

## Effects of land related factors on child labour in agriculture: evidences from Peru

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### Abstract

This study analyzes the relationships occurring between household characteristics, children individual factors, community/rural context, and their effect on agricultural child labour in Peru. In particular, land related factors were explicitly taken into account. In Peru the majority of child workers are engaged in farming systems characterized by great heterogeneity. Data used in this research derives from the 2013 Peruvian National Household Survey. A child labour supply model shows that a strict relation exists between land related factors and child labour in agriculture, both in terms of its incidence and intensity. Moreover, this relation changes according to land size patterns likely related to different agricultural systems. Policy makers should take in count the complex relationship between land and child labour especially with respect to child labour eradication and other development program that could directly and indirectly increase child productivity in agriculture as well as labour demand and supply.

### Keywords

child labour, household survey, rural poverty

### Introduction

Nowadays, around 168 million children work in different activities and conditions worldwide (ILO, 2013). They account for about 11% of the world child population and most of them live in the southern part of the world. Children mainly work in agriculture (98 million), often as family members and thus unpaid, performing hazardous activities (ILO, 2013). Though the cause/effect relationships are still unclear, child labour has been identified as a long-term issue related to poverty that hinders education, human capital accumulation and economic growth. The first studies on child labour date back to the late '70 (Cain, 1977) but economic research on child labour increased only in recent years. Economists studying child labour looked mainly at its determinants and consequences, the impact of eradication strategies and the indirect effects of trade liberalization, among other policies. The determinants of

child labour, one of the most debated topics in the literature, are related to macro and micro aspects like economic growth (Hazan & Berdugo, 2002; Kambhampati & Rajan, 2006), poverty (Jensen & Nielsen, 1997; Basu & Van, 1998; Ravallion & Wodon, 2000; Ray, 2000), income (Rogers & Swinnerton, 2004; Beegle et al., 2006), credit markets (Ranjan, 2001; Dehejia & Gatti 2005), market wages (Jacoby, 1993; Wahba, 2006), household composition (Emerson & Souza, 2007), and remittances (Alcaraz, et al., 2012). Equally controversial are the possible effects of child labour on individuals and their society in terms of lack of education (Ersado, 2005), health (Kassouf et al., 2001), fertility (Ersado, 2005; Kassaouf et al, 2001; Levy, 1985) and economic growth. However, although scholars and policy makers have paid a lot of attention to this phenomenon and several international agencies and national governments invested huge efforts to address child labour, millions of children are still involved in many working (many illegal) activities especially in the agricultural systems (ILO, 2013; FAO, 2011; Fors, 2012<sup>1</sup>). Our hypothesis is that a deep investigation on the determinants, or root causes, of child labour in agriculture is still needed. Moreover, most of the national policies tackling this issue does not necessarily fit the local agricultural contexts. Indeed, in many developing countries, child labour likely become functional to the production systems characterized by low technology, low skills and low productive investments, such as the subsistence agricultural sector.

The present study attempts to overcome this lack of knowledge first analyzing the relationships occurring between household characteristics, children individual factors, community/rural context, and their effect on child labour. Secondly, we explicitly aim to analyze the relationships between child labour and the main agricultural production asset, extension of the farming land. As concerns this latter point, Rosenzweig and Evenson (1977) revealed a strong relation between land size and child productivity, suggesting that land redistribution programs, when not included in a broader rural development policy, would increase the economic contribution of children (increasing parents fertility rate) and lower school enrolment rates (Rosenzweig & Evenson, 1977). A study conducted in rural India showed that land ownership, considered as an income proxy, reduces child labour; while increasing the amount of land farmed, considered as an opportunity cost proxy of the child's time, increases its probability (Cigno & Rosati, 2006). These results are part of an open debate regarding broader aspects such as "wealth paradox" (Bhalotra & Heady, 2003) and "luxury axiom" (Basu, Das et al, 2010). For instance, Bhalotra and Heady (2003) question the general assertion that links poverty to child labour, and rather focus on the link between land, rich farmers, and incidence of child labour in agriculture. On the other hand, another study highlights a possible inverted-U relationship between land size and child labour due to factoring in detailed information on child labour hours as well as children, household and

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<sup>1</sup> As per the latest 2012 International Conference on Child Labour in Agriculture, child labour in agriculture raises a special concern for international agencies, governments and civil societies too, due to its higher incidence and hazardousness. This is reaffirmed by the International Partnership for Cooperation on Child Labour in Agriculture, which is one of the most recent interagency collaboration. This partnership gathers several agencies and research institutes specializing in rural development and food security issues such as, FAO, the International Federation of Agricultural Producers (IFAP) and the International Food Policy Research Institute (IFPRI). Economists were particularly interested in this topic, analyzing relationships between agriculture and child labor with special emphasis on land related factors like land size and land tenure system.

community characteristics. Basu, Das et al, (2010) showed that child labour increases when land plots are smaller than 4 hectares and it decreases once this size is surpassed. Their findings also confirm the “luxury axiom” theory (Basu & Van, 1998) asserting that a child would work only if the family’s income is very low and considering child leisure as a luxurious good.

Thus, in light of the open debate regarding casual effects of poverty on child labour (Luxury axiom Vs. Wealth paradox), the inverted-U relationship between land size and child labour in agriculture will be here explicitly tested in our empirical analysis (Bhalotra & Heady, 2003; Basu, Das et al, 2010). In particular, our study analyzes agricultural child labour in Peru.

The motivation for choosing the agricultural sector in Peru is that in this country the majority of child workers engage in farming and grazing activities within their family settlements. Furthermore, the heterogeneity of the Peruvian family farming system provide an ideal natural setting to highlight how dynamics of child labour may change according to the economic and social context in which children are involved. Finally, there are no specific studies on this topic in the selected country although focus has been placed on related issues<sup>2</sup>.

## Data and Methods

Data used in this research derives from the Peruvian National Household Survey (ENAHO 2013). The ENAHO 2013 is a national representative survey including urban and rural areas of all the 24 Peruvian departments<sup>3</sup>. The population under study is defined as the set of all individual households and its members, residing in rural areas of the country. The main themes investigated are dwelling and household characteristics; household members characteristics; education; health; employment and income; income from agricultural producers; pension system, ethnicity; household expenses; food aid programs; other social programs; citizen participation and opinion. The sample of this study is composed by 12,280 households living in rural areas while the specific statistics unit under investigation includes 31,316 children between 5 and 17 years old. Descriptive statistics indicate that in Peru child labour condition, excluding 1.326 engaging in domestic chores, amounts for 32% of the children interviewed between 5 and 17 years old (10.059 over the 31.316). Among those, 7.381 (about 73%) are engaged in farming and grazing activities to support their small family farm units, mainly settled in rural areas in the highlands and forest regions. Interestingly, around the 50% of child workers belong to households above the poverty line (Table 1; Table 2).

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<sup>2</sup> Patrinos and Psacharopoulos in 1997 investigated the effects of being indigenous and having siblings with different characteristics on child labour. Later on, the relationship between poverty, adult education and child labour was analyzed (Ray, 2000). Lastly, attention has been given to the impact of access to communication technologies on agricultural profitability and child labor in remote rural areas (Beuermann, 2011).

<sup>3</sup> Constitutional Province of Callao is also included.

*Table 1. Child labour distribution among Peruvian natural regions*

Regions	Child workers %	C.L. in Agriculture %
Coast	15	46
Highlands	49	84
Amazon	33	66
Lima	6	5
<b>Total</b>	<b>32</b>	<b>73</b>

*Table 2. Child labour distribution among urban/rural areas and their living standards*

Households living	Child workers %	C.L. in Agriculture %
Urban	30	14
Rural	70	86
Poor	50	60
Non Poor	50	40

As concerns the empirical strategy, following Dumas (2012), a child labour supply model was implemented to investigate at micro level the existing relationship between the intensity of child labour (measured in terms of weekly working hours of each child) and a set of confounding factors and exogenous variables that could influence the outcomes of interest. Since the dependent variable is the outcome of a labour market decision, self selection bias arises. In this case, censoring has been recognized not only as a statistical problem but also as an economic issue (Gronau, 1974; Heckman, 1979; Caracciolo et al., 2014). The child's decision to enter in the job market cannot be considered as randomly taken and moreover it is not independent from the working time spent (our outcome of interest). Children (or their parents for them) indeed decide whether to work (no randomness): Researcher may observe children working and thus the working hours only for children whose, for example, market wage exceeds their alternative opportunity costs implying interdependency with the outcome of interest. The resulting and observed sample is thus biased: it inaccurately represents the overall time allocation decision and kids between schooling, work and leisure. More specifically, the outcome of the child's labour market participation (CWH<sub>i</sub>), the amount of weekly hours working in agriculture, is observed only whether the *i*-th child has chosen to work in agriculture  $P_i > 0$ : Formally, we can write the selection equation and the resultant outcome equation for CWH<sub>i</sub> as follows :

$$\begin{aligned}
 & \text{selection equation: } x'_{1i}\beta_1 + u_{1i} > 0 && i = 1, 2, \dots, n_1+n_2. \\
 (1) \quad & \text{outcome equation: } CWH_i = x'_{2i}\beta_2 + u_{2i} && i = 1, 2, \dots, n_2.
 \end{aligned}$$

where  $\begin{bmatrix} u_1 \\ u_2 \end{bmatrix} \sim N(0, \Sigma)$ ,  $\Sigma = \begin{bmatrix} 1 & \cdot \\ \rho & \sigma_2 \end{bmatrix}$  and  $x_1$  is a  $1 \times k_1$  vector of covariates (including intercept) that explains children participation to labour market while  $\beta_2$  is the parameters vector. Assuming that the amount of weekly hours working in agriculture (CWH) is influenced by a set of  $k_2$  explanatory variables  $x_2$ , we wish to estimate  $\beta_2$  parameters, under sample selection, with a potential source of inconsistency as:

$$(2) \quad E(CWH_i | x_2, P_i > 0) = x'_{2i} \beta_2 + E(u_{2i} | P_i > 0) \quad i = 1, 2, \dots, n_2.$$

Following Heckman (1979) a consistent estimation of  $\beta_2$  and  $\rho$  and  $\sigma_2$  can be obtained by ml estimation of the following log likelihood function for the  $i$ -th child ( $i$ ):

$$(3) \quad l_i = \begin{cases} \ln \Phi \left\{ \frac{x'_{1i} \beta_1 + (CWH_i - x'_{2i} \beta_2) \rho / \sigma}{\sqrt{1 - \rho^2}} \right\} - \frac{1}{2} \left( \frac{(CWH_i - x'_{2i} \beta_2)}{\sigma} \right)^2 - \ln(\sqrt{2\pi}\sigma) & \text{if } P_i^* > 0 \\ \ln \Phi(-x'_{1i} \beta_1) & \text{if } P_i^* \leq 0 \end{cases} \quad i = 1, 2, \dots, n_1 + n_2.$$

where  $\Phi$  is the standard cumulative normal. In order to obtain a better identification of the Heckman model, we impose the exclusion restrictions too<sup>4</sup>.

$x_1$  and  $x_2$  vectors of variables include personal characteristics of both children and household head, community characteristics as well as the agriculture production system (whose children belong to) and the land related factors influencing probability of work and intensity (weekly working hours) of those children working in the agriculture sector.

## Results

Overall, results, in line with the previous studies above mentioned (Cockburn, 2000), reveal that small landholders productive assets composition influence internal labour force allocation with special emphasis on child labour supply (Table 3). Concerning child characteristics, increasing age influence positively child probability to work in the agriculture sector and their working hours. Being female reduces the probability and the intensity (working hours) of engaging in agricultural activities. In case of children are registered to any education institution, the probability and the intensity of working in the agriculture is reduced. Variables characterizing the household, except for foreign remittances in case of the intensity regression, are all significant. As a matter of fact, remittances reduce the child probability of engaging in the agriculture sector as also evidenced by Alcaraz, et al., (2012). The number of household members and poverty status influence positively both child work probability and intensity. Female household head that reduce, both, the children probability to work and its intensity in the agriculture sector could imply that women, in such context, are not usually entitled to land and children likely engage in off-farm activities or to do not work at all.

Higher education level of the household head reduce the probability of their children engaging in work activities and hours spent in the agriculture sector as enough confirmed by literature and common knowledge. Household head "unoccupied" working status, influencing negatively the working probability of their sons, it is eventually related to the lack of land and working opportunity in the agriculture sector faced by the elder household member. In

<sup>4</sup> At least one regressor being significant in the selection part, but not in explaining the outcome should be excluded.

line with the above described luxury axiom (Basu & Van, 1998 ), higher household income reduce child work probability and their working hours spent in the agriculture sector.

Table 3. Child labour in agriculture determinants

Variable Name	Selection equation		Outcome equation	
	Coef.	p-value	Coef.	p-value
<i>Child characteristics</i>				
Gender	-0.232	<0.001	-3.191	<0.001
Age	0.085	<0.001	1.355	<0.001
School	0.424	<0.001	7.196	<0.001
<i>Household characteristics</i>				
hhdsex	-0.183	0.015	-3.910	<0.001
HHH_Edu	-0.040	<0.001	-0.650	<0.001
HHH_DESOCUP	-0.183	0.057		
hhsizex	0.012	0.065	0.207	0.015
F_Remitt	0.001	0.025	-0.001	0.162
HH_INCOME	0.001	<0.001	0.001	<0.001
Poor	0.072	0.005	1.011	0.004
<i>Community characteristics</i>				
altitud	0.001	<0.001	0.002	<0.001
Agri_SHARE	0.001	0.001	0.012	0.032
UBIGEO_INCOME	0.001	<0.001	0.001	<0.001
Costa	0.087	0.051	0.897	0.149
Sierra			0.372	0.161
<i>Agricultural production system</i>				
HH_Livestock Quantity	0.002	<0.001	0.021	<0.001
HH_Crops	0.027	<0.001	0.302	<0.001
PLATANO	-0.124	0.031	-1.654	0.038
CEBADA	-0.312	0.013	-3.552	0.04
MAIZ	0.144	<0.001	1.888	<0.001
TRIGO	0.201	0.012	2.392	0.025
PAPA	0.154	<0.001	1.860	<0.001
YUCA			0.848	0.004
FRIJOL			-1.084	0.126
HH_AgriProd			0.001	0.876
HHShare_Autoconsumo			-0.006	0.025
<i>Land related factors</i>				
HH_Plots	0.017	<0.001	0.299	<0.001
SHARE_HHLSWO			0.001	0.777
HH_LSW	0.064	<0.001	0.877	<0.001
HH_LSW2	-0.004	<0.001	-0.053	<0.001
HH_LSW3	0.001	<0.001	0.001	<0.001
$\rho$	0.997	<0.001		
$\lambda$	13.842	<0.001		

Obs. 31316; // 29,197; LR test of indep. eqns. ( $\rho = 0$ ):  $\chi^2(1) = 2439.18$  Prob >  $\chi^2 < 0.001$

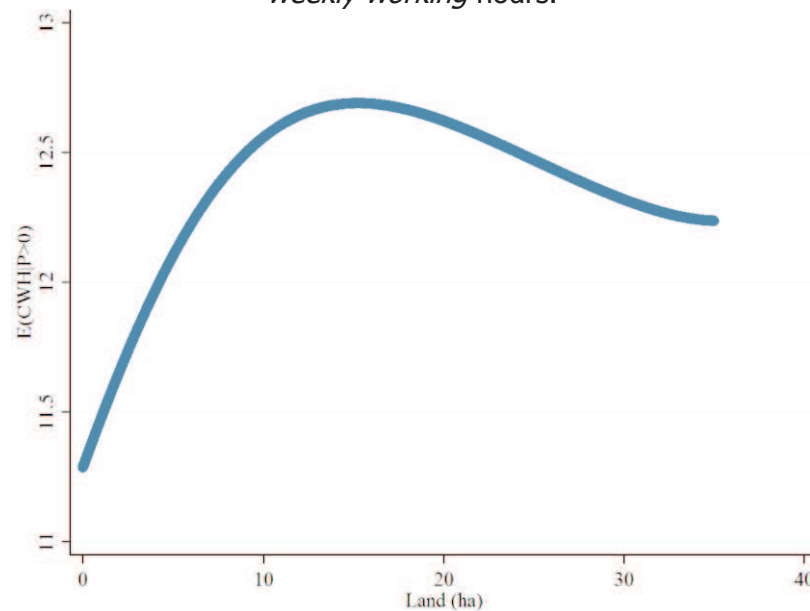
Going through the community characteristics, higher altitude increase both child work probability and intensity confirming that Peruvian highlands result the natural region with highest presence of child labour in agriculture. Increased altitude is even related with lower

land quality implying that child labour in agriculture is related to less productive agriculture production system typical of highland region. Remoteness of higher areas may also affect access to education but unavailability of data related to the distance from each household to the school hamper the analysis of this specified aspect.

The variable appointed UBIGEO\_INCOME, used as wealth proxy of a specific area, influence negatively the probability of children working in the agriculture sector as well as their working hours.

The positive coefficient sign of the Agri\_SHARE variable give evidence that higher percentage of income perceived by population engaging in agriculture, forestry and fishing, in a specific area, influence positively the child work probability and intensity, demonstrating that areas devoted to the agriculture sector increase child productivity and demand for child labour in the sector. More emphasis should be given to several variables describing the agriculture production system that result extremely functional to this study. As evidenced by Levy (1985) and Dumas (2012), cropping system is related with child labour evidencing that specific cultivation are more prone to child work engagement. In the case of Peru, selection and outcome equation highlight that potato, wheat and corn are positively related to the probability of child work in agriculture and to the time dedicated to it. Conversely plantain is, in both equations, negatively related to child work in agriculture. Other key variables related to the description of the agriculture production system as well as the household assets composition, concern the quantity of livestock unities detained and the number of crops farmed by household. Both variables result positively related to the probability of children engaging in agriculture activities as well as to their working hours. These results, in line with Cockburn (2000), confirm the positive relationship between child productivity and productive household assets. Increasing percentage of agriculture production devoted to the internal household self-consumption is positively related to the children working hours; this result clearly define that subsistence family farming system involve child labour in agriculture as evidenced by Alarcon (2011) sociological study focused on Peruvian highland region. Lastly, land related factors represent the key explanatory variables of the present study estimating the existence, in the Peruvian country, of the inverted U relationship between land size and child labour in agriculture (Basu, Das et al, 2010). Starting from the number of agriculture units (HH\_Plots), results evidence its positive relation with probability and working hours of children engaging farming activities. It is worth recalling that high number of land plots likely imply a specific agriculture production system typical of highland region where small farmers often scatter their plots at different altitude levels as coping mechanism against production losses. Different household land size (farmed) relationships with child labour in agriculture confirm our expectations in line with the above mentioned studies (Basu, Das et al, 2010 and Dumas, 2012). This explanatory variable has been utilized in its normal, quadratic and cubic dimension in order to model it according to different land size regimes: Figure 1 illustrates the estimated relationship with the child working hours in the agriculture sector. Two threshold levels can be highlighted: the first occurs between 10 and 20 hectares of household land size farmed; the second take place at more than 30 hectares. The identified two threshold effects could imply changes in the agriculture production systems according to different land regimes.

Figure 1. Estimated relationship between cultivated land size of the household and child' weekly working hours.



## Conclusions

Despite worldwide data reveals that child labour incidence decreased by 78 million units between 2000 and 2012, there are no signs of progressive eradication (ILO, 2013). This seems to indicate that not much has been done to tackle the determinants of this complex phenomenon, especially in the agricultural being the sector where children are mainly involved.

In this paper we specifically focused on Peru to analyze the relationships occurring between children, household and community/rural characteristics and child labour supply. In particular, this paper focuses on the main agricultural production asset, the farming land, typical of family farming system mainly present in the Andean areas of the country. This area is representative of the Latin America Andean region that embraces several countries, giving a wide external validity to our study results. Indeed, the Study on Child Labor in Latin America and Caribbean 2008-2011 reveals that 48% of the 12.5 million children working in the region engage in the agriculture sector. Furthermore, 62% of those working in agriculture live in the Andean countries like Bolivia, Ecuador and Colombia bordering Peru.

Our results showed that a strict relation exists between land related factors and child labour (incidence and intensity) and furthermore this relation changes according to land size patterns likely related to different agricultural systems. Our results are in line with those provided by Dumas (2012) and Basu, et al,( 2010) that highlight the existence of complex relationships between land related factors and the child labour supply.

Peruvian child labour strategy, aiming at eradicating the phenomenon by 2021 , has been elaborated according to 6 key objectives referring to Poverty reduction, increasing access to education and conclusion of compulsory period, reducing social tolerance to child labour, improving labour condition of those permitted activities among younger, child protection and



data gathering on child labour. Within the poverty reduction objective, the strategy aims to improve agriculture productivity in rural areas through strengthening financial assets, physical and managerial knowledge of rural households with children working or at risk of working. These actions should take in consideration the coexistence of several agriculture production systems present in the country that, as evidenced by the results, has heterogeneous effects on child labour according to the land patterns and the production system in which children are involved. Hence, family farming system is the one majorly involving children who are likely affected by the increase of productive assets and land size. Furthermore, increasing agriculture productivity through the strengthen of productive assets may increase child supply in the family farming system as evidenced in the literature review and recently suggested by FAO (2015).

Concluding, results of our paper seems to suggesting that policy makers should take in count the above mentioned relationships especially with respect to child labour eradication and other development program that could directly and indirectly increase child productivity as well as their labour demand and supply. Furthermore, our results could help governments and stakeholders to evaluate the impact of broader public policies, like rural development programs and land reforms, that may affect directly land distribution, the main working settings of child labourers, and therefore indirectly the incidence and the intensity of child labour.

## References

- Alarcón Glasinovich, W (2012). Trabajo infantil en los Andes. Fundación Proyecto Solidario por la Infancia, Telefónica, 136.
- Alcaraz, C., D. Chiquiar, et al. (2012). Remittances, schooling, and child labor in Mexico. *Journal of Development Economics* 97(1), 156-165.
- Basu, K. and P. H. Van (1998). The economics of child labor. *American Economic Review*, Vol. 88, No. 3, 412-427.
- Basu, K., S. Das, Dutta, B. (2010). Child labor and household wealth: Theory and empirical evidence of an inverted-U. *Journal of Development Economics* 91(1), 8-14
- Beegle, K., R. H. Dehejia, Gatti, R. (2006). Child labor and agricultural shocks. *Journal of Development Economics* 81(1), 80-96.
- Beuermann, D. W. (2011). Telecommunications Technologies, Agricultural Profitability, and Child Labor in Rural Peru. Central Bank of Peru, Working Paper Series 2.
- Bhalotra, S. and C. Heady (2003). Child farm labor: The wealth paradox. *The World Bank Economic Review* 17(2), 197-227.
- Cain, M. T. (1977). The economic activities of children in a village in Bangladesh. *Population and development Review*, 201-227.
- Caracciolo, F, Depalo, D. and J.Brambila Macias (2014). Food Price Changes and Poverty in Zambia: An Empirical Assessment using Household Microdata. *Journal of International development*, Volume 26, Issue 4, 492–507.
- Cigno, A. and F. C. Rosati (2006). The economics of child labour. *ILR Review* 60(2), 86.

- Dehejia, R. H. and R. Gatti (2005). Child labor: the role of financial development and income variability across countries. *Economic Development and Cultural Change* 53(4), 913-932.
- Dumas, C. (2007). Why do parents make their children work? A test of the poverty hypothesis in rural areas of Burkina Faso. *Oxford Economic Papers* 59, 301–329.
- Dumas, C. (2012). Market Imperfections and Child Labor. *World Development* Vol. 42, 127–142.
- Emerson, P. M. and A. P. Souza (2007). Child labor, school attendance, and intrahousehold gender bias in Brazil. *The World Bank Economic Review* 21(2), 301-316.
- Ersado, L. (2005). Child labor and schooling decisions in urban and rural areas: comparative evidence from Nepal, Peru, and Zimbabwe. *World Development* 33(3), 455-480.
- FAO (2011). FAO's Work on Eliminating Child Labour in Agriculture 2007 – 2010
- FAO (2015). Handbook for monitoring and evaluation of child labour in agriculture. Measuring the impacts of agricultural and food security programmes on child labour in family-based agriculture.
- Fors, H. C. (2012). Child labour: A review of recent theory and evidence with policy implications. *Journal of Economic Surveys* 26(4), 570-593.
- Grabowski, S. (2008). Agricultural technology and child labor: evidence from India. *Agricultural Economics* 40 (2009), 67–78.
- Gronau, R. 1974. Wage Comparisons - A Selectivity Bias, *The Journal of Political Economy* 82: 1119–43.
- Hazan, M. and B. Berdugo (2002). Child Labour, Fertility, and Economic Growth. *The economic journal* 112(482), 810-828.
- Heckman J. (1979). Sample selection bias as a specification error. *Econometrica* 47, 153–161.
- ILO (2013). Marking progress against child labour. Global estimates and trends 2000-2012. International Labour Office, International Programme on the Elimination of Child Labour (IPEC) Geneva.
- ILO (2013). Study on Child Labor in Latin America and Caribbean 2008-2011. International Labour Office, International Programme on the Elimination of Child Labour (IPEC) Geneva.
- Jacoby, H. G. (1993). Shadow wages and peasant family labour supply: an econometric application to the Peruvian Sierra. *The Review of Economic Studies* 60(4), 903-921.
- Jensen, P. and H. S. Nielsen (1997). Child labour or school attendance? Evidence from Zambia. *Journal of population economics* 10(4), 407-424.
- Kambhampati, U. S. and R. Rajan (2006). Economic growth: A panacea for child labor? *World Development* 34(3), 426-445.
- Kassouf, A. L., M. McKee, Mossialos, E. (2001). Early entrance to the job market and its effect on adult health: evidence from Brazil. *Health Policy and Planning* 16(1), 21-28.
- Levy, V. (1985). Cropping pattern, mechanization, child labor, and fertility behavior in a farming economy: Rural Egypt. *Economic Development and Cultural Change*, Vol.33, No.4, 777-791
- Patrinos, H. A. and G. Psacharopoulos (1997). Family size, schooling and child labor in Peru—An empirical analysis. *Journal of population economics* 10(4), 387-405
- Ranjan, P. (2001). Credit constraints and the phenomenon of child labor. *Journal of Development Economics* 64(1), 81-102.



- Ravallion, M. and Q. Wodon (2000). Does child labour displace schooling? Evidence on behavioural responses to an enrollment subsidy. *The economic journal* 110(462), 158-175.
- Ray, R. (2000). Child labor, child schooling, and their interaction with adult labor: Empirical evidence for Peru and Pakistan. *The World Bank Economic Review* 14(2), 347-367.
- Rogers, C. A. and K. A. Swinnerton (2004). Does child labor decrease when parental incomes rise? *Journal of Political Economy* 112(4), 939-946.
- Rosenzweig, M. R. and R. Evenson (1977). Fertility, schooling, and the economic contribution of children of rural India: An econometric analysis. *Econometrica*, 1065-1079.
- Wahba, J. (2006). The influence of market wages and parental history on child labour and schooling in Egypt. *Journal of population economics* 19(4), 823-852.