nielsen, 1997; Canda and Santiago, 2009; Dayioğlu, 2006). In general these studies make a division either by gender, age group or rural and urban areas. Amin et al. (2004) stated that this is necessary to examine separate demographic groups to really understand the determinants. They

used data from Bangladesh and estimated the likelihood that a child would work using separate logistic regression for younger and older (5 to 11 and 12 to 14 years old) boys and girls in rural and urban areas. They came to the conclusion that as the coefficients changed, the motivation to start working may be different for each group.

Ray (2000a, b) first used a logistic regression to estimate the probability that a child would be working using data from Peru and Pakistan. He noticed that female education and availability of basic services in the household were important in both places, with both having a positive role in decreasing child labour. Another interesting finding with respect to Pakistani is that children who combined education and work earned significantly lower wages than those who left school. In a second study, where he used the same data, he aimed to test two hypotheses: that there is a relation between poverty and child labour, and a relation between education and work. The conjecture was that if parents' wages fell below the poverty line, they would then reduce their children's schooling. For Peru, none of the correlations were proven, but for Pakistan, when the household passed from just above the poverty line to below it, the amount of hours of labour performed by children increased. He also encountered a negative impact on girls' labour when there was an increase in the wage of female adults in Pakistan. In Peru the increase occurred when the wages of male adults fell. According to the research paper, Pakistani women were less educated than Peruvian women. There were also fewer good schools and satisfactory child care in Pakistan, so the acceptance of the hypotheses and the close complementarity between the women's and girls' labour markets in Pakistan, unlike in Peru, could be due to these factors.

A few authors try to deal with the possible endogeneity arising from the relation between poverty, schooling and labour. One case is Ray (2002): using data from Ghana, he made a distinction between "cluster level poverty" (which was the poverty level of the cluster the household is in, measured as the proportion of households that are below the poverty line) and "household poverty", in order to use the first definition instead of the endogenous one as a control for child labour hours. He estimated a 3-stage least squares to observe poverty and hours of labour and schooling, at the same time considering the fact that household poverty is a determinant and a consequence of the other two variables. He obtained a significant and negative relation connecting child labour and child schooling. He concluded that there were rural-urban differences and thus adopting different policies by region would be better for children. He also concluded that improving attendance was of central importance.

The seminal work of Basu and Van (1998) studied the relation between the adult and child labour markets and introduced two axioms which they referred to as the 'Luxury Axiom' and the 'Substitution Axiom'. These have been cited and analysed in several subsequent studies and are understood as an income decision, meaning that the family will send children into the labour market only if the family's income from non-child labour sources is low. The Substitution Axiom tries to assess whether child labour and adult labour substitute each other. Using these axioms or hypotheses, they studied the possible results of prohibiting child labour, arguing that if parents are compelled to send their children to work out of necessity, prohibiting child labour will not be effective in reducing child labour. It could even be negative given that the children will work anyway but they would be left without any protection in the labour market. Thus the axioms posit child labour as a necessity; if household income is not enough for the subsistence of the family, or if the income of the adults decreases beyond a certain point, then children will work. In this view, poverty is the main determinant of child and adolescent labour.

Among the papers that support the idea that a family's poverty increases the probability of child labour, we find Amin et al.(2004) who stated that keeping children away from work is a luxury poor families cannot afford. Ray (2000a) also provided evidence on the Luxury Axiom but rejected it for Pakistan, and for Peru he found a weak correlation. Canagarajah and Coulombe (1997) found that school attendance increases in the highest quintiles but they did not find the one-on-one relation they were expecting between poverty and child labour. They found instead a non-linear relation in rural areas shaped as an inverted U, so they concluded that poverty was not the main determinant of the decision to work or not. Dayioğlu (2006) found that poor children were more likely to enter the labour market and this was confirmed even when using different measures of household material wellbeing.

As mentioned previously, Ravallion and Wodon (1999) analysed the effects of a subsidy for school attendance and found that the subsidy had a positive effect on the probability of attending school and a negative, smaller effect on labour market participation (labour decreased by a quarter with the increase in school attendance for males and one eighth for females). They concluded that parents managed to substitute the time that children spent in other activities to increase schooling and so work decreased less than the increase in schooling.

Household income seems to be important but is only one cause of child labour. Access to credit, for example, is another, and is completely related to income. If the family is going through

financial hardship, it makes sense to think that they might intend to get a loan to deal with the situation, and if they do not get access to one, they will have to resort to extreme measures. In the absence of credit markets, households tend to increase child labour as a reaction to temporarily cover income shortages (Ray, 2002; Ersado, 2005; Grootaert and Kanbur, 1995). The extent to which a transitory income shock increases child labour was investigated by Beegle et al.(2006) together with an analysis of the effects of the shock if the household owned assets. According to them, both relationships were significant: accidental crop loss (their measure of transitory income shocks) leads to significantly increased child labour, so they suggested that insurance or access to credit could reduce the extent of child labour.

In terms of gender and age, all studies seem to find that being a boy and getting older increases the probability of working. This is consistent with the estimates of the Global child labour trends 2008 to 2012 report which show that out of 168 million working children, 59.4% are boys. In Chile the percentage is 61.2%. In general, girls tend to be more involved in domestic chores; however, because of the definition of child labour, they are not included unless they work for more than 20 hours a week. It is interesting to keep in mind that even if we are not including these children in this study, 84.4% of males and 91.0% of females declared that they carried out household tasks in a typical week and that on average boys performed 10.6 hours a week of domestic activities and girls 14.1 hours.

The place where the family lives will also be of key importance; for instance, working in agriculture is part of the culture in rural areas and is considered to help with the child's development, whereas in urban areas work is more closely connected to economic reasons. In Chile there are 15 regions, each with rural and urban areas and different industries, cultures, migration rates, income, accessibility to schools, etc., so the location of the child is important.

Most child labour in the world is actually in agriculture (Ray, 2000 and 2012 ILO 2002b). In Latin America, the story is no different. Even with rapid urbanization underway in the region, the agricultural sector is the one with the most working children. Nevertheless, in Chile, we find that the biggest share is in wholesale and retail trade (43.3%) and in second place we find agriculture, forestry and fishing (20.6%)<sup>8</sup>. Hence, we might find some differences in the estimates compared to the previous literature which in general separates data into two groups, urban and rural (Grootaert and Kanbur, 1995; Ray, 2002), finding variations in the nature and magnitude of the

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<sup>8</sup> Girls participate more than boys in wholesale activities and in services, whereas boys participate more in agriculture and construction.

impact of several control variables<sup>9</sup>. Ersado (2005), for example, found that poverty is the main cause of child labour in rural areas, yet not in urban areas.

Obviously, the family and especially the parents of children and adolescents have a major role to play in the decision to enter the labour market. Parental education plays a decisive role in decreasing child labour (Ray 2000a). We know by now that not only for child labour, but for several issues (health, educational achievement, finding a job, nutrition, etc.), parents with higher education "transfer" these benefits to their children and families. More educated parents have better chances of sending their children to school and not working. An explanation provided by Fors (2008) is that educated parents might have a greater preference for education, or maybe that the children of highly educated families receive higher returns on education due to the intergenerational transmission of human capital. The notion of which parent has greater impact in the decision is not clear yet; there is no consensus in the literature, probably as each study looks at a different culture. Nonetheless, in the case of Chile, I am inclined to say that given the patriarchal nature of society, the one with the last word in the household will be the father rather than the mother.

If we look at the parents separately, Canagarajah and Coulombe (1997) found a negative effect on child labour, especially for boys if the education of the father increased and the mother's education only had an influence on school attendance. In Brazil, the father's education has the greatest impact as reported by Cardoso and Souza (2004, and also the impact is bigger for boys. Kurosaki et al (2006) actually focused on whose education matters more, and concluded that the education of the mother was more important than that of the father, with a similar effect on boys and girls while that of the father has a greater impact on boys.

Other than education, there are some other variables that can be found in the literature. Dayioğlu (2006) included in his estimations that if the father worked in the public sector, it had a significant and negative effect on child labour, if the father was absent, it also had a negative and statistically significant effect, although the age of the mother and father and if the mother was absent were not statistically significant. Wahba (2005) included a dummy to indicate if the child's parents were child labourers and found that if they were the likelihood of sending their children into the labour market increased by 10%.

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<sup>9</sup> It is worth mentioning that school attendance is beneficial everywhere, but poverty is not everywhere, so one of the most effective strategies is enrolment subsidies, and not so much economic growth.

There are several demographic variables of the family with respect to its composition: size of household, number of adults, number of employed adults, number of dependents, number of minors, number of sisters or brothers and age structure of siblings, among others. In general, large families and especially those with a high dependency rate are found to increase the probability of being a child labourer, being among the older siblings and/or having sibling aged between 0 and 6 years will also raise the chances (Patrinos and Psacharopoulos, 1997; Haile and Haile, 2012; Wahba, 2005;). Related to this line of thought is Fors (2008), who identified that the employment status of members of the household was important and employment of all the adults decreased child labour. On the other hand, Canagarajah and Coulombe (1997) stated that the gender and age of the siblings were not statistically significant for the labour decision, but were for school attendance. In summary, we may think that more children means paying more for education<sup>10</sup>. Consequently, if the family is poor, it will not be able to pay for a lot of education. At the same time, bigger families can facilitate schooling for some children if they send the others to work, so it is important to examine the structure of the family and activities of the siblings to better understand the likelihood of each child being in work.

Migration, although important, does not seem to be too common a topic in the literature reviewed. Obviously, there are different migration types. We may think that skilled immigrants will not need to send their children to work so child labour will not increase, whereas unskilled and poor immigrants looking for opportunities might. Child labour will depend on the type of migration; this statement is mentioned by Khoudour-Castéras (2009) who found migration had a positive effect on child labour. He divided the types of migration into 3 groups: that in which the child is travelling autonomously is the worst migration in terms of child labour. Family migration can also involve child labour if the family uses it as a strategy of adaptation, insertion and subsistence in the new environment, and finally if the parent migrates alone without the child, there is no effect on the "migration" variable (it might be classified as absent parent).

To get an idea of the type of migration we are talking about in this study, I can say that net migration<sup>11</sup> in Chile during the period 2011-2015 was 201,289 people, so in general the country experiences more immigration than emigration. The distribution of that immigration is mainly of

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<sup>10</sup> Even if education is free for some quintiles, we know there is an associated cost to studying like materials, uniforms, transport, etc.

<sup>11</sup> Total number of immigrants minus the annual number of emigrants, including both citizens and non-citizens. For more information see [www.data.worldbank.org/indicator/ SM.POP.NETM](http://www.data.worldbank.org/indicator/SM.POP.NETM)



people aged between 30 and 59, with a low presence of children<sup>12</sup> (in cases where immigrants have higher levels of education, more stable jobs and better remuneration, the presence of minors is greater). In relation to education, the immigrant population collectively has more years of education than the Chilean population (13 and 10 years respectively). Their countries of origin can be seen in table 7.

Table 7. Countries of origin of the main foreign population.

	1992 Census		2002 Census	
	Total	Percentage of total foreign population	Total	Percentage of total foreign population
<b>Argentina</b>	34,415	30	50,448	25.8
<b>Peru</b>	7,649	6.7	39,084	20
<b>Bolivia</b>	7,729	6.7	11,649	6
<b>Ecuador</b>	2,267	2	9,762	5
<b>Spain</b>	9,849	8.6	9,531	4.9

Source: Stefoni (2011)

In terms of indigenous children, Psacharopoulos (1997) found in Bolivia, and Patrinos in Peru, that being from a native group was significant and increased child labour along with age, being male and where heads of households are female.

As we saw, for the control variables, there are some that come easily to mind when thinking about child labour and some others that can come as a surprise. For the information available in the dataset, I selected all those variables found in the literature (or similar ones) and also a variable that fits the Chilean reality of natural disasters. Obviously, this is not only specific to Chile: worldwide we see disasters happening everywhere and several times a year leaving behind losses, but what is certain is that, especially in developing countries, disasters increase poverty<sup>13</sup>. It is mentioned that without access to the credit markets or insurance, child labour will increase after a “shock”, and natural disasters are also “shocks”. Floods, earthquakes, fires, droughts, frosts and eruptions have devastating costs in terms of human lives, animal lives, infrastructure destruction, basic services disruption, financial losses, production losses, food losses, etc. This in

<sup>12</sup> This is mainly related to the type of immigration. Parents leave their children in their country of origin and emigrate with the objective of sending remittances home. Other elements are the legal and economic difficulties faced by immigrants in the family reunification process.

<sup>13</sup> Over 80% of the total years lost in disasters are spread across low and middle-income countries, representing a serious setback to social and economic development. For more information, see UNISDR (2015).

turn harms the economy, the development process, increases prices and can lead to chronic poverty<sup>14</sup> of the zone or force some families into poverty.

Thinking about children who live through natural disasters, we can be more specific and assume that they may suffer the death or injury of family members, infections and diseases, loss of identification information and personal belongings, food shortages, homelessness and destruction of their schools. It seems like a crucial point to start working, but there is not much literature directly focused on this topic. As mentioned earlier, the subject of shocks is covered, but natural disasters are not, even though they are also shocks.

According to the ILO (2002), two studies were carried out on natural disasters in Bangladesh ("Urban children's work during and after the 1998 floods in Bangladesh" and "The urban poor in Dhaka City") and did not find any increase in child labour. They explain this by saying that there are no income-generating opportunities due to the downturn. Another study on natural disasters is Janvry et al. (2006), but its focus is more on conditional cash transfer programmes than child labour. They showed that cash transfers have a strong mitigating effect on the school enrollment response to a shock, but a small effect on the child labour answer.

In conclusion, this variable should be included, where available, in these kinds of studies, in order to gather more evidence and take it into account in designing public policies. This makes sense increasingly because natural disasters seem to be incurring more and more costs<sup>15</sup>.

After going through the literature review, the best option for this study was to use a probit model to analyse which variables increase the probability of becoming a child labourer. This decision was made considering the data and the final objective of the paper, which is to find the determinants of child labour and not its relation to education (which has repeatedly proven to be negative). The definition of each control variable included is available in annex 1.

Table 8 presents five estimations for the complete sample. In the first column we can observe a basic model, where several variables are statistically significant; the non-significant ones are being indigenous, having younger siblings, sisters and/or brothers, living in male-headed households, the number of employed adults living in the household and living in the south instead of the

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<sup>14</sup> Funds and resources will almost permanently be used for relief rather than investment in development (ILO, 2002).

<sup>15</sup> See [www.earthobservatory.nasa.gov/Features/RisingCost](http://www.earthobservatory.nasa.gov/Features/RisingCost)

metropolitan area. In the second and third estimations, it is possible to observe what happens when income and education are not included - two key variables according to the literature review - but also two variables that could cause some endogeneity in the model,<sup>16</sup> so it is interesting to see how the rest of the coefficients change with the inclusion or otherwise of these variables. Removing income increases, some other coefficients and some variables like indigenous status and the number of employed adults in the household become significant, meaning that when we do not have a control for income, the other variables have to explain more of the model, and as both variables are related to income (indigenous people in Chile tend to have lower incomes and the number of employed adults tend to increase incomes), the acquired significance is because they may serve as substitutes of income.

In general, in the first three columns, the trends are consistent with the literature review. Age and gender, for example, are as predicted in the literature: being a boy and growing older increases the probability of working. One variable sign that might be hard to understand (but that does fit with what was predicted by Wahba 2005), is the *father\_cl*. This is a variable that takes a value of 1 if the father was a child labourer and 0 if not, and it has a positive sign. According to this, the estimation is telling us that if the father used to work as a child, then the probability that his own children work increases. This could happen for two reasons: the first is that if the father worked as a child because his family was poor, then he probably did not get enough education to work himself out of poverty, thus his family now needs its children to work. The second reason could be that in spite of being a child labourer, he feels he turned out fine so there is no problem in the children working. To know which reason is more important, in the fourth model I include a new variable *father\_cl\_poor* which is an interaction between *father\_cl* and *poor* (household living below the poverty line). The variable is negative, so we can conclude that probably, if the father was a child labourer and his family is poor, he would not want his children to work (unless it is necessary) so the second reason sounds more plausible.

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<sup>16</sup> I'm aware of the possible endogeneity problem which could have been fixed by doing a two-stage estimation as proposed by Ray (2002): the first stage would have studied the decision of the parents to make their child work or not, and the second, the number of hours worked by the child. Unfortunately the number of hours declared in the survey is not as reliable and complete as the dichotomous variable of child labourer or non-child labourer. It could also have been fixed by more complex models but in this case, we are looking at the determinants and not the exact effect of each variable so we can just be aware of the possible endogeneity and sign of bias.

**Table 8.** Coefficients for the national probit estimates.

	(1)	(2)	(3)	(4)	(5)
Age	0.117*** (0.010)	0.114*** (0.009)	0.135*** (0.009)	0.116*** (0.010)	0.108*** (0.011)
Male	0.460*** (0.050)	0.468*** (0.047)	0.433*** (0.044)	0.460*** (0.050)	0.463*** (0.057)
Rural	0.150*** (0.058)	0.149*** (0.054)	0.099* (0.053)	0.145** (0.059)	0.177*** (0.067)
Attends	-0.728*** (0.100)	-0.661*** (0.094)		-0.728*** (0.100)	-0.905*** (0.118)
Ln(income)	-0.079** (0.036)		-0.103*** (0.032)	-0.085** (0.037)	-0.077 (0.047)
Migrant	0.786*** (0.291)	0.755*** (0.287)	0.600** (0.283)	0.789*** (0.291)	0.688** (0.323)
Disaster	0.224*** (0.050)	0.246*** (0.048)	0.160*** (0.045)	0.225*** (0.050)	0.235*** (0.057)
Indigenous	0.050 (0.064)	0.106* (0.058)	0.036 (0.059)	0.050 (0.064)	0.093 (0.073)
Young_sibs	0.034 (0.026)	0.045* (0.025)	0.052** (0.023)	0.036 (0.026)	0.041 (0.030)
Father_cl	0.106** (0.052)	0.108** (0.050)	0.109** (0.047)	0.120** (0.056)	0.123** (0.060)
F_cl_poor				-0.065 (0.101)	-0.037 (0.104)
Mother_educ	-0.038*** (0.007)	-0.047*** (0.007)	-0.039*** (0.007)	-0.038*** (0.007)	-0.030*** (0.010)
Household head male	-0.037 (0.053)	-0.044 (0.049)	-0.020 (0.047)	-0.034 (0.053)	0.004 (0.071)
Sisters	0.024 (0.051)	0.019 (0.047)	0.029 (0.045)	0.025 (0.051)	0.087 (0.057)
Brothers	-0.005 (0.052)	0.001 (0.049)	-0.017 (0.046)	-0.003 (0.052)	-0.013 (0.060)
Employed_adults	-0.008 (0.035)	-0.052* (0.027)	0.024 (0.031)	-0.008 (0.035)	0.017 (0.041)
Father_educ					-0.001 (0.010)
North	-0.151* (0.085)	-0.152* (0.082)	-0.199*** (0.075)	-0.153* (0.085)	-0.178* (0.099)
Centre	-0.230*** (0.085)	-0.221*** (0.083)	-0.203*** (0.073)	-0.230*** (0.085)	-0.240*** (0.098)
South	-0.026 (0.084)	-0.022 (0.081)	-0.035 (0.073)	-0.026 (0.084)	-0.041 (0.097)
Constant	-1.243*** (0.452)	-2.148*** (0.204)	-1.830*** (0.393)	-1.163** (0.470)	-1.152* (0.594)
Observations	6,970	7,599	8,219	6,970	5,273
Adjusted R-squared	0.141	0.141	0.122	0.141	0.146
F Test	480.1	528.4	477	479.4	393.2

Source: author's elaboration.

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

To obtain the best estimates, different variables were used in the model alongside the ones presented: regional GDP, absent father, absent mother, age of household head, dummy for mother being a child labourer, number of adults in household, urbanization rate of each region, presence of children, marriage, among others. These variables were not included in the final model due to low reliability of the variable, having no impact whatsoever in terms of own significance or effect on the rest of the model<sup>17</sup>. The only variable worth commenting on that was not included in the final model because of the high presence of missing values is father's schooling: it can be observed in the fifth column that the years of schooling of the father are not significant but do explain something because the rest of the coefficients change in significance and size.

Having analysed the literature and presented the final model to be used, in the next chapter, I will present the estimations and the results obtained, taking into consideration for analysis, the literature review and descriptive statistics.

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<sup>17</sup> The variables that could not be included because of availability in the data were mainly access to basic services, land ownership and specific income of each member of the household.

## CHAPTER III

### Results

As stated in the last chapter, the model presented in column 4 of table 8 is the one that fits the data best, so it will be the final model. In this chapter, I will describe in further detail the findings of the model by separating the estimates into males and females. Afterwards I will present the final model subdivided into gender, area of residence and I will add dummies for each age group.

Table 9 presents the estimates for males and females. It can be seen that the likelihood of a boy working increases with age, with the number of younger siblings, a father who worked as a child, those with indigenous origins, living through a natural disaster and those living in rural areas, and it decreases for boys who attend school, an increase in household income, with an increase for each year of mother's schooling and for those living in the north or centre of the country.

For girls, the variables that increase the likelihood of working are age, being a migrant and living through a natural disaster. The significant variables that decrease the probability are attending school, each additional year of mother's education and living in the centre of Chile instead of the metropolitan region.

Both genders are affected by natural disasters, namely earthquakes, volcanos, fires, droughts and/or frost. According to the results, the presence of one or more natural disasters in the last 12 months in the zone of residence of the child or adolescent increases their probability of working. The variable is statistically significant and it affects the probability more for males than for females.

Table 9. Coefficients for the probit estimates by gender.

	Males	Females
Age	0.11*** (0.013)	0.13*** (0.017)
Rural	0.21*** (0.074)	0.04 (0.100)
Attends	-0.73*** (0.132)	-0.72*** (0.158)
Ln(income)	-0.09* (0.048)	-0.07 (0.059)
Migrant	0.58 (0.388)	1.03** (0.409)
Disaster	0.25*** (0.065)	0.20** (0.080)
Indigenous	0.13* (0.080)	-0.10 (0.113)
Young_sibs	0.09*** (0.033)	-0.04 (0.045)
Father_cl	0.19*** (0.071)	-0.02 (0.093)
F_cl_poor	-0.10 (0.128)	0.03 (0.169)
Mother_educ	-0.05*** (0.009)	-0.02* (0.013)
Household head male	-0.09 (0.070)	0.05 (0.083)
Sisters	-0.00 (0.068)	0.08 (0.080)
Brothers	0.00 (0.067)	-0.01 (0.086)
Employed_adults	0.01 (0.042)	-0.03 (0.061)
North	-0.22** (0.110)	-0.08 (0.133)
Centre	-0.21* (0.111)	-0.27** (0.136)
South	-0.01 (0.107)	-0.07 (0.137)
Constant	-0.53 (0.607)	-1.54** (0.757)
Observations	3,486	3,484
Adjusted R-squared	0.139	0.111
F Test	318.3	147.7

About the macro-zones included, the reference category is the metropolitan area which is known for being the capital of Chile and the richest zone. The estimates imply that compared to the metropolitan region there is less probability of becoming a working child than if they live in the centre or the north, whereas living in the south or in the metropolitan area makes no difference. It is not so easy to explain these results, so in table 10 we can see some figures that enrich the analysis by zone. The metropolitan area according to that table is the most densely populated and has the highest GDP. According to the

EANNA survey, the average income is higher in the north which is the zone with all the mining (growth sector until 2015) and then in the metropolitan area. Poverty is highest in the centre and the south and average education does not change as much as child labour rates. We saw in the descriptive statistics that the majority of working children and adolescents worked in the wholesale trade and in the south where that industry is the smallest (in annex 3 it is possible to observe the distribution of GDP by zone and economic sector).

**Table 10.** Indicators of demographic and macro figures for each macro-zone.

Macro-zone	Total Population	GDP (CLP)	Child labour (%)	Average income (CLP)	Poverty (%)	Percentage living in rural areas	Average education	Migration
<b>North</b>	2,169,754	24,494,041	5.24	602,222	18.63	10.22	6.476	0.42
<b>Centre</b>	5,761,302	29,358,463	5.70	447,317	32.02	18.05	6.575	0.06
<b>Metropolitan</b>	7,057,491	61,709,518	8.96	790,211	20.34	2.81	6.678	0.60
<b>South</b>	2,456,252	9,660,076	6.87	459,570	28.91	28.94	6.579	0.11

Source: Own elaboration with data from EANNA, Central Bank and National Statistics Institute of Chile (INE).

There are some variables that affect boys and not girls such as changes in income, living in a rural or urban area, being indigenous, the number of younger siblings and the fact that the father worked as a child, to understand those changes better. Taking into account previous literature, I divide the estimates by rural or urban residence and then I include dummies by age group. The dummies for each age group were included to study the differences in the reasons and determinants of child labour. Although the most appropriate thing would have been to separate the groups, it was not possible because of the small number of observations for some groups (girls under 11 and boys under 8 years old would have been omitted). The four following tables include males from rural areas, males from urban areas, females from rural areas and females from urban areas. Besides the coefficients of the estimates the marginal effects are included for easier interpretation of the results.

Table 11 concentrates on boys and male adolescents from rural areas. In the four models of that table, significant and positive variables are age, natural disasters and living in the north, centre or in the south of Chile. On the other hand, the only variable that decreases the probability of being in child labour is school attendance. These results are different to the estimates in table 9 mainly because the number of younger siblings, change in income, years of education of the mother, being indigenous and in some cases, having a father who was a working child, are no longer significant.



We could conclude from this that when boys live in rural areas, child labour will depend less on the income of the family. In general rural areas are known to be more patriarchal and with a strong culture of males working in agriculture, so it makes sense that the mother's education does not play a role and also that culture is more important than income (or income per capita if we consider that the change in the number of siblings has no influence).

If we pay more attention to the marginal effects, it is possible to conclude that the most important determinants in terms of magnitude are: school attendance, living in the north, centre or south and having experienced a natural disaster in the last 12 months. Thus, going from not experiencing a natural disaster to experiencing one increases the probability of being a child labourer by 5.9 percentage points.

Looking at the age dummies we find that the only one statistically significant is negative, so being 12 to 14 years old would decrease the probability of working. Among the rest of the coefficients the only major change is in the dummy for having a father who was a child labourer. When we control for the child aged 9 to 11, the *Father\_cl* variable becomes significant and it increases the likelihood of the boy working by 4.5%.

The second group presented in table 12 corresponds to the estimates for males living in urban areas. The variables that increase the probability of being a working child in this group are age having experienced a natural disaster, the number of younger siblings and having a father who worked as a child. The significant variables that decrease the chances of being in child labour are school attendance, an increase in household income, years of education of the mother and living in the centre or north of the country.

Table 11. Determinants of child labour for males in rural areas.

	<b>Rural males 15-17</b>	Marginal effects	<b>Rural males 12-14</b>	Marginal effects	<b>Rural males 9-11</b>	Marginal effects	<b>Rural males 5-8</b>	Marginal effects
Age	0.05* (0.028)	0.012	0.08*** (0.019)	0.019	0.10*** (0.025)	0.022	0.10*** (0.025)	0.022
Attends	-1.04*** (0.245)	-0.341	-1.02*** (0.247)	-0.334	-1.05*** (0.245)	-0.346	-1.05*** (0.246)	-0.344
Ln(income)	0.02 (0.088)	0.005	0.02 (0.088)	0.006	0.02 (0.087)	0.006	0.02 (0.087)	0.006
Migrant	-		-		-		-	
Disaster	0.26** (0.109)	0.058	0.26** (0.109)	0.058	0.26** (0.109)	0.059	0.26** (0.109)	0.059
Indigenous	0.18 (0.134)	0.042	0.18 (0.134)	0.042	0.18 (0.134)	0.044	0.18 (0.134)	0.043
Young_sibs	0.08 (0.059)	0.017	0.08 (0.059)	0.017	0.07 (0.059)	0.016	0.07 (0.059)	0.017
Father_cl	0.18 (0.115)	0.042	0.19 (0.115)	0.044	0.19* (0.115)	0.045	0.18 (0.115)	0.042
F_cl_poor	0.04 (0.219)	0.009	0.04 (0.221)	0.010	0.03 (0.222)	0.007	0.03 (0.219)	0.006
Mother_educ	-0.02 (0.018)	-0.005	-0.02 (0.018)	-0.005	-0.02 (0.017)	-0.005	-0.02 (0.018)	-0.006
Hhh male	-0.05 (0.130)	-0.012	-0.05 (0.130)	-0.011	-0.04 (0.130)	-0.010	-0.05 (0.130)	-0.010
Sisters	-0.00 (0.114)	-0.001	-0.00 (0.114)	-0.001	-0.01 (0.113)	-0.002	-0.01 (0.113)	-0.002
Brothers	-0.02 (0.112)	-0.005	-0.02 (0.112)	-0.005	-0.01 (0.112)	-0.003	-0.01 (0.112)	-0.003
Empl_adults	-0.05 (0.076)	-0.012	-0.05 (0.076)	-0.012	-0.04 (0.076)	-0.010	-0.05 (0.076)	-0.011
North	0.76*** (0.284)	0.225	0.76*** (0.285)	0.225	0.75*** (0.285)	0.221	0.74*** (0.285)	0.219
Centre	0.52** (0.256)	0.120	0.51** (0.256)	0.119	0.50** (0.256)	0.117	0.50* (0.257)	0.117
South	0.97*** (0.257)	0.250	0.97*** (0.258)	0.250	0.95*** (0.258)	0.245	0.95*** (0.258)	0.246
Age15_17	0.26 (0.163)	0.062						
Age12_14			-0.19* (0.109)	-0.042				
Age9_11					0.13 (0.171)	0.030		
Age5_8							0.20 (0.288)	0.050
Constant	-1.80 (1.120)		-2.10* (1.104)		-2.35** (1.156)		-2.30** (1.119)	
Observations	887		887		887		887	
Adj. R-squared	0.122		0.123		0.120		0.120	
F Test	112.9		112.9		106.8		108.9	

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: The migrant and married variables were omitted because of lack of observations.

It seems that in comparison to rural areas, the number of siblings, mother's education and income do make a difference, so the theory about the strong cultural patterns present in the countryside would still be appropriate to explain the differences in both areas. In rural areas children work mainly because of the culture, but in urban areas the variables seem more related to income. This is also consistent with the literature review; working in agriculture is part of the culture in rural areas and is considered to help the child's development, whereas in urban areas work is connected more with economic reasons.

In terms of the variable included to see the effect of natural disasters on child labour, we can observe in the table that the effect is not as big as in table 9, but it does increase the probability of being a working child. If the child is living in a zone where there was one or more natural disasters in the 12 months prior to the interview, then the probability of being a child labourer for that child will increase by 2.3%.

If we are interested in the magnitude of the effect, we can conclude that the biggest marginal effects are on living in the north instead of living in the metropolitan area and attending school instead of non-attendance, which would be in first place. The first variable, living in urban areas in the north of Chile, will decrease the likelihood of working by 3.6% and boys attending school in those areas will increase their probability by 9.5%.

For the age dummies there are no major changes in the rest of the coefficients and none of them are significant.

For females, the estimations are available in tables 13 and 14. The first one studies girls and female adolescents in rural areas. In general it is possible to observe that the statistically significant variables that increase the likelihood of being a child worker are age, being a migrant and living in a zone where there was a natural disaster in the 12 months prior to the survey. In terms of variables that decrease the chances of being a child labourer we can see that school attendance is important, living in the centre instead of the metropolitan macro-zone and any change (increase) in household income.

**Table 12.** Determinants of child labour for males in urban areas.

	<b>Urban males 15-17</b>	Marginal effects	<b>Urban males 12-14</b>	Marginal effects	<b>Urban males 9-11</b>	Marginal effects	<b>Urban males 5-8</b>	Marginal effects
Age	0.11*** (0.026)	0.014	0.13*** (0.016)	0.015	0.15*** (0.022)	0.017	0.14*** (0.019)	0.017
Attends	-0.55*** (0.160)	-0.095	-0.53*** (0.161)	-0.092	-0.55*** (0.161)	-0.095	-0.55*** (0.161)	-0.095
Ln(income)	-0.15** (0.059)	-0.018	-0.15** (0.060)	-0.018	-0.15** (0.060)	-0.018	-0.15** (0.059)	-0.018
Migrant	0.09 (0.584)	0.012	0.09 (0.586)	0.012	0.11 (0.588)	0.014	0.10 (0.589)	0.013
Disaster	0.23*** (0.084)	0.029	0.23*** (0.084)	0.029	0.23*** (0.084)	0.028	0.22*** (0.084)	0.029
Indigenous	0.06 (0.106)	0.007	0.05 (0.106)	0.007	0.05 (0.106)	0.006	0.06 (0.106)	0.007
Young_sibs	0.09** (0.042)	0.010	0.09** (0.042)	0.010	0.08** (0.041)	0.010	0.09** (0.042)	0.010
Father_cl	0.18* (0.094)	0.023	0.18* (0.094)	0.023	0.18* (0.094)	0.022	0.18* (0.094)	0.023
F_cl_poor	-0.14 (0.160)	-0.015	-0.14 (0.160)	-0.015	-0.14 (0.160)	-0.015	-0.14 (0.160)	-0.015
Mother_educ	-0.06*** (0.011)	-0.007	-0.06*** (0.011)	-0.007	-0.06*** (0.011)	-0.007	-0.06*** (0.011)	-0.007
Hhh male	-0.11 (0.086)	-0.014	-0.11 (0.086)	-0.014	-0.11 (0.086)	-0.013	-0.11 (0.086)	-0.014
Sisters	-0.02 (0.085)	-0.002	-0.02 (0.086)	-0.003	-0.02 (0.085)	-0.003	-0.02 (0.085)	-0.003
Brothers	0.03 (0.083)	0.004	0.04 (0.083)	0.004	0.04 (0.083)	0.004	0.03 (0.083)	0.004
Empl_adults	0.04 (0.051)	0.005	0.04 (0.052)	0.005	0.04 (0.052)	0.005	0.04 (0.051)	0.005
North	-0.33*** (0.118)	-0.037	-0.34*** (0.119)	-0.037	-0.33*** (0.119)	-0.035	-0.33*** (0.118)	-0.036
Centre	-0.21* (0.125)	-0.023	-0.21* (0.125)	-0.024	-0.21* (0.125)	-0.023	-0.21* (0.125)	-0.023
South	-0.18 (0.123)	-0.020	-0.18 (0.124)	-0.021	-0.18 (0.123)	-0.019	-0.18 (0.123)	-0.020
Age15_17	0.12 (0.125)	0.014						
Age12_14			-0.13 (0.083)	-0.015				
Age9_11					0.16 (0.143)	0.021		
Age5_8							0.19 (0.249)	0.026
Constant	0.13 (0.782)		0.05 (0.752)		-0.26 (0.798)		-0.18 (0.763)	
Observations	2,597		2,597		2,597		2,597	
Adj. R-squared	0.141		0.142		0.141		0.140	
F Test	208.4		212		193.4		206.6	

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The increase in the number of sisters will increase the probability of working by 2.9%; this does not support the conclusions of Canagarajah and Coulombe (1997) who stated that gender and age of the siblings were not statistically significant in explaining the labour decision. We are controlling the number of younger siblings so, for two girls that have the same amount of younger siblings, the girl with the bigger share of sisters (younger or older) will have the higher probability of working. This could be related to size of the household, which according to the literature review increases child labour and also if there are more sisters, then there will be enough “labour” to take care of the domestic chores and enough labour to work outside the household if the parents have preferences for child labour or if the household needs the extra income.

It is easy to observe that in the four columns of coefficients in table 13, the age of the girl is significant. Each additional year of age will increase the probability of being a child labourer by approximately 1.7%.

In this group of girls we can observe that natural disasters will increase the likelihood of working as was found for boys in rural and urban areas. This likelihood will increase by 1.3%, which is smaller than for males.

In the case the girl is a migrant, she will have a greater chance of becoming a child worker compared to a Chilean girl. In the table we see that depending on the age of the girl, migration will increase her chances more or less. In the first group, being a migrant will increase the probability by 20.7%. In the second group it will increase by 19.6%. In the third age group it will increase by 20.4% and for female adolescents, being a migrant will increase it by 20.6%.

Girls' school attendance is an important variable for decreasing child labour in terms of magnitude. It is possible to see in the table that if girls and female adolescents attend school, their chances of becoming a working child will decrease by 5.6%. Income on the other hand is statistically significant at a 10% level. We can deduce that a positive variation on income will decrease the probability of being in child labour.

Table 13. Determinants of child labour for females in rural areas.

	<b>Rural females 15-17</b>	Marginal effects	<b>Rural females 12-14</b>	Marginal effects	<b>Rural females 9-11</b>	Marginal effects	<b>Rural females 5-8</b>	Marginal effects
Age	0.18*** (0.037)	0.011	0.16*** (0.023)	0.010	0.18*** (0.029)	0.011	0.17*** (0.024)	0.010
Attends	-0.56*** (0.199)	-0.056	-0.55*** (0.200)	-0.056	-0.54*** (0.201)	-0.054	-0.55*** (0.199)	-0.056
Ln(income)	-0.12* (0.069)	-0.007	-0.12* (0.069)	-0.008	-0.12* (0.070)	-0.007	-0.12* (0.069)	-0.008
Migrant	1.21*** (0.457)	0.206	1.19*** (0.452)	0.204	1.18*** (0.453)	0.196	1.20*** (0.454)	0.207
Disaster	0.19** (0.096)	0.012	0.19** (0.096)	0.013	0.19** (0.096)	0.012	0.19** (0.096)	0.013
Indigenous	-0.19 (0.148)	-0.010	-0.19 (0.148)	-0.010	-0.19 (0.148)	-0.010	-0.19 (0.148)	-0.010
Young_sibs	-0.02 (0.054)	-0.001	-0.02 (0.054)	-0.001	-0.02 (0.054)	-0.001	-0.02 (0.054)	-0.001
Father_cl	0.16 (0.110)	0.010	0.15 (0.110)	0.010	0.16 (0.110)	0.010	0.15 (0.110)	0.010
F_cl_poor	-0.16 (0.220)	-0.009	-0.16 (0.221)	-0.009	-0.16 (0.223)	-0.008	-0.16 (0.221)	-0.009
Mother_educ	-0.02 (0.015)	-0.001	-0.02 (0.015)	-0.001	-0.02 (0.015)	-0.001	-0.02 (0.015)	-0.001
Hhh male	-0.02 (0.096)	-0.001	-0.02 (0.096)	-0.001	-0.02 (0.096)	-0.001	-0.02 (0.096)	-0.001
Sisters	-0.09 (0.108)	-0.006	-0.09 (0.108)	-0.006	-0.09 (0.108)	-0.006	-0.09 (0.108)	-0.006
Brothers	-0.06 (0.107)	-0.004	-0.06 (0.106)	-0.004	-0.06 (0.106)	-0.004	-0.06 (0.106)	-0.004
Empl_adults	-0.04 (0.078)	-0.003	-0.04 (0.079)	-0.003	-0.04 (0.079)	-0.003	-0.04 (0.079)	-0.003
North	-0.10 (0.143)	-0.006	-0.10 (0.143)	-0.006	-0.10 (0.143)	-0.006	-0.10 (0.143)	-0.006
Centre	-0.28* (0.157)	-0.015	-0.28* (0.157)	-0.015	-0.28* (0.156)	-0.015	-0.28* (0.157)	-0.016
South	-0.07 (0.150)	-0.004	-0.07 (0.150)	-0.004	-0.06 (0.149)	-0.004	-0.07 (0.150)	-0.004
Age15_17	-0.08 (0.151)	-0.005						
Age12_14			-0.04 (0.109)	-0.002				
Age9_11					0.22 (0.205)	0.015		
Age5_8							0.13 (0.381)	0.009
Constant	-1.67* (0.960)		-1.46* (0.871)		-1.80** (0.891)		-1.56* (0.851)	
Observations	2,667		2,667		2,667		2,667	
Adj. R-squared	0.137		0.136		0.138		0.136	
F Test	109.3		114.4		112.8		117.6	

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The inclusion of the age dummies did not produce big changes for the rest of the coefficients and if we look at the dummies, we can conclude that none of them are significant.

The last group presented in table 14 for girls in urban areas shows some differences in terms of age groups with respect to the rest of the estimations. First, being 12 to 14 years old will increase the probability of being a working child by 2.5%. Also, when including the dummies the age variable is not significant anymore for column 3 and 4. This means that for the first two age groups, getting older does not increase the probability of working, but it will after the age of 12.

The other variable that increases the probability of being a child labourer is living in a male-headed household. In general a male-headed household is related to richer households compared to those-headed by females, so it should decrease the probability of working for children or leave it unaltered. Also, as stated before, adult male decisions affect boys more and adult female decisions affect girls more, so this variable does not really present the results that were expected.

The variables that will decrease the chances of being in child labour are school attendance which will decrease the probability by 28.4% and having a father who was a child labourer which will decrease the probability by 3.2%. It is noteworthy to say that this variable was also significant for boys living in urban areas, so we can conclude that this variable is important in urban areas and not in rural ones. Also, it is different for males and females: for boys, having a father who worked as a child increases the probability of working but for girls it diminishes the probability.

Another interesting difference with the rest of the groups is that having experienced a natural disaster in the last 12 months does not increase the probability of working. The variable does have a positive sign but is not statistically significant at a 10% level. This is probably explained by the fact that urban areas are in general better prepared for natural disasters, especially for earthquakes in the case of Chile, so in the presence of these phenomena, families in general do not suffer as much damage as suffered by those in rural areas. Given that there are not that many losses, girls and female adolescents are not compelled to help their families and start working. However, why is the variable significant for boys in urban areas? Even though in general in urban areas the damages and loss is rather small, there are damages, and the main jobs that need to be done are related to reconstruction, removal of waste, search and restoration of basic services, etc. All of these jobs are in general carried out more by boy than girls, so this is a good explanation for the difference in the effects that a natural disaster has on girls who live in urban areas.

This last group seems not to be explained well by the model. We can conclude that the determinants for girls as child labourers in urban areas are not absorbed by the model, which is consistent with Amin et al.(2004), who stated that urban girls show the greatest divergence from expectations; they concluded that these girls are motivated by factors not covered in the model.

In the overall estimations, we found that being male increased the probability of being involved in child labour and that living in rural areas only increases the likelihood of working for males, not for females.

The main determinants of child labour for boys besides the 3 which are common to everyone depend on the area of residence. For urban areas the number of younger siblings, having a father who was a child labourer, years of education of the mother and change in income are crucial to the decision to work, whereas in rural areas none of these are significant, only the macro-zones of residence.

The main determinants of child labour for girls besides age and attendance are also different by areas. For girls in rural areas being a working child will depend on natural disasters, being a migrant and on changes in household income. For girls in urban areas the determinants of child labour are living in a male-headed household, the number of sisters and having a father who was a child labourer.

Between these macro-zones an interesting difference is that living in the north and the centre of the country compared to the baseline category, which is the metropolitan area, decreases the probability of working, but for males in rural areas living in any macro-zone will increase the probability. In rural areas the main work that children do is related to agriculture, so the difference in the estimates for the macro-zones might be because rural areas are highly focused on the agriculture sector in every part of the country except the metropolitan zone (GDP by sector and zone is available in annex 3).

The results support the notion that age affects the probability that a child will work; in every case, each year increases the probability of being a working child.

In general we saw that the 'Luxury Axiom', measured as the change in income, was true for males from urban areas and girls from rural areas.

Natural disasters were found to have an impact on child labour even when controlling household income. So developing the insurance system and access to credit could control child labour increases after natural disasters, but is even more relevant to take this into account and to take measures right after a disaster occurs.



Table 14. Determinants of child labour for females in urban areas.

	<b>Urban Females 15-17</b>	Marginal effects	<b>Urban Females 12-14</b>	Marginal effects	<b>Urban Females 9-11</b>	Marginal effects	<b>Urban Females 5-8</b>	Marginal effects
Age	0.09** (0.043)	0.008	0.05* (0.031)	0.005	0.03 (0.026)	0.003	0.05 (0.034)	0.004
Attends	-1.31*** (0.299)	-0.284	-1.35*** (0.301)	-0.296	-1.28*** (0.293)	-0.274	-1.27*** (0.299)	-0.271
Ln(income)	0.06 (0.118)	0.005	0.06 (0.118)	0.005	0.08 (0.119)	0.007	0.08 (0.119)	0.007
Migrant	-		-		-		-	
Disaster	0.21 (0.156)	0.018	0.21 (0.156)	0.018	0.21 (0.155)	0.018	0.20 (0.153)	0.018
Indigenous	0.21 (0.214)	0.020	0.20 (0.214)	0.020	0.20 (0.212)	0.020	0.20 (0.212)	0.020
Young_sibs	-0.08 (0.074)	-0.007	-0.08 (0.075)	-0.007	-0.07 (0.076)	-0.007	-0.07 (0.075)	-0.007
Father_cl	-0.36** (0.168)	-0.032	-0.36** (0.168)	-0.032	-0.36** (0.166)	-0.032	-0.35** (0.167)	-0.032
F_cl_poor	0.36 (0.291)	0.042	0.36 (0.292)	0.040	0.33 (0.287)	0.036	0.35 (0.281)	0.041
Mother_educ	-0.03 (0.022)	-0.003	-0.03 (0.022)	-0.003	-0.03 (0.022)	-0.003	-0.03 (0.022)	-0.003
Hh head male	0.34* (0.203)	0.026	0.35* (0.205)	0.026	0.36* (0.200)	0.028	0.35* (0.198)	0.027
Sisters	0.33*** (0.119)	0.029	0.33*** (0.118)	0.029	0.32*** (0.119)	0.028	0.32*** (0.119)	0.029
Brothers	0.06 (0.142)	0.005	0.05 (0.143)	0.005	0.06 (0.141)	0.005	0.06 (0.140)	0.006
Empl_adults	0.02 (0.088)	0.002	0.02 (0.089)	0.002	-0.00 (0.087)	0.000	-0.00 (0.087)	0.000
North	-0.02 (0.443)	-0.002	-0.01 (0.443)	-0.001	-0.00 (0.444)	0.000	-0.02 (0.445)	-0.002
Centre	-0.11 (0.381)	-0.010	-0.11 (0.382)	-0.010	-0.11 (0.383)	-0.010	-0.12 (0.384)	-0.011
South	-0.02 (0.416)	-0.002	-0.02 (0.415)	-0.001	-0.01 (0.416)	-0.001	-0.02 (0.419)	-0.001
Age15_17	-0.32 (0.242)	-0.026						
Age12_14			0.26* (0.158)	0.025				
Age9_11					-0.31 (0.236)	-0.024		
Age5_8							-0.02 (0.376)	-0.002
Constant	-2.32 (1.648)		-2.01 (1.633)		-1.84 (1.592)		-2.09 (1.633)	
Observations	814		814		814		814	
Adj. R- squared	0.127		0.130		0.126		0.122	
F Test	45.70		47.38		46.58		44.62	

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## CONCLUSION

All over the world authorities are aware of the importance of eliminating child labour; this is clear mainly in the Sustainable Development Goals (SDGs) and in the number of countries that have ratified both ILO conventions on child labour. Even though the goals in the SDGs are interrelated and actually all affect child labour (decreasing poverty, improving education, reducing inequalities, etc.), goal number 8 on decent work, includes in 8.7 the end of child labour and modern slavery. This is eloquent in itself: child labour is of major importance not only because of the effects on the health and development of children but also because of the need to comply with the other goals, such as increasing education or decreasing youth unemployment<sup>18</sup> for example.

After having understood the relevance of child labour, looking for its determinants becomes mandatory in order to know which measures should be taken to tackle it effectively.

As child labour in Chile represents a low percentage it has been overlooked, and so there are few studies on the topic for the country. Considering there are 220,000 children working, this subject should not be passed over, especially as the composition of that child labour is such that 9 out of 10 children and adolescents work in what is considered to be the worst forms of labour.

Using representative and recent household level micro-data, this study examined the impact of various household characteristics on child and adolescent labour, making a special reference to natural disasters.

With the help of a probit model I estimated the likelihood that a child will work using separate groups: boys and girls in urban and rural areas. The estimates turned out to be different for the four groups, so we can conclude that the reasons to start work are in fact different for each zone and gender, but with some common findings, such as age, school attendance and natural disasters. These three variables are statistically significant in almost every case and present the same trend (the exception is natural disasters on urban girls).

In the overall estimations we found that being male increased the probability of being involved in child labour and that living in rural areas only increases the likelihood of working for males, not for females.

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<sup>18</sup> According to the ILO (2015) child labour is one of the main determinants of youth unemployment and underemployment, which is another major concern nowadays and is also included in goal 8.

The main determinants of child labour for boys, besides the 3 which are common to everyone, depend on the area of residence. In urban areas, the number of younger siblings, having a father who was a child labourer, years of education of the mother and change in income are crucial to the decision to work, whereas in rural areas none of these are significant, only the macro-zones of residence.

The main determinants of child labour for girls besides age and attendance are also different by areas. For girls in rural areas, being a working child will depend on natural disasters, being a migrant and on changes in household income. For girls in urban areas the determinants of child labour are living in a male-headed household, the number of sisters and having a father who was a child labourer.

Between the macro-zones an interesting finding is that living in the north and the centre of the country compared to the baseline category, which is the metropolitan area, decreases the probability of working, but for males in rural areas living in any macro-zone will increase the probability. In rural areas the main work that children do is related to agriculture, so the difference in the estimates for the macro-zones might be due to the fact that rural areas are highly focused in the agriculture sector in every part of the country except the metropolitan zone (GDP by sector and zone is available in annex 3).

In child labour literature it is very common to find among the conclusions a comment on the results of the paper about the 'Luxury Axiom'. In this case, the luxury axiom is measured as the change in household income. It was found that the 'Luxury Axiom' is true only for males from urban areas and girls from rural areas.

Based on the results related to natural disasters we can see that it would be of great importance to apply measures that impede labour after a disasters happens. It is also necessary to increase studies on the estimates and effects of disasters to accurately examine the impact they have on child labour.

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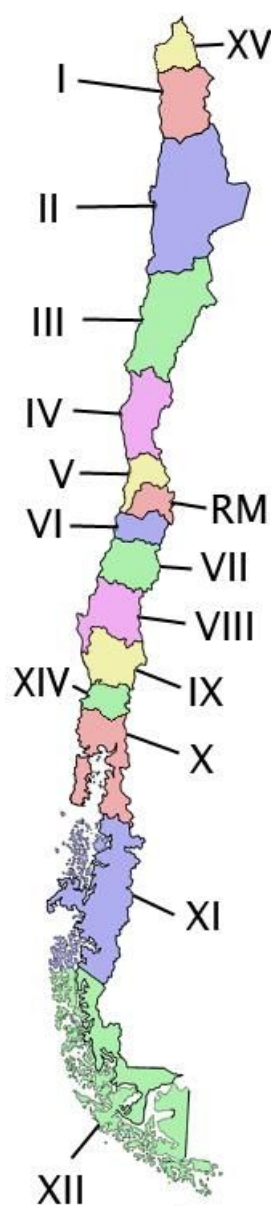
## APPENDICES

### **Annex 1: Definition of Variables used in the Probit**

<b>Variables</b>	<b>Labels</b>	<b>N</b>	<b>Mean</b>	<b>Sd.</b>
child_labourer	1 Child labour in productivity frontier; 0 if not	8,948	0.088	0.283
male	1 Male; 0 Female	8,948	0.497	0.500
rural	1 Lives in a rural area; 0 Urban	8,948	0.214	0.410
age	Age	8,948	12.690	3.102
age5_8	Age group 5-8 years old	8,948	0.104	0.305
age9_11	Age group 9-11 years old	8,948	0.209	0.406
age12_14	Age group 12-14 years old	8,948	0.359	0.480
age15_17	Age group 15-17 years old	8,948	0.328	0.470
indigenous	Belongs to native group in the country	8,948	0.165	0.371
Attends	1 if the child attends school; 0 if not	8,948	0.966	0.182
migrant	1 if the child is an immigrant; 0 if not	8,948	0.003	0.056
young_sibs	Number of younger siblings	8,948	0.875	0.961
sisters	Number of Sisters	8,948	0.251	0.497
brothers	Number of Brothers	8,948	0.245	0.482
minors	Number of people under 18 in the household	8,948	2.232	1.091
adults	Number of adults in the household	8,948	2.418	1.031
employed_adults	Number of employed adults in the household	8,948	1.514	0.865
hhtotal	Number of people living in the household	8,948	4.819	1.679
Income	Income from the main occupation of household (CLP)	8,948	532,781	730,663
lnhhincome	Natural logarithm of the income from the main occupation of the household	8,219	12.87	0.877
hhh_male	1 if the head of household is a male; 0 if not	8,948	0.638	0.481
father_educ	Years of education of the father	6,454	10.390	3.674
father_cl	1 if the father worked as a child; 0 if not	8,948	0.310	0.462
mother_educ	Years of education of the mother	8,948	10.390	3.504
mother_cl	1 if the mother worked as a child; 0 if not	8,948	0.330	0.470
drought	1 if in the last 12 months the commune was affected by a drought	8,947	0.215	0.411
flooding	1 if in the last 12 months the commune was affected by flooding	8,947	0.075	0.263
frost	1 if in the last 12 months the commune was affected by frost	8,947	0.194	0.396
fire	1 if in the last 12 months the commune was affected by a fire	8,947	0.155	0.362
earthquake	1 if in the last 12 months the commune was affected by an earthquake	8,947	0.074	0.262
eruption	1 if in the last 12 months the commune was affected by a volcano	8,947	0.028	0.165
disaster	1 if the commune was affected by one disaster or more; 0 if not	8,948	0.382	0.486
Metropolitan	Macro-zone: Metropolitan	8,948	0.125	0.331
North	Macro-zone: North	8,948	0.252	0.434
Centre	Macro-zone: Centre	8,948	0.335	0.472
South	Macro-zone: South	8,948	0.288	0.453

## Annex 2: Geographical division of Chile

	Region	Macro-zone
XV	Arica y Parinacota	NORTH
I	Tarapacá	NORTH
II	Antofagasta	NORTH
III	Atacama	NORTH
IV	Coquimbo	NORTH
V	Valparaíso	CENTRE
	RMS Metropolitana	METROPOLITAN
VI	O'Higgins	CENTRE
VII	Maule	CENTRE
VIII	Biobío	CENTRE
IX	La Araucanía	SOUTH
XIV	Los Ríos	SOUTH
X	Los Lagos	SOUTH
XI	Aysén	SOUTH
XII	Magallanes	SOUTH





### Annex 3: GDP by economic sector and zone (in CLP)

	Agricultur and forestry	Fishery	Mining	Manufacture	Electricity, gas, water	Construction	Wholesale, restaurants and hotelery	Transportation and comunication	Finance services	Housing services	Personal services	Public administration	<b>GDP</b>
NORTH	337,932	92,721	11,847,149	794,105	532,692	3,992,289	1,649,323	1,322,999	712,266	745,851	1,634,837	831,877	<b>24,494,041</b>
CENTER	2,129,547	99,603	2,908,869	5,445,826	1,653,323	2,526,415	2,208,956	2,711,559	2,203,556	1,695,477	3,948,528	1,826,804	<b>29,358,463</b>
METROPOLITAN	460,909	0	397,756	7,046,070	961,614	3,080,599	8,959,467	3,423,143	22,380,039	3,939,328	8,618,043	2,442,549	<b>61,709,518</b>
SOUTH	700,256	229,732	275,852	1,488,703	195,828	833,636	978,797	841,344	843,317	626,832	1,651,023	994,758	<b>9,660,076</b>